PLAN OF WORK

UPDATE

State of Delaware

University of Delaware
College of Agriculture and Natural Resources

Delaware State University
College of Agriculture and Related Sciences

Federal Fiscal Years

2000-2004 and 2005-2006

A comprehensive Plan of Work for the 1890 and 1862 Land Grant University Research and Extension Programs Serving the Citizens of the State of Delaware

April 1, 2004

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INTRODUCTION

This Plan of Work Update is an extension of Delaware's 2000-2004 Plan of Work and is a comprehensive statement of Delaware's research and extension activities for years 2005 and 2006, as required by the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA), and follows the USDA "Guidelines for Land Grant Institution Plan of Work." This Plan includes the research and extension activities supported by USDA at Delaware State University and the University of Delaware.

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Adoptions by Reference:

1. We adopt by reference the national Coordinated Multi-state Research Framework for fulfillment of our obligation to the AREERA's multi-state, multi-disciplinary and integrated activities.
2. Accomplishments reporting on our multi-state, multi-disciplinary, and integrated activities for Delaware will be through the annual Northeast impact statements and the Northeast results reported through institutionally integrated AD-421s. Financial statements on expenditures will come directly from AD-419s.
3. We adopt by reference the University of Delaware's and Delaware State University's procedure for reporting Civil Rights compliance and Equal Employment Opportunity requirements. These reports will be filed through the Office of Presidents of the University of Delaware and Delaware State University to the U. S. Department of Education.
4. We adopt by reference the National Standards for Peer Review.

PLANNED PROGRAMS

Function	**Goal 1** An Agricultural System that is Highly Competitive in the Global Economy	**Goal 2** A Safe and Secure Food and Fiber System	**Goal 3** A Healthy, Well-nourished Population	**Goal 4** An Agricultural System which Protects Natural Resources and the Environment	**Goal 5** Enhanced Economic Opportunity and Quality of Life for Americans
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1890 Extension Delaware State University	1. Poultry and Livestock Production	4. Food Safety and Food-borne Illness	6. Foods and Nutrition, Dietary Habits and Exercise	9. Ecosystem Balance	11. Family and Youth Development
	2. Agronomic, Vegetable and Horticultural Crop Production				
	3. Risk Management				

GOAL 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Program 1. Poultry and Livestock Production

Statement of Issue: Agriculture is one of the largest enterprises in Delaware. The profitability of this sector of the economy is essential. Poultry production accounts for approximately 70% of the total value of agriculture in Delaware, and broiler production in Delaware is valued at approximately $494 million per year. Accurate diagnosis and effective control of infectious diseases that affect commercially produced chickens are essential to the economic viability of the poultry industry in Delaware and surrounding states. Other livestock industries are also quite significant in Delaware, with dairy valued at $20 million, beef cattle at $6 million, and swine at $2.6 million. The value of the equine industry in Delaware has not been determined. For all of these industries, nutrient management, air quality, food safety, labor, and animal welfare concerns must be addressed.

Performance Goals: Increased profitability and competitiveness of the poultry and livestock industries through reduced disease losses and improved efficiency of production.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, manuals and workshops for producers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Implementation of new disease control measures.
2. Improved competitiveness of the local poultry and allied industries relative to other poultry producing regions.
3. Increased recognition of the quality of science.
4. Identification of chicken genes that are regulated by growth hormone and the importance of prolactin to the productive performance in the domestic fowl.
5. Increased understanding of the feasibility, production costs and benefits of alternative (range) poultry production.
6. Increased producer understanding of the importance of forage quality and its relationship to milk production, resulting in improved forage management, proper silo management and improved forage quality.
7. Improved sustainability of year-round forage systems (alfalfa, tall fescue and bermuda grass) for beef cattle.
8. Reduced use of dietary inorganic phosphorus in broiler diets and reduced phosphorus content of broiler litter.

Key Program Components:

1. Poultry Health and Immune Competence. Research will be directed at understanding basic mechanisms of disease induction in chickens with emphasis on economically important respiratory diseases and diseases with oncogenic and/or immunosuppressive consequences. New and variant forms of disease agents will be characterized and studies designed to explain pathogen evolution will be conducted. Important genes and gene products that contribute to pathogenicity, disease persistence, and host-pathogen interactions will be identified. Development and evaluation of molecular-based diagnostics for current and emerging poultry diseases will continue. The efficacy of available and developing technologies for maximizing disease prevention and control strategies will be determined, including conventional vaccination methodologies and the use of immune modulators and recombinant-derived viable and non-viable immunogens. The role of the major histocompatibility complex (MHC) in relative disease susceptibility of broiler chickens will be assessed. Non MHC-related genes that may influence disease susceptibility will be sought. Efforts to enhance and hasten development of immune competence will be emphasized. Using the BSL-3 biocontainment facilities available at the Charles C. Allen, Jr. Biotechnology Laboratory, innovative work will proceed on developing enhanced diagnostics and control measures for exotic avian pathogens, such as exotic Newcastle disease virus, and for select agents that are potential targets for bioterrorism, such as avian influenza.
2. Poultry Growth and Development. Research will be directed at increasing our understanding of the basic molecular and cellular mechanisms that regulate poultry growth, development, reproductive performance, and meat yield.
3. Avian Genomics. Avian genomics efforts will be refined, expanded, and integrated with chicken genome information, as it is forthcoming. The development and application of avian microarrays will continue and expand with emphasis placed on applications for disease diagnosis and control, immunomodulation, growth and development, and optimization of desired production traits.
4. Alternative Production Systems. Research will be conducted to evaluate alternate production systems and management programs that can reduce disease, mortality, and waste production, minimize antibiotic use, and foster greater compatibility between animal production, environmental quality, and the expanding urban population in Delaware. Alternative facilities and modifications to existing facilities will be evaluated. Studies will be conducted on the use of wind breaks to reduce soil erosion and snow velocity, to maintain energy efficiency for heating in winter and cooling in summer, and to improve air and water quality around poultry houses. Poultry carcass disposal alternatives that are environmentally sound and reduce disease spread will be investigated.
5. Nutrient Utilization in Poultry and Ruminants. Increased nutrient utilization through the use of chemical and biological inputs will be studied. The effects of enzymes and feed ingredients on phosphorous metabolism and excretion in broiler chickens will be evaluated. Procedures that can alter rumen and silage fermentation to improve milk production, weight gain and feed efficiency in ruminants will be assessed. Studies will be conducted to evaluate the effect of fertilization regimes and utilization on the nutritive value, productivity, and sustainability of alfalfa, bermuda grass, and tall

fescue forage systems. The impact of forage species on productivity and conception rate in beef cattle will be studied.

6. Equine Opportunities. Along with the National Agricultural Statistics Service, a Delaware equine survey will be conducted. The overall economic impact of the equine industry in Delaware will be determined, including racing, breeding, boarding, showing, competition, and pleasure riding aspects of the industry. Applied research and outreach programs will be developed accordingly.
7. Integrated Pest Management. Insect and other pest management strategies will be implemented to reduce pest populations and minimize pesticide use in animal production operations.
8. Aquaculture Opportunities for Delaware. The current status of aquaculture, as well as the opportunities for aquaculture as a business in Delaware, will be assessed. This will include the identification of existing and potential markets. Research using native crayfish, baitfish (mummichogs, golden shiners), and food fish (yellow perch, hybrid striped bass, tilapia and freshwater prawn) will be aimed at developing cultural techniques for both pond and intensive recirculation systems where appropriate. Optimal production strategies including reproduction, nutrition, growth, and pond management will be developed around local environmental conditions and with available agricultural practices.
9. Meat Goat Production. The surging immigrant population on the eastern seaboard has resulted in a dramatic increase in demand for native cuisine. One such item is goat meat. The current status of small ruminant production as well as the opportunities available in a meat goat industry will be assessed. This will include the identification of existing and potential markets. The overall economic impact of a small ruminant program will be determined. Both applied research and outreach programs will be developed as deemed necessary by the stakeholders. This will include grass roots hands-on training to help small and limited resource farmers diversify their operations.
10. Forage and Grazing Management In a state where farm size is limited, optimization of the herbage productivity per unit area of land is critical to the economic success of grazing and forage operations. Lower precipitation and higher temperatures in the summer limit the productivity of traditionally used cool season species. Delaware State University forage research group plans to work on the evaluation of forage species with diverse growing habits that could potentially improve the forage supply in the summer and extend the production season. Grazing management guidelines that will optimize the utilization of the pasture resource are projected. The incorporation of small ruminants, such as goats and sheep, in grazing systems will be considered as an alternative to the traditional beef production systems. The group will evaluate the benefits of mixed grazing in terms of pasture productivity and sustainability of the system.

Internal and External Linkages:

Multi-function: Joint appointments of research, extension, and teaching faculty.

Multi-institutional/Multi-state: University of Maryland, Virginia Tech, Ohio State University, North Carolina State, Penn State, University of Georgia, Rutgers University, USDA/ARS, Northeast Pasture Research and Extension Consortium, Maryland-Delaware Forage Council, Intervet Inc., Maine Biologics, Biomune Inc., Immunogenetics Inc., Merial Select, Inc., Multiple Poultry Companies, Cargill, Inc., Chr. Hansen's Biosystems, Agway, Inc., Ecosyl, Ltd., Kemin Industries.

Multi-disciplinary: Virology, Pathology, Molecular Biology, Bacteriology, Immunology, Veterinary Medicine, Physiology, Nutrition, Animal Science, Agronomy

Target Audiences: Poultry integrators, poultry growers, state and federal agencies, animal health companies, peer scientists, dairy and beef producers, forage producers, industry sales and technical services personnel, poultry breeders, animal health companies.

Program Duration: Two years

Program 2. Agronomic, Vegetable and Horticultural Crop Production

Statement of Issue: Delaware's vegetable industry contributes nearly $58 million in cash farm income to producers, and more acreage is devoted to vegetable production in Delaware than in any of its surrounding states. Corn and soybeans support the poultry industry and provide significant contributions to Delaware's economy. The United States is the world's largest importer and consumer of herbs and spices. The market potential for culinary herbs and spices is considerable, but it has not been exploited by small farmers because of a lack of information on efficient agronomic management, marketing, and the availability of authentic germplasm that meets current market specifications. Development of beach, local resorts, and residential communities has led to an expanding horticulture industry, focusing on greenhouse, nursery, and turf production and management. The increasing immigrant population in the Delmarva region has created a constant demand for specialty crops. Producing exotic vegetables to meet this demand can be very profitable. The overall economic impact of a exotic vegetable program will be determined. Both applied research and outreach programs will be developed as deemed necessary by the stakeholders.

Performance Goals: Increased productivity and profitability of agronomic, vegetable, and ornamental crop producers through reduced costs of production, improved percentage of marketable product per acre, improved cultural techniques and adoption of improved crop and vegetable varieties, development and release of new, improved germplasm for plant flavor, fragrance and medicinal uses.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, manuals and workshops for producers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Adoption of higher yielding varieties and varieties with end-user specified traits (e.g. low phytate corn).
2. Reduced crop and nursery production costs as a result of adopting improved fertility, pest management, and other cultural practices.
3. Increased vegetable harvest efficiency through reduced field losses.
4. Increased total value of U.S. herb and essential oil products and commodities.
5. Increased number of non-formal educational programs conducted to improve productivity and global competitiveness of the U.S. herb and essential oil production system.

Key Program Components:

1. Agronomic, Vegetable and Horticultural Crop Production. Efforts will be directed to improving varietal selection, disease and pest resistance, seed technology, and cultural production practices involving fertility, planting method and date, tillage, cover crops, irrigation efficiency, pesticide applications, and harvest efficiency.
2. Culinary Herbs and Essential Oils. The field area and appropriate conditions for propagation of plants of flavor, fragrance, and medicine will be developed. New sources of economically important flavor and fragrance constituents will be explored. Appropriate techniques for production, harvesting, and distillation will be demonstrated and disseminated to producers.
3. New Opportunities. The feasibility, including financial and environmental impacts, of growing new varieties of existing crops (Fordhook lima beans), new crops (greenhouse vegetables, crowder peas, garbanzo beans), horticultural varieties (herbaceous perennials), and turfgrass in Delaware will be investigated. New packaging technologies that enhance shelf life will be investigated. The potential of organic production of crops for processing will be evaluated.
4. By-Products. Emphasis will be placed on developing uses for agricultural by-products, including by-products from soybeans. We will evaluate the feasibility of using by-products for fuel, feed, and litter. We will seek new uses for manures, municipal composts, yard wastes, biosolids, and industrial materials. Consideration will be given to related research projects ongoing elsewhere, and we will collaborate and adapt the work of others to Delmarva as appropriate.
5. Integrated Pest Management. Emphasis will be placed on developing and delivering improved methods for control of insect pests, weeds, and plant pathogens, especially those of importance to Delaware. Efforts will also focus on understanding pesticide movement and interactions within the soil and on identifying herbicide combinations that improve weed control and reduce active ingredient applications.
6. Nutrient Management. Emphasis will be focused on improving nutrient management in crop production and the environment. The nutrient recommendations for virtually all of the major vegetable crops grown on Delmarva need review, research, and possibly re-calibration.
7. Engineering Technologies. Improvements and new developments in mechanical harvesting and automated guidance systems for harvesters will be sought. We will promote water resource protection through research on irrigation management and will develop irrigation scheduling strategies that are effective and easy to implement.

Advances in remote sensing, tillage, and pesticide application will be applied as appropriate.

8. Plant Breeding, Crop Genomics, and Genetically Engineered Plants. Research that improves our understanding of plant genomes and the application of genomic information for crop improvement and crop protection will be continued and expanded. Basic studies on how plants adapt to their environments and manage stress, including disease, will be conducted. Studies that address soil microorganism-plant symbiotic relationships and plant/soil interfacial reactions, such as rhizosphere effects, to enhance crop growth and quality will be undertaken. The feasibility of growing genetically engineered crops and greenhouse plants on Delmarva will be evaluated.
9. Urban Gardens. Delaware State University is collaborating with Community Bridges, a not-for-profit organization located in Wilmington, to develop safe community gardens in impoverished neighborhoods of Wilmington. As expected in urban settings, lead and arsenic contamination of soils is a concern. The goals are to raise awareness of the threat that this situation represents to already underrepresented populations, to provide guidelines for safe gardening at home, and to facilitate the creation of community-based gardens. Participating members include the City of Wilmington Department of Economic Development, Delaware DNREC, DE Div. Public Health, USDA, Del Tech and other not for profit organizations.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-institutional/Multi-state: University of MD, Virginia Tech, Penn State University, University of West Virginia University, Rutgers University, Michigan State University, University of Wisconsin, Cornell University, University of Florida, Clemson University, University of California-Davis, Monsanto, Dupont, Dow Ag. Sciences, AgrEvo, Mobay, BASF, Terra, Ag. Chem, FMC, Rhone Poulenc, Novartis, Zeneca, Griffin, Rohm and Haas, Cyanamid, Valent, New Holland, Delaware Herb Grower & Marketers Association, International Herb Association, The Herb Society of America, Delaware Department of Agriculture, Delaware Department of Natural Resources and Environmental Control, National Herb Garden (National Arboretum, U.S.D.A.), U.S. Botanic Garden, McCormick, Tone Brothers, Baltimore Spice, R. J. Reynolds, Florasynth, CDC, Interweave Press, Mantanzas Creek, Energy Essentials, Prima Fleur, City of Wilmington, Delaware Department of Economic Development, Delaware Division of Public Health, USDA, Delaware Tech.

Multi-disciplinary: Soil Science, Plant Science, Plant Pathology, Entomology, Weed Science, Bioresources Engineering, Food and Resource Economics, and Horticulture.

Target Audiences: Crop producers, green industry, certified crop advisors, private agricultural consultants, state agencies (DDA, DNREC), federal agencies (USDA), chemical/seed/fertilizer companies, agricultural equipment companies, peer scientists,

growers, processors, marketers of plants of flavor, fragrance, and medicine in Delaware, the U.S., and international countries.

Program Duration: Two years

Program 3. Risk Management

Statement of Issue: Agricultural producers have always endured significant risks associated with market price fluctuation and other financial factors, weather variability, and decision-making about adoption of new production practices, technologies and marketing strategies. To remain competitive, Delaware producers must manage their risk effectively, which requires the control of both production and marketing risks. In addition, issues of human resource and legal risks need to be addressed. Generational succession, financial diversification, and public perception of environmental stewardship are key challenges. While new risk management alternatives have been and continue to be developed, these new alternatives create complex decisions for producers who seek to select appropriate risk management tools and marketing strategies.

Performance Goals: Development, evaluation and delivery of new risk management strategies to assist producers in decision making about adopting new production practices, marketing alternatives and technologies.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, manuals and workshops for producers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Improved profits from participating in marketing and production risk management strategies and programs.
2. Evaluation and adoption of new production technologies.
3. Improved public perceptions and attitudes about adoption of new production technologies.
4. Increased adoption of crop and livestock insurance programs along with the futures markets.
5. Increased knowledge of global competitiveness and other policy issues and their impact on domestic production.
6. Improved production efficiency resulting from adopting improved procurement, production, inventory, quality, marketing and distribution systems.

Key Program Components:

1. Socio-Economic Impacts and Risks. A framework to identify and assess socio-economic impacts and risks associated with new technologies, products, industry structure, and global trade policy reforms will be developed.
2. Marketing Alternatives and Strategies. The appropriate mix of marketing alternatives and strategies, and evaluation of the domestic and global market demand for farm products will be determined.
3. Risk Management Strategies. Various risk management strategies such as hedging, forward contracting, crop and livestock insurance, and revenue insurance will be examined.
4. Training Programs. Family and business financial management and marketing training programs will be developed and evaluated.
5. Evaluation of Current Practices. Current procurement, production, inventory, quality, marketing, and distribution systems will be evaluated.
6. Managing Environmental Risk. Strategies for meeting the requirements of the Total Maximum Daily Load (TMDL) programs and other environmental laws will be sought. Groundwater recharge protection via agricultural land preservation will be evaluated.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-institutional/ Multi-state: USDA, University of Maryland, Rutgers University, Penn State University, Cornell University, University of Tennessee and others.

Multi-disciplinary: Agricultural Economics, Animal Science, Plant Science, Entomology, Bioresources Engineering.

Target Audiences: Poultry growers and integrators, grain farmers, vegetable producers, state agencies (DE Dept. Of Ag, DEDO), federal agencies (USDA), peer scientists, students, and the general public.

Program Duration: Two years

GOAL 2. A SAFE AND SECURE FOOD AND FIBER SYSTEM

Program 4. Food Safety and Food-borne Illness

Statement of Issue: The American food system provides consumers with an abundant supply of convenient, economical, high-quality, and safe food products. However, food-borne illness still occurs in the United States, and outbreaks of food-borne illness due to microbial contamination continue to be a major but preventable public health problem. While advances in understanding and controlling food-borne pathogens have been significant, new pathogens, new food products, increases in imported foods, and increasing anti-microbial

resistance present new challenges to the nation's food safety programs. Protecting drinking water supplies from contamination by nitrates, pathogens, and harmful algal blooms is a priority. In view of post-September 11th bioterrorism concerns, monitoring the safety of our water and food supplies seems unquestionably prudent.

Performance Goals: Improved access to a safe, healthful, affordable food supply by all citizens. Increased consumer understanding of food-borne risks and illnesses and of safe food handling procedures.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, newsletters, fact sheets, interactive displays, workshops and training programs for consumers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels; in-service training programs.

Outcome Indicators:

1. Improved understanding of intestinal microbiology; improved competitive exclusion preparations and probiotics.
2. Development of gene-based pathogen detection methods for the testing of foods; expansion of the use of these rapid diagnostic assays to a large segment of agriculture and the food industry.
3. Development of safe, new food products preserved by non-thermal food processing methods that minimize excessive heat treatments, maintain product quality and retain original levels of nutrients.
4. Adoption of at least one food safety practice that reduces the risk of food-borne illness by consumers, foodservice workers, producers, and processors..
5. Training and certification of commercial foodservice managers.
6. Enhanced consumer knowledge of poisonous and non-poisonous products.
7. Increased understanding of safe food handling procedures by youth.

Key Program Components:

1. Characterization of Intestinal Microbial Communities in Chickens. Research will be directed at genetically identifying microorganisms that inhabit the intestinal tract of chickens and that might prevent or reduce intestinal colonization by pathogens of concern to human health.
2. Detection Methods for Food-Borne Pathogens. Research will be directed towards the development of rapid, accurate, gene-based methods to detect food-borne pathogens, including viruses.
3. Non-Thermal Antimicrobial Treatment of Foods. Research will involve the development and use of novel, non-thermal methods (especially high hydrostatic pressure processing) as preservative methods for commercial food products.
4. Fate of Pathogens. The fate and survival of key animal and human pathogenic organisms in air, soil, and water need to be determined.

5. Training for Food Handlers. Food Handlers (foodservice workers, youth, childcare givers, limited-resource individuals and families, elderly, immune-compromised individuals, and pregnant women) will be trained in food safety practices that reduce the risk of food-borne illness.
6. Training for Foodservice Managers. Foodservice managers will be trained for certification.
7. Training for Food Producers and Processors. Food producers and processors will be trained in food safety practices that reduce the risk of food-borne illness.
8. Poison Awareness and Prevention Training. Programs will be developed and delivered to provide poison awareness and prevention training.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-institutional/Multi-state: Federal agencies (USDA, HHS), Qualcom, Inc., Delaware Departments of Agriculture, Education, and Public Health; Delaware Food Safety Council; all school districts in Delaware; Food Bank of Delaware, Inc.; Delmarva Poultry Industry; Delaware Vegetable Growers Association.

Multi-disciplinary: Animal and Food Science, Health, Nutrition and Exercise Sciences, Hotel and Restaurant Management, College of Marine Studies.

Target Audiences: Poultry Integrators, Food Processors, Poultry Growers, Peer Scientists, Federal and State Agencies, Food Quality Assurance Groups, Foodservice Workers, Youth, Childcare Givers, Limited-resource Individuals and Families, Elderly, Immune-compromised Individuals, Pregnant Women; Professionals and Volunteers Working with Consumers, Foodservice Managers/Owners, Food Producers, and Food Processors.

Program Duration: Two years

GOAL 3. A HEALTHY, WELL-NOURISHED POPULATION

Program 5. Quality and Variety of Foods

Statement of Issue: Although Americans have access to an abundant, nutritious, affordable food supply and have many tools such as the Food Guide Pyramid and Nutrition Facts labels to help them select a nutritious diet, many individuals do not consume a well-balanced diet, which leads to increased human health concerns. Food recalls of low-income participants enrolling in the Delaware Expanded Food and Nutrition Education Program (EFNEP) compared similarly to a national USDA survey in that only 10, 10, 17, and 21 percent of Delaware families were eating the minimum number of servings from the dairy, fruit, bread/cereal, and vegetable groups, respectively. Research has unraveled the role of many dietary components, including phytochemicals, in the maintenance of good health. More

effort is needed to determine the effects of processing on these constituents and to provide us with new products so we can continue to enjoy nutritious, affordable foods.

Performance Goals: Increased understanding of the effect of ingredients and processing technologies on food quality and consumer preference. Improved quality, variety, and nutritional value of foods.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, manuals and workshops for producers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Increased use of production by-products to produce value-added food ingredients and nutraceuticals and expand the number of food choices for consumers.
2. Improved understanding of the interaction among various food components and phytochemicals/nutriceuticals during processing on food quality, nutritional value and preference by consumers.

Key Program Components:

1. Study of the Changes in Food Constituents. Changes in food constituents which occur during processing and the interaction of these components will be studied, especially as they relate to nutritional quality and consumer health implications.
2. Utilization of Agricultural Production By-products. Utilizing agricultural production by-products as ingredients for manufacturing new food products and expanding the number of food choices will be evaluated.

Internal and External Linkages:

Multi-functional: Joint appointments of research, teaching, and extension faculty.

Multi-institutional/Multi-state: Delmarva Poultry Industry, Inc., Delaware/Maryland Soybean Board, United Soybean Board, Mid-Atlantic Food Processors Association, National Food Processors Association, DuPont Agriculture and Life Sciences, Hercules, Florida Department of Citrus.

Multi-disciplinary: Food Science, Chemical Engineering, Mechanical Engineering, Environmental Engineering, Food and Resource Economics, Chemistry and Biochemistry.

Target Audiences: Food Industry (dairy, soybean, poultry, citrus, nutraceutical, and processing), peer scientists.

Program Duration: Two years

Program 6. Foods and Nutrition, Dietary Habits and Exercise

Statement of Issue: Although Americans have access to an abundant, nutritious, affordable food supply and have many tools available to help them select a nutritious diet, concerns about diet and human health continue to escalate. Of the ten leading causes of death due to disease, five are linked with diet. Compared to national averages, mortality rates in Delaware are higher for heart disease, cancer, and diabetes mellitus. Nationwide data suggest that the minority, low-income and educationally disadvantaged individuals carry a disproportionate burden of diet-related diseases. Although many diseases occur more frequently with advancing age, dietary practices in young people have a significant effect on occurrence and onset of these diseases. Results from a 1995 survey demonstrate that 37% of students in the Youth Risk Behavior Survey had not participated in vigorous exercise of at least 20 minutes on three of the preceding seven days. Delaware's educational programs designed to assure a healthy population were carefully selected to address issues identified by Delawareans as critical.

Performance Goals: Improved lifelong skills and knowledge base about healthy food choices, preparation of healthy meals, personal safety, and reduced health risk factors through educational programs to improve dietary habits and exercise practices in the general public.

Output Indicators: Trained volunteers, cooking classes, workshops/programs, one-on-one educational programs, media releases, internet site, fact sheets, newsletter series, interactive displays, in-service training programs, presentations at regional and national meetings.

Outcome Indicators:

1. Increased use of the Food Guide Pyramid and Nutrition Facts to meet the US Dietary Guidelines and to choose a healthy diet.
2. Increased understanding of the relationship between diet and chronic diseases such as heart disease, cancer, and osteoporosis, and adoption of dietary patterns that protect against these illnesses.
3. Improved management of food resources (money, WIC vouchers, food stamps, etc.) to meet basic nutritional needs by limited-resource individuals.
4. Increased ability of consumers, especially youth, to acquire domestic skills, i.e., prepare meals with foods to meet their nutritional needs.

Key Program Components:

1. Training for Youth, Child Care Givers, Limited-resource Individuals and Families, and the General Public. Training on how to use the Food Guide Pyramid and Nutrition Facts to meet the US Dietary Guidelines for Americans and to choose a healthy diet.
2. Training for Those at Risk for Chronic Diseases. Youth, parents, child care givers, limited-resource individuals and families, and individuals at risk for chronic diseases will be trained to provide increased understanding of the relationship between diet

and chronic diseases of heart disease, cancer, and osteoporosis and will be encourage to adopt dietary patterns that protect against these illnesses.

3. Training on Food Resouces to Meet Basic Nutritional Needs. Limited-resource individuals and families will be trained to manage their food resources (money, WIC vouchers, food stamps, etc.) to meet basic nutritional needs.
4. Training on Preparing Meals to Meet Basic Nutritional Needs. Youth and limited-resource individuals and families will be trained to prepare meals with foods to meet their nutritional needs.

Internal and External Linkages:

Multi-institutional/Multi-state: UD-DSU Cooperative Extension, Delaware 5-A-Day For Better Health Coalition; Delaware Nutrition Support Network; Delaware Departments of Education (school lunch, summer feeding program, and child and adult care feeding programs) and Public Health; Emergency Medical Services for Children, Delaware State Housing Authority Management, Safe Kids Coalition, WIC; Delmarva Poultry Industry, Inc.; Dairy Council, Inc.; Delaware Affiliates of the American Cancer Society and American Heart Association; Perinatal Association of Delaware; Delmarva Rural Ministries; Produce for Better Health Foundation; and National Cancer Institute.

Multi-disciplinary: Food Science, Health, Nutrition and Exercise Sciences.

Target Audiences: Consumers, Youth, Parents, Public Housing Residents, Childcare Providers, Individuals at Risk for Chronic Diseases, Limited-Resource Individuals and Families, Pregnant Women, Public and Private Schools and Professionals and Volunteers Working With Consumers.

Program Duration: Two years

GOAL 4. AN AGRICULTURAL SYSTEM THAT PROTECTS NATURAL RESOURCES AND THE ENVIRONMENT

Program 7. Fate and Remediation of Nutrients, Organics and Metals

Statement of Issue: To achieve greater harmony between agricultural production and the environment, Delaware must focus on several critical issues that can impact surface and ground water quality. These are, 1) efficient use of nitrogen and phosphorus in animal and crop production, 2) enhanced understanding of the fate, mobility, speciation, and bioavailability of metals and organic chemicals in soil and water environments, 3) efficient use of ground water for irrigation, and 4) appropriate use of pesticides and herbicides. Remediation of contaminated soils whether they result from agriculture or other industries is essential for environmental management. The degradation of water quality associated with nutrients and pollutants is the result of inputs from many sources. However, agriculture is clearly a significant contributor of nitrogen and phosphorus to the environment, given the

large quantities of both used annually in crop and livestock production and landscaping-related activities. Attention to natural resource and environmental management will enhance and preserve water quality, restore the health of the region's aquatic ecosystems, and sustain agriculture in Delaware and elsewhere.

Performance Goals: Improved understanding of the transport of nutrients, metals, and organics through soil. Development of new practices, technologies and educational programs to assist producers in managing plant nutrients and animal wastes. Improved surface and ground water quality on the Delmarva Peninsula.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives, technical reports, bulletins, manuals and workshops for producers; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Development of enhanced research/extension/educational programs on nutrient management, metal speciation, soil remediation, and organic chemical fate and use.
2. Enhanced agricultural income and profitability derived by implementation of improved nutrient management programs.
3. Increased sustainability of agriculture enterprises on the Delmarva Peninsula through improved preservation of soil and water quality.
4. Recognition of the quality of the science by peers.

Key Program Components:

1. Fate, Transport, and Reaction Mechanisms. Research will be directed at understanding the fate, transport and reaction mechanisms of plant nutrients (nitrate, phosphate), metals (copper, chromium, arsenic, mercury, other heavy metals), wastes (manures, sludges, industrial by-products and co-products) and organic chemicals (pesticides, industrial organic chemicals) in soils and soil components, and their effects on soil and water contamination. Soil processes that determine the distribution of inorganic and organic materials in all phases and at different scales (soil solid surfaces, soil column, soil profile, farm, and watershed) will be studied using interdisciplinary approaches that include kinetic, spectroscopic, microscopic, fiber optic, biochemical techniques, conceptual and mathematical modeling. New practices, methodologies, and educational programs will be developed in concert with colleagues from multiple disciplines, state and federal agencies, national laboratories, and state and local governments that will be useful in the management of nutrients, wastes, and other contaminants
2. Cost-Effective, In-Situ Remediation. Research will be directed at developing cost-effective, in-situ methods for the remediation and speciation of contaminated soils, including phytoremediation, bioremediation, and atomic and molecular approaches. Molecular approaches will be applied to study the mechanisms used by plants to take

up, transport, and tolerate metals. Emphasis will be placed on the role of plant/soil interfacial reactions on contaminant accumulation and bioavailability. Innovative in-situ decomposition techniques including the use of rhizosphere organisms in bioremediation will be studied. X-ray absorption spectroscopy and other atomic and molecular techniques in situ will be used to accurately speciate contaminants in soils and plants.

3. Nutrient Management/Water Quality/Air Quality. We will continue to emphasize and develop fertilizer and waste management programs that ensure economic and environmental sustainability while considering crop needs, soil fertility, application technology, alternative fertilizer sources, and government policies and recommendations. Our efforts should reflect the goals and mandates of the Delaware Nutrient Management Commission, USEPA's CAFO rule, and the TMDL settlement between Delaware and the USEPA. The Institute of Soil and Environmental Quality (ISEQ) and the Water Resources Institute will be merged and expanded to assist in addressing a large array of soil and environmental quality issues that affect Delaware. Research on non-point source pollution of surface and ground water by nutrients will continue. Best management practices for phosphorous will be developed with animal scientists, soil scientists, hydrologists, and environmental engineers. Education/certification programs in nutrient management and water quality will continue.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-institution/Multi-state: University of Maryland Campuses, Virginia Tech, Penn State University, North Carolina State University, University of Texas, Clemson University, Brookhaven, Lawrence Berkeley and Pacific Northwest National Laboratories. DuPont, Monsanto, Agrevo, DPI, Mobay, American Cyanamid, Dow Agri Sciences, BASF, DNREC, EPA, USDA, NSF, USGS and State Commodity Boards. States of Maryland, Pennsylvania, Virginia, North and South Carolina, and Texas.

Multi-disciplinary: Animal and Food Science, Bioresources Engineering, Chemistry, Civil and Environmental Engineering, and Plant and Soil Sciences.

Target Audiences: Crop producers, poultry growers, state agencies (DDA, DNREC), federal agencies (USDA, EPA, NSF, DOE), environmental groups, peer scientists, Dupont and other industries, and commodity groups.

Program Duration: Two years

Program 8. Land Use and Community Development

Statement of Issue: Conversion of agricultural land and forests to other uses continues to escalate in Delaware and the region. Critical land use issues in Delaware involve traffic congestion, costs of providing services (water, sewer, and schools), development patterns, the

preservation of working lands and the impact of land use conversions on wildlife and plant populations. Delaware maintains an active Agricultural Lands Preservation program to purchase development rights to agricultural lands.

Performance Goals: Reduced conflict between competing forces in land use and development. Protection of agriculturally productive land for future generations.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives; technical reports, bulletins, manuals and workshops for farmers, land-owners, developers, community members and local governments; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Implementation of land use strategies to balance the conflicts between economic development and farmland preservation.
2. Quantification of economic costs and benefits of alternative ground water quality protection strategies.
3. Farmers, landowners, and community members trained to use tools for optimize land use for appropriate functions.

Key Program Components:

1. Minimize Land Use Conflicts and Protect Natural Amenities. Strategies to minimize land use conflicts and protect natural amenities in an urbanizing environment will be investigated, including the utilization of integrated conceptual models that will aid those responsible for resource management decisions.
2. Benefits and Costs of Alternative Surface and Ground Water Quality Protection. A framework will be developed to examine the economic benefits and costs of alternative surface and ground water quality protection.
3. The Protection and Preservation of Agricultural Land. Current strategies to protect and preserve agricultural land will be evaluated. Promising new approaches will be investigated and assessed.
4. Rural Communities. We will study the social and economic structures of rural communities and assist with the development of strategies for the management of change within these communities.
5. Training Programs. Training programs in land use will be developed and delivered to provide farmers, landowners, and community members with tools to deal with land use and preservation issues.
6. Critical Mass and the Urban Interface. As suburbanization of our landscape continues, issues of agricultural survival are not quantified. We will research the economic, social and cultural impacts of land fragmentation, increased spatial interfaces with urban uses and effects on agricultural support industries. The

necessary “critical mass” for future agricultural viability will be assessed. The web of relationships between urban and rural land uses will be documented.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-Institutional/Multi-state: USDA, University of Maryland, Rutgers University, Penn State University. State agencies in Maryland, New Jersey, and Pennsylvania.

Multi-disciplinary: Resource Economics, Sociology, Community Development, Geographical Information Systems.

Target Audiences: Farmers, landowners, state agencies (Dept of Agriculture, DEDO, DelDOT), federal agencies (USDA), land use organizations, environmental organizations, students, and the general public.

Program Duration: Two years

Program 9. Biodiversity and Ecosystem Balance

Statement of Issue: Maintaining and restoring native biological resources and the vital services provided by healthy ecosystems on the Delmarva Peninsula after 400 years of urban and agricultural utilization is a critical issue. The impact of past agricultural practices and encroachment of urban/suburban populations on the native landscape is not fully understood. New technologies in agricultural production that include control of insects, weeds, filamentous algae, and plant pathogens are needed to insure sustainability of the agricultural enterprise in Delaware while restoring and maintaining biodiversity and natural ecosystems. Finding ways to replace and sustain biodiversity in suburban landscapes is a priority.

Performance Goals: Sustainability of long range, competitive agricultural enterprise and life-style using technologies and production systems that are environmentally sensitive and socially acceptable.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives; technical reports, bulletins, manuals, fact sheets, workshops for producers, consumers, homeowners; Master Gardeners trained; contracts and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Increased number of production units that utilize IPM strategies and systems for selected commodities.
2. Increased diversity of IPM practices used for selected commodities.

3. Reduced total input costs for selected commodities using IPM strategies and systems.
4. Increased number of producers with expertise in sustainable agriculture who serve as extension trainers.
5. Increased number of extension personnel who complete training and who recommend one or more sustainable agricultural practices after completing training.
6. Increased adoption of recommended sustainable agriculture practices.
7. Increased participation in educational programs related to responsible environmental management of natural resources, nutrients, and pesticides; and increased adoption of recommended practices or technologies based on these programs.
8. Increased knowledge base and awareness of environmental issues, awareness of biodiversity and its importance in the general public.
9. Increased volunteerism and dollars saved through volunteer intervention.

Key Program Components:

1. Integrated Pest Management. Research and extension activities will be directed at developing and delivering balanced, integrated pest management (IPM) programs, a "systems" approach using chemical, cultural, mechanical, and biological control to increase net profits to producers while protecting the environment. Studies will be conducted to understand interactions among herbivores, their host plants and their parasites, and to elucidate processes that lead to the development of pesticide resistance.
2. Sustainable Agriculture. Research and extension will be directed at understanding and promoting activities that contribute to a long-range, viable agricultural lifestyle and industry that is economically profitable and environmentally sound. Activities will include developing and promoting efficient and sustainable agricultural, forestry, and other resource conservation practices and policies that ensure ecosystem integrity and biodiversity, including crop diversification, agroforestry, windbreaks, cover crops, living mulches, hedgerows, field border systems, and conservation buffers.
3. Wildlife, Woodlands, and Aquatic Resources. Research and extension activities will be directed at understanding and mitigating the impact of agricultural practices and urbanization on Delaware's wildlife, woodlands, and aquatic resources. Focus will be on understanding the fundamental processes that create and maintain biodiversity, such as speciation, predator-prey interactions, community and ecosystem structure, and extinction processes. The impact of human activities on the processes will be assessed. Approaches will be developed to aid in the development and maintenance of biodiversity in agriculture, planned landscapes, and natural habitats, including marshes.
4. Wetlands Ecosystems. We will seek to improve our understanding of wetlands restoration, protection, and preservation. Emphasis will be placed on both seasonally saturated and non-seasonally saturated wetlands, the wildlife species that inhabit them, and the importance of sedges in wetland habitats.
5. Protection of Delaware's native species. We will promote research on non-indigenous invasive species, a leading cause of plant extinction in Delaware. Research and extension will focus on the impact of invasive species on ecosystem function and on methods of restoration after their removal. Along with the Delaware Department of

Transportation and the Delaware Center for Horticulture, methods of establishment, species evaluation, and maintenance for roadside vegetation will be studied so that native vegetation is used and managed with infrequent mowing and selective use of herbicides.

6. Master Gardener Training. Extension programs will be developed and delivered that provide training in Wildlife Habitat Gardening, Waterwise Gardening for residents through the Master Gardener Training Program, including skill development for inmates of the Delaware Correctional Center.
7. Environmental/Socioeconomic Modeling. Human activities cannot be separated from the natural environment. We are a part of the environment, our lives are dependent upon natural systems, and our actions represent a potential stress upon natural systems. In order to maintain the activities which support us, therefore, it is fundamentally important to devise methods that will help us to predict the likely impacts of our activities on the environment, minimize the impacts of any activities we do carry out, and monitor the environment for signs of damage so that we can respond before the natural system loses the ability to support our activities. At Delaware State University, coupled environmental/socioeconomic modeling methodologies are being developed using the St. Jones River watershed (Delaware) as a test case. These models highlight the interaction between human activities (drivers), environmental impacts from those activities (stressors), potential changes to valued ecosystem components, and feedbacks we may experience from those changes. By identifying these connections for an area, we will be better able to predict the potential impacts of our activities and make informed decisions concerning resource management and use
8. Wildlife Management. Human activity affects migratory shore birds, bat activity patterns on the Delmarva Peninsula, horseshoe crab ecology in the Delaware Bay, and the feral horses on Assateague Island National Seashore. Results from these studies will yield recommendations for the management of horseshoe crabs and migratory shore birds, both of which have a long history of concern for the Delmarva Peninsula. We are also examining the habitat preferences of bats in order to suggest management strategies to maintain populations of these beneficial animals, particularly in wetlands such as Bombay Hook National Wildlife Refuge. The study of feral horses will examine the seed dispersal abilities of horses to determine if grazing fauna has a beneficial or detrimental effect on barrier island flora.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty.

Multi-institutional/Multi-state: UD-DSU Cooperative Extension, Penn State, University of Maryland, DSU-UD Sea Grant, DuPont, Monsanto, other agrichemical companies, US Forest Service, USDA Beneficial Insects Lab, Delaware Correctional Center, Ministry of Caring Childcare, Kent County Conservation District, Local Newspapers.

Multi-disciplinary: Wildlife Conservation, Biological Sciences, inter-departmental major (Natural Resources Management) which includes Entomology & Applied Ecology, Food &

Resource Economics, and Plant & Soil Sciences; Plant Pathology, Weed Science; joint faculty appointments across departments; joint major (Plant Protection) which includes Bioresources Engineering and Marine Studies.

Target Audiences: Farm owners and operators, aquaculture producers, water quality managers, agribusiness and private consultants, horticultural professionals, home gardeners, childcare providers, inmates at Delaware Correctional Center.

Program Duration: Two years

GOAL 5. ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Program 10. Rural Development

Statement of Issue: Delaware's economy is growing, diverse and ever-changing, and economic development remains a critical issue for Delaware. Agriculture remains an important economic base, but major growth in Delaware's economy now comes from other sectors, such as banking, retail/wholesale trade, and service. As the economy changes, there is a need to understand the changes and provide assistance in the transition for members of our rural communities. Concerns about employment, skill development, education, careers, and family financial stability are intertwined with the strength of the State's economy, as well as, that of local communities. The state and local communities must continue to attract new businesses, as well as, retain existing businesses. New approaches are needed to focus on rural and family development - given changes in cultural composition, community structure, and family organization.

Performance Goals: Increased capacity of rural communities and families to enhance their economic well-being.

Output Indicators: Research reports to the scientific community, including refereed journal articles, books, paper presentations, abstracts; professional consultations with industry, government, and private sector representatives; technical reports, bulletins, fact sheets, and workshops for individuals and families, community groups and community leaders; contract and grants to support research, outreach and educational activities; courses taught at the undergraduate and graduate levels.

Outcome Indicators:

1. Increased participation in economic development programs in communities.
2. Jobs created or saved through existing business strategies.
3. Increased participation in developing sustainable, community-based "aging in place" options for the elderly.
4. Implementation of strategies for economic development .

Key Program Components:

1. Rural Revitalization and Community Development. The process of change in rural economies will be monitored and opportunities for rural revitalization and community development will be identified.
2. Individual Academic and Family Financial Success. Factors that encourage individual academic and family financial success will be identified and strategies for enhancing those assets will be developed.
3. Social and Economic Development for All Family Members. Programs to assist communities in building the social and economic capital that will contribute to the civic, social, emotional and educational development of all family members - including youth and the elderly - will be developed and delivered.
4. Economic Growth for Rural Communities. Business expansion and retention strategies for rural communities that encourage and/or manage economic growth will be developed and delivered.

Internal and External Linkages:

Multi-function: Joint appointments of research, teaching, and extension faculty. Research, extension and teaching personnel will be involved in program development and delivery.

Multi-Institutional/Multi-state: USDA, University of Maryland, Rutgers University, Penn State University, Cornell University, West Virginia University, State Agencies in Maryland, New Jersey, Pennsylvania, New York, West Virginia others.

Target Audiences: Business and Community Leaders, Families, State Agencies (Delaware Development Office, Departments of Agriculture, Health and Human Services), and Federal Agencies (USDA), Students, and the General Public.

Program Duration: Two years

Program 11. Family and Youth Development

Statement of Issue: The family has changed more in the last ten years than any other social institution. Rapid economic and social changes increase the challenge of the capacity of families to function well, placing extremely high demands and workloads on those charged with raising children. Strong families are the basic building unit for our future citizens, yet those charged with this important responsibility do not have the time, often the money, or skills to carry out parenting in a positive, productive manner. Preparing citizens to take prominent roles in shaping their future and the future of their communities has been a signature trait of Cooperative Extension from its beginning. While many challenges face society today, perhaps none is more critical than helping youth develop the leadership and decision-making skills necessary to survive in the 21st century.

Financial security is one of the most pressing concerns for Delawareans. Studies show the importance of financial well being to overall well being of families. On average, income in

Delaware has not changed much between 1990 and 1995, with families experiencing a $1,200 increase in this time period. There has been a 50% increase in the number of personal bankruptcies filed. Data indicate that most families would be three to six months away from bankruptcy if their income was unexpectedly lost, pointing to the insecurity faced by many families with respect to their income.

Performance Goals: Increased capacity of families, individuals, and communities to improve their quality of life and financial status through Extension's research-based outreach and educational programming.

Output Indicators: Publications, newsletter series, referred journal articles, financial health care curricula; county, state, regional and national presentations, fact sheets, teaching modules, video satellite conferences, take-home short courses, contacts and courses, county and state workshops; grants and contracts; educational program participants (volunteers, volunteers trained, new volunteers, volunteer hours); youth community service projects, hours contributed to community involvement/service; public policy education; families receiving family education newsletters, newsletters distributed; families completing strengthening families training.

Outcome Indicators:

1. Improved academic performance of youth.
2. Decreased percentage of youth using alcohol, tobacco and related substances.
3. Increased percentage of youth participating in extension programming who demonstrate improved academic, social, and job preparedness skills.
4. Increased percentage of parents/families participating in extension programming who demonstrate positive parenting skills.
5. Enhanced oral and written communication skills in youth and adults.
6. Enhanced decision-making skills and leadership skills in youth and adults.
7. Increased family communication skills.
8. Increased adoption of critical nurturing skills by families.
9. Increased adoption of conflict resolution techniques.
10. Increased adoption of safety rules and regulations.
11. Increased knowledge base about safe and secure child care environments.
12. Dollars saved through volunteer intervention.
13. Parents/families adequately supporting the development of their youth
14. Increased number of families setting financial goals.
15. Increased number of families who develop a spending plan.
16. Increased number of families who report reducing debt.
17. Increased number of families who increase savings.
18. Increased number of people who make a will or review their current will.

Key Program Components:

1. Volunteer Leadership Development Programs. Volunteer Leadership Development programs will be developed and delivered, including: Public Policy Education;

Volunteer Leadership Development (recruitment, screening, training, in-service and recognition) - 4-H adult and teen volunteers, 4-H camp counselors, Master Gardeners, Master Food Educators; T.R.Y. (Teens Reaching Youth) training - 4-H Teen Conference, 4-H Jr. Council, 4-H Leaders' Associations, 4-H club officers; Middle Management Volunteers - volunteers managing volunteers; Extension Advisory Committees development.

2. Enhancing the Quality of Life. Enhancing the Quality of Life for Youth and Families will involve youth, adults, elders and key community stakeholders in planning and advocating for programs and policies that will increase the capacity of families to nurture and support their members across the lifespan. Extension programs will be developed and delivered, including: Workforce Preparation - technology training, job readiness skills needed to compete in the workforce focusing on academic success and resume writing; aquaculture business ventures for rural and urban youth; programming building the capacity of individuals, families and communities to build and support strong families - USDA New Communities Project, Pathways from Poverty – Adult Resource Development, after-school programs at Sparrow Run, Knollwood, Clark's Corner, Drew-Pyle and Hickory Tree that include academic support for children along with life skills development, Strengthening Families training, Child Care Provider training, Growing Up Female, Great Beginnings, Families Matter!, Solo Parenting, and Keeping Your Marriage Strong.
3. Life Skills. Life Skills Development through EFNEP and 4-H Youth Development programs will be delivered - development of decision-making, conflict resolution, communication, teamwork, leadership, and community involvement skills through hand-on learning experiences.
4. Safe Communities. Safe Communities programs will be delivered - drug and alcohol prevention education via the Health Rocks program, bicycle safety education, pedestrian safety education, farm safety, and car seat safety.
5. Family Economic Well-Being. Programs will be developed and delivered in family economic well-being including, high school financial planning programs, financial management counselor training, and basic budgeting and credit management programs.
6. Workforce Preparation. Programs will be developed and delivered in workforce preparation including, technology training programs, pesticide applicator training, aquaculture business ventures for rural and urban youth, child care provider training, and 4-H career exploration programs including job readiness and resume writing skills as well as skills for enhancing academic success.

Internal and External Linkages:

Multi-function: Joint projects with teaching, research, and extension personnel.

Multi-institutional/Multi-state: UD-DSU Cooperative Extension, University of Delaware Early Learning Center, University of Maryland - College Park, Rutgers University, Virginia Wesleyan, State of Delaware (Children, Youth and Families; Health and Social Services; Governor's Cabinet Council, Office of Highway Safety, Department of Education), Delaware Bicycle Safety Commission, Delaware Aquaculture Association, Northeast Regional

Aquaculture Center, Dover Air Force Base, Christiana Care, National 4-H Council, Christina School District, Red Clay School District, Caesar Rodney School District, Cape Henlopen School District, Woodbridge School District, Brandywine School District, Lake Forest School District, local child care centers, Delaware Helmet Bank, Greenwood Trust, Delaware Housing Coalition, First State Action Agency, NCALL, Consumer Credit Counseling Service, Banks, National Center for Workforce Preparation, Family and Workplace Connection, Delaware Prevention Network, Sussex First Time Families and the Early Childhood Comprehensive Systems grant.

Multi-disciplinary: Community Research and Service, Nursing and Health Sciences, Education, Urban Affairs and Public Policy, Child Development and Life Span Development, Social Work, Family and Consumer Sciences.

Target Audiences: Children ages 0-5, Youth ages 5-19, 4-H members, 4-H volunteers, new 4-H volunteers, Master Gardeners, Master Food Educators, Community Leaders, at-risk youth and families, parents, youth agency professionals, key decision-makers, human service professionals, child care providers, family day home providers, social clubs, church groups, private and public school youth and teachers, after school 4-H clubs and school age child care programs.

Program Duration: Two years

STAKEHOLDER INPUT

In the State of Delaware, the University of Delaware and Delaware State University use a multi-faceted approach to securing stakeholder input. We believe in direct contact with people and attempt to solicit input from a wide variety of clientele, users and stakeholders. Opportunities for input include, but are not limited to, the following: extension overall advisory committees, extension issue-based advisory committees, strengthening families statewide advisory committee, 4-H volunteers, 4-H Foundation, LINKS, agriculture commodity groups, environmental interests, the green industry, agribusinesses, agriculture associations (i.e., Farm Bureau, Grange, Pork Producers Association, Delmarva Poultry Industry, Soybean Board, Sheep Producers Association, etc.), Master Gardeners, Master Food Educators, and Master Financial Planners. We hold a variety of regular meetings across the state, which include a diverse mix of clientele, users, and stakeholders. These meetings include such things as: Agriculture Visiting Committee, State Chamber of Commerce, Kids County Advisory Council, Delaware Public Policy Institute Task Force, Friends of Agriculture Breakfast series, Council of Farm Organizations, USDA Food and Agricultural Council, State Agriculture Technical Committee, and user groups like 4-H regular and day camp parents. Students enrolled in our colleges, faculty, professionals and salaried staff, are all encouraged to provide input on program priorities. We have conducted random surveys of users and non-users of the programs and activities on a variety of issues including land use and economic development. Other tools that we use to get input include visioning processes and focus groups. For this Plan of Work Update, specific stakeholder input was obtained via

a committee assembled by the Delaware Secretary of Agriculture to participate in the develop of a statewide plan for agricultural research. This committee consisted of leaders in agriculture as well as faculty and administrators from the University of Delaware and Delaware State University.

These efforts have been focused on both building commitment and getting input from stakeholders such as, government agencies, industry partners, and regulatory agencies. Our programs have expanded, and input continues to increase. We are recognized as a source of not only useful but also reliable information. We will continue to seek input in a variety of ways. These methods will change as the issues themselves change.

Feedback to stakeholders is essential if they are to remain engaged in the input process. Reports back to groups are made whenever possible. This is a continuing effort and is adjusted to fit each issue.

REVIEW PROCESS FOR RESEARCH AND EXTENSION PROGRAMS

Peer Review of Research Programs

We adopt by reference the National Standards for Peer Review.

Merit Review of Extension Programs

Merit review for Delaware Cooperative Extension consists of five levels of peer and stakeholder review. Extension professionals submit county plans that have been reviewed by their peers within the county and by county stakeholder advisory groups. These stakeholder groups provide input on critical needs and issues within their communities, which is used to develop the county plans. After county plans are complete, stakeholders review them for inclusion of the previously identified needs and issues, as well as, program delivery and evaluation methodologies. Each of these plans includes specific objectives that are examined for relevance, usefulness, and potential impact of the programs. This feedback is used to refine county plans and develop future plans.

The second level of review is by college-wide issue teams that are cross-functional and multi-disciplinary. From this review, county plans are combined into a college-wide plan.

The third level of review is both within and outside the university community. Copies of the plan are submitted to university administrators and related agency personnel who function as both present and future partners. These individuals are invited to comment on the objectives identified, areas of collaboration, and potential impacts. University administrators are also asked to comment on ways in which we might work across colleges and schools to increase our outreach efforts.

A fourth level is with statewide stakeholder groups, including advisory groups, commodity organizations, volunteers, research partners, state and local funders, etc. These groups are asked to provide feedback regarding objectives, potential impacts, and how it meets their specific needs.

The final level is the Northeast Extension directors, who have agreed to share all state plans among each other. This peer review helps the states advise each other on opportunities to strengthen individual state plans and ways that we can collaborate across state lines.

ALLOCATED RESOURCES

To accomplish the Plan of Work for Delaware the following human and financial resources have been allocated to each of the 5 Goals.

		FY 99	FY00	FY01	FY02	FY03	FY04	FY05	FY06
GOAL 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY									
1890 Research	Funds	$375,417	$375,417	$401,004	$409,859	$417,500	$474,500	$474,500	$474,500
	People	3.7	3.7	4.4	5.7	6.0	6.0	6.0	6.0
1890 Extension	Funds								
	People								
1862 Research	Funds	$1,284,000	$1,322,520	$1,362,196	$1,403,061	$1,445,153	$474,500	$474,500	$1,533,163
	People	25.7	26	26	26	26	26	26	26
1862 Extension	Funds	$605,000	$623,150	$641,845	$661,100	$680,933	$701,361	$701,361	$701,361
	People	12.1	13	13	13	13	13	13	13
GOAL 2. A SAFE AND SECURE FOOD AND FIBER SYSTEM									
1890 Research	Funds								
	People								
1890 Extension	Funds								
	People								
1862 Research	Funds	$30,000	$30,900	$31,827	$32,782	$33,765	$34,778	$34,778	$34,778
	People	0.6	1	1	1	1	1	1	1
1862 Extension	Funds	$137,500	$141,625	$145,874	$150,250	$154,757	$159,400	$159,400	$159,400
	People	2.8	3	3	3	3	3	3	3
GOAL 3. A HEALTHY, WELL-NOURISHED POPULATION									
1890 Research	Funds								
	People								
1890 Extension	Funds	$26,000	$26,000	$34,000	$35,400	$36,400	$36,400	$36,400	$36,400
	People	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
1862 Research	Funds	$35,000	$36,050	$37,132	$38,245	$39,393	$40,575	$40,575	$40,575
	People	0.7	1	1	1	1	1	1	1

1862 Extension	Funds	$350,000	$360,500	$371,315	$382,454	$393,928	$405,746	$405,746	$405,746
	People	7.0	7	7	7	7	7	7	7
1890 Research	Funds	$231,306	$231,306	$290,128	$297,910	$340,940	$351,168	$351,168	$351,168
	People	3.9	3.9	4.4	4.4	5	5	5	5
1890 Extension	Funds	$64,000	$64,000	$64,000	$65,900	$68,000	$68,900	$68,900	$68,900
	People	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
1862 Research	Funds	$855,000	$880,650	$907,070	$934,282	$962,310	$991,179	$991,179	$991,179
	People	17.1	18	18	18	18	18	18	18
1862 Extension	Funds	$115,000	$118,450	$122,004	$125,664	$129,434	$133,317	$133,317	$133,317
	People	2.3	3	3	3	3	3	3	3
GOAL 5. ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS									
1890 Research	Funds								
	People								
1890 Extension	Funds	$110,000	$110,000	$108,000	$164,300	$171,300	$171,300	$171,300	$171,300
	People	1.6	1.6	1.6	2.2	2.2	2.2	2.2	2.2
1862 Research	Funds	$115,000	$118,450	$122,004	$125,664	$129,434	$133,317	$133,317	$133,317
	People	2.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1862 Extension	Funds	$1,042,500	$1,073,775	$1,105,988	$1,139,168	$1,173,343	$1,208,543	$1,208,543	$1,208,543
	People	20.9	21.0	21.0	21.0	21.0	21.0		
1890 Research	Funds	$606,723	$606,723	$691,132	$707,769	$758,440	$825,668	$825,668	$825,668
	People	7.6	7.6	8.8	10.1	11.0	11.0	11.0	11.0
1890 Extension	Funds	$200,000	$200,000	$206,000	$265,600	$275,700	$276,600	$276,600	$276,600
	People	2.8	2.8	2.8	3.4	3.4	3.4	3.4	3.4
1862 Research	Funds	$2,319,000	$2,388,570	$2,460,227	$2,534,034	$2,610,055	$2,688,357	$2,688,357	$2,688,357
	People	46.4	49.0	49.0	49.0	49.0	49.0	49.0	49.0
1862 Extension	Funds	$2,250,000	$2,317,500	$2,387,025	$2,458,636	$2,532,395	$2,608,367	$2,608,367	$2,608,367
	People	45.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
Integrated	Funds	$231,900	$463,800	$579,750	$580,000	$580,000	$580,000	$580,000	$580,000

Extension Activities (Smith-Lever Act)	People	4.6	9.2	11.5	12.0	12.0	12.0	12.0	12.0
Integrated Research Activities (Hatch Act)	Funds	$225,000	$450,000	$562,500	$580,000	$580,000	$580,000	$580,000	$580,000
	People	4.5	9.0	11.3	12.0	12.0	12.0	12.0	12.0
Multi-State Extension	Funds	$225,000	$450,000	$562,500	$580,000	$580,000	$580,000	$580,000	$580,000
	People	4.5	9.0	11.3	12.0	12.0	12.0	12.0	12.0
Multi-State Research	Funds	$579,750	$579,750	$579,750	$580,000	$580,000	$580,000	$580,000	$580,000
	People	11.6	11.6	11.6	12.0	12.0	12.0	12.0	12.0

People = Effort of human resources in terms of FTE (full time equivalent) including extension agents, associates and specialists, faculty, research scientists, associates and technicians.