ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

for the
Pennsylvania Agricultural
Experiment Station
at
The Pennsylvania State University

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Goal 1
An agricultural system that is highly competitive in the global economy.
Through research and education, empower the agricultural system with knowledge that will improve the competitiveness in domestic production, processing, and marketing.

Executive Summary: The Pennsylvania Agricultural Experiment Station continues to focus on research projects that reinforce a globally competitive agricultural system. During FY2002, 208 projects supported Goal 1 themes. The three planned projects that are featured below illustrate accomplishments and impacts within this Goal. Additional highlights include a study designed to look at the impact of corn fiber digestibility on milk production potential. Results from this research have identified corn hybrids with potential to increase the yield of milk per ton of silage, but have also revealed that these hybrids are significantly different in their response to drought conditions. A hybrid testing program has been developed in collaboration with the Professional Dairy Managers of Pennsylvania, the results of which are distributed to interested producers. A spatially-explicit forest management model is being used to develop management plans for Pennsylvania's 20 state forests. In the districts where models have been completed, the models are being used by Pennsylvania Bureau of Forestry managers to redirect management time into regeneration-focused activities. This change in focus is expected to have a positive impact on sustainable harvests. Dairy farm sustainability is of paramount importance for the Pennsylvania economy. Data from surveys to examine dairy farm features, public perception, and new environmental policies were incorporated into economic models that are used by farmers to improve their on-farm investment practices.

Expenditures of Hatch and Multistate Hatch funds in projects related to Goal 1 were approximately $3.88 million in FY2002, an increase of 12.2 percent from the FY2001 level of $3.46 million. Overall expenditures tracking to Goal 1 projects were significantly higher ($35.5 million in FY2002, up nearly 31.3 percent from FY2001). State appropriated and external grant expenditures were significantly higher during this time period as well. Nine new faculty hired during FY2002 have a significant portion of their proposed research activities within Goal 1 themes. Graduate students are assigned to goals in proportion to faculty assignments. Approximately 322 graduate students can be expected to be working on research projects consistent with Goal 1 themes.

Among the hires related to Goal 1 in FY2002, we have added to our strengths in developing new markets for Pennsylvania's important forest products industry. We have also added toxicological expertise and research capacity on avian development, the latter critical to our interaction with the poultry industry.

Many of these research results are communicated to stakeholders through a variety of methods, but we continue to rely on the close connection between Experiment Station-sponsored research and the Penn State Cooperative Extension Service. Goal 1 outputs can be directly referenced in Penn State Cooperative Extension's Annual Report of Accomplishments and Results. Further accomplishments and outputs, including publications, can be found in by searching Pennsylvania projects in CRIS at http://cris.csrees.usda.gov/menu.html. Pennsylvania researchers also rely on traditional means of disseminating information, including publication in technical, popular, and trade outlets, presentations to stakeholders and policymakers, and web-based delivery methods. Our research results reach audiences in Pennsylvania, the nation, and the world.

Multistate projects are an important part of our activity under Goal 1 themes. Thirty-one of our experiment station projects contribute to multistate projects within Goal 1 (NC-0119, NC-0129, NC-0131, NC-0136, NC-0140, NC-0142, NC-0185, NC-0205, NC-0221, NC-0226, NE-0009, NE-0060, NE-0124, NE-0127, NE-0132, NE-0140, NE-0148, NE-0161, NE-0164, NE-0171, NE-0176, NE-0179, NE-0183, NE-0184, NE-0185, NE-1006, S-0289, S-0291, S-0294, S-1000, W-0195). One of the featured planned projects below, Pennsylvania project PEN03617, contributes to NE-0179. Individual impact statements are available to 'guests' on the web at National Information Management and Support Systems at http://www.lgu.umd.edu/login.cfm.

Allocated FTEs to Goal (in units):

SY	PY	TY	CY	TOTAL
167.6	287.0	42.2	107.1	603.7

Total Expenditures directed to Goal ($ in thousands): [1]

Hatch	Multistate Hatch	McIntire-Stennis	Animal Health	State Appropriated	Leveraging Dollars	Total
$3,048	$835	$393	$65	$16,819	$14,313	$35,473

The following agencies/sponsors provided leveraging dollars:

Allied Domecq Retailing
American Agricultural Economics Association
American Cancer Society
American Cocoa Research Institute
American Egg Board
American Floral Endowment
American Mushroom Institute
Andrew W. Mellon Foundation
Asilas Genomic Systems
Binational Agricultural Research and Development
Cadbury Chocolate Canada Inc.
California Department of Food and Agriculture
Centre County Government
Dairy Management Inc.
EIEICO Inc.
Environmental Protection Agency
GlaxoSmithKline
Golf Course Superintendents Association of America Foundation
Greater Pittsburgh Golf Course Superintendents Association
Hazelnut Council
International Rice Research Institute
Jem Co. Ltd.
Johnson and Johnson
Kane Chamber of Commerce
Max Kade Foundation Inc.
McKnight Foundation
Moir, Andrew
Monsanto Company
National Science Foundation
National Association of Animal Breeders
National Audubon Society
National Cattlemen's Beef Association
National Geographic Society
National Honey Board
National Institutes of Health
National Pork Producers Council
National Science Foundation
Ohio Floriculture Foundation
Pascobel Company
Penn State's Office of Physical Plant
Pennsylvania Department of Agriculture
Pennsylvania Department of Community and Economic Development
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Health
Pennsylvania Department of Transportation
Pennsylvania Fish and Boat Commission
Pennsylvania Game Commission
Pennsylvania Soybean Promotion Board
Pfizer - Warner Lambert
Pioneer Hi-Bred International Inc.
Procter and Gamble
Public Health Service
Strategic Alliance Management Committee
Syngenta Seeds Inc.
Truss Plate Institute
Udale, Richard W.
United States Agency for International Development
United States Civilian Research and Development Foundation for the Independent States of the Former Soviet Union
United States Department of Agriculture
United States Department of Defense
United States Department of Energy
United States Department of Interior
United States Golf Association
United States Poultry and Egg Associations
University of Connecticut Health Center
Washington Tree Fruit Research Commission
Wild Resource Conservation Fund

Planned Program: Germplasm Analysis, Enhancement, and Culture of Edible Mushrooms (PEN03609)

Key Themes: Adding Value to New and Old Agricultural Products, Diversified/Alternative Agriculture, Plant Germplasm

Brief Description: Mushrooms are the fourth highest-ranking vegetable crop in cash value in the United States (behind potatoes, tomatoes and lettuce) with Pennsylvania producing about 53 percent of total domestic mushroom production. Historically, the mushroom industry has relied on one species of mushroom, the commonly cultivated *A. bisporus* or white button mushroom. In recent years, the industry has begun to diversify production of other edible types, called specialty mushrooms, which now account for about five percent of total production in the United States. These specialty types not only have culinary advantages over the common button mushroom, but also command higher prices for producers. One objective of this research project is to develop and improve cultivation technology for specialty mushrooms.

Impact/Accomplishment Statement: The Penn State collection of germplasm for specialty mushrooms increased with more than 70 specimens collected from various parts of the world, making new lines available to more than 20 growers who are interested in diversifying and producing other mushroom species. Several strains collected from China are being used and evaluated by growers on an ongoing basis. Presentations to mushroom growers of research on maitake, shiitake and oyster mushrooms were made at the Annual Mushroom Industry Conference (Penn State) and the North American Mushroom Conference (Banff, Canada). Research by one doctoral student on maitake resulted in improved yields and mushroom quality and shortened the crop cycle time. A large commercial mushroom farm in Pennsylvania now employs this student, and the company has adopted his research into their production program.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from American Mushroom Institute and Pennsylvania Department of Agriculture.

Scope of Impact: State Specific

Planned Program: Technology and Principles for Assessing and Retaining Postharvest Quality of Fruits and Vegetables (PEN03617)

Key Themes: Agricultural Competitiveness, Food Handling, Food Quality, Foodborne Pathogen Protection, Risk Management

Brief Description: Utilization of portable electronic nose technology to assess biological contaminants in apples was initiated during this fiscal year. The portable Cyranose 320 (Cyrano Sciences) was used to detect the presence of *E. coli* K12 bacteria on the surface of whole apples. Tests of the sensitivity of this equipment showed that the sensors can easily differentiate between contaminated and uncontaminated samples. Optimization of the *E. coli* concentration required for detection is continuing. Honey samples with different adulterant sugars were scanned using mid-infrared (MIR) spectroscopy as a screening tool. Adulterants considered were glucose, fructose, sucrose, and corn syrup. Predictive models were developed to classify the adulterated honey samples using discriminant analysis. Correct classification of 100 percent was achieved for honey samples adulterated with corn syrup and sugar mixtures. Results demonstrated that discriminant analysis of the spectra of adulterated honey samples could be used for classification. This planned program contributes to multistate research project NE-0179.

Impact/Accomplishment Statement: Portable electronic nose (e-nose) assessment of apples will help detect pathogens before apples are turned into juice or other processed products. The e-nose would be used by industry as a first-step analysis of incoming product as part of a series of steps to eliminate pathogen contamination. The e-nose would assess a bin of apples as it arrives at the processing or packing

facility. If pathogens are detected in the bin, the origin of the contaminated apples could be identified before the apples are mixed with other sources. This would help the producer trace back to potential contamination sources and would help ensure that the producer eliminates the source. Adulteration of honey with cheaper sugars has been one of the most critical problems for the honey industry. Addition of artificial sugars makes honey an artificial product, while the perception is that honey is a natural product with organic and amino acids that impart specific nutritive and medicinal properties to honey. This research addresses the issue of product purity through a rapid spectroscopic process, strengthening quality evaluation and the assurance process both as a research tool and at the consumer level. A database is being developed that contains the fingerprint of honey varieties in the United States. Variables include the nectar source (or type), region, and season. This will be provided to the National Honey Board, which will be responsible for distribution to the industry.

Sources of Funding: Hatch Act, Multistate Hatch Act, and State appropriated funds.

Scope of Impact: Multistate Research – CA, GA, HI, IN, ME, NC, NY, OH, PA, and WA

Planned Program: Sustaining Competitive Advantage Through Technology Innovation in the U.S. Wood Products Industry (PEN03636)

Key Themes: Agricultural Competitiveness, Agricultural Profitability, New Uses for Agricultural Products

Brief Description: Continuous development of new products has been shown to provide firms with an enhanced image, increased profits, competitive advantages, and better customer need for satisfaction. This research explains the New Product Development process used in our team research for an industrial woodfiber-plastic composite product. Through this process, market definition was integrated with input from engineering, design, and manufacturing processes. This New Product Development process resulted in the development of unique decking and fendering prototype products for subsequent demonstration project applications in United States Navy waterfront facilities. This team research also highlights some of the more salient issues and most attractive opportunities for new product development of woodfiber-plastic composites in a variety of residential building material and industrial infrastructure markets.

Impact/Accomplishment Statement: Perceptions of new and established waterfront materials by United States port authority officials, engineering consultants, and marina owners and operators were measured. An understanding of material perceptions and attribute importance by key waterfront infrastructure decision-makers was used as a guide for new product development of woodfiber-plastic composite decking and fendering products. This research methodology provides not only market-tested prototype products for demonstration projects, but also illustrates the merit of integrating marketing with engineering, design, and manufacturing to produce superior new products. Fendering components have been installed at the Port Hueneme Naval Base in California and industrial decking has been installed at the Newport Naval Base in Rhode Island with additional demonstration projects in progress.

Sources of Funding: Hatch Act, McIntire-Stennis Funds and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from Pennsylvania Department of Agriculture and United States Department of Defense.

Scope of Impact: State Specific

Goal 2
A safe and secure food and fiber system.

To ensure an adequate food and fiber supply and food safety through improved science-based detection, surveillance, prevention, and education.

Executive Summary: The Pennsylvania Agricultural Experiment Station supports a variety of projects that contribute to safe, secure food and fiber production. During FY2002, 31 projects supported Goal 2 themes. The two planned programs featured below illustrate accomplishments and impacts within this Goal. Additional highlights include work to evaluate the life span of nutrients in fresh vegetables during the distribution and marketing process. This project demonstrated that maintaining cold storage and handling have a significant impact on the nutrient—particularly vitamin—content of the produce. Results have been communicated to the industry and should result in produce that is not only visually pleasing but also healthier. A modeling framework was developed to examine the economics of the U.S. dairy industry relative to policy proposals in the 2002 Farm Bill and relative to import policy of milk protein concentrates. The results of this study are being used to inform policy-makers of implications for domestic dairy production, ultimately affecting availability and security of the milk and milk products supply.

Expenditures of Hatch and Multistate Hatch funds in projects related to Goal 2 were approximately $304,000 in FY2002, a reduction of 46.4 percent over the FY2001 level of $568,000. Overall expenditures tracking to Goal 2 projects were significantly lower ($2.0 million in FY2002, down 67.2 percent from FY2001). State appropriated and external grant expenditures were also significantly lower during this time period. No new faculty hired during FY2002 would be characterized as having proposed research activities primarily within Goal 2 themes. Graduate students are assigned to goals in proportion to faculty assignments. Approximately 28 graduate students can be expected to be working on research projects consistent with Goal 2 themes.

The important food processing industry in Pennsylvania maintains effective communication links to the station through the various state and national trade associations. Other stakeholder concerns on the subject of food safety come through guidance of our Ag Council http://agcouncil.cas.psu.edu. The joint appointments that many of our researchers hold with the Cooperative Extension function of our College also provide a route for communicating stakeholder needs into the Experiment Station research enterprise.

Many of these research results are communicated to stakeholders through a variety of methods, but we continue to rely on the close connection between Experiment Station-sponsored research and the Penn State Cooperative Extension Service. Goal 2 outputs can be directly referenced in Penn State Cooperative Extension's Annual Report of Accomplishments and Results. Further accomplishments and outputs, including publications, can be found in by searching Pennsylvania projects in CRIS at http://cris.csrees.usda.gov/menu.html. Pennsylvania researchers also rely on traditional means of disseminating information, including publication in technical, popular, and trade outlets, presentations to stakeholders and policymakers, and web-based delivery methods. Our research results reach audiences in Pennsylvania, the nation, and the world.

Multistate projects are an important part of our activity under Goal 2 themes. Five of our experiment station projects contribute to multistate projects within Goal 2 (NC-0129, NC-0221, NE-0103, NE-0185, S-0294). One of the featured planned projects below, Pennsylvania project PEN03664, contributes to NE-0103. Individual impact statements are available to 'guests' on the web at National Information Management and Support Systems at http://www.lgu.umd.edu/login.cfm.

Allocated FTEs to Goal (in units):

SY	PY	TY	CY	TOTAL
12.6	12.0	0.0	10.4	35.0

Total Expenditures directed to Goal ($ in thousands): [1]

Hatch	Multistate Hatch	McIntire-Stennis	Animal Health	State Appropriated	Leveraging Dollars	Total
$235	$69	$0	0	$829	$884	$2,018

The following agencies/sponsors provided leveraging dollars:

AgroFresh
American Agricultural Economics Association
American Cancer Society
Binational Agricultural Research and Development
Devault Foods
Diamond V
EIEICO Inc.
GlaxoSmithKline
Moir, Andrew
National Honey Board
National Institutes of Health
National Pork Board
National Pork Producers Council
National Science Foundation
Pennsylvania Department of Agriculture
Pennsylvania Game Commission
Rohm and Haas Co.
State Horticultural Association of Pennsylvania
Stemilt Growers Inc.
United States Department of Agriculture
United States Department of Defense
United States Department of Interior
Valent BioSciences Corporation
Virginia State Horticultural Society Inc.
Washington State Tree Fruit Research Commission

Planned Program: Postharvest Physiology of Fruits (PEN03664)

Key Themes: Agricultural Profitability, Food Handling, Food Quality

Brief Description: This research project, which contributes to multistate research project NE-0103, evaluates postharvest requirements of new and existing temperate fruit varieties, develops sustainable alternatives to chemical control of physiological disorders, diseases, and pests, and expands fundamental knowledge to improve and create new technologies to assure high quality and wholesomeness of fruit that may enhance market opportunities.

Impact/Accomplishment Statement: Six new apple varieties grown in Massachusetts, North Carolina, and Pennsylvania were stored in regular atmosphere (RA) and controlled atmosphere (CA) conditions at Penn State's CA research facilities for six months. Comparative analysis was conducted with a limited number of apples treated with a new ethylene blocking compound (1-methylcyclopropene [1-MCP]), which was registered by EPA in July 2002. The analysis demonstrated the differences in flesh firmness per variety under the two different atmospheres and treatment with 1-MCP. The major apple processing variety in the Mid-Atlantic region, York Imperial apple, developed significant internal flesh browning reaction during storage following 1-MCP application. Two consumer sensory trials were conducted to evaluate flavor and fruit texture differences between treated and control fruits. Further research needs to be undertaken prior to making recommendations for treating York Imperial with 1-MCP. A storage regime combination of 1-MCP and RA could be advantageous from both increased product quality and cost effectiveness. With specific engineering adaptations, more consistent fruit quality and more consistent consumer satisfaction will be attained and passed to the apple industry.

Sources of Funding: Hatch Act, Multistate Hatch Act, and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from AgroFresh, Rohm and Haas Co., State Horticultural Association of Pennsylvania, Stemilt Growers Inc., Valent BioSciences Corporation, Virginia State Horticultural Society Inc., and Washington State Tree Fruit Research Commission.

Scope of Impact: Multistate Research – CA, DC, GA, MA, MD, MI, MN, NC, NY, OR, PA, and WA

Planned Program: Reduction or Inhibition of Bacterial Foodborne Pathogens on Fresh and/or Processed Muscle Foods (PEN03786)

Key Themes: Food Handling, Food Safety, Foodborne Illness, Foodborne Pathogen Protection, HACCP

Brief Description: Reducing the presence of foodborne microorganisms in raw foods of animal origins has become an important aspect of insuring that consumers are provided with the safest meat and poultry products. This planned research program focused on identifying, developing and validating antimicrobial delivery systems (packaging films) and novel intervention strategies in applications of antimicrobials to meat and poultry surfaces to inhibit or reduce spoilage and/or pathogenic bacteria on fresh and processed muscle foods. The research was applied to practical intervention methods in slaughter and further processing operations.

Impact/Accomplishment Statement: Flexible and rigid packaging materials, alone or in combination with other preservation methods, were developed to offer the necessary barrier, inactivation, and containment properties required for successful packaging. Various methods were used to compare their effectiveness in reducing and controlling pathogens with applications of antimicrobials on meats and poultry surfaces, including submersion, spray washing, and vacuum packaging and irradiation. Data from these studies were published and incorporated into USDA Food Safety and Inspection Service (FSIS) publications and presented at joint meetings of the American Dairy Science Association, American Meat Science Association, the American Society of Animal Sciences, and Poultry Science Association.

The research results were used to develop a series of state-wide industry workshops for controlling *Listeria monocytogenes* in small meat and poultry establishments, in Penn State sanitation and food microbiology short courses, and to assist Pennsylvania businesses with technical issues related to implementing Hazard Analysis and Critical Control Point (HACCP) requirements. This planned research program has a direct impact on reducing industry meat recalls and incidence of foodborne illnesses.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from Devault Foods, Diamond V, National Pork Board, National Pork Producers Council, and United States Department of Agriculture.

Scope of Impact: Integrated Research and Extension

Goal 3
A healthy, well-nourished population.

Through research and education on nutrition and development of more nutritious foods, enable people to make health promoting choices.

Executive Summary: The Pennsylvania Agricultural Experiment Station engages in a variety of projects that contribute to a healthy, well-nourished citizenry. During FY2002, 18 projects supported Goal 3 themes. The two planned programs featured below illustrate accomplishments and impacts within this Goal. Additional highlights include research to determine the basis of human and animal responses to environmental contaminants. A project designed to elucidate how dioxin, a serious pollutant, has its effect on the body is influencing subsequent research efforts here and around the world. The ultimate outcome will be a better understanding of how to reduce impacts of this and related compounds on human health. The development and distribution of animal source foods may lead to improved health among children in sub-Saharan Africa. A product derived from rabbit or

chicken plus sweet potatoes was evaluated for palatability and safety relative to four foodborne pathogens. Adoption of this technology would address chronic undernourishment in this population, leading to increased cognitive and physical development, and could provide community economic development opportunities.

Expenditures of Hatch and Multistate Hatch funds in projects related to Goal 3 were approximately $146,000 in FY2002, a reduction of 49 percent over the FY2001 level of $286,000. Overall expenditures tracking to Goal 3 projects were also lower ($1.6 million in FY2002, down 27.2 percent from FY2001). State appropriated expenditures increased by approximately $100,000 while external grant expenditures increased by $1,610 during FY2002. One new faculty member hired during FY2002 would be characterized as having proposed research activities primarily within Goal 3 themes. Graduate students are assigned to goals in proportion to faculty assignments. Approximately 22 graduate students can be expected to be working on research projects consistent with Goal 3 themes.

Many of these research results are communicated to stakeholders through a variety of methods, but we continue to rely on the close connection between Experiment Station-sponsored research and the Penn State Cooperative Extension Service. Goal 3 outputs can be directly referenced in Penn State Cooperative Extension's Annual Report of Accomplishments and Results. Further accomplishments and outputs, including publications, can be found in by searching Pennsylvania projects in CRIS at http://cris.csrees.usda.gov/menu.html. Pennsylvania researchers also rely on traditional means of disseminating information, including publication in technical, popular, and trade outlets, presentations to stakeholders and policymakers, and web-based delivery methods. Our research results reach audiences in Pennsylvania, the nation, and the world.

No multistate projects during FY2002 would be characterized as having proposed research activities within Goal 3 themes.

Allocated FTEs to Goal (in units):

SY	PY	TY	CY	TOTAL
11.1	9.2	0.0	3.6	23.9

Total Expenditures directed to Goal ($ in thousands): [1]

Hatch	Multistate Hatch	McIntire-Stennis	Animal Health	State Appropriated	Leveraging Dollars	Total
$146	$0	$0	$0	$452	$1,040	$1,639

The following agencies/sponsors provided leveraging dollars:

American Cancer Society
EIEICO Inc.
GlaxoSmithKline
Moir, Andrew
National Institutes of Health
National Pork Producers Council
Pennsylvania Department of Agriculture
Pennsylvania Department of Health
United States Department of Agriculture
United States Department of Defense
United States Department of Interior

Planned Program: Agricultural Safety and Health for Farm Families and Farm Workers (PEN03583)

Key Themes: Farm Safety, Human Health, Youth Farm Safety

Brief Description: Agriculture is ranked as one of the most hazardous industries in the United States. It is estimated that approximately 5,000 serious farm work accidents occur each year in Pennsylvania and since 1980 over 500 Pennsylvania men, women, and children have lost their lives during farm work or from farm work site hazards. Because farmers do not have to report most of their accidents through Occupational Safety and Health Administration (OSHA) or other mechanisms, it has been difficult to accurately classify whether work fatalities or injury incidents are actual occupational-related incidents or the result of rural life leisure or other kinds of incidents. The goals of this project have been to improve the safety and health of farm families and farm workers

through development of methods and procedures that allow more accurate and complete classification of farm and agricultural injury events, conduct research leading to the development and design of testing and evaluation methods for safer farm equipment handling (e.g., providing real-time stability information for tractor operators and replacing mechanical power-take-off drives), develop educational interventions to reduce risk of injury from farm work, and develop instructional materials, strategies, and a train-the-trainer approach to farm accident rescue for volunteers and first-on-the-scene programs for farm families.

Impact/Accomplishment Statement: Analysis of fatal injury statistics among Pennsylvania residents involved in farm work accidents continued in 2001 and 2002, and a five-year summary of fatal farm related incidents was published. The original American Society of Agricultural Engineers (ASAE) standard for classifying agricultural injury developed by this project in 1999 was revised to concur with a new North American Industrial Classification System. This revision of ASAE Standard S575 Farm and Agricultural Injury Classification Code was passed and will be published in the 2002 ASAE Standards yearbook. The rate for non-fatal farm working injury in Pennsylvania declined nearly 50 percent over an approximate 8-year period (1987-1993/95), while the rate of fatal farm work-related injury has declined nearly 20 percent over the past 20 years (1980-1999). An evaluation of tractor power-take-off (PTO) safety programs resulted in 75 percent of participants indicating that they have been exposed to PTO hazards, 97 percent indicating that the program increased their understanding of PTO hazards, 77 percent indicating they learned new safety information, 88 percent indicating that the program met their needs for PTO safety, and 69 percent indicating that had not attended a farm safety program other than from Cooperative Extension during the past year.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from Department of Health and Human Services, National Institutes of Health, Northeast Center for Agricultural and Occupational Health-Bassett Healthcare, and Pennsylvania Department of Agriculture.

Scope of Impact: Integrated Research and Extension

Planned Program: Socioeconomic Factors Influencing Food Choices and Nutritional Patterns of Limited Resource Audiences (PEN03813)

Key Themes: Children, Youth, and Families and Risk, Health Care, Human Health, Human Nutrition, Multicultural and Diversity Issues

Brief Description: Providing information on the relationship of socioeconomic and other factors to nutrient intake and food security is basic to improving the health and well-being of low income individuals and families such as migrant farm workers. Each year approximately 45,000 to 50,000 migrant farm workers enter Pennsylvania to assist in harvesting the commonwealth's fruit, vegetable, and mushroom crops. The health and wellness of agricultural workers are significantly related to workforce productivity. Despite their importance, these farm workers are usually an invisible population. Limited research studies have been conducted to determine the health and nutrition problems and concerns afflicting these workers – including barriers to achieving good health and the programmatic, social, cultural, and lifestyle factors to which the barriers can be attributed. Although dissemination of regional studies highlighting poor health and economic status of migrant farm workers have provided some awareness of these problems, there is a limited body of knowledge for understanding the nutritional health of this particular audience. In Pennsylvania, no research has yet been conducted. This planned research program began to assess nutritional and food related behaviors of limited resource individuals to determine if relationships exist among demographic variables and the level of food security, dietary practices, food purchasing and preparation patterns, and nutrient intake of those adults.

Impact/Accomplishment Statement: Data collection began by conducting key informant interviews with 27 service providers, a survey of 49 participants and focus group interviews with 34 migrant farm workers and their families in five counties in Pennsylvania heavily involved in agriculture (Adams, Berks, Chester, Erie, and Franklin). Key informants estimate that approximately 60 percent of the migrant farm workers are obese, more than 33 percent have diabetes, and more than 22 percent have hypertension, with two major themes emerging from the interviews regarding participants' health concerns: chronic diseases and obesity. Predominant themes regarding eating patterns include lack of money, low fruit and vegetable consumption, poor food preparation skills, lack of time to prepare meals, communication and language barriers, and fear or confusion in trying new foods. Other contributory problems included lack of adequate housing and cooking facilities and limited availability and access to "healthy" foods. Results from this research will enable researchers to gain a better understanding on migrant farm worker perceptions of what constitutes good health and proper nutrition to assist policy makers and state health officials in making decisions regarding the direction of funds and how to increase utilization of health care programs targeted towards the working poor, such as the Children's Health Insurance Program. In the future, this planned program will be used in a more comprehensive statewide study of the physical, mental and behavioral health and social context of migrant farm workers and their families in Pennsylvania. The information provided from this research project will help to catalyze needed progress in improving the health of migrant farm workers.

Sources of Funding: Hatch Act and State appropriated funds.

Scope of Impact: State Specific

Goal 4

An agricultural system which protects natural resources and the environment.

Enhance the quality of the environment through better understanding of and building on agriculture's and forestry's complex links with soil, water, air, and biotic resources.

Executive Summary: The Pennsylvania Agricultural Experiment Station supports a variety of projects that contribute to protection of natural resources and the environment. In fact, most of our experiment station projects have elements of natural resource and environmental impacts. During FY2002, 88 projects specifically supported Goal 4 themes. The two planned programs featured below illustrate accomplishments and impacts within this Goal. Additional highlights include research on new web-based tools for more effective land use planning. Several tools have been developed to solve problems for various state and local governmental agencies. A GIS application developed for the Pennsylvania Department of Environmental Protection predicts future environmental impacts of water removal from streams and is being used in permitting decisions. The development of the tools to deliver Pennsylvania geospatial data to the general public through the Pennsylvania Spatial Data Access program (http://www.pasda.psu.edu) has resulted in over 2.4 million website hits per year. Another research project has contributed to our understanding of current mine reclamation practices using biosolid application. This project demonstrated that application rates used at present have significant potential for leaching loss of nitrates, which could be ameliorated by stabilization of the nitrogen through addition of carbon. Penn State and Pennsylvania have been leaders in the development of phosphorus management strategies, and another of our projects has continued to examine phosphorus dynamics at the farm and watershed levels. Results from this project have led to modifications of the Pennsylvania Phosphorus Site Index, currently in draft form before the Pennsylvania Nutrient Management Advisory Board and the Pennsylvania State Conservation Commission.

Expenditures of Hatch and Multistate Hatch funds in projects related to Goal 4 were approximately $1.07 million in FY2002, a reduction of approximately 7 percent over the FY2001 level of $1.16 million. Overall expenditures

tracking to Goal 4 projects were lower ($10 million in FY2002, down 8.9 percent from FY2001). State appropriated and external grant expenditures declined slightly during FY2002. Four new faculty hired during FY2002 would be characterized as having proposed research activities primarily within Goal 4 themes. These faculty will contribute to research in sustainable agriculture, turf grass, aquatic ecosystems, and a better understanding of soil dynamics relative to crop production practices. Graduate students are assigned to goals in proportion to faculty assignments. Approximately 80 graduate students can be expected to be working on research projects consistent with Goal 4 themes.

Many of these research results are communicated to stakeholders through a variety of methods, but we continue to rely on the close connection between Experiment Station-sponsored research and the Penn State Cooperative Extension Service. Goal 4 outputs can be directly referenced in Penn State Cooperative Extension's Annual Report of Accomplishments and Results. Further accomplishments and outputs, including publications, can be found in by searching Pennsylvania projects in CRIS at http://cris.csrees.usda.gov/menu.html. Pennsylvania researchers also rely on traditional means of disseminating information, including publication in technical, popular, and trade outlets, presentations to stakeholders and policymakers, and web-based delivery methods. Our research results reach audiences in Pennsylvania, the nation, and the world.

Multistate projects are an important part of our activity under Goal 4 themes. Eleven of our experiment station projects contribute to multistate projects within Goal 4 (NC-0226, NE-0124, NE-0171, NE-0185, NE-0187, NE-1001, NRSP-0003, S-0290, W-0133, W-0170, W-0195). Individual impact statements are available to 'guests' on the web at National Information Management and Support Systems at http://www.lgu.umd.edu/login.cfm.

Allocated FTEs to Goal (in units):

SY	PY	TY	CY	TOTAL
41.2	81.0	13.0	31.9	167.2

Total Expenditures directed to Goal ($ in thousands): [1]

Hatch	Multistate Hatch	McIntire-Stennis	Animal Health	State Appropriated	Leveraging Dollars	Total
$821	$253	$94	$0	$5,529	$3,368	$10,065

The following agencies/sponsors provided leveraging dollars:

Centre County Government
Environmental Protection Agency
Golf Course Superintendents Association of America Foundation
Great Lakes Commission
National Institutes of Health
National Pork Producers Council
National Science Foundation
National Watermelon Promotion Board
Ohio Floriculture Foundation
Pennsylvania Department of Military and Veteran Affairs
Pennsylvania Department of Agriculture
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Transportation
Pennsylvania Fish and Boat Commission
Pennsylvania Game Commission
Pennsylvania Soybean Promotion Board
Pioneer Hi-Bred International Inc.
Susquehanna River Basin Commission
Syngenta Crop Protection Inc.
United States Civilian Research and Development Foundation for the Independent States of the Former Soviet Union
United States Department of Agriculture
United States Department of Defense
United States Department of Interior
United States Poultry and Egg Associations
Washington Tree Fruit Research Commission
Wild Resource Conservation Fund

Planned Program: Monitoring, Mapping and Management of Insects Affecting Vegetable Crops (PEN03602)

Key Themes: Biodiversity, GIS/GPS Integrated Pest Management, Pesticide Application, Precision Agriculture

Brief Description: This planned program developed pest monitoring programs at both local (within-field) and regional scales and helped bring spatial mapping into Integrated Pest Management (IPM) programs. At a within-field scale, studies on Colorado potato beetle showed how border treatments with systemic pesticides could be used for management, and pest population growth within fields could be modified to predict the location of pest hotspots later in the season. At a regional scale, pheromone and blacklight capture data for three lepidopteran pests of sweet corn across nine northeastern and mid-atlantic states were collected and organized into a web-accessible management tool using relational databases. This web-based tool created maps and time-series graphics for each site, which provided regional views, with hot-links to times-series graphics at each site. This work also contributed to development of pest monitoring in IPM in the Caribbean. Work in sweet corn also began to address how consumers would respond to transgenic sweet corn and how insect populations were or were not affected by transgenic versus isoline sweet corn. The influence of transgenics on arthropod communities was also assessed in potatoes and squash.

Impact/Accomplishment Statement: Monitoring programs for sweet corn were developed as part of IPM in sweet corn. The market value for adopting sweet corn IPM in Pennsylvania was approximately $6.7 million for 1999; external value due to pesticide use changes affecting acute and chronic human toxicity, surface and groundwater, and aquatic, avian, mammalian and insect species was nearly $6.8 million ($1.56 per household). Pest monitoring across the nine northeastern states by integrating web and Geographic Information System (GIS) technologies showed an approximate 8-fold increase from 1999 to 2002 in users accessing insect monitoring data during the growing season. Studies defining the spatial patterns of herbivores at a within-field scale enabled spatial targeting of management tactics, which help minimize pesticide use and avoid insecticide resistance. This work at the within-field scale ties applied entomological work with advances in Precision Agriculture. Results from these studies suggest methods for reducing reliance on pesticides reviewed as part of the Food Quality Protection Act, enabling a transition to management that improves farm worker safety and reduces pesticide residue exposure to consumers.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from Pennsylvania Department of Agriculture, Syngenta Crop Protection Inc., and United States Department of Agriculture.

Scope of Impact: Multistate Integrated Research and Extension – DE, MD, MA, NJ, NY, PA, and VA

Planned Program: Effects of Forest Fragmentation on Birds (PEN03695)

Key Themes: Forest Resource Management, Land Use, Wildlife Management

Brief Description: Pennsylvania and Northeastern United States forests have provided mature forest habitat to migrating birds like Neotropical migrants. These birds, which breed in North America and winter in the Neotropics, make up over 70 percent of both the number of species and the total abundance of individuals within the eastern deciduous forest. The birds are extremely important within the forest ecosystem because of their role in insect control in addition to having great aesthetic appeal by virtue of their beauty and vocal sounds. Over the past 50 years, populations of many species of Neotropical migrants have declined. Land use practices promoting dissection of contiguous forests into woodlots isolated from one another by suburban or agricultural lands have been proposed as major factors for these declines. In previous studies, this research project examined the effects

of forest fragmentation on the reproductive success of forest-dwelling Neotropical migrant songbirds. The research this fiscal year has focused on how changes in land use may also affect Neotropical migrant songbirds during their migration.

Impact/Accomplishment Statement: Field work and analysis of data associated with habitat use by mixed species flocks netropical migrants during fall migration was completed. Two hundred twenty (220) flocks were observed for 30-minute periods in six forest habitat types. Consistently high species richness and abundance of migrant bird species strongly suggests that structurally diverse forest edge habitats were selected over forest interior habitat or pole stage habitat and provided relatively high quality stopover habitat for landbirds during fall migration. The data collected will enable conservation organizations to better develop wildlife management plans. The information can also assist private landowners in managing and enhancing existing edge habitats for migrating birds.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Game Commission, and United States Department of Interior.

Scope of Impact: State Specific

Goal 5

Enhanced economic opportunity and quality of life for Americans.

Empower people and communities, through research-based information and education, to address economic and social changes facing our youth, families, and communities.

Executive Summary: The Pennsylvania Agricultural Experiment Station supports a variety of projects that contribute to enhanced economic opportunity and quality of life. During FY2002, 48 projects supported Goal 5 themes. The two planned programs featured below illustrate accomplishments and impacts within this Goal. Additional highlights include a project that provided seventh and eighth grade students at eight Pennsylvania middle schools with information on alcohol, tobacco, and other drugs. Survey results of eighth graders who have completed a full year of educational programming and 'booster' lessons in the second year demonstrate a more thorough understanding of the potential for addiction and adoption of attitudes to resist use of these materials. Economic research examined the impact of a regional system of heritage centers in southwestern Pennsylvania. Modeling of the survey data estimated direct economic impacts of $11.7 million and secondary impacts of $6.4 million, resulting in 335 jobs worth $5.2 million in wages. These data were delivered to local and state planning agencies involved in developing and enhancing these tourist attractions. Economic vitality of rural communities has been a continuing challenge in Pennsylvania, and another project implemented new survey techniques to generate a more informative data base for local planners. Community input resulted in more widely accepted decisions about local forest management policies; the data are being used in support of the Pennsylvania Sustainable Forestry Initiative sponsored by the American Forestry and Paper Association.

Expenditures of Hatch and Multistate Hatch funds in projects related to Goal 5 were approximately $391,000 in FY2002, lower than the FY2001 level of $393,000. Overall expenditures tracking to Goal 5 projects were higher (over $3.2 in FY2002, up from $3.06 million in FY2001). Both state appropriated funds and external grant funding increased during this time period. No new faculty hired during FY2002 would be characterized as having proposed research activities primarily within Goal 5 themes. Graduate students are assigned to goals in proportion to faculty assignments. Approximately 37 graduate students can be expected to be working on research projects consistent with Goal 5 themes.

Many of these research results are communicated to stakeholders through a variety of methods, but we continue to rely on the close connection between Experiment Station-sponsored research and the Penn State Cooperative

Extension Service. Goal 5 outputs can be directly referenced in Penn State Cooperative Extension's Annual Report of Accomplishments and Results. Further accomplishments and outputs, including publications, can be found in by searching Pennsylvania projects in CRIS at http://cris.csrees.usda.gov/menu.html. Pennsylvania researchers also rely on traditional means of disseminating information, including publication in technical, popular, and trade outlets, presentations to stakeholders and policymakers, and web-based delivery methods. Our research results reach audiences in Pennsylvania, the nation, and the world.

Multistate projects are an important part of our activity under Goal 5 themes. Seven of our experiment station projects contribute to multistate projects within Goal 5 (NC-0221, NC-1001, NC-1002, NE-0162, NE-0167, NE-0185, W-0183). Individual impact statements are available to 'guests' on the web at National Information Management and Support Systems at http://www.lgu.umd.edu/login.cfm.

Allocated FTEs to Goal (in units):

SY	PY	TY	CY	TOTAL
19.1	19.1	0.0	12.2	50.4

Total Expenditures directed to Goal ($ in thousands): [1]

Hatch	Multistate Hatch	McIntire-Stennis	Animal Health	State Appropriated	Leveraging Dollars	Total
$305	$87	$12	$0	$1,806	$1,002	$3,212

The following agencies/sponsors provided leveraging dollars:

American Sociological Association
Center for Rural Pennsylvania
Environmental Protection Agency
Kane Chamber of Commerce
National Audubon Society
National Institutes of Health
National Science Foundation
Ohio Floriculture Foundation
Pennsylvania Department of Agriculture
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Energy
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Transportation
Pennsylvania Fish and Boat Commission
Pennsylvania Game Commission
Pennsylvania Landscape and Nursery Association
United States Department of Agriculture
United States Department of Education
United States Department of Interior

Planned Program: Studying Public Perceptions of Social Issues (PEN03630)

Key Themes: Agricultural Financial Management, Jobs/Employment, Ornamental/Green Agriculture

Brief Description: Data from scientifically designed surveys using representative samples have become important sources of information for decision-makers concerned with evaluating the effectiveness of various services and programs and in determining the needs of their constituencies. The focus of this planned program was on conducting a survey with landscape and nursery growers and dealers to ascertain their perceptions of the economic situation and concerns facing the Green Industry (growers, landscaping contractors, distributors, nursery stock producers and retailers, garden and lawn care centers, as well as mail order establishments).

Impact/Accomplishment Statement: Eight hundred forty-two (842) independent businesses in the Pennsylvania Green Industry reported rapid growth in sales, payrolls, and taxes during the last five years; fewer than ten percent had declined in theses areas, despite competition from mass marketers. Issues of greatest concerns were educating government officials and the public about the importance of the industry and increasing research on insect/disease control. The research data also identified other priority issues such as developing industry-wide promotion and educating industry members about advancement in horticulture and business

management, but revealed differences between growers and garden centers. Findings were published in the report: “Pennsylvania Green Industry: Its Nature and Contribution to the State’s Economy.” This report, distributed to the Pennsylvania Landscape and Nursery Association is now posted on the association’s website (http://www.plna.com/assets/downloads/long%20survey.pdf), reaching the Association’s 700 active members who contribute to Pennsylvania’s $3.1 billion Green Industry. The survey and report were also distributed to other researchers, stimulating further research programs on insect and pathogen pests of ornamental plants.

Sources of Funding: Hatch Act and State appropriated funds.

Scope of Impact: State Specific

Planned Program: Examining Food Issues in Resource Stressed Families, Households, and Communities (PEN03658)

Key Themes: Children, Youth, and Families at Risk, Human Health

Brief Description: Diabetes affects approximately 17 million Americans. When a spouse or a partner is diagnosed with the disease, couples may have trouble dealing with dietary changes required to control and manage the disease. This planned research program seeks to understand how family food decisions are made when one partner is diagnosed with Type-2 (non-insulin-dependent) diabetes to enable educators, in conjunction with educational materials, to counsel couples and help them overcome barriers unique to implementing diets.

Impact/Accomplishment Statement: Data analysis of qualitative interviews, conducted earlier in the research with 20 couples in which one partner was recently diagnosed with the disease, was completed. Results were used to develop a Dietary Support Assessment instrument based on 23 Type-2 diabetics living with a partner and, subsequently, 230 married Type-2 diabetics were recruited, through hospital mailing lists and Cooperative Extension offices, to gather and complete the data for a confirmatory factor analysis. The Dietary Support Assessment instrument is based on family systems theory as defined by Olson who found that three dimensions defined family functioning as a system: flexibility, cohesion, and communication. This planned program system focus will be on the 'couple' and the instrument includes sections addressing adjustment, roles (which define cohesion or togetherness), flexibility, and communication. The results will enable researchers to better understand how families make dietary decisions, so that more effective interventions can be designed for these types of diabetics.

Sources of Funding: Hatch Act and State appropriated funds. This planned program also leveraged the appropriated funds by receiving funds from National Institutes of Health and United States Department of Agriculture.

Scope of Impact: Integrated Research and Extension

Stakeholder Input Process: We continue to rely upon the close interactions between the Agricultural Experiment Station and Cooperative Extension as a primary source of stakeholder input. Approximately one half of the faculty, staff, and administrators on the University Park campus supported by research funding have split appointments in research and extension. These connections help to ensure that our research enterprise is informed by the needs of end users of our knowledge generation. Details of the Cooperative Extension processes for stakeholder listening are available in the Penn State Cooperative Extension FY2000-04 Plan of Work and the

Penn State Cooperative Extension Annual Report of Accomplishments and Results FY2000, FY2001, and FY2002.

Representatives of the Pennsylvania Agricultural Experiment Station also interact directly with stakeholders, providing them with the opportunity to comment directly on research priorities. The Pennsylvania Agricultural Experiment Station Research Plan of Work FY2000-04 provides a list of stakeholder groups and events that provide such feedback. Examples within FY2002 include state-wide or regional meetings of the Pennsylvania Farm Bureau, the State Horticultural Association of Pennsylvania, the Pennsylvania Agronomic Education Society, the Pennsylvania Association for Sustainable Agriculture, the Pennsylvania Christmas Tree Growers Association, and the Center for Rural Pennsylvania, among many others. We also have direct connections with the Penn State Agricultural Council (http://agcouncil.cas.psu.edu) and, through the council, the 97 member organizations and groups representing the agricultural industry across Pennsylvania. Our discussions with stakeholders have influenced budget priorities, with regards to both faculty/staff positions and program funds, and the strategic planning process.

Stakeholders continued to provide input in identifying emerging issues that require new or innovative research. For example, stakeholders (industry and the public) identified the need to develop new antimicrobial delivery systems and novel intervention strategies to reduce the presence of foodborne microorganisms in raw foods of animal origins to ensure that the meat, dairy, and poultry industries are delivering safe products to consumers. Results of this research are validated under laboratory conditions and findings are applied in curricula development for stakeholders' short courses and workshops series and for implementing Hazard Analysis and Critical Control Point (HACCP) requirements as described in Goal 2 (PEN03786). Data resulting from scientifically designed surveys (PEN03630), involving stakeholders of the Pennsylvania Landscape and Nursery Association, became important sources of information for the Association's decision-makers who are concerned with the economic development of the Green Industry in Pennsylvania.

Program Review Process: There have been no significant changes in the Merit and Peer Review processes during FY2002 as stated in the Research Plan of Work for the Pennsylvania Agricultural Experiment Station for Federal Fiscal Years 2000 to 2004.

Evaluation of the Success of Multi and Joint Activities:

Multistate Activities: Collaborative research is an important mechanism for expanding the capacity of our Agricultural Experiment Station researchers. Our faculty participated in 43 multistate projects in FY2002. In addition, Penn State researchers regularly engage in collaborative efforts with research colleagues in other states, primarily through the process of obtaining external funding leveraged by Hatch Funds. Several USDA Competitive Grants programs have placed an emphasis on such collaborative research, and our faculty have responded enthusiastically to these opportunities. Many of these efforts are regional in nature, reflecting shared agricultural research priorities, but a number of the collaborations are national and international.

Integrated Activities: The Pennsylvania Agricultural Experiment Station has a commitment to working with Penn State Cooperative Extension and Resident Education to fully integrate the research enterprise with other functions within the College of Agricultural Sciences and the University. Nearly all of our faculty have joint appointments that cross the research, cooperative extension, and resident education functions, and this is reflected in our 14 new faculty added to the Experiment Station in FY2002. This integration of appointment helps to ensure that all clientele receive the benefit of the latest research information generated here at Penn State and beyond.

Multidisciplinary Activities: Nearly all of the research activities conducted by the Pennsylvania Agricultural Experiment Station are multidisciplinary in nature. During FY2001, Penn State instituted a tracking system to examine the role of Colleges in several strategic multidisciplinary initiatives. In FY2002 the College of Agricultural Sciences, of which the Experiment Station is the research enterprise, contributed 12 percent of Social Sciences research, 19 percent of Life Sciences research, 10 percent of research in the Children, Youth, and Families Consortium, and 52 percent of the research expenditures tracking to Environmental Research. These

values are one indication of the significant contribution that our Experiment Station researchers are making to interdisciplinary research here at Penn State.

The planned multi and joint activities conducted by the Pennsylvania Agricultural Experiment Station addressed issues that have been identified through the multistate activities planning process (multistate projects) and through needs assessments in collaboration with cooperative extension and/or resident education faculty and audiences. The relevance of these activities to the five USDA goals has been noted in the previous sections. In addition, multi and joint activities are conducted in the framework of the College of Agricultural Sciences three-year strategic plan, which identifies areas of critical issues (http://www.cas.psu.edu/2002StrategicPlan.pdf) at the state level. The College strategic priorities determine our faculty hires and program fund allocations for each of these issue areas and faculty develop their Hatch and multistate projects on the basis of these critical issues.

Examining the relevance of our planned programs to underserved and underrepresented populations continued to be one of the criteria of our research funding process. In 2002, we provided funding to faculty who addressed the socioeconomic factors influencing the food choices and nutrition patterns of a limited resource audience, primarily Hispanic migrant workers. Despite the importance of this agricultural worker population, which is indispensable to Pennsylvania agricultural production, this audience has been an invisible population. The data collection through PEN03813 will enable other researchers to better understand migrant workers' perceptions of good health and proper nutrition and the project findings will assist policy makers and state health officials in implementing programs that can improve the health of this population. Furthermore, all our faculty are regularly made aware of the need to engage in projects that provide research results with meaningful impact to all of our audiences.

All of our planned programs list expected outcomes or impacts of the research, and our multi and joint activities are no exception to this. Research activities funded via competitive grants are generally required to include outcomes and impacts as part of the application process. The evaluation of these proposals routinely includes consideration of the relevance of the research as measured by these expected outcomes.

Joint and multi-activity planned programs report annually on impact, which measures program effectiveness. Project PEN03862, Eradication, Containment and/or Management of Plum Pox Virus (Sharka), continues to be an illustration of these measures. Through sustained collaboration with state and federal departments and agencies, growers' associations, legislators, and community members, our multistate research and educational eradication activities have effectively contained the virus with little spread during the past two years, thus preventing significant financial losses to growers.

Integrated Research and Extension Activities: Of the 553 administrators, faculty, and staff at University Park who are supported with research funds, 264 have split research and extension appointments. Funds supporting this research portion of these positions account for the appropriated dollars indicated on the first line on Form CSREES-REPT (see Appendix A). The dollars indicated on this line are the result of personnel with a research and extension joint appointment, where the research portion is paid on Hatch or Multistate Hatch funds. The remaining activities on the form are Hatch or Multistate Hatch funds that were used to support the operations at the Fruit Research and Extension Center in Biglerville, the Lake Erie Regional Grape Research and Extension Center in North East, and the Southeast Agricultural Research and Extension Center in Landisville.

[1]The resources indicated in this document are based on FY2002 expenditures and do not include fringe benefits or University overhead.

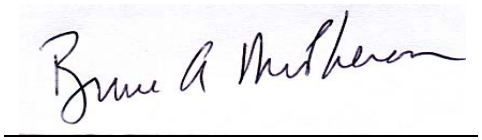
U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution: PA Agricultural Experiment Station
State: Pennsylvania

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

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Joint Research and Extension Personnel Appointments	$1,511,058	$1,509,013	$1,456,953		
Fruit Research and Extension Center			$11,281		
Lake Erie Regional Grape Research and Extension Center			$7,000		
Southeast Agricultural Research and Extension Center			$1,000		
Total	**$1,511,058**	**$1,509,013**	**$1,476,234**		



02/27/03

Bruce A. McPheron, Director
PA Agricultural Experiment Station

Date

Form CSREES-REPT (2/00)

Appendix A