

**Cornell University  
FY02 Annual Report for  
Agricultural Research and  
Extension Formula Funds**

Cornell University Agricultural Experiment Station  
NYS Agricultural Experiment Station  
Cornell Cooperative Extension  
College of Agriculture and Life Sciences  
College of Human Ecology  
College of Veterinary Medicine

March 1, 2003

**FY2002 Annual Report  
Cornell University**

**Table of Contents**

<b>BACKGROUND AND METHODS.....</b>	<b>4</b>
<b>GOAL 1 – AN AGRICULTURAL PRODUCTION SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY .....</b>	<b>6</b>
<b>PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 1.....</b>	<b>7</b>
<b>Indicator Data Specific to Goal 1.....</b>	<b>8</b>
<b>Impact Examples Related to Goal 1 .....</b>	<b>10</b>
<b>GOAL 2 – A SAFE AND SECURE FOOD AND FIBER SYSTEM .....</b>	<b>16</b>
<b>PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 2.....</b>	<b>17</b>
<b>Indicator Data Specific to Goal 2.....</b>	<b>18</b>
<b>Impact Examples Related to Goal 2 .....</b>	<b>20</b>
<b>GOAL 3 -- A HEALTHY, WELL-NOURISHED POPULATION .....</b>	<b>27</b>
<b>PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 3.....</b>	<b>28</b>
<b>Indicator Data Specific to Goal 3.....</b>	<b>28</b>
<b>Impact Examples Related to Goal 3 .....</b>	<b>30</b>
<b>GOAL 4 – GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT .....</b>	<b>36</b>
<b>PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 4.....</b>	<b>37</b>
<b>Indicator Data Specific to Goal 4.....</b>	<b>37</b>
<b>Impact Examples Related to Goal 4 .....</b>	<b>39</b>
<b>GOAL 5 – ENHANCED ECONOMIC OPPORTUNITIES AND QUALITY OF LIFE FOR AMERICANS.....</b>	<b>46</b>

<b>Indicator Data Specific to Goal 5.....</b>	<b>48</b>
<b>Impact Examples Related to Goal 5.....</b>	<b>51</b>
<b>STAKEHOLDER INPUT PROCESS .....</b>	<b>58</b>
<b>PROGRAM REVIEW PROCESSES .....</b>	<b>59</b>
<b>EXTENSION MERIT REVIEW.....</b>	<b>61</b>
<b>MULTISTATE AND JOINT ACTIVITIES .....</b>	<b>61</b>
<b>MULTISTATE EXTENSION ACTIVITIES.....</b>	<b>62</b>
<b>INTEGRATED RESEARCH AND EXTENSION ACTIVITIES .....</b>	<b>62</b>
<b>MULTI-COUNTY INITIATIVES.....</b>	<b>62</b>
<b>APPENDIX A – FY03-04 APPLIED RESEARCH AND EXTENSION PRIORITIES IDENTIFIED BY PROGRAM COUNCILS .....</b>	<b>63</b>
<b>APPENDIX B – MULTISTATE EXTENSION ACTIVITIES REPORT .....</b>	<b>66</b>
<b>APPENDIX C – INTEGRATED ACTIVITIES REPORT .....</b>	<b>73</b>

## **Background and Methods**

**Planning Option:** Statewide activities -- integrated research and extension plan.

**Period Covered:** October 1, 2001 through September 30, 2002

### **Program Definition and Scope**

This report directly reflects our approved plan of work. As indicated in our approved plan, all program descriptions were framed as ongoing major programs. We have not, therefore, separated results into timeframe categories (short-term, near-term, long-term). Data and narrative documentation were collected for the indicators included in our approved plan of work and supplement.

### **Methodology and General Comments**

A variety of data sources and documentation procedures were used to generate this report. For extension, the primary sources were system-wide annual accountability reports and fiscal and personnel accounting records. The annual reports include participation data, reports against our approved performance indicators, and program impact statements. For research, The CRIS reporting system, annual faculty activity reports, and fiscal and personnel accounting records were the primary sources.

Our approach reflects the approved plan directly. For example, as outlined in the plan supplement we used joint extension/research appointments as direct evidence of integrated activity and rely on personnel accounting to do so. In the case of multi-state extension activity, we relied on project proposal ear-marking and direct reports by faculty on a project-by-project basis. With final approval of our plan and supplement, we have worked to include appropriate indicators in our project documentation and reporting structures to facilitate reporting. For example, persons submitting preproposals for both Hatch and S-L funding now are expected to address the integrated activity and multistate extension components of the proposed work. Stable reporting requirements are essential to permit an accurate accounting of our work.

For each of the five goals, we provide indicator, expenditure and effort data to reflect the scope and reach of programming in that area. Note that data for indicators 1.1, 2.1, 3.1, 4.1, and 5.1 are incomplete due to unanticipated problems with new reporting procedures. Rather than submit partial data, we will submit a plan supplement that includes complete data for these indicators by approximately March 31, 2003. Also included are selected impact statements to convey the nature of programming within each goal area. In response to the review of our FY01 annual report, key themes as identified in the Annual Report Guidance are included for each impact statement. For each of the indicators, we report results for 2002 followed by the plan of work target result. In reviewing our aggregated FY02 data, we noted that most of the reported research indicators approximate the targets projected in the plan of work. All but one (5.4.2) of the extension outcome indicators were met. The one outcome target that was not met reflects loss of campus resources in

parenting education. Several extension output indicators (primarily audience involvement) were not met. This typically reflects shifts in teaching strategy away from more mass approaches toward more intensive instruction of fewer individuals.

We did not attempt to communicate in detail the work within or across goals. Rather, we selected examples to provide a broad view of our efforts related to each goal. This approach is best illustrated by our use of impact statement data. Impact statements are solicited annually from research and extension faculty and off-campus educators. The scope of reported results is very broad. We have selected a small number of impact statements from both research and extension to illustrate primary themes within each goal. It should be noted that the impact statements included reflect both federal formula funds and associated matching and/or supplemental funding. In most cases, Smith-Lever and Hatch funding is significantly enhanced by other sources in carrying out any given project.

Another review request was to specifically demonstrate efforts to respond to stakeholder priorities and actively reach out to underserved populations. The Stakeholder Involvement section outlines how our revised program development process is enhancing our long tradition of effective stakeholder involvement. Also described there are new resources in support of the Cornell Cooperative Extension (CCE) plan of work process directed to generating inclusive program development processes. Note that at least eight of the impact examples included in this report include specific efforts to reach underserved populations (Community Nutrition Education, Food Safety in the Home, Nutrition and Healthy Living Skills Program for Developmentally Delayed Adults, Teen Parent Nutrition, Core Pesticide Training for Amish Farmers, "In-Touch" Science for Special Audiences, Franklin County Even Start Family Literacy Program, Teen Job Coaches).

## **GOAL 1 – AN AGRICULTURAL PRODUCTION SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY**

Agricultural production systems in the United States are part of the overall growing global economy of food and fiber products. On a more localized level our production systems are the basis for maintaining the rural economy and providing a safe and nutritious food supply to our diverse population. Our agricultural systems in the northeast are broad and encompass small and large scale plant and animal farming; regional and specialty market production and processing; and, local, national and international marketing. This diversity has enabled our agricultural systems to remain competitive in the global economy. The foundation for this has been our ability to develop and integrate new technology into our agricultural production systems through the combined efforts of fundamental and applied research programs linked with effective extension efforts. However, as the global market changes, we must understand where our opportunities lie.

Although our efforts are extremely diverse, they can be subdivided into the areas of production, protection, processing and marketing.

### **Production**

Improving the yield and quality of plants and animals in agricultural production systems is fundamental to improving our ability to compete in a global economy. These improvements can be accomplished through:

- 1) traditional and modern breeding programs which select for desired traits (such as yield, flavor and pest resistance) and an understanding of how they can be expressed under different environmental regimes;
- 2) improving our understanding of the nutritional requirements for plants and animals so that inputs and waste products are minimized;
- 3) improving our understanding of soils in order to maintain or improve the health of the soil;
- 4) improving our understanding of the impact of environmental conditions on plant and animal production.

### **Protection**

Plants and animals are stressed by various organisms including insects, pathogens and weeds. Traditional control of these pests through the application of synthetic pesticides has allowed farmers to manage some of these pests, but concerns about their effects on the environment and the development of resistance must be taken into account. Improvements in protection of our production systems can be accomplished through:

- 1) genetic engineering of plants to express pesticidal traits and the development of management systems which ensure the durability of the deployment of these plants;
- 2) utilization and/or improvement of insects and microbes which may act as pesticides against insects, pathogens and weeds;
- 3) improvements in the production systems for mass producing natural enemies;
- 4) an improved understanding of the non-target effects of pesticides.

## **Processing**

The value of agricultural raw products is multiplied through processing them into foods and fiber which become distributed through wholesale and retail markets traded worldwide. The value of grapes at harvest, for example, is minimal compared with the value of the wines they produce. Improvement of our agricultural production systems on a global market can be achieved through processing which:

- 1) recovers components from what would be engineering waste and converts them into marketable items (particular enzymes, flavors, bulk materials, etc.);
- 2) enhances the food product by preserving or increasing the level of nutrients or flavors;
- 3) maximizes the freshness of the product through minimal processing;
- 4) minimizes the process of converting the raw product into foods.

## **Marketing**

The competitiveness of our agricultural products is influenced by domestic and international factors and an understanding of the production, distribution and marketing costs will influence what agricultural production systems are most competitive for our region. Improvement of our agricultural production systems on a global market can be achieved through: 1) an understanding of the costs for our production systems compared with other domestic and regional production areas; 2) an understanding of the specific desires of the consumers in various regions of the world economy; 3) an understanding of the political, regulatory and social structures which influence the production and distribution of agricultural products which are produced in other regions.

The agricultural production systems of the northeast are diverse. Over the decades some of our systems have lost their relative strengths compared to other regions while other systems have grown in their relative strengths. The majority of the population of the US is centered in the northeast region and the opportunities for agricultural systems should be high. However, presently we import ca. 80% of our food. In many cases this is the result of more favorable agricultural conditions (lower labor costs, longer season, etc.) outside our region. Future research investments should be directed toward those projects which provide us with the best opportunities to compete both nationally and internationally. Dairy systems, floriculture and ornamental and fresh foods are examples of areas in which northeastern agriculture can effectively compete. The growth of community food systems, such as local and roadside markets, should be encouraged as well. For any of these areas, there will continue to be a need to increase research investments in fundamental and applied sciences to improve the production, protection, processing and marketing of our agricultural products so they can be competitive on the regional, national and international markets.

## **PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 1**

Empower individuals and enterprises in agriculture and food systems to thrive in order to:

- maintain strong, rural communities;
- advance a clean healthy environment;
- promote attractive landscapes;
- assure a safe, nutritious, and abundant local food supply; and
- support a thriving New York State economy.

**Indicator Data Specific to Goal 1**

(For each indicator, both actual and annual target results are included, the latter in parentheses.)

**INDICATOR 1.1** The total number of refereed or peer reviewed articles or materials reporting research on topics related to agricultural production and competitiveness.

<b>Year</b>	<b># refereed items</b>	<b># patents, licenses, varieties</b>
<b>2002</b>	712 (675)	35 (40)

**OBJECTIVE 1.1** To produce new and value-added agricultural products and commodities.

**INDICATOR 1.1.2** The total number of persons completing non-formal education programs on production of new and value-added commodities and products and the number of these persons who actually adopt one or more recommended practices or technologies within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # completing programs</b>	<b>Outcome: # adopting practice/ technology</b>
<b>2002</b>	9643 (5000)	3460 (2300)

**OBJECTIVE 1.2** To annually increase agricultural producer awareness, understanding, and information regarding the production of new and value-added commodities and products in U.S. agriculture.

**INDICATOR 1.2.1** The total number of persons completing non-formal education programs to improve the productivity and global competitiveness of the U.S. agricultural production system and the number of these persons actually adopt one or more new production techniques or strategies within six months of completing one or more of these programs.

<b>Year</b>	<b>Output: # completing programs</b>	<b>Outcome: # adopting practice or technology</b>
<b>2002</b>	12571 (10000)	4649 (4000)



**OBJECTIVE 1.3** To improve decision-making on public policies related to the productivity and global competitiveness of the U.S. agricultural production system.

**INDICATOR 1.3.1** The total number of persons annually completing non-formal education programs on topics related to public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system and the number of those persons make use of such knowledge within six months of completing one or more of these programs.

<b>Year</b>	<b>Output: # completing programs</b>	<b>Outcome: # utilizing information</b>
<b>2002</b>	5142 (5500)	3021 (2400)

**Resources Allocated to Goal 1 (FFF & Match)**

**Dollars x 1000 and (FTE) or (SY)**

	<b>FY2002 Target</b>	<b>FY2002 Actual</b>
<b>Extension</b>	3,378	3,910
<b>Total</b>	(60.9)	(64.0)
<b>Research</b>	5,200	5,482
<b>Total</b>	(34.1)	(98.7)

## Impact Examples Related to Goal 1

### **Developing Sustainable and Environmentally Sound Methods of Managing the Devastating Fire Blight Disease of Apple Trees**

Key Themes: Agricultural Profitability, Plant Health, Human Health, Sustainable Agriculture

The fire blight disease is caused by a plant eating bacterium called *Erwinia amylovora*. The disease infects the flowers, shoots, branches, and roots of apple trees. It causes loss of the year's crop and can also kill trees completely if it infects the roots. Annual losses to fire blight and the costs of controlling it exceed \$100 million. Almost all varieties of apple are susceptible to the disease, as are most rootstocks on which the trees are now grafted. The only effective control is the antibiotic, streptomycin. However the bacterium has developed resistance to streptomycin in several states, and resistant strains have now been found in New York. Thus streptomycin is losing its effectiveness. Also there have been concerns that antibiotic resistance in *Erwinia amylovora* could spread to other bacteria that infect humans.

A program was designed to develop new methods of managing fire blight that are effective, and safe for consumers and the environment. This has been approached in several ways. As it is believed that there is no one "silver bullet" solution that will solve the problem, a combination of different strategies will allow us to manage the disease at levels that do not cause losses to the growers, and are safe for the environment and the consumer. For existing orchards of susceptible varieties and rootstocks, small companies are being assisted in developing new materials that can be sprayed on the trees and reduce infections. A biological material containing a benign bacterium has given promising results recently and is now registered for growers to trial. Other biological materials are also being tested, as well as versions of older chemicals that would be usable in organic production. For the future, new varieties and rootstocks of apple are being developed for growers to plant in new orchards. Both traditional breeding and biotechnology is being employed to do this. Already, several resistant rootstocks have been developed by breeding and are starting to be used on a trial basis by growers. Resistant apple fruit varieties have been produced by biotechnology, and have been shown to have stable resistance and to have normal fruits. Versions of these varieties suitable for commercial use are now being developed. They will use improvements in certain genes that are already present in apple plants, and will therefore present no concerns for the environment or health.

As most of these methods for improving management of fire blight are still in development, the impact of our work still lies largely in the future. However, growers have already started to use some of the fire blight resistant rootstocks that we have bred. The rootstocks will greatly reduce, or even eliminate, death of trees due to infection of the roots by fire blight. It is also expected that some growers will use the biological material to reduce infection of flowers in 2003. Besides reducing crop losses, use of this material instead of streptomycin antibiotic will reduce the chance of streptomycin resistance arising in orchards.

### **Cornell Plant Breeders Develop Improved Alfalfa Varieties**

Key Themes: Agricultural Profitability, Plant Production Efficiency, Plant Health, Plant Germplasm

Alfalfa growers (mostly dairy and livestock farmers) in New York need varieties that have high forage yield, feeding quality, and resistance to several root and stem diseases that can cause costly crop losses and reduce stand life. These losses increase the cost of feeding livestock.

Cornell plant breeders have bred alfalfa varieties that have multiple disease resistance and higher forage yield and feed quality for the dairy animal. The two newest varieties, Oneida Ultra and 9558, have resistance to Verticillium wilt, Fusarium wilt, bacterial wilt, Phytophthora root rot, and anthracnose stem disease. In the most recent yield trials, Oneida Ultra and 9558 were among the highest yielding varieties at various locations across New York. Oneida Ultra, replaces the popular variety Oneida VR by having higher levels of resistance to several diseases and higher quality and yield, has been requested by one seed company. Seed of a new variety (NY 9627, to be named) will be produced beginning in 2003. This variety has the highest forage yield of any Cornell variety, and has excellent resistances to diseases and high forage quality. Extension activities have encouraged seed producers and dealers to grow and distribute seed of these varieties.

These varieties give New York farmers alfalfa specifically adapted to northeastern environments. All the alfalfa varieties released from Cornell produce more than \$30 million annually in hay for the northeastern farmers. Feed costs are reduced by improved forage yield without increased production costs and by improved forage quality, which increases milk production in dairy cows.

### **Cornell Researchers Identify Horse-Killing Toxins in Maple Leaves**

Key Themes: Animal Health, Agricultural Profitability, Animal Production Efficiency

For centuries, horses have been known to suffer from hemolytic anemia, methemoglobinemia, and death after eating red maple leaves. Recently, horses have been observed suffering these symptoms after ingesting leaves from other trees, most notably the sugar maple. It is important to horse owners in the eastern United States to find out what compounds are causing this problem and which species of trees carry these toxins. Furthermore, the horse is similar in one way to the large subpopulation of humans that is susceptible to favism: both groups lack sufficient glucose-6-phosphate dehydrogenase activity to protect red blood cells from oxidation when presented with an oxidizing toxin (fava bean alkaloids in human favism and red maple toxins in horses), and the symptoms are similar (methemoglobinemia and anemia). Therefore, discoveries of protective strategies for the horses may lead to new ways to prevent the human syndrome.

Researchers in Cornell's Department of Animal Science extracted maple leaves with water and methanol. The extracts were then separated into defined fractions by thin layer chromatography. Test tubes containing red blood cells from horses were used to detect the presence of toxins in these fractions. Once fractions were found that could harm blood cells in a test tube in exactly the same way that eating maple leaves harms the blood of live horses, a gas chromatograph/mass spectrometer was used to identify the compounds responsible. The researchers found that gallic acid causes methemoglobinemia and is plentiful in both water and methanol extracts of red maple, sugar maple,

and silver maple and in the extract fractions from these species that oxidize blood cells. Furthermore, 2,3-dihydro-3,5-dihydroxy-6-methoxy-4H-pyran-4-one (a potential co-oxidant) is found in the water extract and probably amplifies the oxidizing power of the gallic acid. This would explain why water extracts were more effective than methanol extracts in oxidizing hemoglobin to methemoglobin. A third, as yet unidentified, factor was discovered that causes a little oxidation but a great deal of hemolysis.

The researchers now expect that not only red maple but also sugar maple and silver maple leaves can poison horses. Similar analysis of Norway maple leaves indicates that poisoning due to the ingestion of leaves from this ornamental tree is much less likely. This information was published and distributed to Cooperative Extension educators in time for horse owners to learn of the horse's vulnerability to all these species of maple before the 2002 pasture season. Publication of these results also will alert the medical research community to a possible means by which foods could be screened for compounds of interest to those suffering from favism.

### **Experimental Field Corn Hybrid Tops Yield Trials in Cornell Breeding Program**

Key Themes: Agricultural Profitability, Plant Production Efficiency, Plant Health, Plant Germplasm

Field corn is the most important crop in New York, grown on about a million acres for both grain and silage uses. However, almost all U.S. field corn breeding is done by the private sector at breeding sites in the Midwest, which do not closely represent New York's growing conditions. While some of the varieties from these breeding programs fit well in New York, many do not, particularly for northern New York and other short-season areas of the state. Varieties with early maturity are needed, and these varieties must have the yield potential and stalk and root quality to make them competitive in northern growing conditions. High-yielding and early-maturing grain varieties will be essential to taking advantage of the ethanol production market that corn producers hope will become a reality in New York. Early-maturing grain corn varieties would fill an important niche on over 7,000 acres in just the six northern New York counties and on many other acres in short-season areas around the state.

Cornell plant breeders initiated a corn breeding program to develop the varieties needed in New York's short-season environments. Promising genetic materials were identified and combined, and selection was done in breeding nurseries for good seedling establishment and vigor (even when not using chemical seed treatments), healthy plants, early flowering and maturity, good stalk and root quality, and high yields. Potential parents were crossed to produce experimental hybrids, and these were tested under farmers' field conditions as well as experiment station conditions at short-season sites in various parts of New York. Cornell Cooperative Extension educators helped to identify farmers willing to host yield tests on their farms. Farmer collaborators provided land and field management for these testing sites. Results of yield evaluations were shared directly with extension educators, farmer collaborators, and seed industry representatives in the annual Hybrid Corn Performance Trial report, which was then shared much more broadly through field day and winter meeting presentations. In 2000 an experimental hybrid called EX8101 involving a parent developed by Cornell's corn breeding program was the highest-yielding variety in the early maturity test when compared with 17 commercially produced corn hybrids being marketed in the state. EX8101 also was among the earliest maturing varieties in this evaluation and showed good test weight. In 2002

commercial variety trials, EX8101 performed very well. Efforts in 2002 also focused on convincing corn seed companies that the hybrid's advantages may extend to a much wider region than just New York, and could be worth adoption and marketing.

The EX8101 hybrid offers a new option for New York corn grain producers in short-season areas of the state. The seed of the Cornell-developed parent is available to the seed industry for marketing in their own commercial hybrids, which can help to make corn grain production in New York more productive and profitable. The increased yield from acreage devoted to corn production also reduces environmental impacts that would otherwise result from bringing additional acreage into production to meet feed and economic needs. The excellent performance of this hybrid even without chemical seed treatment also makes it an attractive option for organic corn producers in the state.

### **American Ginseng Production**

Key Themes: Agricultural Profitability, Forest Crops, Innovative Farming Techniques, Plant Production Efficiency

The value of the reported harvest and sale of wild or wild simulated American ginseng in NY exceeds one million dollars annually. In 1999 Americans spent approximately 3 billion dollars on herbal and botanical supplements. An estimated 45 million Americans purchase herbal products annually. Ginseng was the leading herb sold in 1999. The climate, soils and forest cover of much of Greene County are ideal for wild simulated ginseng production. Wild simulated ginseng production provides significant protection of watersheds, forest resources and biodiversity while providing supplemental income opportunities for forest landowners.

Educational programs and workshops on how to grow ginseng in a forested environment have been conducted throughout the region during the past ten years by Cornell Cooperative Extension. An international ginseng growing conference was held in Greene County in 2000 which attracted nearly 300 growers, researchers and educators. A CCE sponsored ginseng festival held in September 2002 attracted more than 700 visitors.

Prices received by wild or wild simulated ginseng harvesters and growers have tripled in the past five years from an average of \$300 per pound in 1997 to over \$1,000 per pound in 2002 due to enhanced marketing efforts, competition among dealers and retail price awareness by growers. Two ginseng farmers sold more than \$12,000 worth of ginseng in a single day at the first Catskill Mountain Ginseng Festival. More than 40 Greene County residents have begun to grow ginseng on their forested land due to extension education efforts. Ginseng has become an important component of temperate agroforestry initiatives at Cornell University. CCE Greene is in the process of creating an Agroforestry and Sustainable Landscape Learning Center in Greene County. Much of the energy and motivation for this project has originated from years of work on ginseng and other forest crops.

## **Hudson Valley Growers Extend Strawberry Season with New Variety**

Key Themes: Agricultural Profitability, Plant Production Efficiency

The fruit industry of the Hudson Valley has been suffering economically due to low prices paid for fruit and high production costs. Existing farmers are looking for viable crop alternatives as are new property investors who have moved in from outside areas. Local field trials were done with Seascape strawberries, a type of day-neutral strawberry not traditionally planted in the Hudson Valley. This variety was found to have some very acceptable commercial characteristics, and worth trying on a larger scale. A number of articles in popular and extension publications were written to inform the audience. The spring, 2002 fruit school was dedicated to Strawberry production. Presentations on strawberry production were made as a part of the New Farmer Development Program for potential Hispanic growers.

Thirty-five home and commercial gardeners planted trials of the berry. Approximately five new trial acres of berries were planted. Growers had a fruit crop that produced (with peaks and troughs) from June through October. Even though early summer varieties were frozen out, the day-neutrals came through with a crop.

## **Dairy Farm Safety Education Program**

Key Themes: Farm Safety, Agricultural Profitability, Risk Management, Human Health

The audience for this program was dairy farmers, their employees, farm youth and families in Delaware County. As Delaware County is larger than the State of Rhode Island, we needed to reach out into each area of the county in order to bring our program to as many as possible. Primary concerns (from NYCAMH data) are that hearing and respiratory problems are very common among farmers. In a statewide study, NYCAMH found 7 of 10 farmers with an abnormal hearing test. Only 4 of 10 farmers reported using hearing protection when working around noisy farm equipment. Education in the proper use of hearing protection can prevent hearing loss. The same study reported chronic bronchitis symptoms reported by 14% of farmers, asthma symptoms reported by 18% of farmers, and allergy symptoms reported by 57% of farmers, all significantly above national statistics. Education in the use of respiratory personal protective equipment can prevent respiratory problems. Farm Safety programs have always been an initiative of Cornell Cooperative Extension, but funds were needed to carry out a major new educational effort. Kraft Foods was made aware of the need for more health and safety education in Delaware County and responded with a \$7,000 to fund the Dairy Farm Safety Education Program.

Six hearing and respiratory workshops were coordinated with NYCAMH and held in various locations around the county. Hearing and respiratory functions were tested. Earmuffs, earplugs and respirators were purchased and given to participating farmers. Mechanical safety demonstrations ran concurrently with health screenings to add another dimension of safety educators to the workshops. In addition, 25 FFA (Future Farmers of America) students received education and personal protective equipment at another workshop held at their school. Safety outreach education was also held at the Delaware County Fair. Each day featured a different safety initiative: respiratory, hearing, skin, mechanical and pesticide safety. Again, products like hats, sunscreen, slow moving vehicles

signs, “no riders” decals, tyvek suits, goggles, gloves, ear muffs, ear plugs, and respirators were demonstrated and distributed to dairy farmers, their employees, and families.

As a result of the Dairy Farm Safety Education Program, 150 farmers, farm youth and farm employees were educated to the need and the appropriate use of using personal protective equipment designed to maintain hearing and respiratory function. Farmers, farm youth and farm employees are now more aware of the necessity of protecting their health while farming and possess the skills and equipment to do so.

### **Alternative Forage to Corn Silage**

Key Themes: Agricultural Profitability, Plant Production Efficiency, Pasture Management

Small farms, limited resource farmers, and part-time farmers have few resources to produce corn silage at yields above the 13.5 ton/acre necessary for achieving breakeven costs. Limited equipment and labor reduces timeliness of planting and harvest; limited soil resources exacerbate the yield reductions. Brown Mid Rib sorghum-Sudan has the potential to produce forage equal or better than traditional corn silage. Past research by the educator found that sorghum-Sudan can produce yields equal or higher than corn silage, yet be planted at a later date. It is planted with a hay seeding drill, negating the need for a special corn planter and harvested with normal hay silage equipment, negating the need for special harvesters - thus reducing capital cost. Because the crop is harvested in 2 - 3 cuttings rather than one big one, the labor and equipment can be of smaller size yet still achieve timeliness. The multiple harvests reduce the risks inherent in the one harvest system. Planting in a solid stand rather than traditional corn-rows, dramatically reduces the potential soil erosion. Unfortunately, the fundamentals of management for achieving these goals: seeding rates, fertilizer rates, and harvest parameters for high quality; have not been established.

Preliminary research found that there is a potential for this crop as a replacement for corn silage. Field research in 2001-2 was directed at answering the key questions of seeding rates, fertilizer needs, and optimum height for harvesting forage quality equal or better than corn silage. As research based information became available, it was rapidly disseminated through multi-tiered efforts including mass media, regional classes, grower meetings, and one-on-one consultations.

Farmers have been successfully trying BMR sorghum-Sudan as an alternative forage crop. In the drought of 2002, the BMR produced 11.5 tons/acre of silage, while corn silage nearby produced 6.25. In other areas with better rainfall, the yields were equal to corn silage, but produced in two easier-to-manage cuttings, planted over a wider range of time, and harvested without specialized equipment. Energy levels have equaled corn silage and protein levels have been 150 +% of corn silage.

## **GOAL 2 – A SAFE AND SECURE FOOD AND FIBER SYSTEM**

To provide a safe and secure food supply our research program currently maintains three broad initiatives: food safety research program, food quality and functionality program and value-added enhancement program. The three programs combine to address the issues of a safe and secure food system.

We improve the safety and nutritional quality of foods to promote wellness and reduce the risk of disease. We identify and study important consumer and processor food safety issues in the areas of microbiological safety, chemical safety and naturally occurring plant toxicants as well as health promoting opportunities from food components.

Our food safety research program includes initiatives to study the agents, environments and controls related to microbial contamination of fresh and processed foods. Expand research on foodborne pathogens, both emerging and long-recognized species. Develop and utilize modern immunological and molecular biological techniques to study the effect of innovative processes and products on microbial growth and survival and to detect microbial contaminants at very low levels.

This program conducts studies to help processors develop HACCP programs. It includes developing computer simulation/modeling systems to improve food quality and safety and models of microbial growth inhibition. Our scientists investigate putative natural toxicants or antinutrients in genetically modified plant and animal foods. We study the chemistry and toxicology of production-enhancement chemicals used in plant and animal production and manifesting themselves as residue or chemical changes in foods. We investigate health-promoting phytochemicals. This program establishes both required and toxic concentrations of consumption. We investigate risks/benefits associated with increased consumption of plant-based foods. In this program we investigate factors that influence bioavailability of nutrients in foods and diets. We study the effects of processing, preservation and storage on nutritional value and quality of foods. We develop improved chemical and instrumental methods for measurement of macro and micronutrients in foods that can be used for analysis in support of nutrition labeling or for process control. We utilize this knowledge to provide direct assistance to companies to insure the processing of safe foods.

Our program on value added processing systems improves technologies and systems that enhance food value including nutritional value, safety and cost thus securing our food system for the future.

In this effort we evaluate new plant and animal foods and food components as well as production management techniques that add nutritional value and economic benefit. We develop new methods for quality assessment and help set goals for plant and animal breeding and selection. We explore process technologies (e.g., fermentation, thermal processing, extraction, concentration, separation, sensor development) and new modeling techniques that can improve the profitability of the food industry. We study methods of minimal processing and packaging of foods. We also study the economic potential of new products and processes. Our scientists develop engineering systems based on microbiology, enzymology and mechanical techniques to minimize waste disposal problems of the industry. This program develops processing methods for fractionating major and minor components of foods. A major effort includes the development and/or evaluation of processes and/or ingredients designed to improve the sensory quality of low fat foods. We seek to generate the



knowledge base to provide leadership in value-added processing for the food manufacturing industry.

Our program on food quality and functionality uses a multidisciplinary effort as we seek to improve the understanding of mechanisms affecting food acceptability and probe the molecular basis of functionality and quality with special emphasis in the areas of biochemistry of plant and animal foods/post harvest physiology, sensory quality of foods, physical/chemical properties of foods and ingredients and microbiology of foods. Quality foods are a key component to ensuring the security of our food system.

In this program on food quality we develop methods to define and improve quality in fresh and processed foods by studying the factors that influence composition, appearance, flavor and texture with a focus on post harvest storage management and enhancement. We study the biochemistry and genetics of plant and animal products that determine appearance, flavor, and texture. We study the microbial population of foods, and their relationship to quality and shelf life. In order to understand food quality we investigate physical and chemical properties of fresh, raw, and processed foods and ingredients. The development of mathematical models of the relationships between product properties, instrumental measurements and human perceptions are key efforts in this program. Industry directly utilizes this research through outreach and advisory programs.

As effective as these initiatives are, numerous issues will combine to affect changes in their direction over the next five years. The emergence of new pathogens is increasing and will demand greater attention by our scientists. Clearly an interrelationship of both water and food safety issues in our food supply will drive an integration of these research areas. Also the need for unique functional ingredients for food manufacture and health will drive research programs in this area. The need for advanced systems to ensure freshness, quality and safety in fresh and minimally processed foods will require highly interdisciplinary teams of scientists.

## **PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 2**

Improves the health, nutrition, and safety of communities and individuals

- Prepare and keep foods safely
- Reduce food insecurity
- Increase citizen participation in local food related policy decisions
- Expand knowledge of health behaviors that effect women's health status
- Increase fruit and vegetable consumption

**Indicator Data Specific to Goal 2**

(For each indicator, both actual and annual target results are included, the latter in parentheses.)

**INDICATOR 2.1** The total number of refereed or peer reviewed articles or materials reporting research related to a safe and secure food and fiber system and the number of related patents, licenses, or varieties issued.

<b>Year</b>	<b># refereed items</b>	<b># patents, licenses, varieties</b>
<b>2002</b>	87 (125)	3 (5)

**OBJECTIVE 2.1** To improve food accessibility, affordability, safety, and nutritional value.

**INDICATOR 2.1.2** The total number of persons completing non-formal consumer education programs on food accessibility and food affordability, and the total number of these persons who actually adopt one or more recommended practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually Adopt practices</b>
<b>2002</b>	44007 (20020)	19090 (14000)

**OBJECTIVE 2.2** To increase the effectiveness of constituent and citizen participation on public policy issues affecting food security (i.e., food access, affordability, and recovery).

**INDICATOR 2.2.1** The total number of persons completing non-formal education programs on public policy issues affecting food security (i.e., food access, affordability, and recovery) and the total number of these persons who actually become actively involved on such issues within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually become involved</b>
<b>2002</b>	8293 (2002)	2330 (600)

**OBJECTIVE 2.3** To annually increase consumer awareness, understanding, and information regarding food safety and food borne risks and illnesses.

**INDICATOR 2.3.1** The total number of persons completing non-formal, consumer education programs on food safety and/or food borne risks and illnesses and the total number of these persons who actually adopt one or more recommended food safety behaviors or practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt behaviors</b>
<b>2002</b>	42817 (30000)	21256 (17000)

**Resources Allocated to Goal 2 (FFF and Match)**

**Dollars (x 1000) and FTE or SY**

	<b>FY2002 Target</b>	<b>FY2002 Actual</b>
<b>Extension Total</b>	2,360 (31.5)	2,696 (32.0)
Research Total	790 (5.2)	484 (8.7)

## Impact Examples Related to Goal 2

### Cornell Research and Outreach Programs Aim to Improve Food Safety Communications

Key Themes: Food Safety, Foodborne Illness, Foodborne Pathogen Protection, Human Health

*Listeria monocytogenes* is a gram-positive bacterium associated with potentially serious invasive diseases in humans and animals. This microbe also is a common environmental contaminant in food and dairy processing environments. The high prevalence of *L. monocytogenes* contamination in foods presents serious public health and economic concerns for the food industries. Approximately 45 percent of all food product recalls for microbial contamination are due to the presence of *L. monocytogenes*. Therefore, successful prevention of additional cases of foodborne disease requires not only the detection of outbreaks and the identification of responsible food products, but also efficient communication of product recall information. Cornell food scientists developed a project to assess the effectiveness of current procedures for food product recalls for preventing foodborne diseases resulting from the foodborne pathogen *L. monocytogenes*.

Cornell scientists and extension educators combined research and outreach strategies to better understand relationships between specific health risks and the presence of *L. monocytogenes* in foods and to improve capabilities for explaining these risks to consumers. Specifically, Cornell food scientists obtained and "fingerprinted" food, animal, and human *L. monocytogenes* isolates to determine whether the types of isolates found in animals and those responsible for food recalls actually match types of isolates responsible for human disease. Through a telephone survey conducted in Onondaga County, current food product recall procedures were evaluated for effectiveness in reaching consumers and retailers. Cornell extension educators in Onondaga County then developed networks for better dissemination of information about product recalls to extension personnel, food professionals, and consumers.

Through this project, 200 additional *L. monocytogenes* isolates were added to a total database consisting of more than 1,500 organisms. This molecular subtyping database is expected to be released for public access within the next six to nine months (see [www.foodscience.cornell.edu/wiedmann/dbase.htm](http://www.foodscience.cornell.edu/wiedmann/dbase.htm)). Creation of this database ensures that the data collected during this project will continue to be applied to ongoing detection and tracking of human listeriosis outbreaks. (Earlier subtyping of data had allowed the research team to assist in detecting a multistate human listeriosis outbreak in the fall of 2000, work for which these received a USDA award). From the telephone survey, the researchers found that consumers are poorly informed about food recalls and food safety, have little to no information on *L. monocytogenes*, and do not realize the potential health risks associated with pathogen-contaminated food. With this information in mind, an electronic communication system has been established among Onondaga County food professionals to share information about food recalls, consumer food safety resources, publications, and future educational events and meetings in the community.

## **Cornell Food Scientists Determine Role of Starch in Firmness of Russet Burbank and Yukon Gold Potatoes**

Key Themes: Food Handling, Food Quality

Potatoes are consumed throughout the world and are an important part of our diet. In the United States, the value of the potato crop in 2000 was about \$2.8 billion, and about 57 percent of the potato crop was used for production of frozen French fries. An important step in processing cut/diced potatoes is the blanching operation in which they are heated in hot water. Starch is an abundant component in potatoes—an average of 65 percent to 80 percent on dry weight basis. The firmness of heated potatoes is affected by swelling of the starch granules. However, the role of starch content and granule size on the firmness of potatoes has not been known clearly.

To understand the role of starch and heating time/temperature protocol, Cornell food scientists determined the firmness (storage modulus) of disks of two potato cultivars—Russet Burbank (7 percent starch) and Yukon Gold (11.7 percent starch)—with a Dynamic Mechanical Analyzer as they were heated in water at 40, 50, 60, 70, and 80 degrees C for 120 minutes. The two potato cultivars had similar mean starch granule sizes and distributions, indicating that the observed difference in the firmness was due to their starch content. Potato firmness was affected by heating temperature and time and starch concentration. The starch concentration played a crucial role in determining the final firmness characteristics of heated potatoes. Russet Burbank potatoes, with lower starch content, attained higher firmness at higher heating temperatures, while Yukon Gold potatoes, with higher starch content, attained higher firmness at low heating temperatures.

The researchers showed that when cut/diced potatoes are heated in water at a fixed temperature greater than about 50 degree C, there will be two or three stages in the firmness versus time profiles. Optimal heating temperature and time can now be selected by food processors, based on the starch content of their potatoes, in order to achieve the desired final firmness of their product.

## **Safety of Consuming Sport Fish**

Key Themes: Food Safety, Human Health

Recreational fishing is a multibillion-dollar industry. Eating fish provides important health benefits, but 49 states have issued fish consumption health advisories with recommendations to limit or avoid eating recreationally-caught fish because of concerns about chemical contamination (mainly from methylmercury, PCBs, and/or dioxins). In the contiguous 48 states, 100 % of Great Lakes waters, 70% of coastal waters, 28% of lake acres, and 14% of river miles are covered by these advisories. Chemical contaminant exposure risks may be higher for certain populations, due to high levels of fish consumption or to the types of adverse health impacts the chemicals pose (e.g., reproductive and developmental effects).

Risk management and communication research is necessary to help anglers and their families decide which, and how much, sport-caught fish they should eat, taking into account both potential benefits and risks from eating fish. Subpopulations of special concern include women of childbearing age, children, and those who rely on sport-caught fish for cultural or dietary/economic reasons. Research

in the Human Dimensions Research Unit in Cornell's Department of Natural Resources has improved our understanding of human attitudes and behaviors related to fish consumption health advisories. Studies have focused on determining what factors may influence anglers' and other potential fish consumers' understanding of and response to these advisories, as well as program evaluation research to assess the impacts of various risk communication approaches. Research has also addressed factors influencing risk perception, the importance of comparative dietary risk information, assumptions of risk management, methods to assess fish consumption, and challenges of institutional coordination in these programs (which often include health, environmental quality, and fishery management agencies in state and tribal governments).

Results from this research program led to Cornell faculty writing, under contract to USEPA, the first major guidance document on risk communication associated with fish consumption health advisories, now used widely by states and tribes. The first edition is now being revised by a consulting team, including scientific contribution by a Cornell faculty. In addition, a Cornell faculty member is serving on the Institute of Medicine/National Research Council Committee on Implications of Reducing Dioxin in the Food Supply. She provides the risk communication expertise to this committee.

### **Cornell Food Scientists Work to Prevent Contamination of Dairy Products with *Mycobacterium paratuberculosis***

Key Themes: Food Safety, Foodborne Illness, Food Handling, Foodborne Pathogen Protection, Human Health

*Mycobacterium avium* subsp. *paratuberculosis* (MAP) is an important pathogen in cattle that is estimated to affect 33 percent of U.S. dairy herds. Disease caused by this organism is estimated to result in losses as high as \$1.5 billion/year for the U.S. dairy industry. The potential link between Johne's disease in ruminants and Crohn's disease in humans has led to concerns about the possible transmission of MAP to humans through consumption of milk and dairy products. To address these and future concerns, food safety experts must determine the survival of this organism during commercially used processing conditions and develop processing conditions that reliably inactivate MAP present in raw milk. Current knowledge of MAP inactivation during heat treatments is limited because of the lack of rapid and sensitive detection methods for this organism.

The primary objective of this work was to create and apply novel biological tools for measuring the survival of *Mycobacterium avium* subsp. *paratuberculosis* (MAP) in milk following batch and high temperature short time (HTST) pasteurization. To these ends, we generated multiple MAP strains, each bearing a plasmid carrying a constitutively expressed firefly luciferase gene. When viable, these strains produce luminescence, which can be rapidly measured in the laboratory. The underlying hypothesis of this work is that detection of luciferase activity following a heat processing treatment will provide a rapid and sensitive method for detecting the presence of viable MAP. Pasteurization at 72C for 15 seconds does not appear to consistently kill MAP at the inoculum levels used in these studies, as determined through both luciferase assays and plating procedures.

*Mycobacterium avium* subsp. *paratuberculosis* research will ultimately assure elimination of this organism from milk and dairy products by establishing appropriate dairy processing strategies. To

address concerns regarding the transmission of MAP to humans, it is important to determine milk processing conditions that will reliably inactivate this bacterium in raw milk and to determine whether post-pasteurization contamination represents an additional risk for product contamination. This work will help provide sensitive and specific methods for rapid, quantitative determination of the presence of this potential human pathogen in processed products. Our results support the usefulness of luciferase reporter systems for detecting viable heat-treated MAP.

### **4-H Food Safety and Nutrition Program**

Key Themes: Food Safety, Food Quality, Food Handling, Human Nutrition, Youth Development

With increasing rates of childhood obesity and resultant chronic disease (heart disease and diabetes) and the lack of cooking knowledge among youth, youth need education on safe food handling and sound nutrition information and practices related to healthy meal preparation. In addition, there is an increased need for healthful meals at home for economical and health reasons (decrease fast food intakes, increase fruits, vegetables, whole grains). Youth need the knowledge, practical skills, and empowerment to make their own safe and healthful food choices in order to become healthy adults.

CCE of Livingston County, held a 6-session workshop on food safety, kitchen safety, nutrition, meal preparation, and cooking for a local 4-H youth group in 2002. The group consisted of 8 females from a small rural town in Livingston County. The Food Guide Pyramid, healthy recipe modification, serving sizes using food models, principles of and practical application of meal preparation (cutting, chopping, mixing, accurate measuring, baking, broiling, sautéing, boiling water method of cooking). Their final project was a completed healthy meal preparation of their choice under extension supervision; plus, a final written report of the concepts and skills they learned as a result of this workshop.

As documented by pre and post testing and observation: 100% indicated plans to integrate plant-based materials in their diets (whole grains, fruits, and vegetables); 100% identified 4 out of the 4 steps to keep food safe from bacteria compared to only 25% at the start of the session; 75% stated they would strive to eat more fruits and vegetables as snacks; 75% stated they are more likely to wash their hands before and during cooking; 100% were observed to wash their hands before meal preparation; 75% were more likely to clean their work area, cutting boards, and utensils after each use (confirmed by observation); and 100% knew and accurately measured ingredients needed for various recipes.

### **Community Nutrition Education**

Key Themes: Food Security, Food Safety, Food Handling, Food Resource Management, Human Nutrition, Families at Risk

Despite its many assets, Rochester is the 11th poorest city in the nation with population of 100,000 or more, in terms of children living below the poverty level. This ranking is based on the 2000 census, which showed a significant increase in poverty rates since the 1990 census. Thirty-eight percent of Rochester children live in poverty. Low income is associated with a myriad of health problems including chronic disease, poor pregnancy outcome, infant mortality, anemia and

malnutrition Many low-income individuals lack basic skills in food safety, preparation, and resource management.

Cornell Cooperative Extension's Community Nutrition Education Program (CNEP) is committed to improving the nutrition and health status of low-income residents. This program strives to reduce hunger and increase food security, with Extension working collaboratively with over 70 agencies that also serve this target population. Over the past year, Extension Community Nutrition Educators have conducted a series of classes at mental health and substance abuse residential facilities operated by East House. Residents at several facilities participated in life skill activities, with lessons and activities centered on eating a wide variety of foods from all the food groups, portion control, safe food handling practices, menu planning, label reading, grocery shopping and meal preparation.

Over the past two years, Seven East House facilities have engaged their residents in Extension's Community Nutrition Education Program. Over 100 residents have learned and continue to demonstrate safe food handling and nutritionally balanced menu planning. These Residents have increased their capacity to prepare nutritious meals. The pre and post assessments indicate that the resident's dietary quality increased especially in fiber, vitamin C and beta-carotene content. This was achieved through the inclusion of whole grains, fruits and vegetables in their meals. By eating healthier diets, low-income individuals are able to increase their overall health and quality of life, thereby reducing their risk for chronic disease.

### **Food Safety in the Home**

Key Themes: Food Safety, Food Handling, Foodborne Illness

New immigrants are unfamiliar with food safety issues that affect Americans. As new immigrants, primarily Hispanic and from Mexico and Central and South America, settle in Orange County they may be using some of the same practices used in their home countries. Many do not realize that some of the food handling practices that they use may make them and their families sick, especially their small children, aging family members or individuals who have compromised immune systems.

Cornell Cooperative Extension of Orange County is working with limited resource Hispanic immigrants to teach safe food handling practices to minimize their risk of food poisoning. While the FightBAC materials are used, Orange County is also a part of a research study with the University of Wisconsin to test the success of using a computer-based program to teach these facts in the EFNEP homes.

Twenty-nine Hispanic families totaling 135 family members have become familiar with the potential dangers when not following safe food handling practices in the home. They learned the importance of cleaning and washing properly, storing food, separating to prevent cross-contamination, chilling and cooking food properly. The homemakers not only adopted new practices but they are teaching others - their family and friends. One homemaker told Zaida that she told her sister not to thaw meat on the counter. She said she looks around her friend's kitchen to see if she is doing things properly.



### **New Farmers/New Markets**

Key Themes: Food Security, Food Quality, Agricultural Competitiveness

Farmers markets are increasingly important sources of quality foods in many communities. The continued expansion and development of the farmers' market system has been constrained by a lack of producer participation, even as marketing opportunities for growers of fresh produce have increased at numerous community farmers' markets. CCE-NYC's "New Farmers/New Markets" program trains participants from locally-based community organizations throughout NYC to start up their own market programs, and recruits farmers from the Hudson River Valley region to 'grow their own,' thereby increasing access to fresh food for NYC residents. New Farmers/New Markets works with several partners, including Pratt Center, 'Just Food', East NY Farms, the ENY Local Development Corporation, United Community Center and Heifer International. The farmers' markets in the program were awarded NYS Department of Agriculture and Markets grants for permanent improvements, including the largest--\$50,000 to East New York Farms for a permanent, covered structure in a market that generated approximately \$70,000 in 2002 total sales.

### **Application of SmartFresh™ to New York-grown Apple Fruit to Maintain Quality**

Key Themes: Food Quality, Food Handling, Agricultural Profitability

The New York apple industry is the second largest in the US. Growers rely heavily on controlled atmosphere (CA) storage technology to control the speed of ripening and thereby provide high quality produce for the consumer. Softening is stimulated by the production and action of the plant hormone ethylene. Both low temperatures and CA storage help decrease the effects of ethylene, but fruit still can deteriorate rapidly between leaving the storage facility and reaching the fruit bowl. This is especially true for several important New York apple varieties because they soften rapidly after harvest. Therefore, the discovery of 1-methylcyclopropene (1-MCP), commercially known as SmartFresh™, to inhibit the action of ethylene has major implications for storage of fruit and other produce.

1-MCP was available for only a few years before its registration, and therefore it was essential to learn as much about its benefits and limitations as rapidly as possible to ensure that it could be utilized appropriately by the New York apple industry. This research took two complementary approaches. In the first, a program at Cornell was established to evaluate the effectiveness of 1-MCP on important varieties in New York. Storage in air and CA effects of different postharvest handling operations were the focus. In the second, application of 1-MCP at different storage locations throughout the state was conducted, using samples of treated and untreated fruit under commercial storage conditions, thereby identifying if any major limitations to its implementation existed. This research was made possible by a new initiative, the Grow New York program, where funding from the state was matched with contributions from the New York Apple Association and Cornell University. Much remains to be done, especially as commercial implementation will continue over time, but the initial research has led to recommendations about the varieties that respond best and what postharvest factors are important to ensure successful implementation of this new technology.

Results from this project have been made available to the industry at fruit schools throughout New York state, grower magazines, the Cornell Storage and Handling Newsletter, and at the Cornell Storage Workshop.

1-MCP, known under the commercial name of SmartFresh<sup>TM</sup>, was registered by the United States Environmental Protection Agency for the first time in 2002. The results of this initial research demonstrating the effectiveness of 1-MCP in maintaining fruit quality, as well as limitations of the product, ensured that sufficient information to permit its rapid commercial adoption by the New York industry was available. The results, especially the demonstration research, fueled the industry's belief that 1-MCP would provide a superior product for the consumer. Often a year's delay can occur between federal and state registration. However, the efficient processing of additional registration documentation required by the New York Department of Conservation further helped the industry gain access to the product. In addition, AgroFresh, the company that supplies SmartFresh, controlled release of the product to a limited number of states, of which New York was one because of this research. As a consequence of enthusiasm for this product, and despite its availability for New York earlier than expected, and the low volume crop in the 2002 harvest season, approximately 20 controlled atmosphere storage rooms were treated. Although many of these rooms have not yet been opened, sampling of fruit indicates that the compound has lived up to expectation. It is likely that a much greater number of rooms will be treated in the upcoming harvest season. Application of 1-MCP to New York apple fruit, especially those varieties that soften rapidly, should result in a marked improvement of apple quality for the consumer.

### **GOAL 3 -- A HEALTHY, WELL-NOURISHED POPULATION**

Improving the health of our population through food/nutrient-based strategies will become increasingly important in the next five years in achieving health goals designed to reduce preventable mortality and morbidity in the United States. These strategies will be of special significance to USDA because they will serve as important bridges between the country's food production and health sectors. These strategies will be particularly valuable to approaches that seek to empower individual consumers in taking increased responsibility for their health, assure that our food system is consistent with health goals, and refashion our health system, particularly approaches most concerned with cost containment through prevention of chronic, debilitating diseases.

Research areas of current interest include (1) the study of glucose, lipids, vitamin E and homocysteine in cardiovascular disease, obesity, and/or diabetes, (2) role of various nutrients in fetal neural and cognitive development (e.g. genetic polymorphisms and folic acid metabolism), retinoic acid and gene transcription, (3) nutrition and cancer (e.g. modes of action of selenium and vitamin E, role of predominant plant based diets, and the physiochemical properties of dietary fiber), (4) the role of nutrition in the regulation of inflammation (e.g. effects of dietary fat on the expression of genes during the inflammatory response), (5) maternal nutrition during pregnancy and lactation, (6) postpartum weight retention, (7) fetal metabolic imprinting and its relationship to chronic disease, (8) neurohormonal and psychological influences on eating behavior, (9) food security, (10) domestic and international food and nutrition policy, (11) iron and other micronutrient deficiencies, (12) nutritional impact of parasitic infections, (13) behavioral determinants of food choices, (14) dietary assessments among ethnic minorities, and (15) social patterns of obesity and weight control.

The most recent dietary guidelines reemphasize the increased reliance on plant-based foods as a means of controlling caloric consumption, reducing fat intake, modifying the composition of ingested fats, enhancing the consumption of foods associated with reduced cancer risk, and simultaneously insuring that macro- and micronutrient needs are met. For the first time the dietary guidelines also provide information to consumers who restrict their consumption of animal foods completely or rely on only selected few to meet their dietary needs. Future research activities must explicitly recognize the health goals, policy aims, and consumer practices that support these guidelines.

Thus, future research investments will be made in activities that (1) explore how complex genetic interactions determine developmental and other physiological pathways (and thus specific phenotypes) under diverse nutritional conditions (The impending description of the human genome make this an especially exciting opportunity.), (2) capitalize on an improved understanding of the determinants of human behavior to design effective interventions for behavior change related to nutrition, (3) analyze outcomes of food policy options related to food security, health, and disease prevention, and (4) enhance international collaborations that recognize the globalization of the US food supply.

**PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 3**

Improves the health, nutrition, and safety of communities and individuals.

- Increase citizen participation in local health and safety policy decisions
- Expand knowledge of health behaviors that effect women’s health status
- Increase fruit and vegetable consumption

**Indicator Data Specific to Goal 3**

(For each indicator, both actual and annual target results are included, the latter in parentheses.)

**INDICATOR 3.1** The total number of refereed or peer reviewed articles or materials reporting research on human nutrition and health or health promotion and the number of related patents, licenses, or varieties issued.

<b>Year</b>	<b># refereed items</b>	<b># patents, licenses, varieties</b>
<b>2002</b>	113 (300)	1 (2)

**OBJECTIVE 3.1** To achieve a healthier, more well-nourished population.

**INDICATOR 3.1.2** The total number of persons completing non-formal nutrition education programs on better management of health risk factors (e.g., obesity, hypertension, etc.) and the total number of these persons who actually adopt one or more recommended nutrition practices to reduce health risks within six months of completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually Adopt practices</b>
<b>2002</b>	44944 (35000)	24816 (16500)

**OBJECTIVE 3.2** To annually increase consumer awareness, understanding, and information on dietary guidance and appropriate nutrition practices.

**INDICATOR 3.2.1** The total number of persons completing non-formal nutrition education programs that provide dietary guidance to consumers and the total number of these persons who actually adopt one or more recommended Dietary Guidelines within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt recommendations</b>
<b>2002</b>	44578 (38000)	26624 (19000)

**OBJECTIVE 3.3** To promote health, safety, and access to quality health care.

**INDICATOR 3.3.1** The total number of persons completing non-formal education programs on health promotion and the total number of these persons who actually adopt one or more recommended practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt practices</b>
<b>2002</b>	20260 (20020)	13780 (12002)

**OBJECTIVE 3.4** To annually increase the level of individual and family safety (or reduce risk levels) from accidents in the homes, schools, workplaces, and communities.

**INDICATOR 3.4.1** The total number of persons completing non-formal education programs on home and workplace safety and risk reduction and the number who actually adopt one or more recommended practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt practices</b>
<b>2002</b>	20809 (4500)	10104 (2002)

**OBJECTIVE 3.5** To annually increase the effectiveness of constituent and citizen participation on public policy issues affecting health community decision-making.

**INDICATOR 3.5.1** The total number of persons completing non-formal education programs on public policy issues affecting health community decision-making and the total number of these persons who actually become actively involved in one or more public policy issues within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually become involved</b>
<b>2002</b>	3020 (2500)	503 (500)

**Resources Allocated to Goal 3 (FFF and Match)**

**Dollars x 1000 and (FTE) or (SY)**

	<b>FY2002 Target</b>	<b>FY2002 Actual</b>
<b>Extension</b>	3,758	4,220
<b>Total</b>	(50.2)	(50.8)
<b>Research</b>	1,295	484
<b>Total</b>	(8.0)	(8.7)

### **Impact Examples Related to Goal 3**

#### **Cornell Food Scientists Find That Processing Vegetables May Not Reduce Their Nutritional Value to Consumers**

Key Themes: Human Nutrition, Human Health

Regular consumption of fruits and vegetables is associated with reduced risk of chronic diseases such as cancer, heart disease, diabetes, Alzheimer's disease, cataracts, and age-related diseases. The National Research Council has recommended eating five or more servings of fruits and vegetables to increase public awareness of the health benefits of fruit and vegetable consumption and promote adequate intake of known vitamins. Both growing consumer awareness of the health benefits of fruits and vegetables and the emerging need for convenience as a result of fast-paced lifestyles have resulted in high demand for ready-to-use processed fruit and vegetable products. In recent years, manufacturers have come up with various vegetable products to bring convenience to consumers, but processed fruits and vegetables have long been considered to have a lower nutritional value than their fresh counterparts.

Cornell food scientists demonstrated that most of the antioxidant activity in several fruits and vegetables comes from beneficial substances in apples called phytochemicals (phenolics, flavonoids, and carotenoids). Antioxidants protect the body from cell and tissue damage that occurs when free radicals released as oxygen is metabolized by the body. Subsequent research on tomatoes determined that, despite an observed loss of vitamin C, heat processing significantly elevated total antioxidant activity and lycopene content in tomatoes. Lycopene is the major plant chemical substance in tomatoes with red color and is the single most efficient oxygen quencher, thus making its presence in the diet important. More recently, tests showed that thermal processing increased total antioxidant activity in sweet corn by 44%. Similar and/or supportive findings were also seen in tests on extracts from apples, grapes and raspberries. In related research, apples with skin were found to have higher antioxidant activity than apples without skin.

In general, findings from this research did not support the notion that processed vegetables and fruits have lower nutritive values than fresh produce. The results of this research effort have been broadly disseminated through the media and by extension, and as such may be having significant impact on consumers' food selection and preparation habits, and on reducing consumers' risk of chronic diseases. The research provides both direct and indirect evidence that the "Five-a-Day" promotion is sound, and may help US fruit and vegetable growers and processors market and sell more products.

#### **Nutrition and Healthy Living Skills Program for Developmentally Delayed Adults**

Key Themes: Human Nutrition, Human Health

Individuals with developmental disabilities face numerous barriers to enjoying an independent lifestyle within communities. Social, physical and emotional support services are needed to help individuals, particularly those with dependent children, transition to assisted-living arrangements and to establish a healthy interdependence within communities. Coordinated social support services that include comprehensive education to help develop healthy living skills can help families with special

needs to regain or retain custody of dependent children. Skills necessary to support this transition require the ability to secure and manage food resources and to plan and prepare simple, healthy meals to support the growth and nutritional needs of all household members, especially those of children. Multiple barriers to acquiring these skills require that teaching strategies and resources are modified significantly to assist participants gain necessary knowledge and skills needed to achieve successful outcomes.

The Executive Director of H.O.M.E., Inc. (Humanitarian Organization for Multicultural Experiences) learned of the interactive nutrition education programs provided through the CCE Onondaga County's Eat Smart New York! A strategy meeting was convened to discuss and determine teaching approaches to best meet the learning needs of the participant groups identified. Two pilot programs, each 3 hours in length were conducted for 12 consecutive weeks with participants with similar learning needs/abilities. The same program support person attended each nutrition education workshop. Strategies that were implemented to support intended outcomes included:

- Conducting all cooking classes in the specially designed kitchen at H.O.M.E. (Familiarity with the environment and trust were critical factors in acquiring desired knowledge/skills)
- Single focus lessons with a hands-on, visually oriented focus, ample repetition, and multiple ways to reinforce concepts
- A ratio of 1:3 support staff/participants
- Simplified recipes in a low-literacy format with all participants engaged in same step of food preparation
- Multiple ways to evaluate progress that included tests for understanding (verbal report confirmed by demonstration of desired skill/knowledge.)
- Connecting participants with human service providers to facilitate enrollment in food and other community assistance programs (Food Stamp Outreach, etc.)
- Providing a follow-up in-service education on basic food safety for all support staff to help improve/maintain safe, sanitary food preparation conditions for follow-up programs conducted by staff.

In addition to significant improvements in food-related practices and diet quality:

- Participant math skills improved. Skills they learned to measure ingredients and compare prices translated to improvements in adopting other life skills (change for a bus, understanding bills, etc.)
- Participants improved ability to interact with others/share ideas and new skills they learned with group members.
- Participants gained pride in their accomplishments. Participants displayed their learning certificates received in the program with other family members and reported helping to teach others skills learned in the program.
- Evaluation measures to assess extent to which desired behaviors were adopted also included use of a computerized USDA Evaluation and Reporting System to track pre/post nutrition-related behaviors across desired skill sets.

On average the 10 participants completing the two groups of 12- week workshops demonstrated:

- 85% improvement inability to plan meals in advance (1 or more days) and to use one of more shopping skills appropriately (unit pricing, use of a grocery list, use of coupons and comparing sale items)

- 75% improvement in choosing healthy foods and using Nutrition Facts labels to check nutrients
- 60% improvement in understanding the need for and practicing safe food handling (with 100% washing hands prior to food preparation, and 75% thawing foods appropriately.)
- Agency staff documented a noticeable improvement in the nutritional quality of lunches brought from home by the participants who completed our programs. Less high calorie/fat/sugar/salt convenience foods were consumed with more home prepared entrees, fruits, vegetables and low-fat milk are evident.
- Program participants are successfully utilizing community food and program resources to help consume more nutritious meals and stretch limited resources to meet other critical needs. (8/10 receiving food stamps, children enrolled in school meals, and use farmers market coupons.)

Based on participant gains made through the healthy living skills program, CCE is partnering with H.O.M.E., Inc to seek funds to expand cooking skills programs to include participants who have transitioned to the assisted living apartments with their families. Grant funds will support cooking equipment, teaching resources and salary support for training community educators to implement our program model.

### **Heart Health Partnership, Farmers' Markets**

Key Themes: Human Nutrition, Human Health

The Wyoming County Heart Health Partnership's Mission is to reduce the prevalence of cardiovascular disease risk factors by promoting heart healthy eating. This past year the partnership provided mini-grants to encourage four Farmers' Markets to be established and or maintained within Wyoming County. Farmers' Markets have increased ten-fold in the last decade. Consumers are looking for fresher and healthier produce at a low cost, and growers are excited to have the chance to educate consumers about their specific product. Growers can increase their immediate income, reduce distribution costs and raise awareness about the benefits of fresh produce.

Four markets are up and running within Wyoming county. (Warsaw, Perry, Wyoming, and Attica are the locations for these markets.) This enables the markets to reach FMNP coupon recipients, seniors, and the general public who are in desperate need of healthy foods and of education on preparing those foods. The markets create a festive, community event that celebrates the diverse harvest that abounds in our region. The variety of fresh produce will be the ingredients for a healthy meal, and the markets will distribute and educate the public about nutrition, health, new cooking methods and preservation techniques. To date, 12,000 people have utilized the 4 markets. Farmers Market Nutrition Program and senior coupon usage has been maintained. Vendors have increased from seven to 22 throughout the county. Vendors are selling more fresh fruits and produce.



## **Farm-to-School Program Benefits Students, Agriculture and Communities**

Key Themes: Human Nutrition, Agricultural Profitability

Few consumers know where their food originates, and obesity is becoming a national health problem. Particularly alarming is the dramatic increase in overweight among children. National data shows the prevalence of overweight among 6- 17 year olds is now over 15% and is a risk factor for high blood pressure, Type 2 diabetes, stress on joints and overweight in adulthood. Schools and colleges can play an important role in the establishment of life-long healthful and conscious food choices. In an increasingly competitive market, small and mid-sized farms struggle to remain profitable. While New York State (NYS) has the natural resources to produce a wide variety of foods, state production has become much less diverse over time. Processing capacity has also declined dramatically further limiting market opportunities for growers. Between 1978 and 1997, the number of farms declined by 26% and total number of acres farmed declined by 24%.

Focusing on the quality and sources of school and college meals is one way to improve the nutritional quality of children's diets, as well as to strengthen the economic viability of local agriculture. The *Cornell Farm to School Program* is working in partnership with stakeholders to develop and disseminate strategies that incorporate NYS agricultural products into meals served in 6,049 public school cafeterias that feed 27 million children each school day, and in more than 160 college and university dining halls. Farmers, schools, and communities stand to benefit from these farm-to-school initiatives. Schools can provide students with more fresh, nutritious produce, while nearby farmers gain new markets for their products.

The program is forging new connections among farmers, suppliers and educational institutions. In 2001, Cornell held a statewide workshop and a regional conference where over 50 and 180, respectively, food service personnel, farmers, policy makers, and educators helped identify barriers and potential solutions to creating farm-to-school links. Additional interviews with various stakeholders further clarified these issues. Two school districts (Johnson City and Hannibal) serve as farm to school pilot sites, while Cornell University and Vassar College serve as farm-to-college pilot schools. Through the projects, the program is involving an increasing number of farmers, mostly through established suppliers. A program website ([www.cce.cornell.edu/farmtoschool/](http://www.cce.cornell.edu/farmtoschool/)) provides updates on farm to school legislation, describes FTS activities across the state, and provides access to resources on state and federal meals programs, NYS agriculture statistics, and state marketing initiatives. Many other factors, such as costs and revenues, procurement guidelines, and seasonal availability are also being assessed. All NYS college and university-dining directors are being surveyed to assess current practices as well as perceived benefits and barriers to establishing farm to school programs. Discussions are underway about conducting a similar study at the K-12 level.

Public school districts in Johnson City and Hannibal, NY have served as farm to school pilot sites since September 2001. Food service directors in both districts agreed to purchase more NYS products as available, try new recipes with NYS products, and track key indicators for evaluation. During the second year, directors agreed to feature a "New York Food of the Month" on menus and to distribute fliers about the foods. Directors work with their established suppliers, requesting NY grown food as available and cost effective. In Johnson City, the director also purchases some fruits and vegetables directly from a local farmer. The documented value of New York State product purchases since 2001 is \$2,462.70 for Johnson City and \$5,661.95 for Hannibal. Local produce

purchases for September 2003 were more than double those for September 2002. Both districts also held school-wide events with meals featuring New York foods. Both pilot projects were able to incorporate more local products without substantially increasing food service costs.

Cornell University (CU) Dining Services and Vassar College (VC) Dining have initiated farm to college projects as part of the Cornell program. Both institutions sponsored a local harvest week during which New York agricultural products were featured in meals. This past fall both hosted NYS apple tasting events. In one CU dining hall, the executive chef established a New York Vegetable “kiosk” which featured a locally grown vegetable for the dinner meal. A successful purchase agreement was established between CU Dining and a NYS potato producer/processor. This spring VC will host a farm-to-school forum for food service and dining directors, farmers, educators, farmers, and suppliers from the Hudson Valley region.

### **Nursing Home Staff Recruitment and Retention**

Key Themes: Health Care, Jobs/Employment, Workforce Preparation

The problems of nursing home staff shortages and patient care are well publicized and documented. These issues are not unique to Albany County or even the State of New York. Providing quality care is a challenge nation wide and much of the challenge stems from difficulties in attracting and retaining a quality workforce. Cornell Cooperative Extension of Albany County in conjunction with county leadership, nursing home management, and networking with community resources, designed an innovative and flexible plan to recruit and retain nursing home employees. Some of the highlights in the first few months included:

Cornell Cooperative Extension of Albany County facilitates bi-weekly meetings with administrative nursing home staff to identify, discuss, and propose solutions to recruitment and staffing issues. Numerous training organizations have been contacted and a referral process for interested and qualified nursing students as well as other prospective non-nursing referral services is now in place. Cornell Cooperative Extension participates in the nursing home bi-weekly orientation sessions for all new employees to familiarize new staff with the resources and training that Cornell Cooperative Extension has to offer. After the presentation, brochures describing available Cornell Cooperative Extension programs are distributed and a question and answer period is held. An educator from Cornell Cooperative Extension provides on-site retention services at the Nursing Home Facilities for 2-3 hours a day along with a 24/7 telephone availability for emergency issues which may effect nursing home staff's ability to work their scheduled hours. Six open houses were held at two different locations to familiarize all nursing home staff with Cornell Cooperative Extension educational opportunities. Nursing Home employees completed interest surveys to identify issues that may interfere with maintaining employment. Individual counseling sessions have been held and classes and workshops on requested staff topics are being planned.

In the past few months Cornell Cooperative Extension of Albany County has initiated and continues to maintain a dialogue (both in writing and through meetings) with Albany County leadership, Nursing Home Management, and Human Resource entities on staffing and training related to issues at the County Nursing Facilities. Cornell Cooperative Extension keeps all parties involved and up to date by facilitating bi-weekly management and almost daily emails and phone conversations about the latest developments that occur. Follow up takes place on critical tasks with tight deadlines. A

relationship was established with BOCES and several additional training organizations to refer interested and qualified individuals for employment. More than 40 employees considering leaving nursing home positions were retained by providing them with counseling, referrals, or Cornell Cooperative Extension resource information helping individuals resolve issues such as childcare, financial and credit problems, family domestic violence concerns, transportation problems, electrical power shut-offs and housing relocation. In a nine-month period, vacancies at the county nursing facilities went from more than one hundred (100) vacancies down to approximately one dozen vacancies.

### **Teen Parent Nutrition**

Although sound nutrition is essential throughout the life cycle, it is especially important for teenage parents. During the teen years, the consumption of foods containing vitamins and minerals, especially calcium, are essential for continued growth. It is equally important for teen parents to pass their healthy, nutritional habits on to their children. If parents do not know how to eat nutritionally themselves, they will not be able to ensure that their children will get the proper nutrients they need for normal growth and development. Teen parents of low socioeconomic status are at greater risk of incurring nutritional deficiencies as their income is limited, which may contribute to poor food choices. It is especially difficult for teen parents to raise children, as they are practically children themselves. Therefore, there is a great need for teen parents to learn appropriate parenting skills and techniques so that they can ensure the overall safety and well being of their children. In response to these needs, Cornell Cooperative Extension of Rensselaer County provided nutrition/parenting education through the Eat Smart-NY (ESNY) Nutrition Education Program for an initial group of seven teen parents.

Participants in the program have demonstrated increased knowledge of the Food Guide Pyramid, stress reduction, infant and adult nutrition, ability to stretch their food dollars, and kitchen and food safety. They gained skills in discipline and hands-on cooking and expressed an increase in confidence to manage their household nutrition and parenting skills more effectively.

## **GOAL 4 – GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT**

Improving the integrity of our environment and maintaining the ecological systems that enable human prosperity will continue to be high priorities of society, and therefore high priorities of its publicly supported research and educational institutions for the next five years. Growing human populations cause growing consumer demands on the agriculture and food system, which magnifies the challenges of balancing agricultural production and food processing with stewardship and protection of the environment.

CUAES has invested heavily in science to avoid and mitigate impacts of agriculture on the environment. We view the long-term sustainability of agriculture as being inexorably linked to environmental quality. As part of our strategy, we are emphasizing a higher level of integration of research and extension to accelerate: identification of problems, focusing scientific effort to resolving problems, field testing and evaluation of technology and cultural practices, and introduction of environmentally superior innovations/practices to the agricultural community.

The research program is necessarily broad, with complementary thrusts in:

1. Minimization of chemical inputs--(a) research to improve pest management in plant agriculture, (b) development of viable biological control of pests, (c) improved cultural practices (plant systems management), (d) plant and animal breeding research to improve pest resistance and minimize nutrient inputs, (e) soil-plant systems investigations to improve nutrient management, and (f) technological innovations to reduce pathogens associated with animal agriculture.
2. Development of agricultural practices that minimize negative impacts on other natural resource values—(a) protect the integrity of water quality, fish and other aquatic resources, wetlands, terrestrial wildlife habitat, forests, and aesthetic considerations; (b) minimize consumption of energy and petroleum-based materials on farm.
3. Development of environmentally friendly and profitable alternative agricultural products—(a) identify new products and production methods that result in less impact on the environment, (b) develop markets and design marketing strategies that increase profitability of environmentally friendly agricultural products.
4. Improvement of waste management associated with the agriculture and food system—(a) reduce quantity of on-farm waste, (b) improve management of farm-produced waste, including quality and disposal, (c) reduce quantity of waste in food processing, (d) improve management of waste produced in food processing, including quality and disposal, (e) develop scientific understanding of potential for use of agricultural land for environmentally safe application of municipal sewage sludge.

Future research investments will continue to be made in fundamental and applied science areas leading to improvements in chemical management, nutrient management, waste management, and habitat protection on the farm; energy conservation on farm and in food processing; waste management associated with food processing; and natural resource stewardship.

**Issues, Opportunities and Constraints**

Issues--Accelerated time frame of society’s expectations for “cleaning up agriculture” versus reality of pace of science progress, especially given modest funding levels; public image of agriculture and AES system

Opportunities—Keen interest of excellent scientists to address the problems and discover solutions; public support for this kind of work; graduate student interest is high

Constraints—Lack of sufficient federal funding directed at this area so that science can be accelerated (need facilities improvements, fellowships for best grad students, research operating dollars, etc.)—society’s desire for improvements in this area are not matched with financial commitments required to do the job at the rate we all would like; AES’s can move some FFFs to this need, but many other agricultural production needs exist that make it very difficult to redirect large portions of the FFF research portfolio.

**PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 4**

Improves the quality and sustainability of human environments and natural resources.

- Ensure quality and conservation of water supply
- Promote environmental stewardship and sound decision making about the management of natural resources
- Promote community, agricultural, and residential environmental enhancement
- Prepare youth to make considered environmental choices
- Enhance science education through the environments

**Indicator Data Specific to Goal 4**

(For each indicator, both actual and annual target results are included, the latter in parentheses.)

**INDICATOR 4.1** The total number of refereed or peer reviewed articles or materials reporting research on agricultural, natural resource, and environmental policies, programs, technologies and practices and the number of related patents, licenses, or varieties issued.

<b>Year</b>	<b># refereed items</b>	<b># patents, licenses, varieties</b>
<b>2002</b>	271 (255)	1 (2)

**OBJECTIVE 4.1** To develop, transfer, and promote adoption of efficient and sustainable agricultural, forestry, and other resource policies, programs, technologies, and practices that protect, sustain, and enhance water, soil and air resources.

**INDICATOR 4.1.2** The total number of persons completing non-formal education programs on sustaining and/or protecting the quantity and quality of surface water and ground water supplies and the total number of these persons who actually adopt one or more water management practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually Adopt practices</b>
<b>2002</b>	12150 (15000)	5780 (5000)

**OBJECTIVE 4.2** To annually increase producer adoption of agricultural production "best practices" that conserve, protect, and/or enhance the soil resources on or adjacent to agricultural production sites or land uses.

**INDICATOR 4.2.1** The total number of persons completing non-formal education programs on conserving, sustaining, and/or protecting soil resources and the total number of these persons who actually adopt one or more soil conservation practices within six months of completing one or more non-formal education programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt practices</b>
<b>2002</b>	12130 (6500)	3306 (3250)

**OBJECTIVE 4.3** To annually increase the effectiveness of constituent and citizen participation on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.

**INDICATOR 4.3.1** The total number of persons completing non-formal education programs on public policy issues affecting agricultural production and ecosystem integrity and biodiversity and the total number of these persons who actually become actively involved in one or more public policy issues within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually become involved</b>
<b>2002</b>	37704 (30000)	6723 (2000)

**Resources Allocated to Goal 4 (FFF and Match)**

**Dollars x 1000 and (FTE) or (SY)**

	<b>FY2002 Target</b>	<b>FY2002 Actual</b>
<b>Extension</b>	3,184	3,596
<b>Total</b>	(50.4)	(51.2)
<b>Research</b>	2,150	2,286
<b>Total</b>	(13.6)	(41.2)

## **Impact Examples Related to Goal 4**

### **Building Tools for Use in Improving Dairy Farm Profitability While Protecting Water and Air Quality**

Key Themes: Agricultural Profitability, Sustainable Agriculture, Nutrient Management, Agricultural Waste Management, Water Quality

Historically, environmental implications of dairy farming have been poorly understood and consequently, dairy farms have made decisions based more on economic than on environmental considerations. Now, however, the environmental protection component of dairy farm sustainability may become the first limiting factor with recent USDA-EPA requirements for comprehensive nutrient management planning to protect water quality. In New York State, dairy farms account for over 70% of all agricultural economic activity. The sustainability of the dairy industry in New York State will depend on its ability to protect air and water quality from the effects of excess nutrients while maintaining or improving profitability.

A multi-disciplinary group of Cornell faculty, staff, students, extension agents, farmers, agricultural industry and government agencies worked together to develop processes for integrating and applying scientific knowledge necessary to improve dairy farm profitability while protecting the environment. Because of the large amount of information that has to be integrated and applied to address this issue, we focused on the development of computer tools for use in developing nutrient management plans on dairy farms, using the best research information available for application in our state. A family of computerized tools, the Cornell University Nutrient Management System (*cuNMPS*), was developed to incorporate research knowledge to be used as standards in our state in developing nutrient management plans for dairy farms. Included are the Cornell Net Carbohydrate and Protein System (CNCPS) for herd nutrient management and Cornell Cropware for crop, soil and manure nutrient management. Inputs from NRCS were used in the development of Cornell Cropware to insure that its nutrient management plans meet the NRCS 590 Standard for developing Comprehensive Nutrient Management Plans. We developed and trained an extensive network of users of the CNCPS and Cropware.

Farmer based research across dairy farm sizes ranging from 40 to 500 cows was used to evaluate the usefulness of these nutrient management tools. Implementation of herd nutrient management, primarily precision feeding, typically reduced nitrogen and phosphorus in manure about 1/3 while reducing annual feed costs as much as \$13,000/100 lactating dairy cows. Implementing integrated crop, soil and manure nutrient management plans resulted in manure nutrients being efficiently recycled while reducing fertilizer purchases and risk of nutrients leaving the farm in surface and ground water. Linking herd, crop, soil, and manure nutrient management to optimize what can be best grown on the farm while minimizing excess nutrients resulted in reducing purchased N and P by up to 37% and 40%, respectively while reducing purchased feed costs by up to 40% and protecting soil by utilizing grass on hillside land and alfalfa and corn on valley land. The *cuNMPS* has evolved into an ongoing program supported by a Cropware team in Crop and Soil Sciences and a CNCPS team in Animal Science, with a goal of extending these benefits to farms across the state. There are now 585 registered CNCPS users (about half are in New York State). There are 262 registered Cropware users (all New York State) who have used it to develop over 400 nutrient management plans on farms across the state.

## **Reducing Phosphorus Pollution from Animal Waste**

Key Themes: Agricultural Profitability, Sustainable Agriculture, Agricultural Waste Management, Water Quality, Biotechnology

More than 70 percent of the total phosphorus in feed of plant origin is in the form of phytate (myo-inositol hexakisphosphate). Food-producing animals such as swine, poultry, and preruminant calves cannot digest phytate-P because the hydrolytic enzyme phytase is lacking in their gastrointestinal tracts. Thus, expensive inorganic phosphorus, a nonrenewable nutrient, is added to their diets to meet phosphorus needs. More undesirably, the unutilized feed phosphorus ends up in manure and becomes an environmental pollutant, causing eutrophication. Supplemental microbial phytase in diets for swine and poultry obviates the need for inorganic phosphorus addition and reduces manure phosphorus by 50 percent. Serious controversies about phosphorus pollution from animal waste have occurred in many areas of the United States, such as Chesapeake Bay and Onslow, North Carolina. Similar problems exist in New York State because more than 70 percent of manure phosphorus remains on the farm. Undoubtedly, farmers in New York State and elsewhere will have to reduce animal excretion of phosphorus when the Clean Water Act is enforced. Because of the concern over manure phosphorus pollution, farmers in Maryland and Virginia are required by state law to add phytase in poultry diets. However, the two currently commercially available phytases are not fully satisfactory. These enzymes have suboptimal catalytic efficiency, high susceptibility to proteolysis in the stomach, and inadequate stability to resist heat inactivation during the feed-pelleting, rendering them unaffordable for farmers to use in production.

With the continuous support of the Cornell Biotechnology Program, researchers in Cornell's Department of Animal Science have taken two effective approaches to overcome the constraints of current phytase application. First, they have attempted to reduce the fermentation cost of phytase by comparing the efficiency of three bacterial systems and two yeast systems, and they have obtained an impressive yield. Second, they have looked for desirable phytases by cloning new genes and engineering mutants based on three-dimensional structures of various phytases, and, in collaboration with USDA researchers, they have developed a series of new phytases with improved effective pH for activity in the digestive system of animals. Two US patents have been issued to Cornell on the process. Their industry partner has conducted animal tests on the enzymes at four leading institutes and via large scale fermentation tests. Pending FDA approval (applied for in July 2002), a product will be launch by that partner.

Overcoming current limitations to using phytase in animal diets will cut 90,000 tons of phosphorus excretion from animal waste in the United States. It will reduce the need for adding inorganic phosphorus in diets for swine, poultry, and preruminants and save \$2 million in New York State, \$150 million in North America, and \$500 million worldwide. It will preserve nonrenewable inorganic phosphorus and promote sustainable agriculture. In addition, phytate can chelate iron and renders this essential element unavailable for hemoglobin synthesis and other functions, causing anemia and iron deficiency in 50 percent of the world population. The researchers have successfully used their phytases to release iron from whole wheat bread under the normal bread-making condition, so their research will also help prevent iron deficiency and anemia of residents in New York State and elsewhere.



## **Improved Methods to Manage Pesky Dairy Farm Flies**

Key Themes: Animal Health, Agricultural Profitability, Integrated Pest Management

Barn flies (house and stable flies) are significant pests on farms, affecting cattle, farm workers, milk inspections, and community relations. House flies irritate cattle by incessantly crawling on them and flying near their faces; stable flies inflict painful bites and suck blood. The resulting stress, combined with the annoyance of other livestock pests (pasture flies, lice, mange, and external parasites) can reduce milk yields and feed conversion efficiency as well as increase disease transmission and cause blood loss. Furthermore, calves stressed by flies may have lowered performance over their life spans. Yet flies quickly become resistant to insecticides, and it can be difficult to prevent massive population explosions. In addition, the Food Quality Protection Act has mandated a closer look at each pesticide's risk, and some products that dairy farmers rely on may well be taken off the market.

Researchers associated with Cornell's Department of Entomology and the New York State Integrated Pest Management (IPM) Program have developed methods that can keep fly populations at bay, using a combination of cultural, biological, and chemical techniques. Because flies often breed in unanticipated places, it is essential to learn both where and how they reproduce. In fact, sanitation is the single most important factor in successful management, so identifying potential breeding sites, then scouting them for evidence of fly larvae and pupae, is key. Other essential components of sound fly management include monitoring adult populations, parasitoid releases, and traps. Researchers have tested a new sticky trap that promises to be an effective addition to the farmer's fly management arsenal. Because flies become resistant to insecticides so quickly—and because insecticides kill fly natural enemies along with the flies—spraying is the method of last resort. Yet insecticides, judiciously used, are an important aspect of sound fly management, and the Cornell researchers have developed guidelines for using insecticides effectively and sustainably. Research and demonstration activities have also provided opportunities to explore other insect pest problems affecting cattle on pasture. They have also developed web based teaching and resource materials for use. They also have developed web-based teaching and resource materials for use by farmers and Cooperative Extension educators throughout the Northeast.

Studies show that, on average, dairy farmers who use parasitoid releases as part of a fly IPM program use insecticides 80 percent less often than those who rely on insecticides while reducing fly populations by 50 percent. The cost of parasitoids is more than compensated for by the savings on sprays. Reduced insecticide use, in turn, protects the parasitoids and slows down development of insecticide resistance. Eight farmers with a combined total herd size of 7,000 milk cows are collaborating in the current trials, which are also weighing the uses, costs, and benefits of sanitation and sticky traps. Although the results are preliminary, this project has demonstrated reductions in both the costs of fly management and the amount of insecticides used. Adoption of this new sticky trap technology is most likely suited to stanchion style and calf greenhouse animal housing facilities. Exploration of other new fly traps on pasture has been an extension of this mechanical form of pest control. Producer meetings along with teaching materials and fact sheets—both web based—have made this information more readily available than ever.

## **Hydrologically Sensitive Areas: Developing Water Quality Solutions**

Key Themes: Water Quality, Wetlands Restoration and Protection

Current models for predicting pollution risks, landscape management practices, and watershed planning strategies aimed at protecting water quality lag scientific understanding by several decades, especially with respect to hydrology. For example, in the Northeastern U.S. water quality models and management practices ubiquitously assume surface runoff, an important pollutant transport mechanism, is generated when rainfall intensity exceeds soil infiltration capacity despite decades of scientific evidence that the region's runoff is rarely produced this way. Rather, surface runoff is produced from small fractions of a watershed that, because of a system of interconnected hydrological processes, are prone to saturate. New water quality tools need to be developed, contemporary scientific findings need to be made more accessible to water quality professionals, and educational curriculum's need to be updated in order to create an environment where water quality issues can be addressed using the best scientific understanding. Activities were designed to develop new water quality prediction tools, disseminate information, and continue investigations into the basic and applied sciences associated with pollutant transport in the landscape.

Among new tools developed is a suite of new modeling concepts and codes. The Soil Moisture Routing model (SMR) was developed specifically to simulate the unique hydrology that dominates New York State, by incorporating important hydrological processes that no previous models considered. Popular and traditional models like TOPMODEL and the Soil Conservation Service "Curve Number" (SCS-CN) method have also been reinterpreted and modified to account for the hydrological controls that govern New York watershed hydrology. Experience shows that modelers are more likely to use new versions of models with which they are familiar than to apply brand-new models.

In process of development are web-based resources for information dissemination for educators, water quality professionals, and producers. The web resource will include a tool to determine hydrological sensitivity for any location in New York State, starting with Delaware County. Field and laboratory research activities are ongoing to improve the understanding of basic watershed hydrology, especially in the context of pollutant and nutrient transport. As new insights are discovered, they are immediately employed in teaching, extension/outreach, and tool development activities. Findings and emerging concepts are aggressively published in appropriate professional and popular journals, as well as serving as the basis for professional conferences and meetings presentations.

This project has coined several key concepts that have become part of the water quality vernacular and are helping shape the ways people are addressing water quality solutions. Two of the most popular newer concepts are "Whole Farm Planning" and "Hydrologically Sensitive Areas," abbreviated as "HSAs." These concepts are encouraging water quality professionals and land managers to perceive watershed activities within the larger, dynamic hydrological system. This is a major and fundamental change from traditional approaches that focused on static, point specific characteristics such as soil type or local land slope.

Modeling efforts have been well received by scientists and practitioners alike. Although the Soil Moisture Routing model (SMR) was originally developed to characterize New York's unique hydrology, it has found wide application throughout the Northeast, Idaho, Missouri, and other areas with similar hydrology. Also, reinterpretations of the Soil Conservation Service "Curve Number" method are now being incorporated into the USDA's popular water quality model, SWAT, and SWAT developers are being assisted in this endeavor. Finally, because this project's investigators are also instructors, graduate and undergraduate students benefit from our continuously updated course curriculums. Course topics regularly precede inclusion in the latest textbooks.

### **Nutrient Management Planning for Vineyards**

Key Themes: Nutrient Management, Water Quality

Most grape production in the Finger Lakes is on slopes surrounding Canandaigua, Keuka, Seneca, and Cayuga lakes. The lakes are a source of drinking water for several cities. Tourism and lake cottages (with vocal and politically active urban and suburban owners) depend upon clean water, and society is demanding that agriculture, including grape growers, be environmentally responsible and reduce potential for impacts on surface and ground water. Grape production practices generally produce low impacts on the environment. Fertilizer use is moderate, and the main issue is nitrogen (phosphorus is not applied to vineyards). Potential water contamination from pesticide use is mitigated by extensive use of diversion ditches, ground covers, buffer strips, and mulching to manage vegetation on the vineyard floor. A major task for growers is to improve their management to the extent possible, and to also demonstrate to their neighbors that they are producing grapes in an environmentally responsible manner.

In cooperation with Soil and Water Conservation Districts in Yates, Steuben, Seneca, and Schuyler counties, the Finger Lakes Grape Program worked with 14 growers to complete comprehensive nutrient management and conservation plans for their vineyards. These plans include completion of Agricultural Environmental Management worksheets, soil and petiole testing on up to 12 vineyard blocks, and recommendations for optimizing soil nutrients and pH, while avoiding excessive runoff and leaching by pesticides and nutrients. Four plans were completed in 1999, and an additional 10 were completed in 2002.

Fourteen vineyards, totaling over 600 acres of grapes in the Keuka and Seneca Lake Watersheds have completed plans. Most demonstrated low rates of erosion and extensive use of soil conservation practices (diversions, drainage, filter strips). Additional practices (construction of pesticide mixing and loading facilities) were installed in several of the vineyards; others are planning to do so. In the most recent Seneca Lake project, RUSLE (Revised Universal Soil Loss Equation) calculations showed that erosion was below maximum sustainable rates in only 3 of 80 vineyards included. Several growers apply low rates of N (0-30 lb actual per acre per year), and time it to maximize uptake and minimize leaching and runoff. Growers applying higher rates sometimes had high residual levels of N in their vineyards at the end of the season. Now that this is documented, they have the tools to be able to reduce rates to better match uptake and timing.

## **Safe Disposal of Surplus Pesticides**

Key Themes: Hazardous Materials, Recycling

An appreciable amount of agricultural pesticides that have little, if any, value in agricultural production and need an outlet for proper disposal exists on farms, homes and at sites of defunct businesses. Often, individuals do not know how to safely dispose of these pesticides, as the rules and regulations for transportation and disposal can be complex and costly. The Agricultural Clean Sweep program offers an opportunity to properly dispose of unwanted, unusable, and illegal pesticides, and to educate to minimize future pesticide accumulation.

Cornell Cooperative Extension worked collaboratively with Monroe County's Department of Environmental Services and the Monroe County Farm Bureau on this effort, with substantial funding provided by the NYS Soil and Water Conservation District. Participants learned about this effort through posters, direct mailings, word of mouth, and notices at local meetings. Registrations were confidential and handled by the Farm Bureau. All products were initially screened by Extension's agricultural staff for product eligibility and exchange. Notification, consultations, and training were provided by Extension, as well as verification of products on the day of the collection.

The collection held on March 9, 2002 went smoothly with no incidents. Advance scheduling and experience enabled the prompt processing of fourteen participants, who disposed of 3.3 tons of unwanted and unusable pesticides. Approximately 25% of the participants were from defunct and active agricultural businesses, another 25% were landowners that inherited pesticides, and the remainder were farmers. Some of the materials collected include DDT, mercury-based pesticides, Chlordane, lead arsenate, Malathion, and Methoxychlor. The Extension Educator was able to place a number of pesticides with other farmers for use; the largest farmer-to-farmer exchange was 300 pounds of copper sulfate. The total direct cost of the project was \$10,700. This was the third Clean Sweep that Monroe County residents have participated in accounting for 14.5 tons of properly disposed of pesticides. Due to rapid changes in agricultural technology and the advent of genetically modified organisms, there exists the potential for increased future need of disposing of unwanted, illegal and unusable pesticides. Therefore in conjunction with Monroe County's Department of Environmental Services, applications for grant funding are being submitted in order to conduct a future CLEAN SWEEP.

## **Core Pesticide Training for Amish Farmers**

Key Themes: Pesticide Application, Human Health

There is a large population of Amish in the Conewango, NY area. Their religious beliefs limit their acceptance and adoption of technology. Very few of this population attended pesticide trainings or became certified pesticide applicators. A local feed and chemical dealer became concerned that the Amish were limited in pesticide choices for crop protection and may not be using the general use pesticides correctly or safely.

CCE Allegany/Cattaraugus Counties developed a special pesticide training for Amish using flip charts instead of the normal PowerPoint presentation. This presentation was done at the local feed

mill making it easily accessed to the Amish population. The training was immediately followed by certification testing by the NYS Department of Environmental Conservation at the same location.

All nineteen of the Amish farmers attending the training passed the core and private field and forage exams to become NYS certified private applicators. Those farms that now have certified applicators now have more choice in pesticides available for crop protection. Additionally, several of these farms have contacted CCE Allegany/Cattaraugus Counties for recommendations on pesticide materials and effectiveness. Those attending become more aware of safety issues in storing and using pesticides. The Amish have asked that CCE and NYS-DEC do an on farm demonstration of proper spraying techniques using Amish equipment.

### **Natural Rendering Protects the Environment and Saves Dollars for Small Scale Butchers**

Key Themes: Agricultural Waste Management, Composting

Small-scale butchers who provide custom butcher services to the livestock farms were faced with severely escalating costs for offal and meat scrap disposal. These costs sometimes increased 6-fold because of changes in regulations regarding feeding of meat and bone meal to ruminant livestock. Consumers were also concerned about the safety of their meat supply and this led to almost complete abandonment of the practice of feeding these products to poultry. Thus, renders changed from purchasing these products to charging pick-up fees to butcher shops for disposal. An alternative disposal method was needed in order for these businesses to continue to provide affordable services to local farmers and consumers. At the same time, the cost of pick-up of animal carcasses had increased to up to \$75 for a cow, where pick-up still was available. Many dairymen were electing to dispose of dead stock with on farm burial. Many were failing to adequately cover the carcasses they were burying leading to environmental and neighbor relation concerns. A manageable alternative was greatly needed by these agriculturalists also.

Ten demonstration sites, including Empire Farm Days, established across the state provided an opportunity for people to see the composting process being used by their peers. A videotape and fact sheet were developed depicting the process and explaining it. Compost from the demonstration sites is being tested to assure the safety of the process. A statewide composting specialist worked with the site hosts to evaluate and modify the composting methodology being employed to assure the composting process was effective.

The adoption rate among butchers has been very high. In Allegany and Cattaraugus Counties, 4 of 5 small-scale butchers who also have a farm have adopted the composting process. It is estimated that 20 percent of dairy farms, particularly large ones, have implemented on-farm composting of animal mortalities. Early test results of butcher waste and mortality compost show pathogen kill is effectively being accomplished through the composting process. The compost is also higher in nutrients; nitrogen, phosphorus and potassium than typical vegetative compost giving it greater fertility value for on farm use.

## **GOAL 5 – ENHANCED ECONOMIC OPPORTUNITIES AND QUALITY OF LIFE FOR AMERICANS**

Economic and social well-being are deeply intertwined through opportunities for healthy human development that is nurtured by strong families and communities. Over the next five years, the significance of the local community in economic and human development will become increasingly important as federal and state governments continue to devolve authority and accountability for employment, education, public health, social services and general enhancement of a more self-reliant population.

Cornell's research program in these areas includes faculty from the College of Human Ecology and the College of Agriculture and Life Sciences. Their interests are in economic development (especially in rural communities), human development from pre-natal through elderly stages of the life-course, and design that centers on human environment, health, and well-being. Research areas of current interest include the following:

### The Economy

- Collaboration with New York State business and industry in fiber science such as ceramic composites, adhesion problems in fiber glass reinforced circuit boards, and fatigue of joints in plastic pipes, and application of computer-assisted design and manufacturing to the textile and apparel industry through the Apparel Industry Outreach that provides educational programming to firm in the New York metropolitan area and throughout New York State;
- Health and welfare economics, local economic effects of changes in the health sector including mandated managed care for Medicaid and Medicare recipients, consumer behavior in medical care choice and disease prevention, effects of taxation policies on alcohol consumption, health impact of unemployment, and the effects of public finance policies on low-income households and development of human capital;
- Family-based businesses and the interplay between family dynamics, inter-generation transfer of ownership, and economic viability, and time-use in households as it affects household and non-household productivity;
- Management of the nonprofit sector including improved techniques for planning and evaluation, inter-organizational collaboration at the community level, strengthened volunteer involvement in local communities, and organizational change.

### Family and Community

- Human development and family functioning, including cognitive and personality dynamics, biological bases of personality and abnormal development, language development and intellectual growth in infancy and early childhood, the effects on human growth and development of parenting practices, family and school environments and child care programs, and the impact rural work opportunities and community resources on retirement and life-transition decision making;
- Health care cost and quality including finance and organization of health care, employer-financed health insurance, the effects of managed care on service quality, equity and access, and Medicaid and Medicare policy, health and menopause among rural women;
- Social welfare and family policies and programs including issues of child support, foster care, adoption of hard-to-place children, the effects of divorce on children, and management,

leadership and evaluation of human service organizations, food security and food resource management;

- Rural economic and community development including local government and business collaborations on job development and community decision making, rural housing quality and community vitality including issues of affordability, energy efficiency and structural integrity, rural housing conditions and children's psychological development, youth development and mentoring, housing for the elderly and disabled, interior design including furniture and facilities for the elderly, Alzheimer's patients, and child care facilities.

### The Human Environment

- The effects of the physical environment on the workplace and employee including innovative workplace design, non-territorial offices, technological infrastructure, work processes, and formal and informal organizational policies and practices, home-based telecommuting and virtual work environments, the effects of ergonomic factors such as office lighting, computer stations and ventilation systems on employee health and productivity, impact of environmental toxicants such as low-level lead exposure on child development, air and water quality and toxic substance safety for households and communities;
- Innovative uses of computers in design decision making and design education, creative problem solving, human/computer interface issues, and visual, historical and cross-cultural bases of interiors, apparel and textiles;
- Health and safety issues including apparel design that protects employees from workplace contaminants and injury including HIV and other blood borne pathogens, development of new methods to determine skin exposure from pesticide contaminated clothing;
- Fiber science applications to understand the mechanics of fibrous materials, the micromechanics of failure processes, plasma surface modifications, and the development of fiber-based synthetic prostheses and surgical aids.

Future investments in research should be targeted at efforts that (1) link empirical findings to planned economic development and other extension programs; (2) integrate economic with other social science perspectives for a deeper understanding of the influence of family, organizational and community factors on long term development of human capital; (3) integrate biological and psychological approaches to healthy human development; (4) strengthen collaboration among and between business and community organizations in furtherance of economic development and the quality of community life; (5) speed the diffusion of scientific innovation to commercial development that benefits small business and community-based enterprise, (6) integrate the social sciences with information science and its application.

**PERFORMANCE GOALS FOR INITIATIVES RELATED TO GOAL 5**

**Develop the competence and character of youth and adults in families and communities.**

- build strong families;
- develop capable, responsible, and caring young people;
- promote healthy, supportive communities;
- increase financial well-being
- support informed housing choices

**Strengthen the economic and social vitality of communities.**

- empower communities so that they are viable, dynamic, and sustaining;
- expand skills of both the current and future workforce;
- leverage and apply private and public sector resources wisely;
- enhance small business development and management; and
- develop, enhance, and retain a strong agricultural industry.

**Indicator Data Specific to Goal 5**

(For each indicator, both actual and annual target results are included, the latter in parentheses.)

**INDICATOR 5.1** The total number of refereed or peer reviewed articles or materials reporting research on community or family economic or social well being.

Year	# refereed items
2002	207 (200)

**OBJECTIVE 5.1** To increase the capacity of communities and families to enhance their own economic well-being.

**INDICATOR 5.1.2** The total number of public officials and community leaders completing non-formal education programs on economic or enterprise development and the total number of these public officials and community leaders who actually adopt one or more recommended practices to attract new businesses or help expand existing businesses within six month after completing one or more of these programs.

Year	Output: # persons completing Programs	Outcome: # who actually adopt practices
2002	2918 (3500)	1122 (850)

**OBJECTIVE 5.2** To annually improve the financial status of families through financial management education programs implemented in which CSREES partners and cooperators play an active research, education, or extension role.

**INDICATOR 5.2.1** The number of persons completing non-formal financial management education programs and the total number of these persons who actually adopt one or more



recommended practices to decrease consumer credit debt or increase savings within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt practices</b>
<b>2002</b>	21648 (10500)	6924 (4000)

**OBJECTIVE 5.3** To increase the capacity of communities, families, and individuals to improve their own quality of life.

**INDICATOR 5.3.1** The total number of persons completing non-formal education programs on community decision making or leadership development and the total number of these persons who actually become actively involved in one or more community projects within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually become involved</b>
<b>2002</b>	11419 (6500)	5090 (3000)

**OBJECTIVE 5.4** To annually increase the incidence of strong families resulting from non-formal education programs.

**INDICATOR 5.4.1** The total number of dependent care providers completing non-formal education programs and the total number of these dependent care providers who actually adopt one or more new principles, behaviors, or practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt new principles, etc.</b>
<b>2002</b>	9890 (7500)	6842 (3200)

**INDICATOR 5.4.2** The total number of persons completing non-formal education programs on parenting and the total number of these persons who actually adopt one or more parenting principles, behaviors, or practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt principles, etc.</b>
<b>2002</b>	12870 (20020)	8116 (8500)

**INDICATOR 5.4.3** The total number of persons completing non-formal education programs on youth development and the total number of these persons who actually adopt one or more youth development principles, behaviors, or practices within six months after completing one or more of these programs.

<b>Year</b>	<b>Output: # persons completing programs</b>	<b>Outcome: # who actually adopt principles, etc.</b>
<b>2002</b>	32093 (18000)	26158 (11000)

**Resources Allocated to Goal 5 (FFF and Match)**

**Dollars x 1000 and (FTE) or (SY)**

	<b>FY2002 Target</b>	<b>FY2002 Actual</b>
<b>Extension Total</b>	4,842 (80.6)	5,404 (81.6)
<b>Research Total</b>	1,825 (11.5)	1,596 (28.7)

## **Impact Examples Related to Goal 5**

### **"In-Touch" Science for Special Audiences**

Key Themes: Youth Development, Workforce Preparation

The national effort to make science education relevant demands community support and family involvement. Science inquiry experiences are especially important for populations with special needs as they are often excluded from general programs. The In-Touch Science program was developed by a cross-department team of faculty at Cornell University. It trains parents, community volunteers, and educators to deliver investigative science experiences to youth in grades 3-5. Youth learn about animals, chemistry, engineering, the environment, nutrition, plants, and textiles. The curricula are adaptable to many audiences, but special attention has been given to engaging girls, Native Americans, and children with special needs. In the summer of 2001, In-Touch Science was offered to a new audience--adults who function at a third to fifth grade level. Offerings to this audience were expanded in 2002 with workshops for members of the Association of Special Needs Camp Professionals.

More than 1,600 adults and 20,000 youth have participated in the program in 47 states through 4-H clubs, scouts, camps, schools, school-age child care programs, and community organizations. National training continued through 2002 to extend the experience to new audiences. Analysis of facilitator evaluation for 100 children in 1996 and paired pre- and post-tests for 200 children in 1998-99 indicated increased knowledge of science fields and improved ability to communicate about science. In 2001, participating adults interviewed by e-mail or telephone revealed that 41 percent of the respondents are still using In-Touch Science. The majority report that the children are enthusiastic about the program and are increasing their ability to communicate about science. The leaders report an increased comfort level in facilitating science activities with children. Data from a summer camp experience with 12 developmentally delayed adults indicate the usefulness of experiential science for this audience. Information was presented in seminars and with posters at 8 national, 9 regional, and 8 state conferences; the program conducted 32 workshops and administered 60 train-the-trainer grants; developed a portable exhibit and teaching kits; and maintained a website.

### **Moral Education in Schools**

Key Themes: Character/Ethics Education, Conflict Management, Communication Skills, Youth Development

Students' lack of concern and respect for themselves, others (including authorities), and society has led to violence of many forms in schools. Whether it be verbal abuse, bullying, physical harm to people or property, or murder, schools have had to address issues of safety.

A researcher in Cornell's Department of Education examined the ways that people become aware of moral problems, issues of personal responsibility, personal decision making and reflective judgment, and the relationship between what one thinks about and what one actually does or should do in situations of conflict. Research interviews and observations in classrooms led to psychological approaches (cognitive, ethical, emotional) to how people think about ethical issues they experience

in their everyday lives, whether in schools, classrooms, or personal lives, and the development of a model by which moral thought and action interact dynamically with reflective thought to bring about higher levels of moral thinking, moral sensitivity/awareness, and more conscious reflection on acting morally. Presentations and workshops were conducted with schoolchildren in Ithaca, N.Y., to help them identify moral problems, think about their own thoughts about those problems, challenge them to think differently to respect others and authority, and to act morally and peacefully to resolve or prevent conflicts that lead to emotional and physical violence.

Ithaca teachers are using these theories and approaches to modify children's behavior. When bullying, teasing, conflicts of property damage, or disrespect for authority issues arise, teachers draw parallels between the learning activities introduced and the incident to bring about changes in students' thought and behavior. Classrooms have become more civil, and students pride themselves for acting in morally responsible ways. The goal of the project is incrementally to bring about moral awareness, change moral cognitions, stimulate reflective thought on actions, then create a stimulus for acting morally in personal and community relationships. This is achieved through deliberate psychological education for thinking about moral issues and actions that affect interpersonal relationships and community life. The benefit is a more peaceful, respectful community where people take pride in their moral character and actions.

### **Increased Consumer Knowledge about Insurance Purchases**

Key Themes: Consumer Management, Family Resource Management

Inadequate consumer knowledge is believed to limit the competitive functioning of insurance markets and be a major reason for government regulation of these markets. Insurer policy forms, advertising claims, marketing materials, and agent sales practices are all regulated because of imperfect consumer information. However, restrictions on insurer behavior cannot assure that consumers make sound purchase decisions. Consumer information and education is an important supplement to government regulation. A Cornell University study sought to assess the state of knowledge among New York consumers regarding insurance. The study examined consumers' knowledge of insurance products, information search practices, decision-making processes, confidence in decisions made, preferences for learning about insurance products, and confidence in the reliability of insurance education options available as well as the likelihood of their using educational materials and opportunities.

Preliminary conclusions suggest that outreach efforts should focus on creating user-friendly, readily accessible consumer information on specific insurance topics. Short, readable publications that can be accessed by consumers directly, or distributed at times when and in locations where persons are most likely to access the noncommercial information needed for making insurance decisions, are the most likely to be effective. The research findings were presented to Cornell Cooperative Extension (CCE) educators at inservice education opportunities in March 2000 and October 2001. A list of high-quality teaching resources for insurance education was prepared for and distributed to extension educators. One-page, downloadable fact sheets containing basic information about individual insurance types are posted to a financial education web site being created by Cornell's Department of Policy Analysis and Management in collaboration with the Department of Education. The web-based materials are marketed widely throughout the CCE system and to other outreach educators statewide and throughout the land grant university system.

As consumers become knowledgeable about the principles of insurance and learn how to evaluate and understand features of insurance products, they will be capable of making better decisions about how to protect themselves from financial risk and loss. Additional funding has been secured which will allow evaluation of the impact of web-based insurance education materials on consumer knowledge, confidence, and competence in making sound consumer decisions for insurance products.

### **“CommuniTree” Stewards Program**

Key Themes: Community Development, Green/Ornamental Agriculture, Forest Resource Management

Following the devastating effects of local storm events, municipalities across Central New York are replanting their urban forest. Municipal leaders want to replace or rejuvenate the urban forest because of the multiple benefits for the community. While over 1000 trees were planted throughout Onondaga County in the past 4 years, very little if any funding went to sustaining the investment through maintenance. Citizens are willing to donate time towards improving the condition of the urban forest with proper training.

In an attempt to provide research knowledge in support of community solutions, CCE of Onondaga County undertook a pilot volunteer training project, “CommuniTree” Stewards. Volunteers participated in 8 hours of training on how to inventory, assess, and sustain urban forests. Payment for this free training was in the form of each individual volunteering 20 hours of time on community forestry projects that municipal staff defined. An educated workforce then applied knowledge as they actively planted and maintained young trees on community parks.

By the end of its first year, “CommuniTree” Stewards watered, mulched, staked, and pruned at least 500 of trees. Volunteers also were involved with cutting edge research. For example, CommuniTree Stewards initiated a watering program to water recently reintroduced disease resistant American Elms. Volunteers inventoried two county parks. This data for superintendents will initiate the development of management plans for trees on these parks. Pruning efforts on over 400 trees will reduce future storm damage impacts and make existing trees more likely to survive these storms. Collectively these efforts save parks money in the long-term through improving the health and survival of trees and preventing future damage. Volunteers have opportunities to meet their community neighbors, receive professional training, and give something back to their community.

### **Landscape Worker Training**

Key Themes: Ornamental/Green Agriculture, Workforce Preparation, Workforce Safety

Like many areas throughout the northeast, Washington County has experienced a gradual erosion of the traditional (50 cow and less) family dairy farm that has been the backbone of the agricultural economy within the county. In an effort to encourage our historic client base and newcomers to agriculture to consider alternatives that will support an agricultural lifestyle and economy, Cornell Cooperative Extension has provided research based information to support horticulture related businesses. Washington County, because of its proximity to the Capital District, has realized a

growth in homeowners that have the desire and the income, but perhaps not the time, to maintain their own home landscape.

The specific response of CCE in Washington County was to provide a comprehensive 5-day landscape maintenance training program for individuals that lacked the experience or schooling necessary to work in the landscape industry. The training included horticultural and pest management topics, equipment maintenance, operation and safety and professionalism and customer service. CCE also helped course graduates secure jobs in the landscape industry.

Fourteen individuals completed the entire agricultural workforce training positioning themselves to be well prepared, capable prospective employees for the landscape industry. Eighteen others attended portions of the training. Two weeks following the training, nine individuals had secured full time jobs with a landscape related firm, while twelve individuals had been placed in seasonal or part-time positions. NYS pesticide applicator recertification credits were provided to ten people. Six of the students took the NYS Pesticide Applicator Certification exam. Twenty-six individuals completed the tractor safety portion of the course (which also included information about operation and maintenance). Twelve people were safety fit with respirators and also completed a pulmonary function test administered by an agricultural health nurse. Due to the unique, hands-on, nature of the program and the limited enrollment, we have had inquiries about employee training from established landscape firms and from prospective students. This has helped establish Cornell Cooperative Extension in Washington County as a source for horticultural information in a county where our agricultural programming has been historically oriented towards dairy.

### **Franklin County Even Start Family Literacy Program**

Key Themes: Literacy, Families at Risk

High poverty and low literacy families are the focus of the Franklin County Even Start Program. The unemployment rate hovers around 9%; 30.6% of adults are without a high school diploma; domestic violence is on the increase, and adolescent live birth rate is nearly double that of the rest of NYS.

Franklin County CCE formed a partnership with the Franklin/Hamilton/Essex Board of Cooperative Educational Services in 2000 and applied for Even Start funding through New York State. The goals of this partnership are to assist 30 low-income families by providing:

- literacy-based activities to families and through those activities help parents provide safe, stable and nurturing home and community environments for the children
- literacy training that will enable parents to obtain gainful employment
- help to parents so children be ready to learn when they enter school

In just the past six months five young women have received their GED diplomas and three of the five have been accepted at the local community college. Of the other two, one is now employed full time and the last is in the process of applying for admittance to college in January. Children of the families we have served have increased their percentile rank on the language assessment tool that is used by Even Start Programs across NYS. These children will be better able to succeed in school.

## **Teen Job Coaches**

Key Themes: Workforce Preparation, Youth Development

Each year, after conducting the 21-hour Youth Employment Training (YET) with teens, Extension 4-H staff identifies a core group of young people who lack the skills and competencies to hold a job. Teens are accepted into the YET program based on a PINS designation, classification in school or being eligible for free lunch. Most of them are having difficulty in school, and are considered at-risk for school dropout, pregnancy or substance abuse. In past years, such young people would have been told there were no appropriate positions for them. However, in the summer of 2001, the Department of Social Services offered TANF funding to support the development of these skills and competencies in youth from needy families. It was believed that helping these teens become successful in the workplace, would give them an opportunity to move into responsible, self-sufficient adulthood by reinforcing youth assets and resiliency and avoiding risky behaviors.

It was determined that teens would benefit from monitoring and guidance from job coaches who would work alongside them several hours a week. Working in tandem with the Rockland County Youth Bureau, CCE hired twelve individuals as job coaches in July 2001. The coaches were trained to visit the teens at work, help them break down their responsibilities into manageable tasks, speak with the employers regarding assigning work and setting expectations, monitor the teens' performance, provide feedback and intervene when behaviors or communication became problematic. It was expected that the coaches would slowly wean the teens away from their support by giving them the confidence to know they could succeed in dealing appropriately with workplace challenges. Most of the coach's work ended in September when students returned to school but two continued part-time, coaching teens in after school jobs. Again this summer (2002), a corps of job coaches was trained and to accompany teens who were being introduced to their first job or whose job last summer was not a positive experience.

Outcomes for program participants have been positive:

- Sixty-four teens, formerly considered unemployable, were placed in part-time jobs.
- 34 students with special needs were able to be successful at community-based vocational training experiences.
- 54 students were able to develop work habits and attitudes appropriate to the world of work.
- All students' understanding of employers' expectations was clarified and increased.
- On seven occasions, teens who were capable of producing more than was expected were given increased responsibility.

## **Advancing Youth Development: A Professional Development Training for 21st Century Youth Workers**

Key Themes: Youth Development, Youth at Risk

The initial need was for a comprehensive, research-based training in youth development at an affordable price for youth workers in Orange County. A second need was to provide youth workers with "best practice" strategies for engaging high risk youth. The final issue was to address the high rate of turnover amongst youth workers. The target audience is frontline youth workers who work

with higher risk youth and families in Orange County. Although this audience is charged with serving this critically stressed population, only 49% of these youth workers have ever had youth development specific training. In addition, (39%) of these workers have only 1 to 4 years of experience, and 11% have less than 1 year of experience in the field of youth development. Most have engaged higher risk youth without a research based foundation in this area. About half of the youth workers expect to remain in the field of youth development for 10 or more years clearly indicating a need for comprehensive training that leads to well trained and competent staff that are retained by the various agencies and institutions serving higher risk youth in the county.

Cornell Cooperative Extension of Orange County in collaboration with the Orange County Youth Bureau and several youth development agencies provided an educational response in the form of an ongoing professional development training for youth workers in Orange County. The goal is to develop a cadre of front line youth workers trained in research based youth development that are proficient in serving higher risk children, youth and families. Specifically, 6 semi-annual trainings have been provided since January of 2000. A total of 11 facilitators were trained in the Advancing Youth Development curriculum comprising 3 facilitation teams. Team members were from 6 agencies including CCE, several youth development organizations, county and municipal youth bureaus.

100 front line youth workers have been trained to date in this 28 hour course, (35 for 2002). Participants come from several modalities of youth work including education, recreation, prevention, youth development, treatment and detention. Trained participants indicated in post AYD training surveys that they would be sharing their improved skills, learning and practices with 833 staff colleagues, 9,849 higher risk youth, 2,164 parents, 137 board members, 115 other policy makers and 780 volunteers (cumulative).

A final evaluation of youth workers that completed the most recent round of training strongly indicated an increase in three areas for these workers: 1) perception as professionals, 2) identification with exemplary youth development practice, and 3) professional application of this practice to benefit youth, families and communities. A survey of agency directors that sent staff to the training indicated agency satisfaction with the training with 66% indicating training needs of their staff were met and that quality of services for youth were improved as a result.

### **College Interview Program- Successfully Navigating High School**

Key Themes: Youth Development, Workforce Preparation

Youth throughout New York City have expressed the need for support on how to get into college that they cannot obtain from their schools and guidance counselors. Now in its 10<sup>th</sup> year, the College Interview Program is held in a community setting and shows the power of providing young people with the knowledge and skills to successfully navigate the complex system from high school to college. Listening and responding to feedback from program participants that high school years are often too late to prepare for college and/or careers, CUCE-NYC introduced the *Navigating High School* component of the College Interview Program.



Last year four high school seniors-- two are now students at Cornell and two attend college in New York City-- developed and presented the first workshop to 20 students. Other high school seniors in our programs remain committed to sharing their knowledge and experiences with younger youth. Now it its second year, *Navigating High School* is geared toward middle school youth and their parents and is taught by high school juniors, seniors and recent graduates. Older youth share with their younger peers the benefits of working hard in high school and the pitfalls and obstacles they may confront; the younger youth see role models in action. The College Interview Program regularly integrates participant feedback to improve the program.

Last year, the program reached over 200 youth and 50 parents. While this program is not externally funded, the number of collaborators continues to grow. Among the 25 partners are: CUNY, SUNY, Cornell University, Pace University, Eugene Lang College, Fordham University, Job Corps, NYPD/NYFD, Americorps, Teach For America, Metro Alumni Association of Teacher's College, Columbia University, NYC high schools and volunteer professionals in law, education, medicine, civil service, and finance.

## STAKEHOLDER INPUT PROCESS

During this reporting period, the stakeholder input approach jointly utilized by Cornell Cooperative Extension (CCE) and the Cornell University Agricultural Experiment Station (CUAES) transitioned fully to the new statewide program development structure and process outlined in last year's report. The establishment of program advisory councils and program work teams was intended to markedly improve program focus, relevance, development and priority-setting via greater stakeholder engagement, campus-field staff interaction, and research-extension integration.

Five Program Councils (PCs) now exist in each of the common CCE/CUAES theme areas, including *Community and Economic Vitality*, *Quality of Life for Individuals and Families*, *Natural Resources and Environment*, *Youth Development*, and *Agriculture and Food Systems*. Each council is composed of external stakeholders, Cornell department chairs, and county extension association executive directors. In all, the total number of individuals serving on the councils tallies 136, including 68 externals. The PCs advise the directors of CCE and CUAES on annual statewide program priorities, review Program Work Team (PWT) performance and "gaps" in programmatic coverage, and comment on the relevancy of preproposals seeking Federal Formula Fund (FFF) support. The PCs held their second annual set of conferences on the Cornell campus during the week of January 13-17, 2003.

Because the new PCs were yet to be formed by fall of 2001, annual priorities (used in soliciting FFF preproposals for the FY02-03 funding cycle) were distilled from individual county extension association plan-of-work updates, priorities previously developed in 2002 by Statewide Program Committees, and program needs identified by the new PWTs in their originating petitions. For the FY03-04 funding cycle, however, the Program Councils developed and conveyed the annual program priorities for inclusion in the FFF RFP. The FY03-04 priorities are attached as Appendix A. Programmatic responses to these priorities should begin to be reflected in the FY03 annual report but may not come to full fruition for another 2-3 years.

A publicly-accessible website (<http://www.cce.cornell.edu/admin/program/pwts>) now provides comprehensive background and details about the new Program Council-Program Work Team structure and process, including listings of works teams and councils, membership information, public announcements, originating PWT petitions, and PWT annual reports.

An open petitioning process undertaken in 2001 resulted in CCE/CUAES jointly approving 35 Program Work Teams that year. In 2002, the PCs identified programming "gap areas" unaddressed by PWTs, which resulted in a call for new teams focused on these gap areas in spring of 2002. Three additional PWTs were thus authorized in fall of 2002, resulting in the current total number of 38 teams.

All PWTs are self-selected and self-directed affinity groups of external stakeholders, county extension educators, and campus-based researchers and extension specialists. PWTs are required to identify program needs in their selected issue areas and carry forth plans of work to meet those needs. PWTs are expected to nurture research-extension integration, to encourage campus-field interactions and collaborations, to take multi-disciplinary approaches, to evaluate their efforts, and to involve external members in all aspects of their work. They are also expected to seek external funding support, and to report annually on their accomplishments to appropriate PCs. PWTs are

sanctioned for 2 or 3 years. Approximately 750 individuals now serve on at least one PWT, including more than 260 external stakeholders. The externals come from the business, banking, local/state/federal government, non-government organization (NGO) and educational sectors.

Beyond the new program development and stakeholder input structure/process, each of CCE's 55 county extension associations continued to work closely with stakeholders in their counties via participation in their local governance (i.e. board of directors) and program guidance (i.e., advisory committee) structures. Formal advisory committees also are used to guide New York City Extension programs. In 2002, a new statewide Council of Extension Associations was established (as recommended in the *Committed to Excellence* plan), providing another venue for enhanced stakeholder input and engagement within the CCE system. In all, over 2500 stakeholders are engaged and heard through these locally-focused mechanisms, and well 50,000 stakeholder volunteers from all walks of life participate and assist in the direction, priority setting, and delivery of extension programs throughout the state.

Cornell Cooperative Extension has begun another plan of work cycle in preparation for submission of our next Federal plan of work. We are placing special emphasis on effective involvement of stakeholders and underserved populations as part of that process. Under leadership of our Diversity Catalyst Team, new resources on Equal Program Opportunity and inclusive program planning processes have been developed and shared system wide. Key resources are included on the following web page: <http://www.cce.cornell.edu/diversity/planofwork.htm>.

Lastly, the colleges of Agriculture and Life Sciences and Human Ecology, and numerous academic departments and specialized programs within those colleges maintain active advisory committees or councils having broad external stakeholder representation. These groups help bring relevancy and focus to program decision-making and investments.

## **PROGRAM REVIEW PROCESSES**

A revised program review process was implemented in 2002-03 to reflect our new program development and stakeholder involvement processes.

### **Review Process (Research Projects and Extension Projects with Designated Funding)**

1. Principal investigators are asked to consult program priorities (established as outlined in the stakeholder involvement section above) and develop short pre-proposals for new or revised projects funded by Federal Formula Funds.
2. Pre-proposals are reviewed for purpose and relevancy by advisory Program Councils (see Stakeholder Involvement section), the principal investigator's department chair, Extension Program Associate/Assistant Directors, and Experiment Station Directors (Ithaca and Geneva). A new review form was developed for use by off-campus stakeholders serving on the councils. Pre-proposals are discussed with department chairs during annual budget conferences to put work in broader perspective of department program.
3. Pre-proposals are accepted/rejected; accepted proposals are developed into full project outlines by the Principal Investigator.

**For research proposals:**

4. The Department Chair recommends two or three peer reviewers to the Director's Office.
5. The Director's Office obtains the necessary reviews in accordance with CSREES rules using standard format.
6. Changes suggested by the peer reviewer are conveyed to the Principal Investigator. Peer reviewer names are not revealed to the Principal Investigator.
7. The revised proposal, with required CRIS forms, is submitted to the Director's Office.
8. The Director's Office submits the package to CSREES along with an attached statement certifying the peer review was completed.
9. Reviews are kept on file in the Director's Office.
10. The Director's Office attaches a statement to the proposal and sends this with the proposal and Form 10 to the CALS Research Office.
11. After approval by CSREES, funds are allocated to the appropriate research account.

**For extension proposals:**

5. Extension Program Directors receive Program Council and Dept. Chair comments on extension preproposals related to their program areas.
6. Extension Program Directors rank/recommend extension preproposals.
7. Extension Program Directors meet with Experiment Station (Ithaca and Geneva) staff to discuss potential R-E linkages among extension preproposals.
8. Extension Program Directors finalize Smith-Lever funding recommendations and communicate decisions and needed modifications

**Cornell Review Criteria**

1. Anticipated significance of results relative to current priority needs or opportunities
2. Scientific merit of objectives
3. Clarity of objectives
4. Appropriate methodology
5. Feasibility of attaining objectives
6. Accomplishment during preceding project (for revisions)
7. Research performance and competence of investigator(s)
8. Relevance of the proposed work to regional or national goals

**Review Process Calendar**

The calendar of our new, integrated research and extension review process follows below (dates are approximate):

Date	Step
SEP 20	Priorities finalized for federal formula funds (FFF) preproposal RFP
OCT 1	RFP for preproposals issued
NOV 15	Deadline for FFF preproposal submission
DEC 3-JAN 15	Preproposals provided to Program Councils for review
JAN 13-17	Annual Program Council Conferences (campus); discussions held on preproposal relevance. Preproposals available to P.I.s' department chair on-line for review and comment

FEB 25	Extension Program Directors' written comments on program-related RESEARCH preproposals due. Deadline for Program Councils and department chairs to comment on all preproposals.
MAR 6	Extension Program Directors receive Program Council and Dept. Chair comments on extension preproposals related to their program areas
MAR 9 – APR 30	CCE-CUAES program conferences with department chairs
MAR 18	Extension Program Directors rank/recommend EXTENSION preproposals Recommendations are forwarded to CCE director and CCE Assoc. Director for Finance
APR 1	Extension Program Directors meet with Experiment Station (Ithaca and Geneva) staff to discuss potential R-E linkages among extension preproposals
APR 8	Extension Program Directors meet to finalize Smith-Lever funding recommendations, which are then forwarded to CCE Director and CCE Associate Director for Finance
APR 1-15	CUAES and NYSAES Directors consider all research preproposals and make tentative funding decisions
APR 15-30	Joint session of CUAES, NYSAES and CCE Directors and Extension Program Directors to discuss/coordinate funding decisions and notification
MAY 15-30	FFF preproposal decisions communicated to principal investigators and Program Councils
JULY 1	FFF full proposals due
JUL-AUG	FFF full proposals peer reviewed
AUG	Focused priorities identified by Program Councils are incorporated into the RFP for the next FFF cycle
OCT 1	FFF FY begins; proposed projects funded

## **EXTENSION MERIT REVIEW**

As described above, our governance and advisory structures, including the Program Councils, serve primary roles in identifying and determining merit of extension initiatives. In addition, program conferences are conducted with each academic department. In those sessions, extension and applied research priorities of each unit are discussed, accomplishments are summarized in general (e.g., number of educational activities, number of people attending, number of fact sheets, bulletins, videos, documented outcomes and impacts, etc.), and products and outcomes from funded projects are reviewed. The indicators of performance are discussed relative to current program priorities, and extension investments for each unit are adjusted accordingly. Extension projects receiving designated funding are an integral part of the review process outlined above. Final funding decisions are recommended by the extension program directors, all of whom serve as liaisons to Program Councils and work closely with a number of Program Work Teams.

## **MULTISTATE AND JOINT ACTIVITIES**

Our multistate, multi-institutional, and multi-disciplinary activities occur within the same stakeholder involvement and program development processes as in-state activities and as such are directed to priority needs of priority audiences. Our program development structure for federal formula funds is interdisciplinary by definition (see stakeholder involvement and review processes above). All projects are expected to outline expected outcomes and report against them. We have

taken steps to strengthen specific documentation of integrated activity and multistate programs and have included evidence of such activity directly in our pre-proposal and reporting criteria. The fundamental purposes of these efforts are to strengthen quality of programming by bringing together required disciplines and to assure efficient use and maximum leveraging of federal formula funds. The sections below and Appendices B and C provide additional detail.

### **MULTISTATE EXTENSION ACTIVITIES**

When we set our multistate extension goals, we challenged our system by significantly exceeding what would have been the minimum required target based on 1997 expenditures. The mandated minimum based on this calculation would have been only about 1% of expenditures. Rather, we set targets of 3%, 8%, and 12% for FY00, FY01, and FY02 because we fundamentally believe in the value of multistate collaboration. We were not sure we could make the 12% target this year but are pleased to report that we have. It will be a challenge to maintain this level of multistate collaboration. Extreme budget pressure within New York and neighboring states has greatly reduced flexibility for undertaking new multistate initiatives. Multistate extension activity is documented in Appendix B.

### **INTEGRATED RESEARCH AND EXTENSION ACTIVITIES**

During 2002 we continued and expanded upon our integrated research and extension collaborative strategy as outlined in the approved plan of work. Of most import, the revised program development process in the Stakeholder Involvement Section above was fully implemented. Background information on the new program development process and specific information on the new program development structure are available at: <http://www.cce.cornell.edu/admin/program/pwts/> Specific documentation of integrated activities is included in Appendix C.

### **MULTI-COUNTY INITIATIVES**

Multi-county initiatives are fostered through active encouragement of formal and non-formal program partnerships. At present time, there are 8 regional extension program teams involving 30 counties in which Cornell University is a formal funding partner. In addition, at least 12 collaborative relationships involving at least 30 counties exist without formal Cornell sponsorship.

As reported last year, electronic connectivity is one of our key strategies for promoting multi-county initiatives. During the reporting year, our statewide wide area network was fully implemented and now is starting to be used extensively for enhanced resource sharing. Nine regional electronic classrooms are in place and increasingly used for direct educational programming. To spur further development of regional approaches, a statewide specialist for regional approaches was named.

## **Appendix A – FY03-04 Applied Research and Extension Priorities Identified by Program Councils**

### **Natural Resources and Environment Priorities**

(Program Council ranking by order of importance, high to low)

- Managing agricultural and environmental resources for long-term sustainable solutions that reduce use of chemical pesticides and fossil fuels
- Refining land use planning approaches and practices, especially growth management strategies that reduce water quality impacts
- Improving livestock waste management systems and approaches to control odor and reduce other environmental problems
- Analyzing and restoring watersheds, especially via incentive-based approaches to total maximum daily load (TMDL) implementation, and evaluation of where TMDLs are as appropriate management strategy
- Improving upland watershed management practices to lessen adverse impacts on estuary and marine water quality
- Improving the management of natural resources, especially with regard to recreation and tourism, commercial harvesting, human-animal conflicts (deer and birds, specifically management of Canadian geese), and park management
- Exploring alternative energy usage in agriculture
- Managing the impacts of climate change
- Developing competitive alternative agricultural productions systems
- Enhancing urban and community forestry and related management practices
- Assessing personal care product and prescription drug impacts on run-off and drinking water
- Studying salt-to-fresh water conversion feasibility and alternatives, as made necessary in times of drought, especially for Hudson River communities
- Analyzing and improving indoor air quality

### **Community and Economic Vitality Priorities**

Building community capacity based on comprehensive research, models and tools

- community leadership and governance
- community visioning and strategic planning
- sustainable economic development

Developing effective and collaborative land use management approaches and policies that enhance connections among economic, environmental and infrastructure issues

- main street revitalization, working landscapes, water quality, affordable housing
- smart growth/quality communities
- rural-urban interface

Nurturing non-profit and neighborhood group development

- leadership and volunteer development
- grant writing and fund development education

Advancing community based agricultural economic development

- mainstreaming agricultural economic development
- enhancing local food systems (rural, suburban and urban)

#### Promoting workforce and entrepreneurial development

- strategic workforce development planning
- workforce composition research
- financial management education
- e-commerce

#### Cross-cutting themes (for these priorities)

- improving Public Issues education and community decision making approaches
- including and reaching out to under-represented groups
- promoting citizenship and community participation
- building collaborative partnerships

### **Quality of Life for Individuals and Families Priorities**

(Numbers within each grouping indicate rank order)

#### Overarching Priority: Promoting Tolerance and Acceptance; Embracing Diversity

##### Group A--Nutrition, Health, and Wellness

1. Advancing healthy lifestyles, safety, and wellness
2. Improving food security
3. Enhancing competence in practice of nutrition

##### Group B--Life Course

1. Improving caregiving for children and elders
2. Strengthening family support across the life course--young to aging families and elders
3. Reducing stress and violence

##### Group C--Environments

1. Improving the quality of housing, home and grounds, school, and workplace environments and the horticultural environment in our communities.

##### Group D--Family and Consumer Economics

1. Enhancing personal skills in household economics, financial literacy, and resource management.

### **Agriculture and Food Systems Priorities**

(The italicized items (1-6) were given clear consensus priority by the Agriculture and Food Systems Program Council.)

- *Managing animal wastes through whole farm nutrient management plans and practices*
- *Managing human resources, especially related to identifying, hiring, and retaining new workers and the education of middle management and owners*
- *Identifying market channels for value-added products*
- *Minimizing biohazards in the food chain*
- *Managing risk to reduce stress on resources and increase stress resistance*
- *Increasing production efficiency*
- Improving product quality
- Promoting NYS agriculture to youth, non-farm citizens, and the world's consumers
- Understanding and promoting agricultural economic development within the context of community
- Improving weed controls and developing herbicide resistant crops



- Educating the public on health related to genetically engineered organisms (GEOs)
- Managing turf grass
- Improving water resource management using precision agriculture and irrigation
- Managing farm business product pricing, profit maximization, and decision making
- Studying and advancing intra and interstate regionalism
- Enhancing animal welfare
- Meeting the challenge of competitive imports, especially Canadian
- Marketing agricultural products
- Analyzing agricultural businesses
- Creating new plant varieties
- Understanding the impact of retail level consolidations on production agriculture
- Increasing the efficiency and value of food manufacturing and marketing operations across agriculture

### **Youth Development Priorities**

- Defining and applying principles of positive youth development
- Defining curricular standards
- Advancing life skill development (e.g., workforce/ career development, citizenship, caring, success in education)
- Enhancing science and technology literacy
- Developing and applying youth community service models and methods

**Appendix B – Multistate Extension Activities Report**

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

**Institution** Cornell University

**State** New York

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

<b>Title of Planned Program/Activity</b>	<b>FY2002 Expenditures</b>
Natural Resource, Agric. and Engineering. Service	15,943
Milk Marketing	49,000
Farm Net	16,250
Dairy Waste Management	73,800
NYS 4-H Horse Program	36,000
CED Tool Box	17,000
Managing Waste	52,750
West Nile Virus	29,711
Workforce Preparation-Youth Careers	48,631
Work Force Training	86,346
Insects: Bio & Pest Management for Adults & Youth	38,893
Farming Alternative. Program & Ag Food Com. Partnership	36,600
Food Safety	63,900
Youth Program Leadership	39,000
Educational Program for Professional Horticulturists.	39,000
Natural Resource Based on Economic Development	39,500
Wildlife Damage Management	36,400
Potato Breeding	2,000
Crop & Seed Improvement Project	10,000
Landscape Horticulture Industry	18,500
Lake Erie Regional Grape Program	22,978
EPA Project	467
Diversity Program	44,043
Housing	21,000
Indoor Air Quality	14,200
Food & Nutrition Prof Dev Initiative	57,087
Youth At Risk Program Support	66,000
Consumer Policy	40,600
Health	35,000

Family & Social Welfare	34,000
Adolescent Sexuality Pregnancy Prevention	10,000
Health & Safety Issues Related to Textiles & Clothing	15,000
Water Quality Education for Individuals & Community	8,000
Fiber Science & Textile Progr for Youth	24,000
<b>Total</b>	<b>1,141,599</b>

Helene R.Dillard  
Director

March 1, 2003  
Date

Form CSREES-RPT (2/00)

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

**Institution** Cornell University  
**State** New York

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

Our total multistate extension expenditures of \$1,141,599 represents 12.85 % of our total FY02 approved Smith Lever 3b & 3c funding of \$8,84,150 exceeding our FY2002 target of 12.0%. The FY2002 project listing follows.

Natural Resource, Agricultural, and Engineering Service

This is a regional effort based in the Biological and Environmental Engineering Department. Purposes are to improve competitiveness and sustainability of agricultural and natural resource enterprises and promoting food safety and environmental enhancement. Primary activities include publishing resource materials and conducting conferences on current issues. Thirteen states plus the District of Columbia currently participate. For more info: <http://www.nraes.org>

Dairy Markets and Policy

Part of a national research and extension program that provided firms and policy makers with timely, this Applied Economics and Management department program provides relevant information on dairy markets, policy options, and business performance benchmarks.

Farm Net

The primary purpose of this Applied Economics and Management department based program is to develop and sustain strong farming families often in the face of significant stress. There are ongoing collaborative relationships with similar programs in New England, Pennsylvania, Iowa, and Wisconsin and additional connections with New Jersey and Maryland.

Dairy Waste Management

This project of the Department of Agricultural and Biological Engineering involves extensive collaboration with the primary dairy industry states.

NYS 4-H Horse Program

This Animal Science Department effort is a broad educational program addressing animal science, equine science, veterinary science, animal welfare, health and diseases, etc. Important multistate collaborations include the American Outhorse Council and the Northeast Regional Leaders Forum. Collaborative training initiatives have involved Pennsylvania and New Jersey.

### Community Economic Development Toolbox

This is a collaborative project of Penn State University and Cornell the latter through our Community and Rural Development Institute. For program details:  
[http://www.cardi.cornell.edu/cd\\_toolbox\\_2/cdindex.cfm](http://www.cardi.cornell.edu/cd_toolbox_2/cdindex.cfm)

### Managing Wastes

This project based in the Center for the Environment works to improve management and recycling of organic residuals from farms, residences, insitituions and businesses through new and continued research and outreach programs. It is part of a broader multistate effort that involves New Hampshire, Pennsylvania, Massachusetts, and New Jersey.

### West Nile Virus Resources

This project is based in the Cornell Center for the Environment and includes extensive collaboration with states in the New York Metropolitan area and elsewhere. For information:  
<http://www.cfe.cornell.edu/erap/wnv/WNVupdate.html>

### Workforce Training and Workforce Preparation – Youth Careers

These closely related Education Department projects are focused on strengthening the agricultural workforce and youth career development and have direct connections with other efforts in the Mid-Atlantic region including the Food Policy Institute at Rutgers and Pathways to a Better Trained Workforce sponsored by several Mid-Atlantic states.

### Insects Bio & Pest Management for Adults & Youth

This is a project of the Department of Entomology to develop educational materials that can be readily adapted by school, after school, and informal educational programs for youth in the subject area of entomology and gardening. Direct collaboration occurs with several northeastern states.

### Farming Alternatives Program & Ag Food Com. Partnership

This Rural Sociology Department project promotes community agriculture development and civic agriculture. A key collaborator is the Northeast Sustainable Agriculture Working Group. Efforts are under way with New Hampshire and Maine to build mechanisms to better coordinate research and extension efforts .

### Food Safety

This project of the Department of Food Science includes extensive collaboration with food safety resource persons nationwide.

### Youth Program Leadership

This Horticulture Department project is to develop, implement and evaluate materials for youth and adult gardening audiences that address core principles of the plant sciences. Direct collaboration occurs with a Texas A&M faculty member and several regional and national gardening organizations.

#### Educational Program for Professional Horticulturists

This Horticulture Department project develops, implements, and evaluates programs on environmentally responsible turfgrass and landscape management that results in reduced reliance on pesticides. Direct collaboration occurs with campus experts across the northeast region and national sources.

#### Natural Resource Based Economic Development

This project of the Department of Natural Resources focuses on agroforestry, maple production, natural resources-based recreation and tourism, etc. and involves extensive collaboration in the Northeast.

#### Wildlife Damage Management

This is a broad project of Department of Natural Resources including deer and other wildlife damage management. It involves extension collaboration in the Northeast and other regions.

#### Potato Breeding

This Plant Breeding Department aims to develop grower/processor consensus for release of improved potato varieties. This is related to a northeast regional project and involves cooperators in Pennsylvania, Maine, New Jersey, Virginia, and North Carolina.

#### Crop and Seed Improvement Project

This is a project of the Department of Plant Breeding to develop and promote use of foundation and certified seeds of superior crop varieties. Collaborators include the Northeast Seed Alliance and resource persons particularly in Pennsylvania and Maine.

#### Landscape Horticulture Industry

This project of the Plant Pathology department involves collaboration with horticulture pathology experts nationwide.

#### Lake Erie Regional Grape Program

On-going, joint research and extension program with Penn State serving the grape industry along Lake Erie. For more info: <http://lenewa.netsync.net/public/lergphom.htm>

#### EPA Project

Support for the USEPA Extension Liaison addressing environmental issues in the Metropolitan NY region.

#### Diversity Program

Cornell Cooperative Extension is one of the Change Agent States for Diversity national initiative. Key resources are available at: <http://www.cce.cornell.edu/diversity/>

#### Housing

This project of the Department of Design and Environmental Analysis addresses housing availability and affordability. It is a joint project with Wisconsin and a national multi-state committee.

### Indoor Air Quality

This is a project of the Department of Design and Environmental Analysis that develops approaches to protect public health by reducing risks associated with indoor air pollution. It is a joint training project with New Jersey and linked to the CSREES/HUD nationwide "Healthy Homes Initiative."

### Food & Nutrition Professional Development Initiative

This is a project of the Division of Nutritional Sciences intended to provide the latest research-based information to professionals, paraprofessionals, and educators in food and nutrition related fields. It includes the nationally used WWW resource "Ask the Nutrition Expert" and involves collaborators in many states via active list-servs.

### Youth at Risk Support

This Department of Human Development effort is part of the national CYFAR project.

### Consumer Policy

This project of the Department of Policy Analysis and Management involves development and implementation of a multi-state curriculum of family financial management. It includes active collaboration with New Jersey and a national design group.

### Health Policy

This Department of Policy Analysis and Management project focuses on rural health policy and includes participation Rural Health Alliances in neighboring states.

### Family and Social Welfare

This project of the Department of Policy Analysis and Management aims to strengthen public sector responses to community issues. It involves multi-state instructional resource development and sharing with Pennsylvania and Kentucky being key partners.

### Adolescent & Sexuality Pregnancy Prevention

This project of the Department of Policy Analysis and Management is a curriculum development effort involving collaborators from several states.

### Health & Safety Issues Related to Textiles & Clothing

This Department of Textiles and Apparel project focuses on textiles and clothing systems and worker practices and attitudes relative to reducing pesticide exposure of handlers, workers, and their families. Collaborating states include California, Iowa, Illinois, Maryland, Michigan, Nebraska, Oklahoma, and Texas.

### Water Quality Education for Individuals & Community

A project of the Department of Textiles and Apparel, this effort focuses on household water supplies and watershed protection. It is linked to several multistate and national initiatives including Home\*A\*Syst and the NEMO project.

Fiber Science & Textile Program for Youth

This project of the Department of Textiles and Apparel included developing and evaluating a broad textile program for youth that includes fiber science, lifeskills, community service, computer pattern-making, and cultural arts. Eleven states are participating on a design team.



**Appendix C – Integrated Activities Report**

**Form CSREES-REPT (2/00)**

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

**Institution** Cornell University  
**State** New York

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

<b>Title of Planned Program/Activity</b>	<b>Expenditures FY2002</b>
Research/Extension Integration Grants Program	84,404
Departmental Support for Integrated Activities	1,229,462
<b>Total</b>	<b>\$1,313,866</b>

Daniel J. Decker  
**Director**

March 1, 2003  
**Date**

**Form CSREES-REPT (2/00) – Smith-Lever**

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

**Institution** Cornell University  
**State** New York

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

<b>Title of Planned Program/Activity</b>	<b>Expenditures FY2002</b>
Research/Extension Integration Grants Program	74,281
Program Work Teams & Other Projects	120,013
Departmental Support for Integrated Activities	2,327,588
<b>Total</b>	<b>\$2,521,882</b>

Helene R. Dillard  
**Director**

March 1, 2003  
**Date**

**Form CSREES-REPT (2/00) – Hatch and Smith-Lever Integrated Activities Narrative**

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

**Institution** Cornell University  
**State** New York

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

For the past decade, we have progressively integrated planning processes for federal formula fund allocation for research and extension. Our joint plan of work was a natural extension of that effort. In the first year of this plan, our joint research and extension Statewide Program Committees reviewed virtually all project support proposals and allocations were made reflecting that input. Now that the Program Council/Program Work Team structure—that replaced the Statewide Program Committees—is in place (see Stakeholder Involvement section), Program Councils establish priorities that guide our call for proposals and provide relevancy reviews for all proposals. In identifying our target percentages for integrated activities, and in accordance with the final administrative guidance, we used two criteria:

1. Review and support of projects by Program Councils, OR,
2. Support to persons with joint appointments

**Research/Extension Integration Grants Program**

Please see approved FY00-04 plan of work page 36, paragraph 4 for a description of this program. (Note that we now are phasing out this separate funding mechanism because we include research/extension integration as a key criterion in funding all Hatch and Smith-Lever projects.) Project funds from Smith-Lever funds in FY02 totaled \$74,281 and included:

- An Analysis of Market Opportunities and Marketing Options for Expanding the Northeast Stone Fruit Industry
- Do Corn Silage Hybrids Respond Similarly to Kernel Processing?
- Citizen Horticultural Science
- Evaluation of Weed Suppressive and Pest Resistant Ornamental and Grass Groundcovers for Use in the Landscape
- Linking Local Foods and the College Cafeteria to Strengthen Community Food Systems
- Strengthening Neighborhoods: A Participatory Action Research Initiative
- The Engaged Community Project (ECP): Participation as a Cornerstone of Main Street Revitalization
- Community Design Service: Linking Teaching, Applied Research and Extension

### **Program Work Teams and Associated Projects**

Our research/extension Program Work Teams (PWTs) are described specifically in the Stakeholder Involvement section of this report. During FY02, \$120,013 of S-L funding was provided for PWT projects and activities.

### **Departmental Support for Integrated Activities**

As per the final administrative guidance, this item consists of support to programs carried out by persons with joint extension and research appointments in academic departments.

Cornell Cooperative Extension provided Smith Lever 3 b and c funds totaling \$2,327,588 to support faculty and staff who were responsible for research and extension programs in the Colleges of Agriculture and Life Sciences and Human Ecology and the Geneva Experiment Station. Total faculty supported equaled 45.45 FTEs and Senior Extension and Extension Associates equaled 2.40 FTE. These expenditures are fully documented by department and university financial and human resource records.

### **Smith-Lever Integrated Activities Target Percentage Attainment**

The combined support for Research/Extension Integration Grants, Program Work Team Projects and Activities, and Departmental Support for Integrated Activities was \$2,327,588 which is 28.4% of our total S-L 3b and 3c funds for FY02 thereby exceeding our target of 25%.

### **Hatch Act Integrated Activities and Target Percentage Attainment**

The Cornell University Agricultural Experiment Station and the New York State Agricultural Experiment Station provided Hatch and Hatch-Multistate funds totaling \$1,313,866 to support faculty and staff who were responsible for integrated research and extension programs in the Colleges of Agriculture and Life Sciences and Human Ecology and the Geneva Experiment Station. This is 25.4% of our total Hatch Act Dollars thereby meeting our target of 25%. Total research and extension appointments equaled 261.2 FTEs for faculty who were responsible for research and extension programs in the Colleges of Agriculture and Life Sciences and Human Ecology and the Geneva Experiment Station. These expenditures are fully documented by department and university financial and human resource records.