PLAN OF WORK

Annual Report of Accomplishments and Results

Iowa State University

Iowa Agriculture and Home Economics Experiment Station

Iowa State University Cooperative Extension Service

Federal Fiscal Year 2003
(October 1–September 30)

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A. Planned Programs:

1862 Research

Goal 1: An Agricultural System that is Highly Competitive in the Global Economy.

Overview

The Iowa Agriculture and Home Economics Experiment Station has made progress against all the impacts identified in the plan of work for Goal 1. Research outputs take a number of forms, including:

- 251 Refereed Publications, Research Papers, Manuscripts
- 162 Non-refereed Publications, Reports, Technical Papers
- 246 Proceedings, Published Abstracts
- 48 Extension Publications
- 299 Invited Presentations
- 222 Education Programs, Field Days, Tours
- 49 Books & Chapters
- 8 Patents
- 52 web pages supported
- 56 Theses, MS/Ph.D. Programs Completed
- 1 video, 3 CD Rom's

Outputs, outcomes and impacts: Highlights of research at Iowa State University:

① The Midwest Apple IPM site we developed offers research-based advice on how to safely reduce pesticide spraying for apple scab and sooty blotch/flyspeck. Resulting savings in annual input costs on 1,000 acres of apples in Iowa, assuming 3 fungicide sprays saved per year, are $60,000.

② The NASA Food Technology Commercial Space Center (NASA-FTCSC) is in its third year of operation. Commercial partners Arla Foods A.M.B.A. and East West Medical Research Institute submitted dairy products and all-natural fruit sticks, respectively, to the Johnson Space Center for evaluation. These submissions are being used to develop new products for NASA and the public.

③ Hundreds of commercial varieties of soybean, maize, small grains and alfalfa were evaluated in replicated field trials throughout Iowa. Only subsets of the cultivars are optimally adapted to the prevailing environmental conditions in Iowa: choice of an inappropriate variety would waste resources and reduce income by 50% or more of the potential. The statewide evaluation of varieties provides citizens with conflict-free assessments of crop varieties sown on nearly 30 million acres in Iowa.

④ Models were developed to simulate pollen production, pollen dispersal, and out-crossing in seed production fields. Risk of out-crossing from a GMO source was tested by varying competition between local and adventitious pollen source. Pollen and seed samples are being

analyzed for presence of transgenes in non-GMO seed. Outcomes of research on risk of out-crossing and gene flow fill critical knowledge gaps to improve industry standards for isolation of seed production fields and APHIS policy regulating field deployment of transgenic corn created to produce plant made pharmaceuticals and industrial compounds.

⑤ Each year over eight billion pounds of nitrogen are applied as anhydrous ammonia to U.S. crops. Research has clearly demonstrated that variations in port-to-port manifold distribution of anhydrous ammonia can lead to poor nitrogen utilization efficiency, and excessive nitrogen losses to the environment. A low-pressure manifold with greater distribution accuracy has been developed and tested at Iowa State University. The manifold has been licensed and is now commercially available to assist growers in reducing nitrogen application rates and minimize the release of nitrogen into the environment.

⑥ Guidelines for activity limits on playing fields were developed so that field management and user expectations could be coordinated to improve athletic field safety. City planners, private sport facilities, and grounds managers now have data and a working knowledge of the limits of traffic on natural grass fields. Their scheduling and management strategies use this information to reduce risk of injury and litigation.

⑦ A patent on natural weed control with corn gluten meal brought in $150,000 in 2003; total income is nearly $1,000,000 total. The natural herbicide on which the patent is based is being adapted nationwide and in Canada. Use of corn gluten meal is reducing pesticide use in lawns and in crop production.

⑧ Researchers developed new rating methods for livestock and whole-farm revenue insurance products. These new rating methods have been adopted by the Risk Management Agency for determining how insurance premium rates should change as the insurance deductible changes. One of the products developed was used to protect revenue on more than half of the crop acres in Iowa. A second product was used to insure gross margins on more than one million hogs in Iowa in 2003. Research results formed the basis of advice and analysis given to the House Agricultural Committee staff in regards to the role of subsidies on the demand for crop insurance.

⑨ Kaolin clay products were effective in managing squash bugs and cucumber beetles in organic squash destined for the organic baby food market. Alternative oat straw mulch treatments for organic herb production (St. John’s Wort) adequately controlled weed populations in 2003, while wood mulch was identified as an effective weed management strategy in organic grapes. Short- and long-term impacts include economic savings and environmental benefits from reduced reliance on synthetic pesticides.

⑩ ISU participation in the following multistate research projects also contribute to goal 1: NC007, NC062, NC094, NC100, NC107, NC113, NC119, NC125, NC129, NC131, NC140, NC142, NC168, NC174, NC185, NC189, NC205, NC209, NC213, NC215, NC218, NC224, NC225, NC228, NC229, NC1003, NC1004, NRSP004, NRSP007, NRSP008, NE060, NE112, NE127, NE185, NE1010, S281, S284, S291, S292, S294, S303, S1000, S1004, S1005, W168, W171, W177 and W183.

Assessment of accomplishments as measured against POW:

Greater profitability and competitiveness through the development and dissemination of information on new or improved methods, practices, and products that will result in

- reduced crop and post harvest product losses ①⑦
- increased efficient use of agricultural chemicals ①⑤⑦⑨
- yield gains through genetic improvements ③④
- new products and applications ②⑤⑦
- improved quality and consistency of products ③④
- better understanding and adoption of appropriate risk management practices. ④⑥⑧

New contributions to the understanding of agriculturally important plants and animals and the applications of scientific advances promote greater utilization of Iowa agricultural products for the continuing competitiveness of Iowa and U.S. producers.

State and Hatch Funds	$ 9,636,013
FTEs	58.9

Key Theme – Adding Value to New and Old Agricultural Products

Program 1: Food Crops

. Description of activity

This program has focused on three major issues: (1) better adapted fruit and vegetable cultivars, (2) greater understanding of basic plant biological processes, and (3) more efficient cultural practices.

The production, marketing, and selling of fruit and vegetable crops provides a primary or secondary income for many Iowans. To remain competitive in our rapidly changing global economy, these commercial food crop producers must adopt new cultivars that are more tolerant to abiotic and biotic stresses affecting plants, cultural systems that improve production efficiency and promote sustainability, and post harvest handling practices that improve crop utilization and product safety. Before new cultivars, production systems, or post harvest practices can be recommended, they must be thoroughly evaluated under Iowa environmental conditions, and the results made available to stakeholders. In keeping the industry competitive, we also need to understand the basic processes associated with these applied problems.

. Impact/accomplishment

Short-term:

- Cultivar evaluations were conducted for asparagus, fall-bearing raspberries, sweet corn, sweet bell peppers, muskmelon and watermelon. Cultivars having desired characteristics for Iowa production were identified in each crop. Selecting the right cultivar to grow is the first step in being successful in specialty crop production. For example, sweet corn

with poor tip fill or muskmelons weighing less than five pounds are unmarketable in most commercial markets.

- The Midwest Apple IPM site we developed offers research-based advice on how to safely reduce pesticide spraying for apple scab and sooty blotch/flyspeck. Resulting savings in annual input costs on 1,000 acres of apples in Iowa, assuming 3 fungicide sprays saved per year, are $60,000.

- Application of high soil K rates was discovered to reduce field tomato leaf B concentration to deficiency levels. A subsequent greenhouse study confirmed this finding. A soil test for B was developed that would predict conditions where added soil K may cause problems with plant B absorption. Tomato vegetable growers who monitor their crop for micronutrient status through plant sampling can avoid reduction in fruit quality and, thus, profit.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific; Integrated Research and Extension

Program 29: Value Added Agriculture

d. Description of activity

This program focuses on developing technologies that add value to agricultural products produced in Iowa. Where possible our efforts strive to increase demand and prices farmers receive, and contribute to rural economic development by creating new businesses and job opportunities in rural areas. Many of these activities are coordinated by the Center for Crops Utilization Research (CCUR) and the NASA Food Technology Commercial Space Center (NASA FTCSC) in partnership with faculty in the departments of Food Science & Human Nutrition and Agricultural & Biosystems Engineering. Both centers seed research and commercialization activities to develop products and processes that add value to Iowa agriculture, especially corn and soybeans. The centers' staffs assist ISU scientists, emerging and established private companies, and producers of grain, food and materials for bio-based products in developing new technologies, as well as assist ISU scientists find companies interested in commercializing new technologies developed at ISU.

Goals of this program are: 1) to develop food and bio-based, value-added products from agricultural materials, including low-value commodities and waste streams; 2) to improve the quality, safety, and efficiency of producing these commodities and process them to improve their values in the marketplace; and 3) to conduct technology transfer activities that increase rural development, employment, and the profitability of growers and processors.

d. Impact/accomplishment

Short-term:

- The NASA Food Technology Commercial Space Center (NASA-FTCSC) is in its third year of operation. Commercial partners Arla Foods A.M.B.A. and East West Medical

Research Institute submitted dairy products and all-natural fruit sticks, respectively, to the Johnson Space Center for evaluation. These submissions are being used to develop new products for NASA and the public.

- In cooperation with Genencor International (Palo Alto, CA), enzyme technologies were developed to enhance soy protein products. Enzymatic hydrolysis produced protein hydrolysates with improved adhesive properties. This hydrolysis procedure is much more environmentally friendly than the traditional alkaline hydrolysis method, and an Iowa company is interested in commercializing the hydrolysis process to make soy protein adhesives for building products.

- Outreach efforts to cider producers have assisted in implementing good manufacturing practices (GMP), standard operating procedures (SOP), and hazard analysis critical control points (HACCP) plans. Three videos were completed on preventing apple cider food-borne illnesses and HACCP. Implementation of the HACCP plans increased the shelf life of raw and pasteurized ciders (with and without preservatives).

- Methods were developed and adopted by an Iowa company to toast full-fat soy flakes for food ingredients, and to utilize the flakes in reduced-fat soymilk production.

- Optimization of a blanching process for Edamame soybeans was completed and the technology has been transferred to several frozen-food operations.

- As part of the NASA Faculty Fellowship Program, a soybean cultivar and a Soymilk, Tofu, Okara, Whey Processor (STOW) processing system was evaluated for Lunar and Mars Mission applications. The results of this study have been adopted by NASA.

Long-term:

- A primary goal of the experiment station is to build partnerships with the private sector. This has high impact, even though we cannot share companies' confidential results. Shown below are examples of these partnerships:
  - The Small Business and Industry Incubator program coordinated by CCUR has had two resident companies during the past year including Proliant, Ames, IA and Kemin Americas, Des Moines, IA.
  - Nine different companies used the pilot-plant crops-processing facilities of CCUR during the past year in developing their own proprietary technologies.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Plant Genomics

Program 3: Fundamental Plant Sciences

. Description of activity

The Fundamental Plant Sciences program continues a vigorous research effort in basic biochemistry, molecular biology, genetics, and cell biology targeted towards understanding the molecular mechanisms of life functions in plants and their pathogens. This report covers the programs of 21 individual investigator laboratories within the program. There is a wide range of fundamental research being addressed. Examples within this broad program include the biosynthetic mechanisms the produce oils and waxes, starch biosynthesis, the metabolites present in plant species with human health benefits, the functions of plant-specific varieties of hemoglobin proteins, recombination in the genomes of crop species, seed development in corn, nectary development and function, the molecular responses of plants to virus infection, the mechanisms employed by viruses to reproduce within plant cells, and others. The program members are responsible for publicizing their advances in fundamental plant sciences in professional journals that are the most respected and highly cited in the field. They are also expected to obtain financial support for their research programs from competitive sources, especially those in the federal granting agencies. In both of these regards the program has been highly successful. The number of publications is high for this discipline, and the work is being published for the most part in journal of the highest visibility including *Plant Cell*, *Plant Journal*, *Journal of Biological Chemistry*, *Biochemistry*, *Plant Molecular Biology*, and others. External funding success is indicated by many principal investigator grants from the major agencies including the National Institutes of Heath, the National Science Foundation, the US Department of Agriculture, the US Department of Energy, and others. These outputs indicate that the program is making a nationally significant contribution to the fundamental knowledge base about plants and their systems, providing the information that will be drawn on over the long term to meet emerging needs in agriculture as current challenges are addressed and new ones arise.

. Impact/accomplishment

Long-term:

- Program member Steve Whitham published the first paper on microarray analysis of plant responses to virus infection. The results demonstrated that viruses cause a variety of changes to host gene expression during infection and that many of these changes appear to be coordinately regulated in response to diverse viruses. These results provide a global picture of how viruses manipulate host cells and provide much needed data to aid in generating hypotheses regarding the plant genes that may play roles in viral infection and disease. This new knowledge is a significant advance in the fundamental knowledge available towards the aim of developing novel strategies to combat losses in crop productivity owing to viral pathogens.

- Genomics and proteomics approach have also been applied by program member Thomas Baum to investigate the fundamental nature of the molecular interactions between soybean and the soybean cyst nematodes, the most serious pathogen threat of this crop species. The majority of the soybean cyst nematode parasitism proteins were identified in this project. In addition, the project conducted global analyses of plant gene expression changes following cyst nematode infection using Arabidopsis Affymetrix GeneChips. Plant disease caused by cyst nematodes was found to be accompanied by specific gene expression changes in the host plant. Both the protein and mRNA expression

characterization results provide a valuable resource to understand cyst nematode parasitism and to devise novel strategies to eliminate these pathogens from agricultural practice. The results provide the fundamental basis towards future major breakthroughs in plant pathology, enabling researchers to make faster progress toward solving the cyst nematode problem.

- Fundamental discoveries about the enzymes involved in starch biosynthesis have been applied by program member Alan Myers to construct transgenic maize plants that produce kernel starches with novel structure and properties. This program seeks to discover the mechanisms by which biosynthetic enzymes achieve the architectural specificity that determines the properties of starch that allow it to serve as the major energy reserve used by plants in leaves and seeds. Knowledge gained by the program is being applied to develop new varieties of maize that produce starches with novel structures and properties. These novel starches are now under evaluation to determine whether their properties would provide value in industrial applications.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific

Key Theme – Plant Germplasm

Program 4: Plant Germplasm

. Description of activity

This project conducts educational and research programs in theoretical and applied plant genetics for the purpose of identifying and using the genetic variation needed to produce improved germplasm of maize, soybean, oats, alfalfa and other plants species that could enhance regional agroecosystems and economies.

. Impact/accomplishment

Hundreds of commercial varieties of soybean, maize, small grains and alfalfa were evaluated in replicated field trials throughout Iowa. Only subsets of the cultivars are optimally adapted to the prevailing environmental conditions in Iowa: choice of an inappropriate variety would waste resources and reduce income by 50% or more of the potential. The statewide evaluation of varieties provides citizens with conflict-free assessments of crop varieties sown on nearly 30 million acres in Iowa.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Agricultural Profitability

Program 5: Crop Production and Management Strategies for Iowa

d. Description of activity

Research under this program strives to 1) Improve understanding of the biology and ecology of weeds in the agroecosystem; 2) Identify genetic material or biochemical pathways that help crops maintain dry matter production or limit loses when growing under stressful environmental conditions; 3) Conduct field experimentation of basic production research using modern varieties or cultivars growing in different environments and soils; 4) Alter seed chemical composition to increase marketability; 5) Identify and characterize factors that limit the nutritive value of forage grasses and legume; 6) Develop systems and strategies for improving the seasonal distribution and utilization of forages; and 7) Understand the influence of the seed production environment on seed quality and dormancy in a range of crop and forage species important to Iowa.

d. Impact/accomplishment

Short-term:

- Biology of seed development: A library of TZ staining images was collected from frosted and non-frosted corn seed. Screening protocols for characterizing responses to low temperature stress are being developed. An improved staining protocol to reliably quantify freezing injury in corn has helped seed companies and seed brokers in Iowa identify freeze-damaged seed lots.

Long-term:

- Weed management: Agricultural professionals are greatly interested in research concerning weed ecology and management.
  - Iowa biotypes of giant ragweed required less than three weeks to achieve 95% germination. Emergence patterns across environments indicated emergence rate is controlled genetically. Development of effective weed management programs allows for locally adapted systems of giant ragweed management.
  - Population dynamics of velvetleaf and giant foxtail varied among crops and years of rotation in systems containing corn, soybean, triticale, and alfalfa and reduced rates of chemical inputs. The models being developed represent the state of the art for understanding the impacts of crop rotation systems and tillage practices on weeds.
  - Removal of weed seed by predators was crop-specific and associated with canopy development. Simulations indicated requirements for weed control by herbicides and cultivation could be reduced by greater weed seed predation. Decreases of 40% of the velvetleaf seeds are possible. Insights provided by the weed seed predation project enhances the evolution of farming practices, decision-making tools, and management systems that increase crop production efficiency while improving protection of soil and water resources.

- Quality and value of agricultural products:
  - Near-isogenic soybean lines were developed that vary in seed protein by 11%. Gene activity early in seed development was a key determinant of protein accumulation. A soybean microarray chip containing 9000 genes associated with plant biochemistry and seed development was developed to compare gene expression in the near-isogenic lines. In vitro culture studies indicated seed composition was determined by events in the seed. Transformation of US agricultural industry from a public, commodity based model to one driven by contractual agreements between end users and producers requires access to genotypes with specific traits and quality characteristics. Knowledge of genes regulating seed development and composition accelerates the development of soybeans having seed traits suited for identity preserved markets.
  - Models were developed to simulate pollen production, pollen dispersal, and out-crossing in seed production fields. Risk of out-crossing from a GMO source was tested by varying competition between local and adventitious pollen source. Pollen and seed samples are being analyzed for presence of transgenes in non-GMO seed. Outcomes of research on risk of out-crossing and gene flow fill critical knowledge gaps to improve industry standards for isolation of seed production fields and APHIS policy regulating field deployment of transgenic corn created to produce plant made pharmaceuticals and industrial compounds.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Precision Agriculture

Program 6: Precision Agriculture

d. Description of activity

Over the last decade, technological advances and GPS have led to increased interest and adoption of the concept of precision agriculture, which holds the promise of both economic and environmental benefits. Although precision agriculture has tremendous potential, there are two major barriers preventing the full benefit of precision agriculture being realized. The first being the interpretation of spatial variability and the lack of decision support systems based on sound agronomic principals to assist in the development of management strategies to account for spatial and temporal variation within the field. The second major impediment to widespread implementation of precision agriculture is gathering the requisite information to describe the spatial and temporal variation of important factors.

This project has been addressing these critical needs through the development of sensor technologies for the measurement of spatially and temporally varying crop production factors so that variability can be effectively quantified in crop fields. Significant progress has been made in the development of decision support systems and crop production models to further understanding on the effects of in-field variability on crop yield variability and the effects of production practices on the environment. As the causes of variability are better understood,

this understanding will lead to advances in farming management systems to protect the environment while increasing production efficiency.

d. Impact/accomplishment

Short-term:

- Each year over eight billion pounds of nitrogen are applied as anhydrous ammonia to U.S. crops. Research has clearly demonstrated that variations in port-to-port manifold distribution of anhydrous ammonia can lead to poor nitrogen utilization efficiency, and excessive nitrogen losses to the environment. A low-pressure manifold with greater distribution accuracy has been developed and tested at Iowa State University. The manifold has been licensed and is now commercially available to assist growers in reducing nitrogen application rates and minimize the release of nitrogen into the environment.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Ornamental/Green Agriculture

Program 7: Green Industry

d. Description of activity

Because we have very little current information characterizing landscape tree usage trends in Iowa, we initiated a study among nursery and landscape professionals to identify the most popular tree selections within several important species and genera.

Establishment methods for the conversion of conventional creeping bentgrass to Roundup Ready creeping bentgrass is being studied. The research will help golf course superintendents who want to convert to the new bentgrasses while closing the golf course for the shortest period of time. This can have a significant impact on income of public courses that rely on daily greens fees.

Rare trees and shrubs of several species were evaluated for their potential as new crops for the nursery and landscape industries. Related studies were conducted to address factors responsible for the rarity of certain species in their native habitats.

Ten environmental conditions related to the winter injury of putting greens were evaluated in field plots to determine critical factors and strategies to limit turf grass kill. We are attempting to answer the critical questions; should ice cover be removed, are winter covers necessary, and when during the winter does the grass die?

An Athletic Field Traffic Survey was developed and implemented by the turf program at ISU. Guidelines for activity limits on playing fields were developed so that field management and user expectations could be coordinated to improve athletic field safety.

d. Impact/accomplishment

Long-term:

- Ten environmental conditions related to the winter injury of putting greens were evaluated in field plots to determine critical factors and strategies to limit turf grass kill. Annual bluegrass greens are more susceptible to ice cover injury than creeping bentgrass. The cost of winter protection covers is justified since they were very effective in preventing winter desiccation injury. Golf Courses have been given strategic information related to winter protection of putting greens and can now assess risk and allocate resources with confidence.

- Guidelines for activity limits on playing fields were developed so that field management and user expectations could be coordinated to improve athletic field safety. City planners, private sport facilities, and grounds managers now have data and a working knowledge of the limits of traffic on natural grass fields. Their scheduling and management strategies use this information to reduce risk of injury and litigation.

- A patent on natural weed control with corn gluten meal brought in $150,000 in 2003; total income is nearly $1,000,000 total. The natural herbicide on which the patent is based is being adapted nationwide and in Canada. Use of corn gluten meal is reducing pesticide use in lawns and in crop production.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Animal Production Efficiency

Program 9: Understanding the Physiological Basis of Animal Reproduction, Growth and Well-Being

d. Description of activity

This program focuses on increasing efficiencies of producing food from animals. The key area of research within this objective was to improve scientific understanding of physiologic mechanisms affecting reproduction, growth and performance.

d. Impact/accomplishment

Short-term:

- We have demonstrated that the addition of small amounts of forage to calf diets around the time of weaning can improve feed intake, feed efficiency, and growth response by improving rumen environment. This impacts producer profitability.

- The herbicide, atrazine is reported to be an environmental endocrine disruptor in amphibians. We have demonstrated at the levels used atrazine has no effects on wild birds populations. This supports the safety of this widely used herbicide.

- Our collaborative work evaluating the California Mastitis Test as a post-calving mastitis screening tool has demonstrated that this tool can be very beneficial and allow producers to maximize profitability. This is being adopted widely.

Long-term:

- A strategy has been developed for minimizing adverse reactions to intravenous immunoglobulin infusions in older calves. This allows livestock producers to enhance passive immunity in "at-risk" populations of cattle, and potentially reducing dependence on antibiotics.

- Leptin is produced by the adipose tissue. We have unambiguously demonstrated that this hormone stimulates the pituitary cells that produce growth hormone (GH). Thus adipose tissue can influence pituitary functioning. This has profound biomedical and agricultural implications in reducing obesity.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Program 11: Develop and Integrate Nutritional Knowledge to Enhance Animal Production

. Description of activity

The objective of this program is to increase the biological capacity and efficiency of animals to produce food, pharmaceuticals, clothing, and pleasure. The primary areas of research are elucidation of factors regulating key biological processes, quantification of the nutrients required to support these processes, development and evaluation of novel feedstuffs, greater awareness of the impact of animal production on the environment, and the quality and wholesomeness of animal-derived foods.

. Impact/accomplishment

Short-term:

- It was demonstrated that winter grazing of stockpiled forages at stocking rates of 0.84 and 1.18 heifers/hectare reduced the costs of developing bred beef heifers over winter by 24 to 48 percent compared with feeding hay supplemented with corn gluten feed in a dry lot system to meet targets for gain in developing heifers.

- Feeding programs were developed for young calves that enhanced feed digestibility and reduced age at weaning, thereby provided improved profitability and reduced waste outputs.

Long-term:

- The research on alternative swine production systems is the foundation of the new pork niche market movement. This national movement is rapidly expanding. About 40 niche markets were documented. Many small- and medium-sized family-based pork producers are successful in these niche markets.

- It was demonstrated that grass-based production of milk and beef is an effective management system for increasing the conjugated linoleic acid content of milk and beef, which allows producers to add value to milk and beef in niche markets.

- It was demonstrated that grazing of smooth bromegrass pastures by rotational stocking to leave the forage at a residual height of 10 cm reduced the amounts of sediment and total phosphorus in precipitation run-off by 25 to 85 percent and 38 to 78 percent compared with continuous stocking at a sward height of 5 cm.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific

Key Theme – Animal Genomics

Program 10: Genetic Enhancement of Agriculturally Important Animals

d. Description of activity

Ongoing activities focus on comprehensive research to enhance the genetic ability of livestock for the efficient and sustainable production of food for human consumption and on the transfer of results to stakeholders. Emphasis is on traits related to product quality, disease, and production efficiency in the main livestock of dairy cattle, beef cattle, poultry, and swine. Research efforts range from quantitative analyses of phenotype using comprehensive data bases from experimental and producer herds, to development and use of genomic tools to discover the genetic control of traits. Substantial focus is on the integration of phenotypic and genomic methods and data for genetic analysis and genetic selection. Education and outreach activities focus on the transfer of research results by assisting stakeholders in the livestock industry—including producer organizations, individual producers, and genetics companies—with the design and implementation of genetic systems that will enhance genetic progress for important traits.

d. Impact/accomplishment

Short-term:

- Direct selection for feed efficiency, the main cost factor in pork production, requires collection of feed intake data using automated electronic equipment. Interactions of this equipment with the animal and the barn environment results in error-prone data. Procedures were developed to identify, monitor, edit, and correct errors in data from electronic feeders. Use of these procedures, in combination with performance testing

strategies that were developed to allow for a tripling of the number of pigs tested per feeder, increases the accuracy and number of records from electronic feeders. This results in more effective genetic improvement of feed efficiency, lower costs of production, and lower waste output. Aspects of these procedures have been implemented in the two largest commercial breeding programs in the United States.

- Product quality is of growing importance to U.S. consumers, but it is difficult and expensive to measure, thus, limiting genetic improvement. These limitations can be overcome by non-evasive evaluation methods, such as ultra-sound, or by identifying causative genes or genomic regions.
  - In pigs, a model to evaluate intramuscular fat, a major determinant of pork quality, on the live animal using ultra-sound was developed and evaluated. This technology reduces the expense and time for evaluating breeding stock. In addition, statistical methods were developed and applied to identify genomic regions that affect meat quality in two important pig breeds, Berkshire and Yorkshire. Several genes associated with meat quality were discovered. Use of these genetic tests could be worth over $10 million annually to the U.S. industry.
  - In poultry, genetic analysis of meat quality traits demonstrated that these traits are under partial genetic control, and several genomic regions associated with egg quality traits were identified in egg-laying chickens. These results allow for direct selection for quality traits to meet consumer demands.

Long-term:

- Disease is an area of high priority in all livestock.
  - In poultry, genomic regions associated with Marek's disease, a major cost to the U.S. poultry industry, were identified and associations of several newly investigated genes with resistance to Salmonella in chickens were verified in unrelated populations, thus demonstrating that these genetic tests can effectively be used across a wide range of genetic lines to improve animal health and food safety.
  - In dairy cattle, genetic analyses of calf survival have been conducted to better explain causes of stillbirths and several putative genomic regions were identified. The use of these results in to select sires for superior perinatal survival enhances the opportunity to market value-added semen and can decrease the loss of calves in the U.S. by 7% per year and increase profitability.

- Use of DNA technology in genetic improvement in livestock requires integration of genetic tests with phenotypic data. An inventory of the use of genetic tests in the livestock industry was made and strategies for their use were reviewed. This review helps the U.S. industry to assess opportunities, limitations, pitfalls, and challenges for the use of genetic test in breeding programs and will result in improved implementation to enhance genetic improvement for economic traits.

- Compared to the human and mouse, research in livestock genetics is limited by a lack of DNA sequence data. To start to overcome this, an ISU-led multi-institutional effort provided over 10 million base pairs of sequence, representing over 10,000 genes expressed in reproductive tissues. This sequence data has already been used to efficiently

map over 700 genes and has contributed to a “first-of-its-kind” commercial product for gene expression analysis in the pig.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Agricultural Competitiveness

Program 13: International Economic Competitiveness

d. Description of activity

Researchers developed economic models to analyze policy questions related to the production and distribution of agricultural products. Models of individual firms and models with various levels of aggregation were created and utilized to investigate a large number of current economic questions related to firm profitability, international trade, market structure, and food safety. Researchers also used experimental survey methods to ascertain consumer attitudes toward various types of products and policies.

d. Impact/accomplishment

Short-term:

- Research continued on the profitability and environmental impacts of alternative methods of hog production, particularly the use of hoop structures in comparison with more traditional confinement operations. Researchers found little difference in cost of production or animal health expenditures between the systems with higher production costs in hoop systems in the winter and in traditional confinement systems in the summer. The lower capital costs of hoop systems make them a reasonable alternative for producers with limited capital. Swine producers are using hoop structures as a low-cost housing alternative for finishing slow-growing pigs that need to be separated from the larger group, allowing for full utilization of their confinement units.

Long-term:

- Models were developed for ethanol plants in order to analyze their potential profitability under alternative scenarios. Some producer groups have used these models in considering whether or not to invest in a plant.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Risk Management

Program 14: Agricultural Risk Management

d. Description of activity

The program concentrated on four basic areas of activity: crop insurance, the investment behavior of Iowa farms, farmland values and cash rental rates.

d. Impact/accomplishment

Short-term:

- A study on farmland values analyzed the main determinants of the behavior of Iowa farmland prices. Econometric tests indicated that the most widely used model of farmland prices, i.e., the present value model (PVM), was consistent with typical transaction costs assuming a one-period holding horizon. This study demonstrated that the PVM performed much better than often thought, once the high transaction costs involved in the transfer of farmland ownership are taken into consideration. This information provides support to one of the more popular methods used by appraisers in evaluation of farmland value.

Long-term:

- Researchers developed new rating methods for livestock and whole-farm revenue insurance products. Studies were conducted about how subsidies influence the demand for crop insurance. The same researchers also developed a tool to be used to simulate the effects of a new reinsurance partnership between private industry and the federal government. These new rating methods have been adopted by the Risk Management Agency for determining how insurance premium rates should change as the insurance deductible changes. One of the products developed was used to protect revenue on more than half of the crop acres in Iowa. A second product was used to insure gross margins on more than one million hogs in Iowa in 2003. Research results formed the basis of advice and analysis given to the House Agricultural Committee staff in regards to the role of subsidies on the demand for crop insurance.

- In a study on crop insurance, researchers estimated the probability density function of the Federal Risk Management Agency's (RMA) net income from reinsuring crop insurance for corn, wheat, and soybeans. Based on 1997 data, it is estimated that there is a five percent (5%) probability that RMA will need to reimburse nearly $1 billion to insurance companies, and that the fair value of RMA's reinsurance services to insurance firms equaled $78.7 million. This result pointed out the amount of implicit government subsidy to the crop insurance program. An extension of this work examined the potential of various hedging strategies to reduce RMA's reinsurance risk.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Organic Agriculture

Program 20: Sustainable/Organic Agriculture

d. Description of activity

This project investigated new sustainable production and post-harvest practices, which included grain, vegetable, fruit, turf grass, and greenhouse crops. It focused on four major issues: (1) development of sustainable/organic horticultural and agronomic systems; (2) development of improved nutrient management and soil building systems; (3) development of value-added industry products through improved sustainable/organic production and post-harvest techniques; and (4) development of research-based information in sustainable/organic systems for public training and advancement.

Sustainable fruit, vegetable, grain and turf grass production systems continued to be developed for Iowa conditions in 2002-2003. Effective pest management practices for new and existing pest problems will be necessary for the continued viability of sustainable/ organic agriculture in Iowa. The soybean aphid (Aphis glycines Matsumura), native to China and Japan, was first reported in Iowa in 2000, and may have up to 18 generations a year in Iowa, beginning with over-wintering eggs on the alternate host of buckthorn trees. Problems resulting from aphid-feeding included stunted plants, reduced pods and seeds, and transmission of viruses that cause mottling, distortion of the leaves, a reduced seed set, and discolored seeds, resulting in losses totaling $1 million annually. Research results found that when organically-approved spray treatments were applied, a significant decrease in aphid populations was obtained, with lowest aphid populations in the Neemix™ -treated plots. Beneficial insect populations were generally not affected by spray treatments.

Work continues on the development of corn gluten meal as a natural herbicide. Currently, there are two active studies at the horticulture research station on the subject: One is for long-term pre-emergence weed control in Kentucky bluegrass turf; and the second is a combined pre-emergence and post-emergence study on Kentucky bluegrass which is being conducted to evaluate the effect of corn gluten meal on perennial weeds such as dandelion and white clover. High-quality, organic day-neutral strawberries were produced using compost and corn gluten meal, but effects from applications of biological disease control treatments (Bacillus subtilis and Trichoderma harzianum) were not significant under conditions of low disease pressure.

The validity of common soil test procedures for sand-based root zones on golf course greens and sports fields are being evaluated. Procedures were developed for loam and clay-loam soils, and may yield erroneous results when used on sand-based systems. This work should have significant impact on the industry by providing more accurate testing methods.

In other grain, vegetable, and fruit research projects across Iowa, organic crops fertilized with compost produced similar yields to conventional crops. Soil health parameters, including organic carbon pools and microbial biomass, remained high in organic systems, even under multiple tillage operations.

d. Impact/accomplishment

- Kaolin clay products were effective in managing squash bugs and cucumber beetles in organic squash destined for the organic baby food market. Alternative oat straw mulch treatments for organic herb production (St. John's Wort) adequately controlled weed populations in 2003, while wood mulch was identified as an effective weed management strategy in organic grapes. Short- and long-term impacts include economic savings and environmental benefits from reduced reliance on synthetic pesticides.

- Efforts have resulted in a significant increase in agronomic and horticultural operations farmed or maintained without potentially polluting levels of nitrates and synthetic pesticides. Longer crop rotations, which included small grains and legumes, provide yield stability, improved plant protection, enhanced soil health and economic benefits, compared to conventional systems with shorter corn/soybean rotations and greater off-farm inputs.

- Interest in commercial grape plantings, including organic grapes, continues to increase in Iowa. The identification of grape cultivars adapted for Iowa winters and humid summer conditions will allow growers to avoid significant losses associated with planting non-adapted cultivars.

- The organic industry continued to expand in Iowa and the United States. Growers obtained a 50 – 300 percent increase on premium price for crops produced without synthetic inputs, thereby increasing the economic base of Iowa's farm families. Organic and sustainable production practices have resulted in a decrease in potentially polluting levels of nitrates and synthetic pesticides. The impact of improved soil quality in the organic/sustainable systems includes lower pesticide and sediment loading in waterways throughout the state. Diversification of Iowa farmland from conventional corn and soybeans to alternative crops, such as organic edible beans, fruits and vegetables, has led to an increase in biodiversity and a lower risk associated with monocropped systems.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Goal 2: A Safe and Secure Food and Fiber System.

Overview

The Iowa Agriculture and Home Economics Experiment Station has made progress against all the impacts identified in the plan of work for Goal 2. Research outputs take a number of forms, including:

- 31 Refereed Publications, Research Papers, Manuscripts
- 18 Non-refereed Publications, Reports, Technical Papers
- 47 Proceedings, Published Abstracts
- 6 Extension Publications
- 18 Invited Presentations
- 28 Education Programs, Field Days, Tours (1,950 participants)

- 810 individual consultants
- 4 Book/Chapter
- 5 web pages supported
- 3 Patents

Outputs, outcomes and impacts: Highlights of research at Iowa State University:

① Evaluation of pork slaughtering processes demonstrated that the timing of specific processes may be altered to improve pork quality and operating efficiency. Several large pork plants have utilized this information to improve handling for approximately 8,000,000 carcasses per year.

② Some 2,000 meat industry personnel received specific training in meat science, food safety and processed meat technology. These individuals are subsequently making a tremendous contribution to improved meat quality and safety in dozens of companies in the U.S. and abroad.

③ Safety of ready-to-eat processed meats was shown to be greatly improved by combining pediocin with post-package thermal pasteurization or with irradiation. These technologies provide the meat industry with the means to assure the safety of these products from contamination by *Listeria monocytogenes*.

④ ISU participation in the following multistate research projects also contribute to goal 2: NC062, NC100, NC129, NC136, S292, and S295.

Assessment of accomplishments as measured against POW:

A more safe and secure food and fiber system due through the development and dissemination of information on new or improved methods, practices, and products that will result in
- improved quality of fresh and processed meat products,①
- greater public understanding of the principles of food safety and quality, and ②
- greater understanding of chemical, physical, and biological hazards to food safety. ③

New contributions to the understanding of the hazards to a safe food supply and the applications of scientific advances promote enhanced food safety and consumer confidence in the food supply in Iowa, the United States, and the world.

State and Hatch Funds $ 1,189,311

FTEs 4.2

Key Themes – Food Safety and Food Quality

Program 16: Improving the Quality and Safety of Muscle Foods

f. Description of activity

The focus of this program is on quality and safety improvement of muscle foods. Fundamental studies of muscle growth and muscle protein properties are being conducted to

determine the role of muscle structure in meat tenderness. Processing technologies that can be used to improve eating quality of meat products are being investigated. Development of technology for effective distribution of muscle foods that are unquestionably safe under a variety of conditions is being developed. Control of off-odor and color changes in irradiated poultry meat is being developed. Information derived from this work is disseminated to producers, processors and consumers by a wide variety of publications, extension programs and individual consultations.

f. Impact/accomplishment

Short-term:

- Evaluation of pork slaughtering processes demonstrated that the timing of specific processes may be altered to improve pork quality and operating efficiency. Several large pork plants have utilized this information to improve handling for approximately 8,000,000 carcasses per year.

- Demonstration of how a low-value pork meat component may be utilized to improve the texture of processed meat products has resulted in commercial development of this product by an Iowa-based company, Proliant, Inc. The processed meat industry is utilizing the Proliant product to provide consumers with better products at lower cost.

- Investigation of antioxidant properties of a natural rosemary extract has resulted in the development of a new market for an Iowa company, Kemin Americas, Inc. The Kemin natural rosemary extract is being adopted by the meat industry for applications in fresh sausage products as an alternative to synthetic antioxidants.

- Safety of ready-to-eat processed meats was shown to be greatly improved by combining pediocin with post-package thermal pasteurization or with irradiation. These technologies provide the meat industry with the means to assure the safety of these products from contamination by *Listeria monocytogenes*.

- Because food-borne pathogenic bacteria exhibit greater resistance to electron-beam irradiation after adapting to stress, new information on radiation resistance of these organisms is being provided to assist food processors in achieving control of these pathogens in meats with an adequate margin of safety.

Long-term:

- The discovery that oxidative conditions in early post mortem muscle slows meat tenderization will allow processors to prevent toughening from oxidative preservation treatments such as irradiation.

- Some 2,000 meat industry personnel received specific training in meat science, food safety and processed meat technology. These individuals are subsequently making a tremendous contribution to improved meat quality and safety in dozens of companies in the U.S. and abroad.

- Twenty-five specific muscles from pork shoulders and hams were individually analyzed for a wide range of chemical, physical, nutritional and sensory properties. Several currently undervalued muscles were identified as having exceptional potential for greater value-added use with greater potential profitability for the pork industry.

f. Source of Federal Funds—Hatch

f. Scope of Impact—State Specific

Goal 3: A Healthy, Well-Nourished Population.

Overview

The Iowa Agriculture and Home Economics Experiment Station has made progress against all the impacts identified in the plan of work for Goal 3. Research outputs take a number of forms, including:

- 2 Refereed Publications, Research Papers, Manuscripts
- 1 Non-refereed Publications, Reports, Technical Papers
- 3 Proceedings, Published Abstracts
- 1 Thesis, MS/PhD Program Completed

Outputs, outcomes and impacts: Highlights of research at Iowa State University:

① Research focusing on understanding factors that play a role in the regulation of folate, homocysteine, and methyl group metabolism, interrelated pathways important in health and disease has found that the administration of retinoid compounds and a diabetic state play a role in disrupting these metabolic pathways. Understanding the mechanistic basis for this interaction will be important in future dietary and therapeutic recommendations directed at individuals that may use retinoid compounds and/or are diabetic.

② Research established that some isoflavones directly lower blood cholesterol in a valid animal model for human cholesterol-lowering, and shows a significant role for the combination of rapid gut transit time and low gut microbial isoflavone degradation rate in enhancing the absorption of isoflavones in humans. Thus, individuals may be more likely to benefit from isoflavone-containing foods or supplements if they have hypercholesterolemia, relatively rapid gut transit time and low fecal isoflavone degradation rate. This theory will be tested in further studies, including a hamster model of variability in gut microbial isoflavone degradation currently under development in our laboratory.

③ ISU participation in the following multistate research projects also contribute to goal 3: NC100, NC167, NC170, NC213, NC219, NC1001, and W181.

Assessment of accomplishments as measured against POW:

A healthy and well-nourished population through the development and dissemination of information on new or improved methods, practices, and products that will result in

- increased availability of health promoting foods for consumers, ①②

- increased risk-taking by food companies in developing improved foods, and ①②
- increased public awareness of health promoting dietary and feeding behaviors. ①②
- increased dissemination of information through ISU extension project 330 ((Nutrition: choices for healthy FY 2000-2004). (see program 330)
- improved food selections that will enhance nutritional status and improve health of the general population of Iowa, the United States, and the world. ①②

State and Hatch Funds $ 676.099

FTEs 3.1

Key Theme – Human Nutrition

Program 18: Improving Human Foods: Functionality, Selection and Nutrition

. Description of activity

This project focuses on improving the foods people consume. The scope of the research is all consumer aspects of foods include functional, sensory, economic, nutritional, and selection criteria. Research spans from developing more effective nutrition education tools to understanding fundamental principles of food ingredients, nutritive value and bioavailability. The overarching objective of this project is to improve human food consumption patterns to provide for a healthy, well-nourished population. An additional objective is to support the development of a reliable food industry that can sustain this population.

. Impact/accomplishment

Long-term:

- Research focusing on understanding factors that play a role in the regulation of folate, homocysteine, and methyl group metabolism, interrelated pathways important in health and disease has found that the administration of retinoid compounds and a diabetic state play a role in disrupting these metabolic pathways. Understanding the mechanistic basis for this interaction will be important in future dietary and therapeutic recommendations directed at individuals that may use retinoid compounds and/or are diabetic.

- Research established that some isoflavones directly lower blood cholesterol in a valid animal model for human cholesterol-lowering, and shows a significant role for the combination of rapid gut transit time and low gut microbial isoflavone degradation rate in enhancing the absorption of isoflavones in humans. Thus, individuals may be more likely to benefit from isoflavone-containing foods or supplements if they have hypercholesterolemia, relatively rapid gut transit time and low fecal isoflavone degradation rate. This theory will be tested in further studies, including a hamster model of variability in gut microbial isoflavone degradation currently under development in our laboratory.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific; Integrated Research and Extension

Goal 4: An Agricultural System Which Protects Natural Resources and the Environment.

Overview

The Iowa Agriculture and Home Economics Experiment Station has made progress against all the impacts identified in the plan of work for Goal 4. Research outputs take a number of forms, including:

- 111 Refereed Publications, Research Papers, Manuscripts
- 111 Non-refereed Publications, Reports, Technical Papers
- 129 Proceedings, Published Abstracts
- 132 Extension Publications
- 157 Invited Presentations
- 379 Education Programs, Field Days, Tours
- 176 Books & Chapters
- 32 Web Sites, Multi-Media
- 2 Patents
- 31 Theses, MS/PhD Programs Completed

Outputs, outcomes and impacts: Highlights of research at Iowa State University:

① This research establishes the scientific knowledge base of the technical requirements for restoring savanna ecosystems and of the ecological functions of these native ecosystems within the agricultural landscape of the Midwest. Conservationists, foresters, land managers, and private land owners use this knowledge to improve the health of degraded natural areas, as well as agricultural landscapes as a whole, thereby enhancing the sustainability of the environment and improving quality of life in the region. Additionally, the new research initiative with the U.S. Forest Service addresses watershed scale processes related to improving water quality and flow through the strategic placement of perennial plant communities on the landscape. Policymakers, land managers, and civil society groups use these research results to design alternative landscapes that enable them to achieve their goals related to enhancing social, economic, and ecologic benefits to society.

② A multi-year, on-farm demonstration/research project was completed that documented liquid swine manure as a reliable and valuable nitrogen and phosphorus nutrient source for corn and soybean production in Iowa. Through a systematic approach to manure sampling, laboratory analysis, applicator calibration, and control of application rates, liquid swine manure was effectively managed as a sole source of nutrients for corn and soybean production. With an estimated 12 million market hogs in Iowa and associated production of 89 million pounds of crop-available N and 95 million pounds of crop-available P in swine manure, successful agronomic utilization of this N and P can replace expenditures for fertilizer by an estimated 45 million dollars annually in Iowa.

③ Manipulating naturally occurring insect predators using their attractants reduced soybean aphid numbers, resulting in more bean pods and greater pod weight. The manipulation of natural enemies will provide environmentally benign strategies for organic and sustainable growers to reduce soybean aphid damage.

④ We linked physical, chemical, and biological factors that affect water quality in Clear Lake Iowa system to lake usage and the public attitudes toward protecting the common resources. Our research was conducted in a wide variety of nationally-prominent as well as locally important ecosystems, including the Greater Yellowstone ecosystem, forestry systems of the Southeast, the Gulf coast, the prairie pothole region of northern Great Plains, and most prominently the corn belt of Iowa including prairie and wetland preserves, riparian areas, the Loess Hills, Conservation Reserve Program lands, all the important lake watersheds, and managed croplands and pasturelands. The specific results from the Clear Lake Iowa watershed have had a direct impact on policy and the public attitudes about the value of the lake ecosystem.

⑤ ISU participation in the following multistate research projects also contribute to goal 4: NC094, NC100, NC125, NC174, NC202, NC205, NC218, NC230, W082, W128, W170, W187, and W188.

Assessment of accomplishments as measured against POW:

An agricultural system which protects natural resources and the environment through the development and dissemination of information on new or improved methods, practices, and products that will result in

- enhanced soil and water quality, ①
- increased utilization of integrated pest management, sustainable, and organic agricultural practices, ②③
- adoption of better manure management practices, ②
- increased wetland restoration and improved riparian management on public and private lands, ①
- greater societal recreational and economic benefits from surface water uses, and ④
- Iowa's agriculture being highly productive, economically profitable, environmentally friendly, and socially responsible. ①②③④

New contributions to the understanding of the impact of agriculture on the environment and the applications of scientific advances promote protection of the environment and natural resources of Iowa, the United States, and the world.

State and Hatch Funds $ 2,901,077

FTEs 28.3

Key Theme – Forest Resource Management

Program 2: Forest Resource Enhancement

d. Description

The overarching objective of the research conducted as part of this project is to use forests, woodlands, trees, shrubs, perennial grasses, and forbs to improve environmental quality and to create value-added products. To assure an adequate research base and high impact products, available resources are focused on five broadly based performance objectives: 1) protect the soil resource, improve water quality, increase crop yield, and enhance biological diversity; 2) enhance and restore naturally occurring ecological communities; 3) meet the growing demand for wood fiber based products and biofuels through the development of fast growing disease and insect resistant plantation grown trees that require minimal chemical inputs; 4) provide a low cost means of saving energy, improving the aesthetics and livability of populated areas, and protecting air and water quality in both urban and rural areas; and 5) further the development of bio-based materials that utilize agricultural fibers and commodities to create new materials that add value and diversify income potential.

d. Impact/accomplishment

Use of forests, woodlands, trees, shrubs, perennial grasses, and forbs to improve environmental quality:

- The results of this work provide more concrete evidence of the effectiveness of riparian buffers that leads to their further proliferation in agroecosystems. It also provides information to management agencies on the extent of existing native buffers and the amount of riparian land that needs to be restored to provide effective buffers.

- This research establishes the scientific knowledge base of the technical requirements for restoring savanna ecosystems and of the ecological functions of these native ecosystems within the agricultural landscape of the Midwest. Conservationists, foresters, land managers, and private land owners use this knowledge to improve the health of degraded natural areas, as well as agricultural landscapes as a whole, thereby enhancing the sustainability of the environment and improving quality of life in the region. Additionally, the new research initiative with the U.S. Forest Service addresses watershed scale processes related to improving water quality and flow through the strategic placement of perennial plant communities on the landscape. Policymakers, land managers, and civil society groups use these research results to design alternative landscapes that enable them to achieve their goals related to enhancing social, economic, and ecologic benefits to society.

- We are in the process of providing samples of our best clones to be grown in support of approximately 30,000 acres of biomass energy and fiber plantations in Iowa and surrounding states and the Pacific Northwest. We continued work with the Iowa DNR State Nursery and commercial nurseries to get these improved clones into sufficient production to supply further planting demands. Results of the buffer study demonstrate the impact that woody species like cottonwood can have on the retention of phosphorus on site. Modeling efforts provide a means to quantify the potential impacts of various types of buffer configurations on the retention of phosphorus.

- Direct comparison of different residential development designs enable land use planners and developers to better assess the environmental costs and benefits associated with those

designs. Survey results form the basis for dialog among residents and city officials in identifying priorities to address as growth occurs in urbanizing areas in the watershed.

d. Source of Federal Funds—McIntire-Stennis

d. Scope of Impact—State Specific

Key Theme – Soil Quality

Program 21: Sustainable and Environmentally Safe Management of Soil Resources

d. Description of activity

This program is focused on four major issues: (1) management of crop nutrients in soils, (2) how microorganisms and their products function in soils, (3) the assessment and sustainable management of soil resources, and (4) the fate and transport of chemicals in soils.

d. Impact/accomplishment

Short-term:

- A multi-year, on-farm demonstration/ research project was completed that documented liquid swine manure as a reliable and valuable nitrogen and phosphorus nutrient source for corn and soybean production in Iowa. Through a systematic approach to manure sampling, laboratory analysis, applicator calibration, and control of application rates, liquid swine manure was effectively managed as a sole source of nutrients for corn and soybean production. With an estimated 12 million market hogs in Iowa and associated production of 89 million pounds of crop-available N and 95 million pounds of crop-available P in swine manure, successful agronomic utilization of this N and P can replace expenditures for fertilizer by an estimated 45 million dollars annually in Iowa.

Long-term:

- A technique was developed for rapid measurement of soil hydraulic properties. We developed a mathematical analysis that, combined with a simple water infiltration experiment, allows for the determination of the soil water retention curve and unsaturated hydraulic conductivity. This approach will lead to new determinations of soil hydraulic properties for a wide range of soils and management situations.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Integrated Pest Management

Program 22: Integrated Pest Management

b. Description of activity

Integrated Pest Management (IPM) promotes minimized pesticide use, enhanced environmental stewardship, and sustainable systems. This is achieved by protection of commodities, homes, and communities with environmentally- and economically-sound practices that result in abundant, high quality supplies of food and fiber products and improved quality of life. Specific activities in 2003 included the following:

- Projects on horticultural crops focused on: validation of a weather-based disease-warning system for the sooty blotch-flyspeck fungal complex on apples in Iowa and Wisconsin; reduced-pesticide options for management of cucumber beetles, bacterial wilt, foliar fungal diseases, and weeds in Iowa, Minnesota, and Colorado; and strategies for mulch manipulation to suppress spatial dissemination and define overwintering potential of *Sclerotium rolfsii* var. *delphinii* on Hosta.

- Methods to detect, monitor, and quantify crop disease stress were developed by integrating GPS (global positioning systems), GIS (geographic information systems), and remote sensing technologies using soybean rust (*Phakopsora pachyrhizi*) in Argentina, Brazil, and Paraguay, soybean cyst nematode (*Heterodera glycines*) in Iowa, and Stewart's disease of corn (*Pantoea stewartii*) in the North Central Region of the US.

- The evolution in giant ragweed (*Ambrosia trifida*) emergence characteristics that favor survival in agronomic fields was compared to native habitat of this weed to determine how this affects control tactics. The mechanisms of action and genetics for herbicide resistance in common waterhemp and marestail and the physiological mechanisms and genetics that controls dormancy in common waterhemp were investigated.

- Genetically engineered corn and synthetic insecticides were evaluated for insect control. The spatial distribution of insects in corn was analyzed to determine if the controls could efficiently and effectively be applied to sites within fields rather than whole fields.

- Insect basement membrane-degrading proteases were screened for insecticidal activity when delivered by an insect virus vector. One protease with high toxicity is the subject of a new patent. A system for production of transgenic plants that express this protease along with an appropriate system for delivery of the protease to its target site is being developed.

- Manipulating naturally occurring insect predators using their attractants reduced soybean aphid numbers, resulting in more bean pods and greater pod weight. The manipulation of natural enemies will provide environmentally benign strategies for organic and sustainable growers to reduce soybean aphid damage.

Greenhouse, growth chamber, and field experiments were conducted to study the interaction of brown stem rot with the soybean cyst nematode on soybean. The effect of resistant soybean varieties on soybean cyst nematode reproduction and growth and yield was studied. Finally, field experiments were conducted to assess the effect of various commercial products on soybean cyst nematode and yield of the soybean varieties.

b. Impact/accomplishment

- The validation of a weather-based disease-warning system for sooty blotch and flyspeck on apples showed potential to save at least 2 fungicide sprays per season without reducing yield or quality of harvested apples. This average savings in input costs would be $20/acre/spray, or $2,000/year for a 50-acre orchard typical of those in Iowa and Wisconsin.

- A disease advisory system that predicts the risks for Stewart's disease of corn was developed and is now being field-tested. The model predicts the survival of corn flea beetle populations (pathogen vector) and generates risk maps at the county level. The disease advisory system allows growers to select low disease-risk planting sites and to decide where and when seed and foliar insecticides will be needed. The research also demonstrated that delaying planting can further reduce the risk for Stewart's disease.

- Monsanto has released the first commercial corn varieties that produce *Bacillus thuringiensis* endotoxin effective against corn rootworms. To determine if the approximately $20 per acre purchase price of the resistant corn is justified, growers must sample the adult stage the previous summer. Sampling has been conducted weekly for 8-10 weeks while the beetles are active. Because of the cost of sampling for two months, it is cheaper to apply control prophylactically. An adult emergence model has been developed that is initiated by the appearance of the first adult and then predicts the cumulative emergence of beetles. The model forecasts the best times to sample corn rootworm adults, reducing the sample to two weeks, a 5-6-fold reduction in sampling costs.

- Information was given to Iowa soybean growers to help them select resistant soybean varieties that offer both high yields and suppression of soybean cyst nematode reproduction. Also, growers were shown that most of the commercial products being sold for management of the soybean cyst nematode did not affect nematode reproduction or soybean yield in the experiments conducted in central Iowa in 2003. The results of these research activities is that Iowa soybean growers who have fields infested with soybean cyst nematode will be able to make decisions concerning which soybean varieties to buy and grow and what commercial products to buy and apply to their fields in order to produce the maximum soybean yields on their fields at the lowest cost while preserving the productivity of that land for soybean production in the future.

b. Source of Federal Funds—Hatch; Smith-Lever

b. Scope of Impact—State Specific, Integrated Research and Extension

Key Theme – Agricultural Waste Management

Program 23: Animal Waste Management

d. Description of activity

This project's research addresses the challenges of efficient and cost effective utilization of the nutrients, energy, and fiber that are embedded in manure. Several projects address critical

control points in manure handling systems, including management and maintenance, as well as technical needs such as more accurate manure application equipment. Promising alternatives ranging from anaerobic digestion to bedded manure handling systems have been critically analyzed with respect to both environmental impact and economic cost.

Primary activities were 1) publication of manure treatment and odor control white papers, and 2) work toward achieving acceptance of alternative technologies for control and mitigation of pollution potential of open feedlot runoff. The white paper activities included primarily leading a multi-university team to summarize past research and extension efforts to publish the papers. Research into the feedlot runoff alternative technologies provided information used to work with EPA and Iowa DNR personnel to convince them that the alternatives provide equal pollution protection to traditional total containment systems.

Topic: Open feedlot runoff control using traditional methods was modeled. Discovery: The modeling showed that "total" containment actually only contains approximately 80% of the feedlot runoff because the containment basins overflow due to excess precipitation and runoff. Outcome: Discovery that water quality protection is not 100% using "total" containment provides a reason to substitute other equally effective, but less costly, alternatives.

Topic: Infiltration basins followed by vegetative filter strips as an alternative to clean up open feedlot runoff. Discovery: Infiltration basins remove over 85% of contaminants as feedlot runoff moves through the system. The vegetative filter strip following the infiltration basin removes another 50-70% or the remaining pollutants. Outcome: Infiltration basins followed by vegetative filter strips are more effective at protecting water resources than "total" containment basins.

Topic: Impact of poultry and swine manure on water quality. One study was conducted at the AERC near Ames to determine the effects of poultry manure on water quality and crop growth parameters. The results of this indicate that application of poultry/swine manure at an application rate of 168 kg N/ha resulted in lower NO_3-N concentrations in subsurface drainage water and higher crop yields in comparison with the UAN (urea ammonium nitrate) applications at similar rates of application. Also, the 168 kg N/ha application from poultry/swine manure resulted in reduced total NO_3-N losses with subsurface drainage water as compared to the UAN and 336 kg N/ha applications.

d. Impact/accomplishment

Short-term:

- Manure water quality study has demonstrated that if poultry/swine manure is applied at the appropriate application rates equivalent to 168 kg N/ha (150 lb N/ac), farmers could expect better crop yields with positive effects on groundwater quality and possibly with better long-term impacts on soil quality.

Long-term:

- An economic feasibility analysis of anaerobic digestion systems for Iowa livestock demonstrated limited opportunities for this technology under current energy price and policy constraints. Dairies have the most potential, becoming feasible in the range of 250 to 500 cows, while swine systems require 5000-20,000 head to achieve economies of scale. Policy analysis indicated green power premiums and other financial incentives are needed to significantly increase the number of economically viable anaerobic digesters in Iowa.

- Our group demonstrated the first U.S. use of tracer gases to quantify ammonia and greenhouse gas emissions from naturally ventilated livestock buildings, as part of a nutrient mass balance study of swine hoop structures. A key finding of this research is that the majority of manure bedded pack N losses are in gaseous forms, including NH3, N2O, and N2. These losses provide a benchmark and incentive for development of new management systems to reduce this environmental impact.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Water Quality

Program 24: Improving Water Resources Management in an Agroecosystem

d. Description of activity

Objective 1. With funding from U.S.G.S. Iowa State University (ISU) researchers are attempting to develop a battery of immunological assays that could be used as a biomonitoring tool by registering responses of wild fish to pollution from swine manure waste effluents. A common Iowa stream fish, the fathead minnow (FHM), is being used as the experimental organism for developing the assays. During the past year, a disease-free FHM colony was established, and it is producing fish for laboratory testing. Two functional assays for measuring neutrophil immuno-response activity have been developed.

Objective 2. ISU researchers are attempting to determine the effects of modified and unmodified weirs on fish movement in streams. There are now three years of sampling data that are currently being analyzed. The study has been greatly affected by seasonal weather patterns and drought in southwestern Iowa. For the past two summers the study streams have had very low flows and therefore fish movement has been minimal. The modified and unmodified weirs are both barriers to fish movement at low flows and there is little evidence of that fish move past any of the weirs during these times. However, when water is flowing over the weirs, some fish have moved over the modified weirs.

Objective 3. Scientists are working with colleagues to integrate information into a comprehensive Iowa Rivers Information System (IRIS). There is an urgent need to incorporate new databases into models predicting the presence of aquatic species for conservation planning and assessment. The investigators will integrate relevant information about watersheds, i.e., land cover and use, underlying geology, soils, river networks and elevation. Other information such as flow, channel morphology, water quality, riparian

conditions, instream habitat and biological communities will also be incorporated. Additional ongoing projects include: Iowa Aquatic Gap, and Deep-Water Habitat and Stream Fish. An other, related project will describe the physical and chemical characteristics of sediment and water samples from a warm-water stream in the Midwest corn belt, determine the toxicity of river sediments and water to larval fish, and evaluate the bioavailability (sublethal effect and acute toxicity) of chlorpyrifos adsorbed to river sediment. Another study examined the estrogenic potency of wastewater at aerated wastewater lagoon systems of 10 sewage treatment facilities in central Iowa. The findings indicate that water entering aerated sewage lagoons is highly estrogenic to male fish, but the estrogenic potency decreases with serial passage through the lagoon systems to levels that are not sufficient to induce a feminizing effect on the test fish. The estrogenic activity of municipal wastewater was reduced by serial passage through aerated lagoon treatment facilities to levels found in unexposed fish.

Objective 4. The objectives of this project are to document the fate of aquaculture waste components (phosphorus and solids) relative to feed input in a recycle aquaculture system, evaluate rapid solids removal/recovery, and provide a workshop describing pending EPA regulation of aquacultural effluents and best management practice (BMP) to reduce water quality impacts of the effluents.

d. Impact/accomplishment

Short-term:

- The aquaculture industry is now undergoing public scrutiny to decrease both the water usage as well as potential pollutants. Technology used in the recycle aquaculture system reduces water requirements per unit of fish produced, rapidly captures solids (microscreen filtration and swirl separator), and provides a biological process (septic tank) for reducing total solids, nutrients (N and P) and biological oxygen demand of the effluents. A conference was organized to present information on proposed Federal (EPA) regulation and best management practices for pond, raceway and recycle aquaculture systems. Proceedings of the conference are available to regulators interested in BMPs, and for producers interested in both the regulations and BMPs. This information will be critical to aquaculturists who use recycle aquaculture systems since effluents from these systems will be addressed in the upcoming 2004 proposed effluent regulations of the EPA related specifically to these systems.

- Traditionally, the hazards of organophosphororus (OP) insecticides to aquatic life have been studied in aqueous solution, but in this study the toxicity of OP-soil complexes were evaluated. This information contributes to EPA evaluation of regulations regarding the hazards of OP insecticides to aquatic life and serves as a guide to best management practices for preventing environmental harm from use of this high toxic group of insecticides.

Long-term:

- Swine manure is a major pollutant in Iowa waters, often associated with kills of resident aquatic organisms. Two functional assays for measuring neutrophil immuno-response

activity have been developed. The assays can be used by environmental protection agencies to monitor aquatic ecosystems to identify and thwart situations of swine manure pollution prior to occurrence of catastrophic effects.

- Based on three years of research on the effectiveness of modifications of weirs, we have demonstrated that by creating a 20:1 back slope on existing 4:1 weirs, fish passage is enhanced. County agencies can now see the necessity of implementing modifications of weirs under their control.

- Findings from objective 3 are important because they demonstrated that although municipal wastewater entering aerated lagoon systems in central Iowa was strongly estrogenic to a warm-water fish, the conventional lagoon systems are effective for reducing the potential environment hazard of estrogenic compounds in municipal wastes from small towns. The construction and operation of wastewater treatment systems are major budgetary categories for municipalities.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Weather and Climate

Program 25: Interaction of Biosystems with Weather and Climate

d. Description of activity

Climate variability is the major contributor to large year-to-year variations of crop yields in the Midwest. Our research focuses on understanding climate variations and their effects on production variation. Research to date has focused mainly on growing-season rainfall over the central United States. We have found that springtime rainfall systems were affected by the strong El Nino of 1997-98. Additionally we have evaluated the skill of regional climate models for simulating precipitation and soil moisture. The models were able to capture year-to-year variations in growing-season rainfall although the magnitudes of the variations were somewhat damped in comparison with observed trends. The models were able to predict upper-level soil moisture quite well. There was a persistent low bias in deep soil moisture. Since soil moisture depends mainly on the difference between rainfall or evapotranspiration, a small error in either of these quantities can produce noticeable error in soil moisture. The errors in deep soil moisture were thus hypothesized to result from a negative bias in simulated precipitation. Other research has examined weather and climate trends in agricultural competitor regions such as and South America. We found substantial variations in South American rainfall over interannual and even decadal time scales.

d. Impact/accomplishment

Short-term:

- Short course students learned methods developed to analyze biosystem response to weather and climate. A survey of students indicated that added farm profits from using

system principles was $10,000 this year. This is a documented $20,000,000 addition to Iowa farm income during 2003 as a direct result of this project.

- The Iowa Environmental Mesonet has brought together data from various agencies (ISU, Iowa Department of Transportation, and others) into a unified data base that can be readily accessed by the public and agencies at http://mesonet.agron.iastate.edu/ . Data from the Mesonet were critical to the timely issuance of a severe storm warning on June 18 within two minutes of the first indication of a strong wind gust.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Natural Resources Management

Program 26: Improving Environmental Quality in a Changing Landscape

. Description of activity

Natural processes that influence the distributions, abundance, and diversity of wild animal and plant species in ecosystems are affected by the spatial characteristics of landscape cover that are linked to economic, social and environmental factors. We used GIS classifications linked with species abundance and diversity data to broadly predict species distribution and abundance and to dynamically model populations under current conditions, and those conditions predicted under global climate change, severe habitat loss, and various combinations. For example with reduced precipitation and reduced or fragmented habitat, interactions between butterflies and host plants are negatively altered and waterfowl are forced to nest in landscapes with limited wetland habitat exacerbating the impact of predation. Another large-scale problem on which we made progress is to show that Midwestern agricultural land use is ecologically linked to the economic changes in Gulf coast fisheries. To some degree the processes causing changes in abundance and diversity of biota can be altered by the arrangement of remaining patches, for example by linking remaining habitats by natural corridors or by clustering remaining patches on the landscape. At a more local scale, consumption of seeds of both desirable and weedy plant species by ants and rodents is affected by the size and shape of habitat patches, as well as linkages with other patches. We studied how specific land management practices such as the composition of vegetation (warm- vs. cool-season grasses, inclusion of broad-leaved forbs), strip width, and presence of woody vegetation affects bird abundance and nesting success in riparian filter strips or butterfly diversity in prairie patches and roadsides. Work on endangered populations in both aquatic (mussels) and terrestrial (butterflies, snails) has indicated an extinction debt in the agricultural Midwest with >50% declines in local biodiversity over the past 15 years. GIS analysis links these impacts to riparian deforestation, increased stream siltation, and increased edge. During this year we did not make much progress on linking these terrestrial ecological changes to the social and economic conditions that produce the large and small-scale patterns. However we did progress on this objective by linking physical, chemical, and biological factors that affect water quality in Clear Lake Iowa system to lake usage and the public attitudes toward protecting the common resources. Our research

was conducted in a wide variety of nationally-prominent as well as locally important ecosystems, including the Greater Yellowstone ecosystem, forestry systems of the Southeast, the Gulf coast, the prairie pothole region of northern Great Plains, and most prominently the corn belt of Iowa including prairie and wetland preserves, riparian areas, the Loess Hills, Conservation Reserve Program lands, all the important lake watersheds, and managed croplands and pasturelands.

. Impact/accomplishment

- The interdisciplinary nature of the project provides a mechanism for exchange of information and ideas that will encourage solutions that have practical implications for ecological and environmental policy. The National Park Service, Natural Resources Conservation Service, the Fish and Wildlife Service, and state conservation agencies are using our results to improve the design and management of natural habitats, riparian buffers and CRP lands to benefit wildlife diversity. Results have also been released in books and magazines for the general public. The specific results from the Clear Lake Iowa watershed have had a direct impact on policy and the public attitudes about the value of the lake ecosystem.

. Source of Federal Funds—Hatch

. Scope of Impact—State Specific

Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans.

Overview

The Iowa Agriculture and Home Economics Experiment Station has made progress against all the impacts identified in the plan of work for Goal 5. Research outputs take a number of forms, including:

- 143 Refereed Publications, Research Papers, Manuscripts
- 47 Non-refereed Publications, Reports, Technical Papers
- 12 Proceedings, Published Abstracts
- 36 Extension Publications
- 192 Invited Presentations
- 68 Education Programs, Field Days, Tours
- 37 Books & Chapters
- 34 Theses, MS/PhD Programs Completed
- 553 web pages supported
- 1 grant

Outputs, outcomes and impacts: Highlights of research at Iowa State University:

① Research on community food systems was used as input into community-level decision making regarding how to design, implement, and maintain farmer's markets, community-supported agriculture, and other locality-based retailing of farm products.

② Publication of the findings from the 2002 Iowa Farm and Rural Life Poll raised awareness of agricultural and natural resource issues facing Iowa. Data from the survey were widely disseminated to legislators, congressional members and local policy makers to help them assess conditions in the state and design intervention programs to improve the agriculture and the quality of life in rural Iowa.

③ Conducted research on determinants of small business success in small towns in rural Iowa. These findings were used in small business development seminars, Chamber of Commerce leadership institutes and extension meetings to address the need to support businesses owned and operated by women.

④ Results from our four-state study of child care quality have been presented to 30 local, state, regional and national organizations, and those findings indicate that the quality of child care at infant centers and family child care homes is significantly lower in Iowa. In response to these findings, Iowa policy makers have begun a project designed to provide training and technical assistance to child care providers who care for infants and toddlers.

⑤ ISU participation in the following multistate research projects also contribute to goal 5: NC100, NC221, NC222, NC1001, NC1002, NE167, NE185, NE1011, S296, and W133.

Assessment of accomplishments as measured against POW:

Enhanced economic opportunity and quality of life through the development and dissemination of information on new or improved methods, practices, and products that will result in

- increases in employment opportunities, educational attainment, per capita income, housing availability, continuing education, participation in local events, and elements of the environment such as water quality, ③
- communities supporting development projects; increased capacity of communities, families, and individuals to improve their own quality of life, ①②④
- improved cooperation between the university, state and federal agencies, industries and communities to transfer technology that will lead to industrial growth and rural development, and [see value added program under goal 1] ②
- enhanced education of decision-makers at local, regional, and state levels; those initiating development projects; and those setting policies. ①②③④

New contributions to the understanding of social and economic factors and the applications of scientific advances promote economic opportunity and quality of life for the populations of Iowa, the United States, and the world.

State and Hatch Funds $ 3,141,934

FTEs 22.8

Key Theme – Impact of Change on Rural Communities

Program 27: Rural Development

d. Description of activity

The purpose of this program is to develop research and outreach activities to improve the efficiency, productivity, and sustainability of agriculture and the prosperity and well being of people who live in rural Iowa. The program seeks to inform potential development policies and projects that can be provided through education and extension.

Critical issues related to rural development involve the changing structure of agriculture and of rural communities, as well as a focus on relationships between rural and urban sectors. Among research and education topics raised by stakeholders that relate to development are assessing the image of agriculture and rural life among all residents, evaluating environmental issues, informing rural residents through education and extension, considering the increase in diversity among rural residents, educating future scientists while also sharing research ideas and results with the general public, and examining potential implications of policies related to rural areas.

d. Impact/accomplishment

Short-term:

- In Polk County, the Board of Supervisors worked with CD-DIAL to conduct a customer satisfaction survey regarding county government services. Polk County Supervisors used the survey results to make decisions regarding resource allocation and service improvement.

- Research on community food systems was used as input into community-level decision making regarding how to design, implement, and maintain farmer's markets, community-supported agriculture, and other locality-based retailing of farm products.

Long-term:

- Publication of the findings from the 2002 Iowa Farm and Rural Life Poll raised awareness of agricultural and natural resource issues facing Iowa. Data from the survey were widely disseminated to legislators, congressional members and local policy makers to help them assess conditions in the state and design intervention programs to improve the agriculture and the quality of life in rural Iowa.

- Publications and presentations on consumer risk assessments to groups of scientists and the public promoted better understandings of how the people view new agricultural technologies. Improved understanding of consumer risk assessments enabled scientists to better express to the public the advantages and disadvantages of complex innovations in agricultural production and processing.

- Conducted research on determinants of small business success in small towns in rural Iowa. Discovered that women-owned businesses, controlling for factors related to business success, had lower gross sales than men-owned businesses. These findings were used in small business development seminars, Chamber of Commerce leadership institutes and extension meetings to address the need to support businesses owned and operated by women. Main street business owners in small, rural communities now are

more aware of the need to work with women-owned businesses and local populations to support this fast-growing segment of locally-owned businesses.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Key Theme – Other

Program 28: Fiber-Related Products (Textiles and Apparel) and Businesses for Protection, Social, and Economic Enhancement

d. Description of activity

Research under this project addressed both production and consumption issues concerning textile and apparel fiber products. In NC-222 research, Damhorst analyzed longitudinal panel data on rural and small town use of the internet and other modes of shopping to assess change in shopping and information search over time for food and fiber products. Campbell, Parsons, and Damhorst collaborated on research integrating digital printing, mass customization, and consumer response, Campbell and Parsons examined application of digital printing technology to the co-design process (customer individualization) of mass customization and analyzed the effectiveness of marketing digitally printed garments through an internet retail environment, dubbed Digikids. Damhorst assessed consumer response to two versions of the Digikids mass customization internet site for children's clothing. Fiore investigated the effect of psychological variables on consumers on their responses toward mass customization option of apparel. Littrell, in a national survey, compared preferences of tourists for different types of travel activities (outdoor-oriented activities; cultural, historical and arts-oriented activities; and sport-oriented activities) with the importance they attached to shopping venues, criteria for product purchases, and mall characteristics. Niehm surveyed members of the Iowa Retail Federation to assess their degree of three-commerce readiness and their use of the Internet and computer technology in business applications and personal live. Stone, with NC-170, conducted three studies exploring consumer preferences for sun-safe shirts, substitution of engineering controls for personal protective clothing during pesticide application, and use of cotton glove liners for green house chemical applicators.

d. Impact/accomplishment

Damhorst's longitudinal data provided important information for small retailers about how to use the internet and how to develop retail strategies. Digital printing research by Campbell and Parsons provided input to the apparel industry for enhancing design through computer technology. Findings from Damhorst's Digikids online survey help businesses to design innovative mass customization sites that consumers find usable. Fiore's research assisted apparel firms in designing website experiences for mass customization. Littrell's research provided guidance for shopping center managers and retailers in better targeting potential customers as related to the tourism activities prevalent in their communities. Educational programming from Niehm's research contributed to upgrading and expanding computer usage for Iowa retailers. Messages to the public related to apparel protection for sun and

chemical application safety from Stone's NC 170 research offer the potential to reduce skin cancer and other diseases.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific; Integrated Research and Extension

Program 30: Quality of Life

d. Description

This program focused on sustaining and enhancing rural life quality by investing in community and social services and support to families. These investments must be based on scientifically valid research that responds to a variety of challenges: population aging and employment needs, changing family structure, and the devolution of social service policy making to the community level.

d. Impact/accomplishment

Long-term:

- Iowa ranks first in the nation for the percentage of working age parents with children under age six (71.4%). In 2003 there were 7,700 Iowa children ages 0-5 receiving non-registered child care at a cost of $10.6 million, and a total of 20,000 Iowa children received some form of state or federally subsidized child care assistance. Results from our four-state study of child care quality have been presented to 30 local, state, regional and national organizations, and those findings indicate that the quality of child care at infant centers and family child care homes is significantly lower in Iowa. In response to these findings, Iowa policy makers have begun a project designed to provide training and technical assistance to child care providers who care for infants and toddlers.

- As the baby boomers age, the U.S. elderly population will dramatically enlarge. Already, more than 65,000 Iowans are 85 years and older and there are over eight million elderly people residing in non-metropolitan areas. Research results about risk and resiliency among the rural elderly from Onawa and Polk County, Iowa will benefit frail, isolated elderly by providing information critical for health care agency planning, community support service providers such as meals on wheels, and nursing home administration. Faculty presentations and workshops for Extension field agents have increased their research base for developing educational programs for the elderly and their families, and to plan better community support systems in rural communities.

- A survey of transportation and employment among low-income Iowa households was conducted in North East Iowa to assess the extent to which transportation affects employment outcomes in metropolitan and non-metropolitan areas. Generalizing from survey findings, there are at least 80,000 Iowa households in non-metropolitan areas who do not have their own automobile and thus depend on other forms of transportation. Limited public transportation in rural areas was found to be problematic. Those in nonmetro (rural nonadjacent and adjacent to metro) counties are more likely to work, and

their wages are significantly higher, but transportation resources are an important predictor of employment. Policies to expand public transportation or subsidize private vehicle ownership would expand the employment of rural, low-income households. To illustrate, project researchers have provided consultation to Story County, Iowa transportation planners, which resulted in a major revision of plans, toward expanding public bus service to outlying communities in central Iowa.

d. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

1862 Extension

Goal 1: An Agricultural System that is Highly Competitive in the Global Economy.

Overview

Outputs, outcomes and impacts of extension at Iowa State University:

- 33 Refereed Publications, Research Papers, Manuscripts
- 192 Non-refereed Publications, Reports, Technical Papers
- 69 Proceedings, Published Abstracts
- 145 Extension Publications
- 212 Invited Presentations
- 1,868 Education Programs, Field Days, Tours
- 2 Books and chapters
- 5 Patent
- 57 Theses, MS/PhD Programs Completed
- 110 web pages supported
- 1,673 volunteers trained
- 13 CD Rom's developed
- 61,604 one-on-one consultations

① An effort was mounted by members of the Iowa Legislature to repeal the rule against perpetuities in Iowa. As a result of background information published by a central staff member and a briefing to the Governor's staff on the nature of the negative economic consequences from repeal of the rule, the Governor vetoed the legislation on May 30, 2003.

② Manure Nutrient Management – Manure Application Field Days: Iowa State University Extension field specialists organized several manure application field days in Northwest Iowa in cooperation with agency partners, the Natural Resource Conservation Service (NRCS) and Iowa Department of Natural Resources (IDNR). The field days demonstrated manure application equipment with side-by-side comparisons, and participants were taught spreader calibration and manure testing as management practices that are environmentally sound. Of the livestock producers who apply their own manure, 62% indicated they tested their manure and applied manure according to test results. All utilized manure as a nutrient resource and 77% used manure exclusively for crop nutrient needs. Of the livestock

producers who hire commercial applicators, one-third indicated they changed commercial applicators as a direct result of the field days, and all now hire commercial operators that either inject manure or immediately incorporate manure after application. Eighty-four percent reported they now test their manure annually. The commercial applicators reported that up to 100% of the manure they apply is injected or immediately incorporated, and several reported they have improved their calibration accuracy.

③ In response to the 2002 Farm Security and Rural Investment Act, a Commodity Programs Payment Analyzer was developed. Spreadsheet output shows exactly how many dollars of program payments each farm will receive under each signup option. By comparing the value of the best option to the default option, a concrete dollar benefit can be estimated. A random sample of farms for which individual analyses were performed showed an average benefit of $11.30 per program acre, on an average of 471 crop acres per farm, or $5,322 per farm each year. Since payments are fixed for 6 years, the longer-term benefit was $31,932 per farm. Extending this to the 1,119 farms for which ISUE specialists performed individual analyses results in an estimated total benefit of $35,732,000 in increased USDA payments for Iowa farmers and landowners.

④ Leaf spot and melting out of turfgrasses is an unsightly and costly problem. An ISU Extension Bulletin was developed on leaf spot and melting out which describes strategies that can save Iowa turfgrass managers, both professional and homeowners, from having to lose lawns to this disease. By following this brochure, statewide annual savings from not having to replant lawns is $50,000 (1,000 lawns @ $500 reseeding or resodding costs each).

⑤ Grid Marketing: Value-based marketing of fed cattle has increased dramatically in recent years. The value of cattle can differ by as much as $300 per head on the same truckload, making proper management and marketing decisions essential to producer profitability. The Iowa Beef Center program on grid marketing began in 1995 and has grown through use of meetings, publications, and software tools to educate Iowa producers. One example of the success of this program includes the Chariton Valley Beef Cooperative producers, who marketed 8,500 cattle that received $21.77 above the average market price.

⑥ Responding to producer requests for advanced training and education in the area of swine herd health, the IPIC cooperated with ISU Extension livestock field specialists and Iowa Pork Producers Association (IPPA) to offer seminars across the state. The latest in this annual series of Iowa Pork Regional Conferences focused on improving swine health, including diagnostics, prevention and treatment. Those who attended represented annual marketing of more than 2.7 million head of finishing pigs and more than 1.1 million head of feeder pigs. Ninety percent rated the program excellent or superior, and 33 percent said they estimated that their business income might increase between $2,500 and $10,000 when they apply knowledge they gained from the conference. Veterinarians who attended were eligible to receive five hours of education credit.

⑦ 25 producers installed low-cost milking parlors and increased labor efficiency while minimizing capital investment. Cost savings compared to “off the shelf” parlors is about $3,000 per stall. Most families are building swing eight or larger parlors, which would give them a cost saving of about $48,000.

⑧ *Sausage and Processed Meat Short Course*. Each year 400-450 meat processors representing 30-35 states and 20-25 international countries participate in one of Iowa State's processed meat short courses. In July 2003 Iowa State University Sausage and Processed Meat Short Course program celebrated its 25th anniversary. Since the inception of Iowa State's Processed Meat Program, more than 10,000 meat processors from across the United States and around the world have participated in one of the processed meat short courses. The meat courses have provided personnel with training in the production of quality, consistent and safe meat products. It is estimated that the Iowa State University Processed Meat Short Course Program has had a positive effect of more than 1.04 trillion pounds of processed meat products. Topics covered at the short courses include meat science, ingredients, processing food safety and microbiology.

⑨ The Iowa Master Gardener Program is an educational and volunteer service program of Iowa State University Extension and the College of Agriculture. University faculty and staff in the departments of entomology, horticulture, plant pathology, animal ecology and agronomy and Extension field specialists work with County Extension staff to provide research-based horticultural information to the citizens of Iowa through the volunteer efforts of trained Master Gardeners. This year 734 adults were trained to become Master Gardeners at 36 locations. Master Gardeners volunteered approximately 67,000 hours of service to their communities. Valuing volunteer time at the rate of $11.46 per hour means Master Gardeners performed more than $767,820 worth of service to the state.

Assessment of accomplishments as measured against the POW:

The Goal 1 impact that "Iowa producers will reduce input costs, adopt new technologies and develop value added enterprises to meet the demands of global markets" was met as shown through the individual Program impact statements.

State and Smith-Lever Funds: $ 7,460,390

FTEs: 122

Key Theme – Managing Change in Agriculture

Program 101: Strategic Advantage: Management Development for Iowa's Farm Businesses

a. Description of activity

This activity offers educational programs, information and direct assistance to farm families in business strategy and organization. In addition, professional development programs in these areas are offered to lenders, attorneys, CPA's and public officials. During FY 2003, primary activities included:

- Provided information to public officials on the consequences of proposed legislative changes to Iowa's law on perpetuities.
- Provided tools for analysis of the impacts of farm program payments on Iowa family farm sustainability

- Supported agribusiness efforts to provide outlook information to a shared client base
- Built staff capacity with regards to international agriculture through a focus on China
- Intervened by means of instruction in long term farm family partnerships
- Enhanced reach of instruction in the area of farm leasing arrangements through an on-line course, public meetings and publications.

b. Impact/accomplishment

- An effort was mounted by members of the Iowa Legislature to repeal the rule against perpetuities in Iowa. As a result of background information published by a central staff member and a briefing to the Governor's staff on the nature of the negative economic consequences from repeal of the rule, the Governor vetoed the legislation on May 30, 2003.
- Research on income dependency on government payments and the effects on financial viability, efficiency, and competitiveness has resulted in new analysis tools in use by Iowa's agricultural producers, agribusinesses, and lending communities.
- Transition of management from one generation to the next is the focus of the Ag-Link program. This year 45 families were provided with instructional intervention to help them make better long-term decisions concerning inter-generational partnerships.

f. Source of Federal Funds—Smith-Lever

f. Scope of impact—State Specific

Key Theme – Plant Production Efficiency

Program 103: Crop Nutrient Management

. Description of activity

It is essential for crop production to have nutrients readily available for plant uptake. Management of all nutrient sources, including fertilizer and manure, within the constraints of farm production systems and operational goals are prerequisite for both profitable crop production and environmental sustainability. Inappropriate management can lead to lower economic return and potential environmental degradation. Recognizing that fertilizer use is a major input cost for crop production touches on the importance of recognizing and appropriately using alternate sources of nutrients in crop production systems, such as manure. Doing so will help Iowa producers optimize systems for comprehensive farm planning and maintain long-term economic viability and environmental stewardship.

. Impact/accomplishment

- Manure Nutrient Management – Manure Application Field Days: Livestock producers and commercial manure applicators endeavor to apply manure using improved technology and management practices that fully utilizes the fertilizer value and precludes water and odor pollution. Iowa State University Extension field specialists organized three manure application field days in Northwest Iowa in cooperation with agency

partners, the Natural Resource Conservation Service (NRCS) and Iowa Department of Natural Resources (IDNR). The field days demonstrated manure application equipment with side-by-side comparisons, and participants were taught spreader calibration and manure testing as management practices that are environmentally sound. Post-attendance phone interviews were completed with a sample group of participants to learn what changes they adopted as a result of attending the field days. Of the livestock producers who apply their own manure, 62% indicated they tested their manure and applied manure according to test results. All utilized manure as a nutrient resource and 77% used manure exclusively for crop nutrient needs. Of the livestock producers who hire commercial applicators, One-third indicated they changed commercial applicators as a direct result of the field days, and all now hire commercial operators that either inject manure or immediately incorporate manure after application. Eighty-four percent reported they now test their manure annually. The commercial applicators reported that up to 100% of the manure they apply is injected or immediately incorporated, and several reported they have improved their calibration accuracy.

- Fall Versus Spring Anhydrous Ammonia (NH_3) Nitrogen Application: An Iowa State University Extension crop specialist met with the growers in SW Iowa and presented information and led discussion on nitrogen management options and practices. Several extension publications were reviewed along with ten-year pricing trends for NH_3 fertilizer and other financial issues such as prepayment options, in season pricing, and the financial carrying costs of fall NH_3. As a result, and contrary to fertilizer supplier recommendations that they fall apply as much nitrogen as possible, every grower indicated they reduced the number of corn acres that received a fall NH_3 application. Of the 9,500 corn acres that would normally receive fall applied nitrogen, only 1,050 acres had received fall-applied nitrogen, an 89% reduction. The remaining acres will receive spring applications or sidedress NH_3. This change in application practice can increase farmer profits and lead to less nitrate in water systems.

- Demonstration of the Iowa Phosphorous Index to Improve Environmental Phosphorous Management: Phosphorous (P) is an essential plant element necessary to maintain profitable crop and animal production. But excess P inputs or inappropriate management practices can increase P losses to surface water supplies. Increased livestock concentration and the associated manure, in combination with high P testing soils, is an important influence on impaired water quality in several Iowa watersheds. To mitigate water quality impairment due to P loss from agricultural fields, the Iowa P index was created. The P index is a tool that ranks and identifies areas or practices that have the greatest vulnerability to P loss with erosion, surface water runoff, or tile drainage. It is now adopted by the Iowa NRCS for farmers enrolled in certain programs and by IDNR for manure management planning. Iowa State University Extension developed the goal of organizing a team of university personnel, farmers, private crop consultants, and NRCS staff to assist in implementing the P index, to educate the farming community on its use, to collect information on adoption progress of the P index, and to evaluate implementation. Two hundred small-group work meetings and 20 field days were held to educate farmers on the P index. In addition, as part of this team effort, a project was implemented with 30 fields and farmers in six clusters across the state to document the impacts of implementing the P index. State and area Extension specialists and researchers

collected field management information, measured soil-test P levels, documented soil conservation practices, and calculated a P index rating for all fields. Initial evaluation from the team and project farmers indicates that farmers can now identify management practices that reduce the risk of P loss from crop fields. The evaluation also indicates the combination of managing P inputs and controlling soil erosion is more effective at reducing P loss in high P risk fields than either practice alone.

- Watershed focused education: In the Maquoketa watershed as an example, a Watershed Citizen Council was organized to review and monitor water quality. ISU Extension facilitated this group's watershed planning and decision making with environmental and economic models. Due to experiences with educational and demonstration projects it has been documented that producers farming about 50% of the watershed have refined their nitrogen management, resulting in increased farm profits averaging $2880 per producer. Ten demonstrations in 2002 showed that 114# N per acre was the optimum rate instead of the 140 to 150# previously considered necessary.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific and Multistate (through the Midwest Planning Service) ND, SD, KS, MO, MN, MI, WI, IL, IN, OH, NE

Key Theme – Agricultural Profitability

Program 104: Agricultural Financial Management

. Description of activity

The major focus was to respond to the 2002 Farm Security and Rural Investment Act (FSRIA). One title of the act authorized two new types of commodity payments for an expanded list of program commodities, including essentially all the grain crops grown in Iowa. Producers and landowners had until April 1, 2003, to sign up for the new Direct and Counter-Cyclical Program (DCP) at their county Farm Service Agency (FSA) offices. The signup process required them to choose from among five options related to how base acres and program yields for their individual farms would be calculated, which directly affected the level of payments to be received for the 2002 through 2007 crop years. The procedures for calculating the potential payments under each option were complex and unintuitive. In addition, farmers were required to submit production information on each farm and crop for the years 1998 through 2001. Many tenants and cash rent landowners did not possess complete information.

Education about FSRIA and in particular the DCP title was carried out through a variety of activities:

- A four-page publication explaining the DCP provisions was developed. Approximately 5,000 copies were distributed, and 12,212 copies were downloaded from two Extension web sites. Three additional publications describing the Conservation Security Program, Environmental Quality Incentives Program, and the Dairy Market Loss Assistance Program were developed and disseminated.

- A Commodity Payment Program Analyzer electronic spreadsheet was developed to help Iowa operators and landowners analyze program alternatives for their own farms. It was downloaded 29,520 times from two Extension web sites.
- At least 193 informational meetings were held, with a recorded attendance of 14,917.
- At least 1,119 individual consultations were performed, using the Commodity Programs Payment Analyzer spreadsheet to determine the most profitable option for each farm.
- Over 100 radio interviews and print media columns and articles were disseminated.
- Extension personnel answered thousands of questions via e-mail and telephone contacts.

Other organizations involved in this educational effort included the Farm Service Agency, the Iowa Farm Bureau Federation, many local credit institutions, and all the major agricultural mass media outlets.

. Impact/accomplishment

The Commodity Programs Payment Analyzer spreadsheet output shows exactly how many dollars of program payments each farm will receive under each signup option. By comparing the value of the best option to the default option, a concrete dollar benefit can be estimated. A random sample of farms for which individual analyses were performed showed an average benefit of $11.30 per program acre, on an average of 471 crop acres per farm, or $5,322 per farm each year. Since payments are fixed for six years, the longer-term benefit was $31,932 per farm. Extending this to the 1,119 farms for which ISUE specialists performed individual analyses results in an estimated total benefit of $35,732,000 in increased USDA payments for Iowa farmers and landowners.

Farmers and landowners who performed their own analysis after attending an informational meeting or downloading Extension information materials likely realized similar benefits. This would increase the total benefits roughly tenfold. Overall, 95.6 percent of the 159,775 Iowa farms that were eligible for program benefits completed signup by April 1, 2003.

. Source of Federal Funds—Smith-Lever

. Scope of Impact—State Specific

Program 106: Commercial Greens Industry

e. Description of activity

The production, marketing, installation, and maintenance of horticultural and forestry crops create many jobs for Iowans. Forestry and commercial horticultural enterprises in Iowa include, timber, fruit, nut, herb, flower, and vegetable producers, lawn care companies, golf courses, school and professional sport athletic fields, corporate grounds care, turf grass sod producers, production wholesale nurseries, landscape design and installation firms, retail garden centers, landscape maintenance companies, arborists, greenhouse crop producers, retail florists, and Christmas tree growers. Other important clients include public utilities, and city, county, and state public lands and private woodland owners. Program 106 has focused on three important issues for performance goals: (1) increasing the quality and percentage of

marketable crop per acre and increasing profitability of businesses without harming the environment; (2) improving and enhancing the quality of life for all Iowans through the use of horticultural and forestry crops; and (3) insuring the safety of commercial horticulture workers and all users of the cultivated and managed landscapes they design, build, and maintain.

The Commercial Greens Industry group is a multi-disciplinary amalgamation of scientists and Extension professionals dedicated to solving problems faced by producers and end users of horticultural and forestry crops and services. Departments committed to helping Iowa's citizens use horticultural crops to enhance their quality of life include: Entomology, Natural Resource Ecology and Management, Horticulture and Plant Pathology.

e. Impact/accomplishment

- *Performance Goal 1.* (see www.ag.iastate.edu/iaexp/POW-revised.html#106 for goals)

    - Iowa State University Forestry field days have had a long successful tradition of nearly 20 years of helping woodland managers. Every two years since 1985 there has been a follow-up survey from the previous two years. Highlights from the 265 returned surveys from 2001 and 2002 field days include: 43% of respondents had 1-50 acres of woodlands, 49% had 51-250 acres, and 8% had over 250 acres; 75% of respondents implemented specific management changes; 27% estimated less than $250 in benefits received from the program, 34% estimated between $250-$,1000, 19% estimated between $1,000-$5,000, and 15% estimated over $5,000 in benefits (there was 5% no response).

    - Leaf spot and melting out of turf grasses is an unsightly and costly problem. An ISU Extension Bulletin was developed on leaf spot and melting out which describes strategies that can save Iowa turf grass managers, both professional and homeowners, from having to lose lawns to this disease. By following this brochure, statewide annual savings from not having to replant lawns is $50,000 (1,000 lawns @ $500 reseeding or resodding costs each).

- *Performance Goal 2.*

    - The Iowa Community Tree Steward and Perennial By Design Programs. The aesthetic, environmental, and functional benefits that come from using trees in urban and rural landscapes are well documented, but municipalities and individual homeowners alike frequently run into difficulties when selecting and planting trees, and maintaining this valuable community resource. There are currently 527 graduates of the Iowa Community Tree Steward Program that have turned in 15,106 hours of volunteer service. This small army of trained volunteers has worked with their local communities to implement Iowa's urban and community forest program. Eighty-four percent of respondents attending the Perennial By Design programs implemented some of the recommendations.

- *Performance Goal 3.*

- An Athletic Field Traffic Survey was developed and implemented by the turf program at ISU. Guide lines for the activity limits on a playing field were developed so that field management and user expectations could be coordinated to improve athletic field safety. Since 2002, 82 sports turf facilities have adopted the practice of event monitoring and scheduling based on traffic activity. This has impacted 410 athletic fields, 26,650 events, and 586,300 athletes. City planners have also used the survey to project the number of playing fields that need to be built to support local population growth.

- Pesticide Applicator Recertification Training. Many of the same professionals that provide the extension outputs in the Commercial Greens Industry provide content and deliver programming for pesticide recertification classes. Approximately 4,000 Iowans received this recertification training in the Commercial Greens Area (this is a subtotal from Program 143:Pesticide Applicator Training).

. Source of funding: Smith-Lever

. Scope of impact: State specific and Integrated Research Extension

Key Theme – Animal Production Efficiency

Program 107: Iowa Beef Center

b. Description of activity

The Iowa Beef Center is a central contact point for "all things beef" at Iowa State University. Its mission is to enhance the vitality, profitability, and growth of the Iowa beef industry through timely and relevant producer education, applied research, and improved access to information. A core group of campus and field extension specialists and applied researchers from five departments in two colleges work together to deliver statewide conferences, published materials, local meetings, one-on-one consultations and a dynamic user-friendly website. Fundamental program areas were developed with significant input from producers, regulators, USDA agencies, and extension staff. In addition to a formal advisory board that meets annually, the Iowa Beef Center conducts producer listening sessions at several locations across Iowa to identify the priority areas that direct our program.

b. Impact/accomplishment

- Educational Programs for Cow/Calf Producers. The Iowa Beef Center program to Cow/Calf producers builds on research-based information to develop publications, educational meetings, and management support tools. For example, the Cyclone Beef Days program, a continuing education series, included targeted education for forage and grazing resources, weaning decisions, and calving time management. Specific examples of the cow/calf program include:

  - Calving Time Management: Proper preparation, cow genetics and nutrition, and herd health management are keys to delivering a healthy live calf. Twelve Calving Time Management Schools were held throughout the state to educate novice as well as

experienced cattle producers in proper herd management and techniques in the calving barn. Evaluations of one such program, for less-experienced producers, showed that nearly half learned five or more new concepts, 82% planned to implement change in their operation, and expect a savings of $813 per year.

- Cornbelt Cow/Calf Conference: The Cornbelt Cow/Calf Conference has been held annually over the past 30 years to present timely and relevant industry trends, technology, and services. Participants at this widely-attended conference indicated that changes made due to these conferences has resulted in increased returns (8-13%), production efficiency (~11%), and decreased labor inputs (16-19%).

- Educational Programs for Feedlots: The Iowa Beef Center program for feedlots emphasizes proper use of management and marketing systems to improve producer efficiency and profitability in an environmentally-sound manner. These programs focus on nutritional management of corn co-products, grid marketing, and performance benchmarking. In addition to disseminating research results, this program works closely with producer groups in on-farm research and education programs.

  - Grid Marketing: Value-based marketing of fed cattle has increased dramatically in recent years. The value of cattle can differ by as much as $300 per head on the same truckload, making proper management and marketing decisions essential to producer profitability. The Iowa Beef Center program on grid marketing began in 1995 and has grown through use of meetings, publications, and software tools to educate Iowa producers. One example of the success of this program includes the Chariton Valley Beef Cooperative producers, who marketed 8500 cattle that received $21.77 above the average market price.

- Preparing for COOL: The 2002 Farm Bill included Country-of-Origin Labeling (COOL) legislation and mandatory implementation by September 30, 2004. The Iowa Beef Center led the development of practical, low- or no-cost guidelines that meet USDA approval to help livestock producers become COOL compliant. A joint meeting for beef and pork producers was delivered by the ICN to 150 producers and 45 industry affiliates. As a result, knowledge level of participants increased from 2.75 to 3.85 on a five-point scale, and producers felt they better understood how their operation may be impacted when the COOL rules are finalized and implemented.

b. Source of Funding: Smith-Lever

b. Scope of Impact: State Specific, Integrated Research and Extension

Program 108: Iowa Pork Industry Center

. Description of activity

The Iowa Pork Industry Center (IPIC) is a coordinated effort across the colleges of Agriculture and Veterinary Medicine, and focuses on programs that are integral and complementary to work by Iowa State University (ISU) Extension and the Iowa Agriculture

and Home Economics Experiment Station. Extensive use of traditional as well as emerging technologies from private and public partners enhances the organization and delivery of these programs and improves access to all Iowans.

The IPIC works closely with faculty having responsibilities for teaching, research, and extension in the departments of Agricultural and Biosystems Engineering, Animal Science, and Economics within the ISU colleges of Agriculture and Veterinary Medicine. Nearly thirty extension field specialists in swine and other livestock, farm management, and agricultural engineering areas, as well as 100 county extension education directors (CEEDs), work with the IPIC to provide program delivery.

The Iowa Pork Industry Center sponsors educational programs designed to assist all segments of the pork industry. The IPIC demonstrated its commitment to providing timely, accurate and unbiased information to producers through several avenues including producer meetings, research projects and Internet resources.

For example, the IPIC held Iowa Communications Network (ICN) and satellite programs on these topics: Iowa master matrix and associated manure matters, surviving the hog market price crunch, and the federally mandated Country of Origin Labeling (COOL) program.

A five-site series of advanced swine health was held in cooperation with Iowa Pork Producers Association (IPPA.) Nearly 300 people attended, and based on the positive response (90 percent of respondents rated the program superior or excellent), similar series are planned for the future. Area programs led by ISU Extension field specialists focused on the use of Paylean(tm) and antibiotics in swine diets, animal handling, feeding ethanol co-products to livestock, advanced breeding herd management, finishing facility technology, and current odor research.

In cooperation with ISU Extension field specialists, the IPIC has aided in development and/or funding of several demonstration and applied research projects designed to help answer producer questions about costs and benefits of various technologies and to provide information on the financial impacts. Projects include comparison of barley and corn as energy sources in swine diets, study of residual effects of swine manure one-year and two-years post application, using swine manure in forage production, and impact of diet modification on odor production.

. Impact/accomplishment

- USDA official William Sessions was a featured speaker at the June 2003 satellite program coordinated by IPIC about COOL. IPIC presented the program because Iowa was not selected to host a USDA listening session on COOL and because other ISU speakers John Lawrence and James McKean were involved in creating the proposed “Iowa plan” for compliance with the program requirements. More than 70 Iowa county extension offices and at least one Ohio State University office planned to host the event, and close to 200 people registered at the sites. Additional inquiries about the program content and speaker Sessions were received from Iowa Public Television (prior to the program) and Kansas senator Tim Huelskamp (following the program.) Just five percent

of attendees said they were very familiar with COOL before the program, compared with 20 percent who said that following the program they understood their responsibilities and options very well. Attendees included livestock producers, private business people, commodity group representatives and veterinarians.

- Responded to producer requests for advanced training and education in the area of swine herd health, the IPIC cooperated with ISU Extension livestock field specialists and Iowa Pork Producers Association (IPPA) to offer five seminars across the state. The latest in this annual series of Iowa Pork Regional Conferences drew nearly 300 people to these five locations in February 2003, and focused on improving swine health, including diagnostics, prevention and treatment. Those who attended represented annual marketing of more than 2.7 million head of finishing pigs and more than 1.1 million head of feeder pigs. Ninety percent rated the program excellent or superior, and 33 percent said they estimated that their business income might increase between $2,500 and $10,000 when they apply knowledge they gained from the conference. Veterinarians who attended were eligible to receive five hours of education credit.

. Source of Federal Funding: Smith-Lever

. Scope of Impact: State Specific and Multistate (through the Pork Industry Handbook) ND, SD, NE, MN, MO, WI, MI, IL, IN, OH, and Integrated Research and Extension

Program 109: Strengthening Iowa's Dairy Industry

a. Description of activity

- Issue 1. Human resource management: A five-session dairy personnel management course was developed and offered to producers in NW Iowa. Topics covered included leadership, communication, running effective meetings, understanding and dealing with controversy, understanding personalities, and workforce organization and development. Five multiple family farms were assisted in developing professional support teams. Farms have improved calf performance post-calving, developed a Dairy Leadership course, dramatically improved forage harvesting, storage and feed out and improved accounting and budgets for the farm.

- Issue 2. Risk management: A program on strategies for dairy marketing was developed and presented to 75 agricultural lenders.

- Issue 3. Business planning and arrangements: A Managing Dairy Farm Finances program was initiated in 2003 with over 300 Dairy Day participants increasing their understanding of dairy farm financial analysis and benchmarking using the Dairy TRANS 4.0 program developed by the ISU Extension Dairy Team. In 2003, 24 dairy producers used the program in Iowa to determine their cost of milk production, financial benchmarks, and analyze their dairy farm business. In addition, a Beginning Dairy Producer Model utilizing 5 very profitable dairy grazing farms in the Upper Midwest was developed and presented to 110 clients. These data were utilized in the School for Beginning and Transitioning Dairy Producers.

- Issue 4. Improving production practices: Eleven county based Dairy Days were conducted. Two Four-State (IA, IL, MN, WI) programs, one covering feeding and management practices to maximize profitability (380 clients) and the other dealing with forages, cow health, and longevity (207 clients), were held this past year. An upper mid-west grazing conference was attended by 120 individuals from seven states and two foreign countries.

  A series of 19 low-cost parlors tour were conducted for 732 producers in NE Iowa in an attempt to illustrate ways to increase labor efficiency associated with milking cows, reduce the capital investment required for the milking system, and improve the ergonomics of milking, thereby improving profitability and quality of life. Thirty-one producers have worked with ISUE Field Specialists to install a low cost parlor in their operation.

  ISUE has cooperated with the North East Iowa Dairy Foundation to develop and train technicians for a relief milker service. Four training session involving 23 technicians were held.

  Pasture walks gave 219 producers and agricultural advisors hands-on experience with Managed Intensive Rotational Grazing. Individual topic workshops were held on milker training, dairy nutrition, managing the transition cow, udder health, and livestock biosecurity.

  ISUE dairy specialists, along with ISU students who wanted applied dairy experience, worked closely with 15 dairy producers to evaluate the strengths and weaknesses of their operation and to identify opportunities to improve productivity and profitability. The herd owners increased their milk sales an average of $14,856 and 13 of the 15 herds lowered feed costs by an average of $0.13/cow/day. Thus cost savings averaged $4,763 per herd, resulting in average increased profits in excess of $19,600 per herd.

- Issue 5. Environmental quality (also being handled by Program 103). Thirty dairy producers attended one-on-one sessions to develop manure management plans and 36 other attended seven workshops held in NE Iowa.

- Issue 6. Food safety and quality: Improving milk quality was the focus of three modern dairy milking procedures programs in NW Iowa, and 48 one-on-one farm consultations. One 200-cow herd reduced SCC from 2,800,000 to 200,000 via targeted problem identification, building a milk quality management team, and implementation of control strategies. These changes resulted in > $180,000 in increased milk quality premiums and decreased treatment costs.

a. Impact/accomplishment

- Seven dairy producers increased profits in excess of $23,500 per herd in a six-month period by implementing ISUE suggested rations and related recommendations

- Bilingual on-farm milker training programs on five farms reached 64 employees and resulted in average SCC reductions of 150,000, increased milk quality bonuses from $.25 to $.70/cwt. of milk sold, which translates to increased monthly income of $5,250 to $14,700 for 1,000 cow dairies.

- 25 producers installed low-cost milking parlors and increased labor efficiency while minimizing capital investment. Cost savings compared to "off the shelf" parlors is about $3000 per stall. Most families are building swing 8 or larger parlors, which would give them a cost saving of about $48,000.

- The image of dairying and the per capita consumption of dairy products plus the impact of this industry on family and community are being told in "Iowa's Dairy Story". Extension Field, County and State staff developed a 3rd, 4th, and 5th grade curriculum and field day visit at the NE Iowa Foundation Dairy Center to have students see, smell, taste, and learn about dairy. By participating in several learning stations and based on the classroom curriculum, 901 children from 19 schools are much more knowledgeable about the dairy farm and the impact of dairy products on human nutrition and health. From its inception (February 2002) over 2100 children have participated in the Iowa Dairy Story.

- Dairy women's peer group discussions resulted in two projects being developed. The Iowa Dairy Story was told at dairy booths at two county fairs and a non-profit organization was dedicated to setting up school milk vending machines and enhancing in-school nutrition programs in 9 North West Iowa schools. In addition, two other schools have utilized the peer group's information to start milk vending machines on their own and five5 schools are on the waiting list for the program when funds are available.

e. Source of Federal Funds—Smith-Lever

e. Scope of Impact—State Specific

Key Theme – Adding Value to New and Old Agricultural Products

Program 121: Value-Added Agriculture

. Description of activity

Value Added Agricultural programming at Iowa State University focused on working with producer groups and individual entrepreneurs to build long-term economic, environmental and socially sustainable capacities. Emphasis this year has been with on working with existing value added ag groups, development of value chains, and development of quality systems to ensure accountability and safety in the food system.

Additional programming has included:

- Capacity building and training for producer value added ag groups. An in-depth workshop with follow-up mentoring was held to assist producers in locating sources of capital, such as venture capital funding, grants, and bridge capital, etc.

- Through consultation on feasibility, marketing and business plans, ISU staff worked with groups starting a value added ag business. Extension conducted five in-depth feasibility studies for farmers this year starting value added ag businesses. They included a beef processing facility, two wine cooperatives, a soy-based enterprise and a composting facility.

- Development of niche value markets for producers. Working with nine pork marketing groups, ISU Extension has begun to assist the producers in determining the highest market for their products.

- A major emphasis this year has been working with existing value added ag groups, development of value chains, and development of quality systems on farms to ensure accountability and safety in the food system. The ISO certification system has been piloted in a project the last two years. This year more than 15 farmers were assisted by ISU staff and received ISO certification.

. Impact/accomplishment

- *Ethanol Industry in Iowa*. Since 1997, Iowa State University Extension (ISUE) has been a key provider of information and education to farmer owned cooperatives starting ethanol production plants in Iowa. Demand for information by farmer groups lead to the formation of an informal group of organizations to respond to that demand. The group included Iowa State University Value Added Agriculture Programs, Iowa Department of Agriculture and Land Stewardship, United States Department of Agriculture, Iowa Corn Promotion Board, Iowa Farm Bureau Federation, and the Iowa Department of Economic Development. In 2000, the group published a 200 plus-page manual to answer many of the questions associated with starting a new ethanol business. The manual was made available on the world-wide-web at www.iowaagopportunity.org/ethanolmanual/sponsor.html. Additionally, producers can access an interactive decision making tool, to determine via a pre-feasibility model if their input costs, location or corn basis would allow for profitable ethanol production. The model aids in understanding how these economic factors operate in a successful and less-than successful combinations before producers proceed with an in-depth analysis of an ethanol business. This model has been downloaded more than 1,000 times. The Web site is <www.agmrc.org/energy/eth.html>. ISUE co-sponsored meetings to provide information on ethanol, co-product marketing, and nutritional value of distiller's grain for livestock, legal issues, plant design, financing and business management. More than 800 people from around the Midwest have attended these meetings. ISUE Value Added Agriculture Programs reviewed the business plans of five ethanol cooperatives applying for USDA Rural Development Loan Guarantees. There are 12 farmer-owned ethanol facilities in production, under construction or planned as of November 2003. The total production will be 411 million gallons of ethanol, 1.72 million tons of distiller's dried grains and will utilize152 million bushels of Iowa corn. The economic impact to the state is significant. The cost to construct the 12 plants will reach $500 million dollars. Corn utilization by the industry will provide a seven-cent per bushel increase in value to all Iowa corn farmers valued at $156 million dollars. There will be 403 jobs and $14.8 million dollar of annual payroll from the 12 plants. The direct

and indirect job creation will total 1,500 valued at $49.3 million dollars to the Iowa economy and $3.05 million dollars of state general fund revenues.

- *Sausage and Processed Meat Short Course*. Each year 400-450 meat processors representing 30-35 states and 20-25 international countries participate in one of Iowa State's processed meat short courses. In July 2003, Iowa State University Sausage and Processed Meat Short Course program celebrated its 25th anniversary. Since the inception of Iowa State's Processed Meat Program, more than 10,000 meat processors from across the United States and around the world have participated in one of the processed meat short courses. The meat courses have provided personnel with training in the production of quality, consistent and safe meat products. It is estimated that the Iowa State University Processed Meat Short Course Program has had a positive effect of more than 1.04 trillion pounds of processed meat products. Topics covered at the short courses include meat science, ingredients, processing food safety and microbiology.

- *Leadership Issues for a Successful Producer Supply Networks*. A series of three meetings specifically aimed at up-start producer groups that were trying to enter the value added arena were held. These groups were not only new to value added but were also new to working so closely together as a group. It is difficult for many farmers known for their independence to function as a group. The three sessions were aimed at developing the skills that would be needed by group from both the internal workings and the external interactions. The impact of the training on the people involved has been significant. It has helped the groups in which the participants are involved, move forward in the organization of their groups and start implementing some of the training received. These groups continue to mature and have frequently returned to Extension for advice. Other organizations in the state have heard about the training and expressed interest in using all or parts of the program. Participant interaction with speakers was excellent with many participants following up with questions after the program. One of the groups is moving down the road to becoming a marketing business. They are talking with end users about designing a supply chain to service the food industry. Present conversations could involve a million acres of crops.

- *Food Safety Training*.

    - In June 2003, 23 ConAgra Foods employees successfully completed the two-year Iowa State University/ConAgra Foods Meat and Poultry Training Program and were designated as ConAgra Foods Black Belt Processing Specialists. The two-year training program consisted of five short courses held at the Iowa State University Meat Laboratory, 11 Internet modules and a plant project. Each year employees of ConAgra Refrigerated Prepared Foods transform more than a billion dollars worth of raw materials into processed meat products. The Black Belt Training Program positively influences the production of these products.

    - Iowa State University Extension worked to develop a food safety training program for plant employees of Mount Pleasant Foods, Mount Pleasant, Iowa. Mount Pleasant Foods is a major producer of pre-cooked sliced turkey providing product to more than 6,000 restaurants. As a result of this training the safety of their products has been

improved. To-date, 12 training programs have been held with a total of approximately 300 Mount Pleasant employees being trained.

. Source of Federal Funds—Smith-Lever

. Scope of Impact—State Specific

Key Theme – Home Lawn and Gardening

Program 146: Consumer Horticulture

h. Description of activity

According to recent surveys, gardening ranks as the most popular outdoor leisure activity. The Iowa State University (ISU) Extension Consumer Horticulture and Forestry programs provide research-based education and information about plants and their care in the home lawn, landscape, garden and woodland. As a result, horticulture consumers are better able to make wise decisions in plant selection and maintenance and pest management.

h. Impact/accomplishment

- The Iowa Master Gardener Program and the Calhoun County Extension Office have been training Master Gardener volunteers at the North Central Correctional Facility in Rockwell City since spring 1998. Since that time, 89 inmates and 64 county residents have been involved with the program. A modified program was offered in the summer of 2003 using videotapes, live presentations, laboratory activities and field demonstrations (in lieu of live telecast lectures used in the traditional fall and spring semester programs). Ten inmates were trained along with five participants from the general public. Master Gardener training contributes to a more knowledgeable workforce in the prison gardens and greenhouse. As a result, inmates and staff raised more than 299,000 pounds of fresh produce in 2003 to feed the 500-plus inmates within the facility.

- The Iowa Master Gardener Program is an educational and volunteer service program of Iowa State University Extension and the College of Agriculture. University faculty and staff in the Departments of Entomology, Horticulture, Plant Pathology, Animal Ecology and Agronomy and Extension field specialists, work with County Extension staff to provide research-based horticultural information to the citizens of Iowa through the volunteer efforts of trained Master Gardeners. This year, 734 adults were trained to become Master Gardeners at 36 locations. Master Gardeners volunteered approximately 67,000 hours of service to their communities. Valuing volunteer time at the rate of $11.46 per hour means Master Gardeners performed more than $767,820 worth of service to the state.

- The Junior Master Gardener program was presented in Franklin County to provide in-depth learning experiences for youth in horticulture. Students in Grades 4-12 enrolled and met once a month to study curriculum classes, and participate in garden tours in an intergenerational setting. Completed projects included propagating houseplants, planting container gardens and terrariums, making stepping stones, and planting and caring for

home vegetable and flower gardens. For their community service project the group planted and cared for a butterfly garden and flower containers at the local care facility.

- O'Brien County Extension in cooperation with city parks departments used Lawn Demonstration Field Days in multiple locations to educate urban homeowners on proper lawn fertilization and how fertilizer impacts water quality. The public viewed displays and research plots located at a baseball and soccer complex, a town square band shell and a regional amusement park. Surveyed participants reported saving an average of $14 in fertilizer costs per lawn because of the information provided. Further, one city parks department has switched to organic fertilizer, and another has begun using soil testing to determine turf fertilizer needs.

h. Source of Federal Funds—Smith-Lever

h. Scope of Impact—State Specific

Goal 2: A Safe and Secure Food and Fiber System

Overview

Iowa's Extension Plan of Work, "330 - Nutrition: Choices for Health," speaks to the federal goal 2. Food safety education to Iowa's 99 counties is provided by Nutrition and Health field specialists and paraprofessionals in the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) with support from a campus team of food safety educators. The field and campus specialists partnered with a variety of agencies at the state and local levels including; Iowa Food Safety Task Force, Iowa Food Security Task Force, Iowa Hospitality Association, Iowa Department of Inspections and Appeals, and local health departments. A variety of food safety workshops were conducted throughout the state by campus and field specialists. Campus specialists also participated with the Iowa Food Security Task Force to plan Iowa Food Security Response Plan and develop a statewide conference on food security. Field and campus specialists use resources developed by USDA, the Partnership for Food Safety Education's such FightBac® materials, and food safety web-sites, including the ISUE Food Safety Project web-site (www.extension.iastate.edu/foodsafety/), FDA-CFSAN sites, Foodsafety.gov, and others. Resources in biotechnology, irradiation, and Hazard Analysis Critical Control Points (HACCP), are provided at the Iowa State University Extension Food Safety web site (www.extension.iastate.edu/foodsafety) maintained by a campus specialist to support food safety. Food safety rules and regulations specifically for Iowa have been developed with the State of Iowa and Iowa State University and posted at a web-site used by the Iowa food safety educators (www.extension.iastate.edu/hrim/publications.htm).

a. Output/Impact

- 50,262 individuals participated in nutrition education, including youth and adults.
- 80 food safety programs were done for 10,981 consumers including youth and adults.
- 529 volunteers were trained in food safety.
- 3,497 individuals received food safety education through individual consultations.

- Campus and field specialists promoted hand-washing awareness with the USDA Food Safety Mobile and interacted with 9,000 individuals over four days at the Iowa State Fair. Campus and field specialists also promoted hand-washing awareness and interacted with 6,000 individuals at the Boone Farm and Field Days and the Clay County Fair.
- Thirty-nine food safety programs were held including hand-washing demonstrations and food safety during the RAGBRAI intra-state cycling trek for 1981 participants.
- 478 participants in ServSafe training programs sponsored or co-sponsored by Extension.
- Seven HACCP training programs for school foodservice managers were done with 84 participants in 38 school districts.
- 213 school foodservice managers and lead employees of child nutrition programs attended Extension sponsored short courses. Managers report they are responsible for over 120,000 daily school foodservice meals.
- 3,239 adults and 16,506 youth in either small group settings, schools or individually in the home were reached through EFNEP or FNP.
- 3 food safety websites were supported and updated daily/weekly:
  - Food Safety Project www.extension.iastate.edu/foodsafety/
  - Iowa HACCP www.iowahaccp.iastate.edu
  - Consortium Food Safety www.foodsafety.iastate.edu

b./c. Outcomes

① Of 599 respondents (56% response rate) in face-to-face nutrition education programs, 62% reported actually adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products.

② Ninety-eight percent of the food safety program participants (n = 185, 56% response rate) reported adopting one or more of the recommended food handling practices.

③ Two thousand five hundred and seventy-two teachers downloaded the on-line lesson plans to facilitate the use of the web-based food safety lessons, "Safe Food…It's Your Job Too!" in their classrooms.

④ Of the 487 ServSafe® participants, 438 (90%) successfully passed the certification test.

⑤ One thousand five hundred and seven (80%) graduates of the EFNEP and FNP programs demonstrated acceptable practices in food safety at graduation from the program, as compared to only 1011 (50%) at enrollment.

⑥ 62 percent (2,008) of EFNEP/FNP program graduates showed improvement in one or more food safety practices (i.e., thawing and storing foods properly).

⑦ 25 percent of 2,152 youth from 89 groups improved practices in food preparation and safety.

d. State's Assessment of Accomplishments – Original performance goals were exceeded.

e. Total expenditures by source of funding – State and Federal funds, $1,600,610.

SYs – 20.37.

Key Theme – Food Accessibility and Affordability

a. Researchers at Iowa State University (ISU) with the assistance of local Extension staff and community partners, and funding through Iowa Department of Public Health and the Iowa Nutrition Network conducted two research studies to benchmark community and household food security and food deserts in four selected counties in Iowa. The two studies: The Iowa Food Security Report Card Project and Iowa Community Food Assessment. Findings from the Iowa Food Security Report Card Project were presented through a panel presentation and workshop, "Creating a Local Community Food Security Profile", at the second annual National Workshop for State and Local Food Policy Councils. In addition, a video titled, "Food for All? Status on Hunger in Iowa", was developed by a partnership between ISU, IDPH and the Iowa Nutrition Network to increase awareness and understanding of individual, community and societal issues surrounding food insecurity and hunger and possible action steps for individuals and communities. The video was shown prior to the panel presentation at the national conference, as well as has been distributed to ten individuals and organizations in Iowa. A Web site was developed to assist communities in identifying individual and community factors that affect food insecurity and hunger, create profiles of their communities, and find resources and internet sites related to food security, local food systems, and interventions that mitigate, mediate, or reduce food insecurity and hunger. One community has written a grant to do further community and household food security assessment in their community, and another community is in the process of exploring possible options for further study and intervention. Additionally, two poverty simulations, coupled with sharing of the research findings related to food insecurity and hunger in Iowa were held in two communities reaching 100 people.

   In the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), 57 paraprofessionals delivered nutrition education to 3,239 adults and 16,506 youth in either small group settings, schools or individually in the home.

b. Impact/accomplishment

   - 300 participants in programs which addressed food security issues
   - 40 members of food policy councils trained
   - Four hundred ninety (27%) graduates of the EFNEP/FNP program demonstrated acceptable practices in all three categories of behaviors taught (nutrition, food safety, and food resource management at graduation from the program, as compared to only 81 (4%) at enrollment.
   - 78 percent (2525 participants) of EFNEP/FNP graduates showed improvement in one or more food resource management practices (i.e., planning meals, comparing prices, using grocery lists, or not running out of food.
   - 296 (9%) of program families in enrolled in one or more food assistance programs as a result of EFNEP/FNP assistance or recommendation.

c. Source of Federal Funds – Smith-Lever 3b and c; Food Stamp Nutrition Education matching funds

d. Scope of Impact – State Specific

Key Theme – Food Safety

a. Extension Families this past year worked with 10,981 food safety program participants including youth and adults with more than 165,000 education contact hours. Five hundred twenty-nine citizens served as volunteers in Extension food safety programming. Extension field and campus specialists partnered education programs with the Iowa Department of Inspections and Appeals, the Iowa Hospitality Association, the Iowa Bureau of Food and Nutrition, local schools, hospitals, community organizations, the Food Safety Consortium (Iowa, Kansas, Arkansas), WIC, food stamps, Head Start, Promise Jobs, and empowerment boards. Field and campus specialists used resources developed by USDA, the Partnership for Food Safety Education's such FightBac® materials, and food safety web-sites. Biotechnology, irradiation, foodborne pathogen information and HACCP resources are provided at the Extension Food Safety web site (www.extension.iastate.edu/foodsafety/) and are maintained by the campus specialists who support food safety. Food safety rules and regulations specifically for Iowa have been developed with the State of Iowa and Iowa State University and posted by the Iowa food safety educators at www.extension.iastate.edu/hrim/publications/. More than 394,000 visitors had 1.2 million page views of content on the ISU Food Safety Web-site home page or one of its links to total 7 million hits last year**.** Over 35,000 consumers have accessed and completed one of the four interactive food safety lessons in 2002-2003.

b. Impact/accomplishment

- Eighty food safety programs were done for 10,981 consumers including youth and adults.
  - Thirty ServSafe® food safety training programs with 478 participants. Ninety percent of participants received a passing score and were certified.
  - Campus and field specialists promoted hand-washing awareness with the USDA Food Safety Mobile and interacted with 9,000 individuals over four days at the Iowa State Fair.
  - Campus and field specialists promoted hand-washing awareness and interacted with 6,000 individuals at the Boone Farm and Field Days and the Clay County Fair.
  - Thirty-nine food safety programs including hand-washing demonstrations and food safety during the RAGBRAI intra-state cycling trek were held for 1981 participants.
  - Seven HACCP programs for school foodservice operations were done with 84 participants.

- Three food safety web-sites were supported and updated daily/weekly*:
  - Food Safety Project www.extension.iastate.edu/foodsafety/
  - Iowa HACCP www.iowahaccp.iastate.edu
  - Consortium Food Safety www.foodsafety.iastate.edu

  * The ISUE Food Safety web sites had 394,786 visitors who had 1,228,038 page views through the ISUE Food Safety Web-site; 7,060,930 hits were recorded last year.

- Two thousand five hundred and seventy-two teachers and trainers downloaded the lesson plans "Safe Food…It's Your Job Too!", an on-line food safety education program to facilitate the use in their classes and courses.

- 62 percent (2008) of EFNEP/FNP program graduates showed improvement in one or more food safety practices (i.e., thawing and storing foods properly).

- 25 percent of 2152 youth from 89 groups improved practices in food preparation and safety.

a. Source of Federal Funds – Smith Lever 3b and c

- Extension was awarded $70,000 in federal funds for food safety work and is participating in another $500,000 project on irradiated foods.

d. Scope of Impact – state specific. However, ISUE partnered with USDA, USDA/FDA National Agricultural Library, the FDA Center for Food Safety and Applied Nutrition (CFSAN), 7 universities, 12 different state health departments, 28 city and county health departments, and others to design and maintain web-based food safety resources including the "Ask a Food Safety Expert" web site.

Goal 3: A Healthy Well-Nourished Population

Overview

Iowa's Extension Plan of Work, "300-Nutrition Choices for Health," speaks to federal goal 3. Nutrition education to Iowa's 99 counties is provided by Nutrition and Health field specialists and paraprofessionals in the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) with support from campus nutrition staff. The field and campus specialists partner with a variety of agencies at the state and local levels. Key collaborations formed include: Iowa Nutrition Network, Iowa Department of Public Health, Iowa Department of Education, Iowa WIC Program, Iowa Department of Human Services, Head Start, University of Iowa, local substance abuse programs, local food pantries, Leopold Center for Sustainable Agriculture, commodity groups, local empowerment boards, Team Nutrition schools, and the Iowa Hospitality Association.

a. Output/Impact

- 50,262 individuals participated in nutrition education, including youth and adults
- 12,000 Iowans participated in 'Lighten Up Iowa'
- 279 individuals representing 146 schools participated in regional Team Nutrition workshops
- 230 school teachers, nurses, administrators, registered dietitians and local community advocates attended the Action for Healthy Kids: Eat Smart, Play Hard state summit
- 3239 families and 16,506 youth participated in EFNEP or FNP during FY03
- 844 volunteers contributed 2.5 FTE time to assist with teaching, educational service roles and support service roles in EFNEP.

b./c. Outcomes

① Of 599 respondents (n = 1061, response rate 56%) in face to face nutrition education programs who were surveyed, 62% reported actually adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products.

② Of teams reporting weight loss (n = 749, response rate 69%) a total of 47,000 pounds were lost by Lighten Up Iowa participants; of teams reporting physical activity (n = 746, response rate 74%) a total of 2.5 million miles of accumulated physical activity were recorded by Lighten Up Iowa participants.

③ Of the Team Nutrition regional workshop participants (n = 279) 79% reported that they were planning and/or implementing a Team Nutrition plan for their school.

④ Of those participating in the Action for Healthy Kids: Eat Smart, Play Hard summit (n = 230), 57% indicated that they would take action to support a healthy school environment in their local school/community.

⑤ The percentage of 1,923 EFNEP/FNP program graduates who reported diets that contained food from all five food groups increased from 18% at the beginning to 47% at the end of the program.

⑥ Results from the food behavior survey of 1,834 graduates showed 84 percent of participants showed improvement in one or more nutrition practices (i.e., planning meals, making healthy food choices, preparing meals without adding salt, reading nutrition labels, or having children eat breakfast).

d. State's assessment of accomplishments – meets performance goals.

e. Total expenditures by source of funding – State and Federal funds, $1,600,610.

SYs, 20.37.

Key Theme – Human Nutrition

a. Description of activity

Nutrition and health programs were offered in 202 communities in 90 counties. Targeted audiences were adults, employees at worksites, older adults, child-care providers, school teachers and health professionals. The primary focus of nutrition education programs this year was overweight and obesity among children and adults. Delivery methods included audiovisual presentations, bulletins, displays, and a national satellite videoconference for health professionals. Audiences learned about the myriad of factors in the current socioeconomic environment contributing to overweight and obesity including genetics, the feeding relationship, lack of physical activity, increase in technology, portion distortion, and food availability. Community advocacy was promoted as a measure to meet the demands of this growing problem. WISEWomAN, a community-based intervention designed to reduce

prevalence of risk factors for heart disease among middle-aged women who lack health insurance and access to health care was initiated in the middle of the year. A total of 135 women were enrolled in the program and attendance at 144 sessions was 576. Data is currently in progress for this research study. Extension staff actively participated in 94 community coalitions to address local health needs. County and campus-based Extension staff is supported by grant funds for key areas of programming. Program collaborations were established with the Iowa Department of Public Health, Iowa Department of Education, University of Iowa, College of Public Health, and the Iowa Games.

In the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), 57 paraprofessionals delivered nutrition education to 3,239 adults and 16,506 youth in either small group settings, schools or individually in the home. A project in 5 EFNEP units funded through a WIC Special Project Grant brings together experience in applied community nutrition and nutrition education research to increase the consumption of children 2-5 years of age using the stages of change model and interactive lessons. Other partnerships with Head Start, Promise Jobs, empowerment boards, and others resulted in increased funding, more effective audience recruitment, and enhanced program delivery. ISUE has a Memorandum of Understanding between WIC and EFNEP to formalize and expand reciprocal referrals between the two programs. ISUE also partners with the Iowa Department of Human Services to fund the FNP and to provide local EFNEP/FNP units with a monthly list of referrals. Five EFNEP units.

b. Impact/accomplishment

- Of 599 respondents (n = 1061, response rate 56%) in face to face nutrition education programs who were surveyed, 62% reported actually adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products.
- Of teams reporting weight loss (n=749, response rate 69%) a total of 47,000 pounds were lost by Lighten Up Iowa participants; of teams reporting physical activity (n=746, response rate 74%) a total of 2.5 million miles of accumulated physical activity were reported by Lighten Up Iowa participants.
- The percentage of 1,923 EFNEP/FNP program graduates who reported diets that contained food from all five food groups increased from 18% at the beginning to 47% at the end of the program. A positive change in at least one food group was noted in 94 % of the participants graduating from the program.
- Results from the food behavior checklist of 1,834 graduates showed 84 percent of participants showed improvement in one or more nutrition practices (i.e., planning meals, making healthy food choices, preparing meals without adding salt, reading nutrition labels, or having children eat breakfast).

a. Source of Federal Funds – Smith-Level 3b & c: WISEWomAN (CDC grant) $91,135, Team Nutrition grant (USDA grant) $10,000

a. Scope of Impact – State Specific

Goal 4: An Agricultural System Which Protects Natural Resources and the Environment

Overview

Outputs, outcomes and impacts of extension at Iowa State University:

- 14 Refereed Publications, Research Papers, Manuscripts
- 17 Non-refereed Publications, Reports, Technical Papers
- 32 Proceedings, Published Abstracts
- 78 Extension Publications
- 67 Invited Presentation
- 542 Education Programs, Field Days, Tours
- 750 attended meetings and conferences
- 7 Web pages supported

① Integrated Tillage and Manure Management Demonstration: This project used a hub (Experimental Farm) and spokes (cooperator farms) process to demonstrate what optimal yields with manure as a nutrient source, resulting in a 50 lb/acre commercial nitrogen reduction. Thirty-six percent of cooperators have stopped applying commercial fertilizer on manured fields, and 14% have reduced application by the 50 lb/acre. Seventy-one percent of involved cooperators indicated they learned new skills or improved existing skills through this project. Seventy-nine percent indicated they are managing their tillage and manure more efficiently due to project involvement.

② The private pesticide applicator training program conducted 333 meetings with 19,392 participants from December 2, 2002 to April 15, 2003.

③ The organic industry continues to expand in Iowa and the U.S., with growers obtaining a 50 – 300% premium price for crops produced without synthetic inputs, increasing the economic base of Iowa's farm families. Organic and sustainable production practices have resulted in a decrease in potentially polluting levels of nitrates and synthetic pesticides. The impact of improving soil quality in the organic/sustainable systems includes lower pesticide and sediment loading in waterways throughout the state. Diversification of Iowa farmland from conventional corn and soybeans to alternative crops, such as organic edible beans, fruits and vegetables, has led to an increase in biodiversity and a lowering of the risk associated with monocropped systems.

Assessment of accomplishments as measured against the POW:

The Goal 4 impact that "Iowa producers will make more efficient use of resources, which will reduce the potential for negative environmental impacts" was met as shown through the individual Program impact statements.

State and Smith-Lever Funds: $4,782,382

FTEs: 38

Key Theme – Integrated Pest Management (repeat from research program 22)

Program 142: Integrated Pest and Crop Management

a. Description of activity

Insects, weeds, plant-parasitic nematodes, and diseases are a continuing threat to Iowa's crop production. Every crop acre in Iowa is subject to yield reduction resulting from these pests. Additionally, costs are incurred when managing these pests, including the costs associated with cultural, mechanical, and chemical controls. Adoption of integrated pest management (IPM) and integrated crop management (ICM) principles results in more efficient use of resources, increased profitability, and enhanced environmental stewardship.

The agricultural IPM and ICM programs in Iowa currently focus primarily on field corn, soybean and alfalfa. In addition, an IPM school program was initiated to address the increase in stakeholders concerned about the environmental quality in schools.

IPM and ICM program priorities are:

- Establish a baseline database of IPM practices employed in Iowa.
- To work with producers and agribusiness to increase the number of acres under IPM and ICM practices
- To increase the efficiency of IPM and ICM techniques, particularly those involving pesticides
- To increase awareness of IPM and promote adoption of IPM in schools

These agricultural IPM and ICM program priorities are addressed through seasonal monitoring and forecasting of crop pests (i.e., alfalfa weevil, bean leaf beetle, black cutworm, corn rootworm, European corn borer, soybean aphid, western bean cutworm, disease presence, weed emergence, and degree-day accumulations) is conducted throughout the state. Information is disseminated through pest management education programs (i.e., crop clinics, short courses, scout schools, field days, and farm meetings), ICM Newsletter, regional IPM publications, radio programs, and the IPM Web site. Also targeted pest management programs are developed and supported to address emerging pest issues, such as the soybean aphid, western bean cutworm, and weed shifts in production fields. Plant disease clinics, weed identification and herbicide diagnostic services, insect identification clinics and remote diagnostic clinics provide timely information to the growers and industries throughout the state. IPM and ICM education is intertwined into the private and commercial pesticide applicator continuing instructional courses that reach more than 28,000 individuals each year.

In addition, Iowa developed a standardized tool to measure adoption of IPM on Iowa corn and soybean acreage. This database will enhance future efforts with growers to increase and improve IPM adoption.

The urban IPM school program addresses the increase in stakeholders concerned about the environmental quality in schools. Iowa public schools depend upon routine pesticide sprays to solve or prevent pest problems. Most schools also rely on commercial services to provide

pest control decision-making. In a recent Iowa survey of public school's pest control practices, 80% of the respondents were not familiar with Integrated Pest Management (IPM). As a result, this project developed and implemented an educational program in a small number of pilot schools, which helped the staff understand why pests become problematic and then how to solve the pest problems following integrated pest management techniques.

b. Impact/accomplishment

- Integrated Tillage and Manure Management Demonstration: This project used a hub (Experimental Farm) and spokes (cooperator farms) process to demonstrate what optimal yields with manure as a nutrient source, resulting in a 50 lb/acre commercial nitrogen reduction. Thirty-six percent of cooperators have stopped applying commercial fertilizer on manured fields, and 14% have reduced application by the 50 lb/acre. Seventy-one percent of involved cooperators indicated they learned new skills or improved existing skills through this project. Seventy-nine percent indicated they are managing their tillage and manure more efficiently due to project involvement.

- Agricultural IPM. A number of workshops were conducted by ISUE personnel that presented certified crop advisers from Iowa information about improved understanding of soils and landscapes, and how that understanding directly relates to improved crop management, including crop and pest development, leading to improved use of pest management tactics, including pesticides. This information will be magnified through the efforts of these professionals as they interact with client farmers in developing management plans on their farms. Typical written comments from the crop advisors trained included "it was a good refresher on soils that gave me tricks to use the soil survey," and "(This program allows me) more use of the soil survey as a tool (to) make cropping and pest treatment advice."

- Western bean cutworm (WBC) is a pest that, though it has been reported occasionally in Iowa, has recently caused significant losses to corn producers in northwest Iowa. The ISU extension IPM program responded in 2003 by developing a network of stakeholders who placed and monitored pheromone traps, and immediately shared the data at http://latrodectus.ent.iastate.edu/westernbeancutworm/, a website that allowed for sharing of information so that scouting, and treatment based on that information, could happen. Two results were that Iowa farmer's attention was raised and acreage was scouted for this emerging pest, and so that collectively we can improve this cooperative information network. Also, because of the trapping program, we learned that there were WBC moths emerging as far east as Delaware County, about 40 miles from the Mississippi River. As a result, we plan to recruit cooperators and gather data from all areas of Iowa in 2004.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific, Integrated Research and Extension

Key Theme – Pesticide Application

Program 143: Pesticide Applicator Training

d. Description of activity

Federal and State law requires that all people who purchase and apply restricted use pesticides and any applicator who applies pesticides for hire be certified according to established standards. Iowa State University Extension is mandated by the state of Iowa to develop and deliver training programs for all commercial pesticide applicators and private pesticide applicators.

The primary focus for the commercial pesticide applicator was program development and delivery for the continuing instructional courses. These activities occurred during January–July and October–December. During these months, 40 programs were provided to 8,208 commercial applicators in 23 certification categories and sub-categories.

In addition, initial training for commercial pesticide applicator certification was provided to Iowa State University students through a course, ENT 283. Commercial certification was emphasized for the 98 students enrolled in this course including a core background on pesticide application and specialization in agriculture, forestry and horticultural pesticide application. Additional initial training for certification was provided to individuals throughout the state of Iowa (64 participants).

The primary focus for the private pesticide applicator was program development (August–November) and delivery (December–April). During the training season, 333 programs were conducted in all 99 counties in the state. In addition, initial training for private pesticide applicator certification was provided to 40 individuals throughout the state of Iowa.

d. Impact/accomplishment

- The private pesticide applicator training program conducted 333 meetings with 19,392 participants from December 2, 2002 to April 15, 2003. A post-training evaluation indicated that the program was successful. Overall 96% of the respondents indicated that the program was excellent or good. In addition, 97% of the respondents strongly agreed or agreed that the information presented was useful for their farm operations.

- To determine if the private program had an impact on the participants, the evaluation examined specific areas to assess behavioral changes towards more safe practices. After receiving information on reducing spray drift, 40% of respondents indicated that they would use a wind meter, reduce sprayer pressure, or increase the nozzle size to reduce spray drift. In addition, 39% of respondents indicated that they would notify all owners of registered bee yards within a two-mile radius of application when applying a pesticide that is toxic to bees.

- In addition, this post-training evaluation examined if participants had indeed successfully implemented new pesticide safety activities, as a result of the previous year of private pesticide applicator training. According to the respondents, 83% of the respondents now

review the storage and disposal section of the pesticide label prior to use of the pesticides and 89% of the respondents maintain pesticide use records that meet the legal recordkeeping requirements. These results indicate that this program is positively impacting the private pesticide applicator and the environment. The applicator is learning and implementing safe and effective practices while using pesticides.

d. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Sustainable Agriculture

Program 147: Sustainable Agriculture

. Description of activity

Sustainable fruit, vegetable, grain and turf grass production systems continued to be developed for Iowa. Effective pest management practices for new and existing pest problems will be necessary for the continued viability of sustainable/organic agriculture in Iowa. The soybean aphid (*Aphis glycines* Matsumura), native to China and Japan, was first reported in Iowa in 2000, and may have up to 18 generations a year in Iowa. Research results found that when organically-approved spray treatments were applied, a significant decrease in aphid populations was obtained, with lowest aphid populations in the Neemix™-treated plots. Beneficial insect populations were generally not affected by spray treatments.

Kaolin clay products were effective in managing squash bugs and cucumber beetles in organic squash destined for the organic baby food market. Alternative oat straw mulch treatments for organic herb production (St. John's Wort) adequately controlled weed populations in 2003, while wood mulch was identified as an effective weed management strategy in organic grapes. Short- and long-term impacts include economic savings and environmental benefits from reduced reliance on synthetic pesticides.

Work continued on the development of corn gluten meal as a natural herbicide. There are currently two active studies at the horticulture research station on the subject. One is for long-term pre-emergence weed control in Kentucky bluegrass turf and the second is a combined pre-emergence and post-emergence study on Kentucky bluegrass which is being conducted to evaluate the effect of corn gluten meal on perennial weeds such as dandelion and white clover. High-quality, organic day-neutral strawberries were produced using compost and corn gluten meal. Effects from applications of biological disease control treatments (*Bacillus subtilis* and *Trichoderma harzianum*) were not significant under low disease conditions.

In other grain, vegetable and fruit research projects across Iowa, organic crops fertilized with compost produced similar yields to conventional crops. Soil health parameters, including organic carbon pools and microbial biomass, remained high in organic systems, even under multiple tillage operations.

A survey of 400 organic growers was conducted to determine producer needs, University research interests, and sources of available technical information.

. Impact/accomplishment

- Efforts have resulted in a significant increase in agronomic and horticultural operations farmed or maintained without potentially polluting levels of nitrates and synthetic pesticides. Longer crop rotations, which included small grains and legumes, provide yield stability, improved plant protection, enhanced soil health and economic benefits, compared to conventional systems with shorter corn/soybean rotations and greater off-farm inputs.

- The organic industry continues to expand in Iowa and the United States, with growers obtaining a 50 – 300% premium price for crops produced without synthetic inputs, increasing the economic base of Iowa's farm families. Organic and sustainable production practices have resulted in a decrease in potentially polluting levels of nitrates and synthetic pesticides. The impact of improving soil quality in the organic/sustainable systems includes lower pesticide and sediment loading in waterways throughout the state. Diversification of Iowa farmland from conventional corn and soybeans to alternative crops, such as organic edible beans, fruits and vegetables, has led to an increase in biodiversity and a lowering of the risk associated with monocropped systems.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

Overview

Several Iowa Plans of work support federal goal 5, including:

145 Farm Safety (submitted in our federal POW under goal 3, however, instructions are to now report under federal goal 5)
200 – Building Community Capital
300 – Money for Life
310 – Strengthening Family Relationships
320 – Child Care That Works
340 – Family Policy That Works
410 – Youth/Staff Development
420 – Out of School Time
440 – Science and Technology Literacy
450 – Strengthening Volunteer Development
460 – Urban Youth

This overview covers work done for 145.

Outputs, outcomes and impacts of extension at Iowa State University:

Descriptions of Output Performance Measures	Outputs
Number of people that received farm safety training	14,003
Number of farm workers that received farm safety training	2,367
Number of youth participating in youth farm safety activity taught by extension	8,073
Number of youth participating in youth safety activities coordination by extension	3,498
Number of individual consultations	2057
Number of youth that received hazardous occupation certification	65
Refereed publications, research papers, and manuscripts	1
Non-refereed publications, reports, and technical papers	1
Proceedings and published abstracts	1
Number of Thesis (MS/PhD programs competed)	1
Extension publications	1
Books and chapters	3
Videos	1
Number of Web pages supported	5
Media release and popular press articles	12
radio interviews	68
Participation on state, national, and professional societies safety committees	25

This overview covers work done for 300-340.

a. Output/Impact

- 1,762 Iowans participated in aging-related educational events.
- 8,147 individuals received child care training and education.
- 1,561 individuals participated in ROWEL Poverty Simulations.
- 22 Extension staff served as conveners, moderators or recorders of issue forums on homeland security (13) and communities supporting young families (1).
- 12,638 Iowans participated in 358 workshops on financial management.
- 1,684 Iowans were reached face to face in the Earned Income Credit campaign. 1,404 Iowans learned about Iowa's Child Health Insurance Program for uninsured Iowans and moderate-income children.
- 5,982 individuals were involved in parent education programs.

b./c. Outcome/Impact

- 89% of participants in workshops from the *Adult Children and Aging Parents: Conversations between Generations* reported being much better prepared to make decisions impacting later-life families.
- 87% of participants in training on mental health and caregiving increased understanding of depression in older adults; 85% felt better prepared to assist caregiving families.
- 1,656 existing childhood programs and businesses were strengthened with Extension involvement.
- 168 new child care centers, early childhood and family home childcare programs were started serving 1,920 children.

- Poverty Simulation participants show increased awareness and sensitivity to needs of families (i.e., reduced requests for donations from students for field trips, more participation in school breakfast programs, learning more about resources and programs within communities to help limited resource families).
- 78% of participants involved in issue forums indicated that while they didn't change their thinking about the issue under deliberation, they did change their thinking and understanding about other people's views of the issue.
- 84% of resource management program respondents took actions to reduce debts (80% response rate).
- 69% of retirement planning program respondents gained greater control of their current spending, saving and financial security (75% response rate).
- 32% of retirement planning program respondents increased their contributions to a personal retirement investment (88% response rate).
- 914 parents (87%; n = 1048) who participated in parenting education programs reported adopting one or more recommended parenting practices.

Overview – 4-H Youth Development Programs

This overview covers work done for 410-460.

a. Output/Impact

- A total of 128,370 youth were involved in Extension 4-H Youth Development sponsored community clubs, special interest groups, school enrichment programs, overnight camping and other programs. Nearly one in four Iowa school age youth participate in a 4-H Youth program.
- A total of 13,118 youth and adult volunteers contributed their time, energy and expertise to helping youth learn life skills.
- A total of $70,000 dollars of scholarships were given by the Iowa 4-H Foundation and its partners to 80 4-H'ers.
- Over 950 high school youth attended State 4-H Youth Conference, held on the campus of Iowa State University, and participated in educational seminars and community service opportunities.
- Over 7,300 educators, school teachers, school administrators, and parents participated or were trained in science related extension 4-H sponsored youth curriculum.
- A total of 2,086 youth, 3,967 adult volunteers, and 805 other adults were trained in leadership, parenting and other topics.
- All 100 counties report involvement in out-of-school time programming. 44,000 youth participated in one or more of the out-of- school time offerings.

b./c. Outcome/Impact

Youth completing life skill evaluation statements following participation in Extension 4-H Youth Development programs indicate the following:

- 82% stated 4-H programs helped them set goals for their future (compared to 46% reported in 2001)

- 83% stated 4-H helped them consider how their actions affect others. (62% reported in 2001)
- 72% stated 4-H helped them to volunteer their time for community service. (62% reported in 2001)
- 85 % stated 4-H help them value the contributions of others. (59% reported in 2001)
- 91% stated 4-H helped them to be friends with people who are different from them. (57% in 2001)
- 80% stated 4-H helped them to avoid risky behaviors. (74% reported in 2001)
- 87% stated 4-H helped them to feel comfortable saying "no" to things they did not want to do. (87% reported in 2001)

d. State's assessment of accomplishments – Original performance goals were exceeded.

e. Total expenditures by source of funding – State and Federal funds, $3,107,067.

SYs, 39.6.

Key Theme – Aging

d. Description of activity

1,762 Iowans participated in aging-related educational events in FY03. *Adult Children and Aging Parents: Conversations Between Generations,* a curriculum addressing family decisions and relationships in later life, reached 495 Iowans, 317 through 39 contact hours of sequenced programming and, 178 through one-topic workshops. Iowa State University Extension cooperated with University of Minnesota Extension specialists to explore new applications for the web-based *Adult Children and Aging Parents* curriculum materials. Families specialists in 8 states beyond Iowa adopted the Iowa State University *Adult Children and Aging Parents* curriculum.

There were 743 Iowans that participated in caregiver strengths education. A training workshop prepared Extension staff to participate in community educational efforts supporting family caregivers and to manage personal family caregiving roles. Iowa State University collaborated with Oregon State University to provide a distance education workshop on mental health issues in family caregiving for health and elder services professionals and Extension staff. Oregon State faculty taught Iowa participants through the Iowa Communications Network and video conferencing technology.

b. Impact/accomplishment

- 89% of participants surveyed following the *Adult Children and Aging Parents: Conversations between Generations* workshops (N=159) reported they were much better prepared to make family decisions related to later-life issues.
- 106 health and elder services professionals and Extension staff participated in training on mental health issues in family caregiving. 87% (N=100) of participants increased their understanding of depression in older adults and 85% felt more prepared to assist caregiving families.

- 81% of Extension staff participating in training on family caregiving issues felt more prepared to participate in community educational efforts to support family caregivers and 92% had applied the information in personal caregiving situations.
- ISU Extension participated in 30 coalitions related to aging issues at county, regional, and state levels and co-sponsored public educational programs on later-life family issues with area agencies on aging, universities, community colleges, hospitals, hospice organizations, and community businesses.

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State specific, curriculum now used in 8 states

Key Theme – Child Care

. Description of activity

8,147 individuals received child care training and education, onsite training and consultation. 988 providers received training through the *Child Care that Works* self study program, reaching individuals in 62 counties, Kansas and Nebraska. Providers participating in this program received Iowa Department of Human Services credit for licensing requirements. Center-based programs accessed 53% of the self study kits; 42% were accessed by family child care programs. 13,308 study video kits have been checked out since the program's inception in 1997.

586 Iowans attended *Better Kid Care* satellite programs conducted in collaboration with Penn State University. Infant and toddler caregiver training was conducted for 428 individuals. Literacy training was provided for 332 individuals. Playground safety training was conducted for 183 individuals. The National Network for Child Care web site (NNCC.org), managed by Iowa State University, received visits averaging 142,000 each month from all 50 states and 100 countries. Iowa State University Extension also provides oversight and management of the Early Childhood Section of the CYFERnet web site for the Children, Youth, and Families, Education and Research Network (CSREES).

b. Impact/accomplishment

- 125 playgrounds were improved with technical assistance or consultation from ISUE.
- 168 new child care centers, early childhood and family home child care programs were started as a result of direct Extension involvement. These programs serve 1,920 children.
- 1,656 existing childhood programs and businesses were strengthened with Extension involvement.
- 126 individuals were employed as a result of new or expanded programs or businesses.
- 88 childhood education programs were assessed with nationally recognized Early Childhood Rating scales for the purpose of improvement.

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State specific; NNCC is actively sponsored by 37 states, posts information from land grant universities in all 50 states and is accessed by more than 100 countries. CYFERNET Early Childhood reviews and posts resources from all 50 states on CYFERNET.org. Better Kid Care Satellites are sponsored in Iowa in collaboration with Pennsylvania.

Key Theme – Children, Youth and Families at Risk

d. Description of activity

The statewide goals for Iowa's Children, Youth, and Families at Risk (CYFAR) project are to improve the ability of families at risk to raise healthy, contributing citizens and to improve the well-being of children, youth, and families and build community capacity to support these families. Iowa's New Community Project (NCP) continues integration and expansion of CYFAR programming into ISU Extension, continues to strengthen collaborations, and supports 3 community projects in Davenport, Perry, and Sioux City. The ISUE CYFAR Web site averages 4,130 visits per month. The LeClaire project offers youth summer and after-school programming and community gardening. Hispanics United for Perry (HUP) a 501C legal, nonprofit group, focuses on three priorities: full citizenship participation among Hispanics, more parent involvement with their children and reducing language barriers. HUP was sponsored and assisted with multiple community activities and celebrations, works to bridge barriers and conducted a leadership training in Spanish. The Westside Resource Center in Sioux City offers a wide variety of educational and parenting programming in addition to health and safety screenings and resource and referral services to neighborhood residents.

The ROWEL Poverty Simulation proves effective in increasing participants' awareness of poverty issues to those living in poverty. From October 2002 through September 2003, ISU Extension staff conducted 25 simulations for 1,561 participants.

b. Impact/accomplishment

- Poverty Simulation participants show increased awareness and sensitivity to needs of families – (i.e., reduced requests for donations from students for field trips, more participation in school breakfast programs, learning more about resources and programs within communities to help limited resource families, etc.).
- From September 2002 to September 2003, youth spent a total of 438 hours at LeClair House developing citizenship, leadership, literacy, and life skills. HUP sponsored a fall Latino/a Festival that drew over 1,000 citizens. The Westside Resource Center provided resource and referral services to 2,323 people.

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State Specific

Key Theme – Family Policy

. Description of activity

Twenty Extension staff trained in 2002 as conveners, moderators and recorders for deliberative issue forums, served in one of those roles for forums on homeland security/terrorism and "communities supporting young families." A team of five Extension staff trained to frame an issue, created an issue map and power point presentation for the issue, "How Can Communities Support Young Families," and piloted a forum using the materials developed. Piloted public awareness resources that educate about quality child care in both an urban and rural community through hospitals, libraries, child care centers, businesses, in partnership with AAUW and IA/AAFCS. Drawing upon an ISU Transportation research project, ISU Extension consulted with one county's study of transit needs. A report, summarizing public and private transportation needs and policy recommendations, will be presented in a community forum in November 2003.

b. Impact/accomplishment

96% of respondents to an evaluation of child care awareness campaign resources indicated the information is useful. Comments included: "Is both parents working really worth it? It made me realize that someone else is raising your child." "Crazy how little home time a child in daycare has."

c. Source of Federal Funds – Smith-Lever 3a & c, leveraged with state funds, user fees, DOT, HUD, and not for profit organization contracts

d. Scope of Impact – Statewide

Key Theme – Community Development

d. Description of activity

Organized in-state around Building Social Capital – visioning, planning and organizational capacity building are prerequisites for strong communities. Six separate projects have social capital as a central feature. These include a) *Community Visioning*, changing the landscape and physical entryways to 8 communities; b) *ad hoc planning and visioning*, locally-supported efforts to address one or more elements of community capital in 6 communities; c) *Resident-led watershed planning*, facilitation and organizational development support to citizen-based planning in 3 watersheds; d) *Community Voices*, a program for new Spanish-speaking residents to the state in 8 communities reaching 500 residents; e) *Land Use Planning*, assistance provided to 18 communities and 38 counties.

d. Impact/accomplishment

- One business network established
- Two comprehensive development plans adopted
- One community attributes the following impacts from FY2000 planning: new park and lake, a trail system, a sand beach, bathroom facilities, a camping area, and a butterfly garden
- Three bond issues passed
- 323 business entrepreneurs trained

- 455 organization assisted and strengthened

d. Source of Federal Funds – Smith-Lever 3b & c, leveraged with state funds, user fees, DOT, HUD, and not for profit organization contracts

d. Scope of Impact – State specific.

Key Theme – Family Resource Management

b. Description of activity

The goal of family resource management programs is to help Iowans build knowledge, skills, and attitudes that enable them to achieve their financial goals, improve their quality of life, and enhance their financial security. Limited resource Iowans were targeted in Earned Income Credit (EIC) campaigns, reaching 1,684 Iowans in face-to-face workshops and 1,404 learned about the Healthy and Well Kids in Iowa (HAWK-I) program – Iowa's Child Health Insurance Program (CHIP) for uninsured low- and moderate-income children.

12,638 Iowans participated in 358 ISU Extension workshops that emphasized the "basics" of financial management –budgeting, recordkeeping, credit use, privacy, savings, and investing. Nearly 450 of those learners took part in retirement planning workshops and more than 800 persons participated in workshops on the distribution of personal assets. 212 consumers received a PowerPay debt reduction analysis. 1,391 clients received individual consultations, including 487 who visited the ISU Financial Counseling Clinic. 17 Iowans completed the financial counselor certification program and 68 enrolled in the program. 11,505 high school students in 269 Iowa high schools enrolled in the High School Financial Planning Program.

b. Impact/accomplishment – The following outcome data are reported from surveys of program participants. Survey response rates are included in parentheses.

- More than 16,500 Iowans participated in programs that addressed financial management skills.
- 84% of resource management program respondents took actions to receuve debts (80% response rate).
- 69% of retirement planning program respondents gained greater control of their current spending, saving and financial security (75% response rate).
- 32% of retirement planning program respondents increased their contributions to a personal retirement investment (88% response rate).

b. Source of Federal Funds – Smith-Lever 3b & c

b. Scope of Impact – State specific - "Secure Your Dreams" retirement curriculum and publications are featured on the national initiative website.

Key Theme – Farm Safety

b. Description of activity

The Iowa farm fatality summary for 1988 to 2002 continues to show a decrease in the number of farm fatalities during those years. A target group identified in Iowa is farm youth. Farm safety day camps, in-school educational programs and other activities are conducted to reduce the number of injuries and fatalities.

- Iowa State University Extension staff hosted 33 farm safety day camps and participated with external partners to help sponsor or participate in additional camps. A partnership was continued with a national sponsor, Progressive Agriculture Foundation. Iowa State University Extension program provides supporting materials of publications and demonstrations to these camps.
- Iowa State University Extension staff delivered education to public schools with our in-school programs. These in-school programs, combined with the tractor and machinery certification programs, are structured learning experiences. The Certification program fulfills the youth requirements to operate tractors and machinery that meets the federal guidelines and include 24 hours of training.

Full-time farmers are most receptive to publications, demonstrations, and mass media events. Safe Farm is an Iowa State University Extension program helping to make Iowa farms a safer place to work and live by the combination of a media campaign and various educational efforts. A structured farm safety media campaign included weekly scheduled radio interviews. During National Farm Safety Week, Iowa State University Extension coordinated a multi-organizational promotion to increase awareness. The Safe Farm agricultural health and safety pages on the World Wide Web (<www.abe.iastate.edu/safety.htm>) contribute to the media campaign by providing current and timely information to both the county extension offices and Iowans. Items found on these pages include: listing of farm safety day camps, location, date, contact person, listing of tractor and machinery certification classes, county, contact person, links to camera ready printable version of all Safe Farm fact sheets, listing of information about available farm safety displays, and links to other farm safety organizations and their efforts.

b. Impact/accomplishment

- 65 youth, ages14-16 years of age, received federal required certification for being legally eligible for agricultural work opportunities off their parents' or legal guardians' farm. These youth can now enter the agricultural workforce and reduce the potential occurrence of agricultural-related injuries to this age group.

- 3,498 youth, ages 8 to 14 years of age, received one day of farm safety education from participating in farm safety day camps hosted throughout the state. These camps offer a variety of farm safety messages tailored by local community and stakeholders. These camps create awareness of farm hazards; develop an understanding of safe and unsafe behaviors; create a positive life-long acceptance of safety responsibilities; and decrease the incidence of farm youth injuries and fatalities.

- Safe Farm E-News, an electronic monthly newsletter for extension educators has remained successful. There are currently 117 subscriptions, and several extension staff from other states are taking advantage of this timely delivery of agricultural safety

information at no cost. Recipients include people from Kentucky, Minnesota, Nebraska, Texas, and Wisconsin.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Impact of Change on Rural Communities

d. Description of activity

Organized around community policy and planning programming, communities and organizations are supported with objective statistical social and economic data as input to informed decisions. The support is in the form of archived on-line and print date (Office of Social and Economic Trend Analysis), custom-designed and localized fact sheets, graphic media, and analysis and interpretation in reports and presentations delivered to audiences. Additionally, support is provided to organizations and communities to generate custom-designed data by providing technical services for applied sample surveys and focus groups. In FY2002 and FY2003, these offerings were enhanced with on-line interactive graphics. New geographic information systems support was provided statewide to counties through sponsorship of the state geographic information council coordinator. All data-based activities are augmented with group process facilitation to assist local officials in decision making activities.

d. Impact/accomplishment

Four million pages of economic and demographic data were delivered to internet users in FY2002 with a commensurate number in FY2003, 30 counties were provided GIS consultation services, county-specific fact sheets were published on two topics of community change, four referenda were initiated and passed, three comprehensive plans and three3 watershed plans were developed. In FY2003, ISU Extension sought and received federal funding for a state-based community vitality center. In FY2003, these resources were used to provide entrepreneurial education and facilitation to ten communities, and seed grants to six communities. One community, Fairfield, IA, received a national community entrepreneurial education award. Additionally, policy analyses applied research has been completed on community philanthropy, real estate records costs, and communities of distinction.

d. Source of Federal Funds – Smith-Lever 3b & c.

d. Scope of Impact – State specific; geographical contiguous states (on-line database supplied to Iowa and 11 other states)

Key Theme – Leadership Training and Development

. Description of activity

Organized in-state around Building Human Capital. Iowa citizens were taught leadership skills from a portfolio of six programs. The development of human and social capital is

central to the ability of communities to solve their problems. In FY2003, these included a) *Developing Dynamic Leaders*, a six-session skill-building program in group formation, goal setting, group dynamics, decision-making, and assessing community needs and direction; b) *Governing Cities: A Leadership Toolbox*, a six-session program for elected city officials offered in partnership with Iowa League of Cities on communication and building public trust, c) *Citizen Initiated Performance Assessment*, a collaborative project with Iowa League of Cities at the Sloan Foundation that involves citizens in an interactive process that identifies goals and benchmarks for local government services; d) *Nonprofit Management Institutes*, a 13-session (2 days each session) certificate program targeting the special concerns of nonprofit organizations such as governance by volunteer boards, legal and regulatory concerns, and developing diversified revenue sources; e) *Tomorrow's Leaders Today*, a cooperative program on targeting potential leaders from Des Moines' Enterprise Community and focusing on skill building, community projects, and local issues; f) *Municipal Clerks' Institute*, a 3-year tiered program with a curriculum built around budget and finance, communications, city records, ordinance development, community development, intergovernmental relations and technology updates; and g) *Election Officials Training*, 2-level, 3-day workshops for county auditors and staff to better manage Iowa's elections.

. Impact/accomplishment

Some form of Extension leadership training and development occurred in 87 of Iowa's 100 Extension districts and for 78 communities. During the year 2378 community leaders were trained, 515 service providers were trained, 101 service providers were certified and 1748 youth were trained. Using self-assessment tools, skill and aspiration increased among two-thirds of participants. In follow-up surveys, 80 percent of leadership program participants report taking on new roles in community organizations or changing their roles to be more effective.

. Source of Federal Funds – Smith-Lever 3b & c, leveraged with state funds, user fees, and not-for-profit organizational contracts

. Scope of Impact – State specific.

Key Theme – Parenting

b. Description of activity

ISU Extension continues to train professionals, volunteers, and parents in implementing sequenced parenting education, as well as individual parenting workshops. These programs reached 5,982 Iowans. For sequenced parenting education efforts, *The Strengthening Families Program* (for parents and youth 10-14) reached 369 parents and youth and 94 facilitators were trained. *Girl Talk/Guy Talk* (designed to increase communication about sexuality issues between parents and youth) reached 461 individuals: *Celebrate Families* (program for parents and school-age children)- reached 90 individuals; *Great Beginnings for Families* (program for parents of children 0-5 years) and *The Incredible Years* (for parents of children 2-7 years) reached 154 individuals; and *Partnering with Parents* (an in-depth

training series for parenting educators) reached 73 parenting educators who work in both private and public settings.

Additionally, 180 individuals were reached through *Kindermusik*, an educational series promoting parent/child interaction and child socialization; 369 individuals were reached through *Family Storyteller*, a parent/interaction and literacy program designed for parents and preschool-age children; and 121 individuals were reached through workshops focused on fatherhood. An additional 2,722 parents were reached through workshops focused on various parenting topics (managing conflict; learning through play; brain development, parenting teens, etc.). Over 2,000 professionals and volunteers, who work with teens and their families across the nation, were reached through the two-part educational satellite series, *Healthy Teen Development*.

Iowa State University, in collaboration with Pennsylvania State University, received a $20.7 million federal grant from National Institute of Drug Abuse for Promotion School-Community and University Partnerships to Enhance Resiliency (PROSPER). This five-year research/extension project involves 28 schools, community stakeholders, and more than 10,000 families in sustainable science-based programs to build resiliency among youth and reduce substance abuse.

b. Impact/accomplishment

- 5,982 individuals (i.e., parents, grandparents, professionals, volunteers) participated in parenting education programs facilitated by ISU Extension.
- 466 professionals and volunteers were trained by ISU Extension staff to deliver parenting education.
- 1,547 individuals received parenting education through individual consultation.
- 914 (87%) parents who participated in parenting education programs reported that they adopted one or more recommended parenting practices.

c. Source of Federal Funds – Smith-Lever 3b & c, NIDA

d. Scope of Impact – State specific, PROSPER project includes Pennsylvania

Key Theme – Rural Mental Health

a. Description of activity

During the second year of the Iowa Rural Mental Health Initiative project year, Extension collaborated with Ecumenical Ministries of Iowa (EMI) to promote the Rural Mental Health Initiative through faith-based community partnerships. Information about mental health services was distributed in an ecumenical newsletter reaching 2,300 congregations in Iowa. Information was also distributed at three denominational conferences on responding to the mental health needs of farm families. Ministers of several congregations shared information on mental health services with their congregations, ministerial associations, and other local contacts. Letters were sent to 32 churches addressing issues of rural stress offering information about the resources available through Rural Mental Health Initiative.

Extension programs including mental health information were delivered to many groups of rural residents, displays were exhibited at events including county fairs and health fairs, and information about the mental health resources available was distributed through newsletters sent from county Extension offices. One of the larger events was a three-day multi-state event, the Farm Progress Show, held at Alleman, Iowa, on September 24-26, 2002. An estimated 3,000 stopped by a display on rural mental, "Just for the Health of It", visited with staff, and picked up information on reducing stress, getting a grip on finances, eating and health habits, and developing community as a support system. As part of the Farm Progress display, over 300 individuals had their blood pressure checked, while others received support on issues related to credit and debt management.

A statewide video teleconference was held to provide research-based information to help ISU Extension staff and their mental health partners utilize updated information to improve access to rural families and to provide better support services including counseling to those families. ISUE also brought three experts on caregiving and mental health from Oregon State University to 15 remote sites in Iowa through the video-conferencing technology. One hundred-six people participated in the two and one-half hour workshop.

A multi-state conference, "The Clock is Ticking for Rural America," was held on May 29 and 30, 2003, in Kansas City. Ten ISU Extension staff members led workshops that documented changes and defined best practices related to reducing barriers to accessing mental health services for farm and rural families.

b. Impact/accomplishment

- 400 farm businesses received Farm Business and Financial Analysis through the Extension Service.
- 37 volunteers were trained to do financial counseling with individuals and families. These counselors provide financial counseling to families requesting that service.
- During the funding year, approximately 130 individuals and families received counseling using PowerPay, a computer program that assists families in making wise financial decisions.
- Displays, newspaper, television, and radio ads, and other media are used to market the hotline. The Iowa Concern website is available and during certain times of the day it is interactive with a professional who answers questions from web users. The URL is www.extension.iastate.edu/iowaconcern/. The hotline averages about 1,000 calls per month and makes appropriate referrals to callers needing mental health services.
- Contracts were signed with 40 counseling agencies in Iowa to provide one-on-one counseling with rural individuals and families; 2,436 individuals and families received counseling funded by the grant. This includes 2,030 adults and 406 youth. 95 (68%) rated the counseling sessions "very helpful". With 138 responding: 3 (2%) I am as hopeless now about my problems as I was before the counseling, 49 (35%) I feel better but still do not know how to solve my problems, and 87 (63%) feel that I can find solutions to my problems and make life better.
- "Sowing Seeds of Hope: Caring for the Mental Health of Iowa's Farm Population," a collaborative project of Ecumenical Ministries of Iowa, the Iowa Concern Hotline, the Iowa State University Extension Rural Mental Health Initiative and AgriWellness, Inc.

was awarded the Iowa Community Health Prize for their efforts in promoting mental health among rural residents.

c. Source of Federal Funds – Smith-Lever 3b & c and grants, SAMHSA Grant No. 1 H79 SM54584-01

d. Scope of Impact – State specific, regional conference

Key Theme – Youth Development/4-H

This section is further divided into key themes as named in Iowa's state plan of work.

Key Theme – Youth/Staff Development

a. Description of activity

The mission statement of the Iowa 4-H Youth Development Program is to empower youth to reach their full potential working and learning in partnership with caring adults. To fulfill this mission it is essential that all staff, paid and volunteer, have a working understanding of the research basis of positive youth development. This will assure that the programming opportunities within the 4-H Youth Development Program are designed to enhance the chances of youth reaching their full potential. To fulfill this mission it is also necessary that the 4-H Youth Development staff work with other youth workers in the state to make certain they have a working understanding of positive youth development.

b. Impact/accomplishment

- A total of seven "Advancing Youth Development" trainings were held and 109 youth workers completed the training. The following statements are examples of the impact the training had on the participants.
  "Best I've ever attended over the last 15 years (that I've been practicing)."
  "Great research base, but even better is that there are applications/ideas for all."
  "This training enlightened the path for my work within the programs to come."
  "It got me motivated to work with youth and showed me there are tons of resources to assist me."
  "Was packed full of information, but so useful to take home."
- Over 85 different 4-H Community Clubs have completed the "Community Club Survey". This has lead to clubs getting feedback on strengths and identifying practical strategies for integrating the principles of youth development.
- The State 4-H Youth Development Office is consulting with another youth organization to assess their application of the principles of positive youth development. Each division within the organization is having their individual staff complete the "Program and Activity Assessment Tool". The combined results of the tool will be used to identify strategies for the organization to incorporate the principles of positive youth development.

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State Specific

Key Theme – Out-of-School Time

a. Description of activity

Throughout the state staff are engaged in a number of activities to fulfill these two goals. The types of activities include 4-H clubs, Clover Kids, Day Camps, Summer residential camps, after schools specifically the Governor's AmeriCorps After-School Initiative and special interest activities during non-school days. Specific Iowa 4-H curriculum used include: Challenge, Growing in the Garden, Boomerang, Wonderwise, etc. To provide these efforts staff are working with community based collaborations, volunteers and various state and local agencies. These programs use 4-H research based curriculum and educator preparation programs to teach life skills to youth.

b. Impact/accomplishment – Out-of- School programs focused on character development and team building. The following impact data were collected through the ISUE Life Skill Evaluation database.

- The life skill evaluations indicate the following:
  - 82% stated 4-H programs helped them set goals for their future.
  - 83% stated 4-H helped them consider how their actions affect others.
  - 72% stated 4-H helped them to volunteer their time for community service.
  - 85% stated 4-H help them value the contributions of others.
  - 91% stated 4-H helped them to be friends with people who are different from them.
  - 80% stated 4-H helped them to avoid risky behaviors.
  - 87% stated 4-H helped them to feel comfortable saying "no" to things they did not want to do.
- Governor's AmeriCorps After-School Initiative in 10 school districts for at-risk middle school youth reached 736 middle school students.
- As a result of participation in tutoring services and 4-H educational enrichment the average quarterly G.P.A.s increased .35 points, attendance by 22%, and students' problem-based school referrals decreased 36%. A significant increase over the 2002 report.
- AmeriCorps members and 152 community volunteers provided 189 middle school students tutoring assistance.
- 358 middle school students participated in a total of 2,610 service learning hours. A significant increase over last year's report.
- 152 different community partnerships were developed or strengthened. These partnerships benefited youth by providing direct programs, media coverage, funding for program supplies, provision of curricula resources and youth job shadowing experiences.

c. Source of Federal Funds – Smith-Lever 3b & c and special grants

d. Scope of Impact – State Specific

Key Theme – Science and Technology Literacy

a. Description of activity

This plan of work focuses on improving science and technology literacy of American students through experiential activities within and outside the school classroom. Performance goals include marketing the ISUE E-SET program to Iowa Educators; helping k-12 youth understand the relationship between science and technology; providing k-8 youth with non-formal, experiential science activities that will develop science life skills; and delivering technical assistance, curricula, kits and professional development workshops to Iowa schools through partnerships with AEA's and LEA's.

E-SET has received many positive responses from formal and informal educators across the state. They have commented on the quality of the resources, the responsiveness of the staff, and the breadth and depth of training. The demand for E-SET is high and reflects the effectiveness in teaching Iowa youth life skills.

b. Impact/accomplishment

- E-SET curriculum presentations were made to Iowa Science Teachers Fall Conference, NAE4HA Galaxy Conference, CYFAR Annual Conference, ISSEC, Iowa 4-H Youth Conference, CYFAR National Conference, AEA and LEA Teacher workshops, and area leader trainings. 5000 people were reached through these efforts.
- Youth Reached through E-SET Educational Programs include: 16,523
- Youth Enrolled in Science and Technology Project Areas: 3,427
- NASA International Space Station Exhibit Trailers and Astronaut Peggy Whitson: 3,267

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State Specific

Key Theme – Strengthening Volunteer Development

a. Description of activity

Enhancing and expanding the roles of volunteers to initiate a comprehensive volunteer management system in their counties is the focus of this plan of work. Selected activities include: 1) 300 volunteers and staff were involved in planning and participating in two volunteer training conferences in the state; 2) 29 youth and adults participated in the North Central Region forum in St. Louis, MO; 3) 936 evaluation forms were completed by 4-H club leaders participating in a four part satellite training series focusing on skills new leaders need; 4) 45 high school age youth from across Iowa served on the State 4-H Council; 5) 100 4-H Horse Project Leaders participated in a ICN training designed to share new educational resources and to strengthen local horse project meetings and workshops; and 6) A club survey designed to strengthen youth as partners programming in Iowa 4-H community clubs was completed by 16 clubs, 240 4-H'ers and 78 adult leaders and parents.

b. Impact/accomplishment

- $7,500 was granted by the Iowa Commission on Volunteer Service to ISU Extension 4-H to administer this program to encourage local youth groups to partner with another community group to plan and carry out a community service project. Forty-one grants funded. The original $7,500 grant resulted in projects totaling $17,095 aided by 732 volunteers (youth and adult) working 3,592 volunteer hours.
- Extension supervised AmeriCorps members reported that an average of 358 middle school students provided 2,610 service learning hours. The two most common service learning events were intergenerational learning relationships with elderly nursing home residents and maintaining community and state parks. In addition, 151 community volunteers provided 2,301 volunteer hours. The overall most widely reported benefits of the community volunteers' time and skills were the provision of volunteer hours to lead educational workshops and service projects with youth, assist with implementing enrichment activities, and to chaperone service projects and educational field trips.
- Eighty-five people were recognized for their outstanding contribution to the 4-H program by their induction into the 2003 Iowa 4-H Hall of Fame. Over 700 4-H members, alumni, and supporters were present at the induction ceremony at the Iowa State Fair to honor these volunteers and staff members.
- From a satellite leader training series on "how to utilize project materials" and "putting it all together", participants shared: 70% believed the program helped them become more comfortable in helping youth learn through their 4-H projects; 87% said they had a clear understanding that 4-H'ers need new challenges, contacts, and opportunities to build their 4-H experience. Leader comments: "We have focused on community service for the first time in our club's history and completed three projects in the first year." "Being new to 4-H is a little overwhelming. These meetings help!"

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State Specific

Key Theme – Urban Youth

a. Description of activity

According to Iowa Department of Education statistics, 38.6% of school age youth live in the seven designated urban counties. The total population of school age youth in Iowa is generally stable, with some decline; however the ethnic diversity of youth continues to increase. According to census data, the population of school age youth of color is increasing, with the largest increase in youth of Hispanic origin. Minority school enrollment is twice the Iowa state average is four of the seven urban counties. There is a continued increase in the number of single parent families in urban counties. A need to increase the math and science skills of all youth has previously been identified. The urban 4-H program must adapt to meet the diverse needs of these young people and their families.

b. Impact/accomplishment

- 42,777 youth participated in 4-H Youth programs in the seven urban counties. This is an increase of 13.4% from FY 2002.

- Programming involving partnerships and collaborations continues to increase resulting in targeted programs for specific community needs. Examples include 21st Century Community Learning Centers; BASICS nutrition education programs; AmeriCorp programs, Tobacco Prevention projects; Growing in the Garden programs, and Positive Behavioral Supports programs.
- Programs specific to science and math activities are conducted in the urban counties. These programs include curriculum in both the physical and life sciences.
- Positive Behavioral Supports demonstration sites are operating in two urban centers – Des Moines (Polk County) and Dubuque (Dubuque County).
- New 4-H clubs reaching underserved audiences were established in Waterloo (Boys & Girls Club) and Sioux City (Latino 4-H Club).
- Personal Development programs to develop life skills were offered in all urban areas. Programming included (but not limited to) the topics of: Anger management, asset building, character education, conflict resolution, nutrition, cultural awareness, drug prevention, gardening, leadership development, money management, and team work.
- Through 4-H, urban youth participated in service learning activities in their communities. These activities included organizing clothing drives for families in need of warm clothes, serving meals at homeless shelters, and cleaning and beautifying community and state parks.

c. Source of Federal Funds – Smith-Lever 3b & c

d. Scope of Impact – State Specific

B. Stakeholder Input Process:

The Iowa Agriculture and Home Economics Experiment Station (IAHEES) and Iowa State University Cooperation Extension Service undertake a wide range of actions to seek stakeholder input and make it an on-going process that encourages participation. These actions occur on many levels and take many forms, both formal and informal. Many of these were listed in the FFY00 report and will not be repeated here. [Incorporated by reference: Plan of Work Annual Report of Accomplishments and Results, Iowa State University, Iowa Agriculture and Home Economics Experiment Station, Iowa State University Cooperative Extension Service, Federal Fiscal Year 2000, Section B. Stakeholder Input Process].

Also, during fall and winter (2003-2004) the IAHEES will conduct a complete review of its projects and resource allocations, and will share the report with stakeholders and solicit Iowans' input to ensure that resources in the Iowa Agriculture and Home Economics Experiment Station are aligned to meet the present and future needs of Iowa, as well as to adequately address current realities in state funding for research. The report assembles information for a snapshot of our recent research. As stakeholders review the information, they will be asked to consider whether we are asking the right questions to meet Iowans' needs and whether resources are adequately aligned to respond to needs.

Below, find examples how stakeholder input, on an ongoing basis, has had programmatic impact.

1862 Research:

- Program 1. Food Crops. Grower Advisory Panels have been set up to guide federally funded research/extension projects on apple and melon pest management

- Program 4. Plant Germplasm:

    - Alternatives to commercial single-cross maize hybrids are being developed in response to requests from farmers who wish to spend less money on seed while maintaining acceptable productivity per unit area of land.

    - The development of soybean varieties with improved fatty acid profiles was supported for decades by Iowa soybean farmers and the Iowa Soybean Promotion Board in an effort to diversity the utility of their crop, add value to their crop and provide a product more beneficial to human health.

    - The Germplasm Enhancement of Maize (GEM) breeding activity was largely initiated through lobbying of Congress by large and small U.S.-based seed companies. The breeding protocols used by GEM are developed and modified through regular communication among the companies and scientists from the USDA-ARS and state agricultural experiment stations. Annual lobbying by a group of companies is critical to the vitality of GEM.

- Program 9. Understanding the Physiological Basis of Animal Reproduction, Growth and Well Being. Received input from numerous stakeholders (including personnel from Merricks. Inc., American Protein Corporation, and Gallo Dairy Farms) regarding design of projects related to passive immunity. Received funding and advise from the Iowa Turkey Federation on a program of research to reduce Salmonella in turkeys.

- Program 10. Genetic Enhancement of Agriculturally Important Animals: This program addressed stated priorities of stakeholder organizations, which are regularly consulted for input. Faculty regularly meet with genetics companies and industry organizations who supply input on important traits and research priorities. For example, selection of research topics in poultry molecular genetics is based on stakeholder input received at the Midwest Poultry Consortium Research Summit, and from consultation with industry breeders. Also, in consultation with swine producers and breeding companies, a program was initiated to examine sow longevity and genetic markers that might predict sow longevity. Research to markers for dwarfism in beef cattle was initiated at the request of the American Angus Association.

- Program 11. Develop and Integrate Nutritional Knowledge to Enhance Animal Production:

    - A 24-member team composed of Iowa cattle producers, Iowa-DNR, USDA-NRCS, faculty from Dordt College, livestock extension specialists and ISU research and extension faculty served as an advisory group to identify project areas of importance to beef cow-calf production to be addressed in the forage grazing research program.

- Cattle producers and other stakeholders participated in development of a request for proposals and in the evaluation of the proposals for feeding distillers grains to dairy beef. A feeding trial was completed evaluating the effects of feeding wet or dry distillers grains on performance and carcass value of Holstein steers.
- Farmers using alternative production systems to produce pork for niche markets participated in roundtable discussions and advisory groups along with representatives from Practical Farmers of Iowa, local research organizations and the Pork Niche Market Working Group of the Iowa State University Leopold Center for Sustainable Agriculture to identify areas of research and educational outreach programs.
- Farmers, ISU scientists, staff from an organic cooperative, and the local RC&D Coordinator are participants in a USDA SARE funded project to support on the farm research to enhance the conjugated linoleic acid content of milk and beef. Input from farmers was the stimulus for submitting a new proposal to USDA SARE to investigate the effects of consumption of milk, milk products and meat produced from grass-based ruminant systems on parameters of human health.
- Companies, a commercial dairy farm and a community-based dairy foundation provided project input and/or facilities for the project on rumen development of young dairy calves.

- Program 13. International Economic Competitiveness:

  - Many small and medium size producers have requested research on alternative production systems consistent with their investment ability and environmental concerns. The hoops project was developed in response to these concerns.
  - The study on air quality was due to a specific request and received funding from the Iowa Pork Producers.
  - The work on PRRS involved members of the National Pork Board and personnel from the National Animal Health Monitoring System.
  - The work on source verification with Chariton Valley Beef was in repose to industry interest in better ways to compete in the cattle market.
  - The work on ethanol plants was in response to requests from producer groups to
  - Work on GMOs has been stimulated in large part by interactions with major export commodity groups and their concerns about losing markets in Europe, Africa, and in some places in Asia.
  - The land value survey was significantly altered as a result of input from various user groups. The cost of production estimates were also adjusted based on comments from various users.

- Program 14. Agricultural Risk and Financial Management: Feedback from USDA, Congressional staff, and the crop insurance industry guided some of research on crop insurance. Data for the panel studies involved cooperation with Iowa Farm Business groups. Issues related to farm program payments and cash rental rates arise frequently in discussions of the beneficiaries of farm programs.

- Program 16. Improving the Quality and Safety of Muscle Foods: Stakeholder input resulted in development of two training programs on food safety for Mount Pleasant Foods. The

training programs were utilized by over 300 people who are responsible for safety of turkey products provided to over 6,000 restaurants.

- Program 20. Sustainable/Organic Agriculture. Organic Advisory Committee meetings were held with organic farmers, industry and Extension stakeholders to obtain input on research and extension needs in Iowa. A discussion on research to date was followed by input about the organic business climate, concerns, and future research needs. Stakeholders requested that research on soybean aphid and soybean rust management be conducted. Stakeholder involvement has increased the applicability of research, including on-going evaluation of the program.

- Program 21. Sustainable and Environmentally Safe Management of Soil Resources.
  - Stakeholders have been directly involved in several research projects of this program. Producers are heavily involved in the execution and management of our tillage and manure project. Annual meetings are held every year with farmers involved with this project to discuss outcomes and to make adjustments to the studies.
  - The Biosolids Committee of the Iowa Water Pollution Control Association (IWPCA) contacted the College of Agriculture with concerns about land application of biosolids. As a result, a pilot project was developed to explore the use of the Iowa P Index as a management tool for biosolids management. In addition, a short course on P and biosolids management was presented at the annual meeting of the IWPCA in September.
  - One research project was initiated as result of private industry interest in compaction research. The farmer cooperator helped to design field operations, allowing smoother field activities to occur. Agronomists within the companies involved worked with us to insure most efficient operations and that suitable information would be collected to meet their needs as well as ours.

- Program 22. Integrated Pest Management:
  - Stakeholder reaction to on-farm demonstration trials that implemented a disease-warning system for sooty blotch and flyspeck on apples convinced us that the warning system, which had been adopted from the southeastern U.S., needs to be modified for reliable use in Upper Midwest orchards. This finding was not evident from trials in orchards on ISU farms, but was clear in results from commercial orchards. This realization resulted in a new research and extension program, funded in 2004-2005 by USDA/PMAP, to refine the warning system.
  - A research program to develop a GIS-based disease advisory system to predict the seasonal and geographical (site-specific) risks for Stewart's disease of corn in seed corn fields was initiated following a meeting with representatives from three seed corn companies. As a result, these three companies agreed to form a Consortium to fund this project.
  - The research to evaluate the effects of commercial products reported to be useful for managing the soybean cyst nematode was initiated after dozens of growers and agronomists who work for seed companies and grain elevators throughout Iowa had called asking if there were any data available on whether the products worked. After the interest was expressed, a proposal was prepared and submitted to the Iowa Soybean Promotion Board to secure funding to conduct the research.

- Program 24. Improving Water Resources Management in an Agroecosystem: The Walnut Creek Project was initiated, in part, by requests from southwest Iowa countries and Hungary Canyon RC&D.

- Program 25.
  - A series of joint seminars were held under the auspices of a joint venture of Iowa State University and the federal Farm Credit Service of Iowa. This effort was comprised of 19 one-day short course seminars with attendance of 2298 farmers.
  - The Iowa Department of Transportation requested a bridge frost forecast system superior to their current method. We have produced a frost forecast model that is superior to current methods as measured by standard statistical forecast evaluation indices.
  - We met with state primary and secondary school teachers at a workshop on the Iowa Environmental Mesonet. The teachers let us know what products would be most useful for K-12 educational purposes. We have modified the format of the Mesonet in response to the teachers' comments.

- Program 27. Rural Development.
  - Consulted with the Iowa Association of Water Utilities to better understand EPA Source Water Assessment Regulations.
  - Interviewed men and women owners of small businesses to help organize research and extension efforts to improve the success of small businesses in Iowa.
  - Worked with farm leaders, extension staff, legislators, and community representatives to improve the Iowa Farm and Rural Life Poll.
  - Worked with community leaders, citizens, and farmers to improve the viability of farmer markets in Iowa.
  - The work in the project is often influenced by stakeholders, including farmers, entrepreneurs, industry, and consumers. Considerable financial support comes from these stakeholders, especially the Iowa Corn Promotion Board and the Iowa Soybean Promotion Board. The NASA FTCSC has an industry advisory board to guide its work and help set priorities.

Extension:

- Program 103. Crop Nutrient Management. Iowa State University Extension is responsible for development and delivery of educational programs to help manure applicators meet state certification requirements as mandated by Iowa law. Iowa State University Extension was approached by commercial manure applicators to help facilitate the organization of a manure applicators interest group and provide leadership in the initial organization of a peer group. The group's goals are by 2003 to have a united voice in addressing environmental concerns, legislation, training requirements and fees, and to become self-sustaining. Fourteen commercial applicators and manure application equipment dealers met three times and formed a legal entity – the Iowa Commercial Nutrient Applicators Association (ICNAA). Legislative and educational priorities were established by ICNNA under the leadership and guidance by Iowa State University Extension. The ICNAA influenced legislation that now allows commercial applicators to have more flexibility in hiring employees and adjusted applicator fees paid for certification programs. The ICNAA organization has also helped

Iowa State University Extension develop training materials and programs by providing input and suggestions, sharing expertise in manure handling and application, and providing equipment resources for field days.

- Program 104. Agricultural Risk and Financial Management. The written materials describing the FSRIA commodity programs were revised four times, and the analysis software program was revised seven times, all in response to comments and questions from users about special situations. Feedback from Farm Service Agency personnel was also valuable for improving the educational program materials. Extension personnel in many counties in Iowa initiated individual consultation services to evaluate farm bill alternatives, at the request of farmers and landowners in their counties.

- Program 106. Commercial Greens Industry. All the programming in Program 106 is at least in part derived from conversations and surveys from current and potential clients.

    - The Amish/Mennonite communities initiated produce auction houses in three areas of Iowa in 2003 to provide an additional marketing channel for fresh grown Iowa fruit, vegetables, flowers, and plants. The founders of the auctions requested help when they found that ISU Extension had research based and practical knowledge on the production of fruits, vegetables, bedding plants, flowers, and potted plants. Program 106 contributed in total, eight educational opportunities and 40 field visits representing 450 participants in three distinct areas of the state.
    - Forestry education for youth. The book 'The Forest Where Ashley Lives' was a well received book put out by Forestry Extension a few years ago. Many adult and youth readers had asked if the book could some how be made more interactive to further enhance interest and comprehension of the book. PM 1812 A, 'The Forest Where Ashley Lives' Interactive CD-ROM, was produced from a Focused Funding Grant by an Extension Forestry Specialist. Thus far this very popular CD-ROM has had demand exceed eleven thousand copies across the Unite States.
    - Third Season for Central Iowa Grape/Wine Meeting Series. Eight monthly grape/wine training sessions were held at Summerset Winery at Indianola Iowa in 2003. A total of 382 people attended these meetings, averaging 48 per session. Monthly and end-of-season meeting evaluations from meetings held in 2002 helped to direct what topics to present during the 2003 monthly meetings. The 2003 meeting evaluations showed excellent ratings from the attendees. Information learned at these meetings was being put to immediate use in their vineyards and/or wineries.
    - Landscape Troubleshooting Tour/Iowa City (September 19, 2003) - Co-sponsored by ISU Extension and the Iowa Nursery & Landscape Association, this day-long event featured presenters from ISU Departments of Entomology, Horticulture, and Plant Pathology, the Iowa Department of Natural Resources, the city of Iowa City, and several from the nursery and landscape industry. The hands-on workshop took participants to a variety of sites in and around Iowa City to view and react to critical problems facing nursery and landscape professionals. The idea for this event was borne out of a series of discussions between Jeff Iles (Department of Horticulture) and several board members from the INLA. So successful was this first "tour" that it probably will become an annual or semi-annual event (the next one is already scheduled for Spencer in the fall of 2004.

- Program 107. Iowa Beef Center.

    - New Farmer-owned Ethanol Plants: Several new farmer-owned ethanol plants are being built in Iowa. The economic success of these plants often depend upon successful marketing of the corn co-products. The Iowa Beef Center developed and delivered a program on corn co-product feeding, storage, and pricing at the request these new plants.
    - Preparing for COOL: The 2002 Farm Bill included Country-of-Origin Labeling (COOL) legislation and mandatory implementation by September 30, 2004. The USDA did not specify a particular record-keeping system to satisfy COOL requirements and producers were asking for a practical method to meet this new legislation. The Iowa Beef Center led the development of practical, low- or no-cost guidelines that meet USDA approval to help livestock producers become COOL compliant. A joint meeting for beef and pork producers was delivered by the ICN to 150 producers and 45 industry affiliates. As a result, knowledge level of participants increased from 2.75 to 3.85 on a 5-point scale, and producers felt they better understood how their operation may be impacted when the COOL rules are finalized and implemented.

- Program 108. Iowa Pork Industry Center.

    - Based on personal communications and continuing professional contact with swine industry representatives, including several of the state's livestock integrators, IPIC has worked with IPPA and faculty from the ISU veterinary diagnostic and production animal medicine department to develop a 12-week program on developing and refining stockmanship skills. The program is divided into three course components, and is set for winter-spring 2004. Registration is open to individual and company swine operation owners, managers, and employees.
    - Responding to producer requests for advanced training and education in the area of swine herd health, the IPIC cooperated with ISU Extension livestock field specialists and Iowa Pork Producers Association (IPPA) to offer five seminars across the state.
    - The past year has seen an on-going challenge from the budget standpoint coupled with retirements of key extension swine personnel. Realizing that industry support is essential for the longevity of our programs, the Iowa Pork Industry Center leadership led a drive to solicit and procure industry support for the gift of start up monies to ensure the availability to fill these key swine extension positions. The Iowa Pork Producers Association committed to this opportunity and as a direct result an established swine extension specialist was hired and is now active in POW 108 activities.

- Program 109. A Mennonite Advisory Committee was established in four counties in NE Iowa, partly in response to serving the educational needs of the approximately 75 Mennonite dairy families in the area. Bi-annual meetings help focus Extension programming on issues the Mennonite families face. These include forages, corn silage, and garden produce raising and marketing.

- Program 142. Integrated Pest Management and Integrated Crop Management: In crop year 2000, several farmers in Plymouth and Woodbury Counties reported significant economic damage from western bean cutworm (WBC). In the next three years, other farmers in the northwest third of Iowa discovered WBC damage, drawing considerable local concern. WBC

infestations have caused up to 50% yield losses in western states, and Iowa producers noticed significant and patchy losses in infested Iowa fields. The ISU extension IPM program responded in 2003 by developing a network of stakeholders who placed and monitored pheromone traps, and immediately shared the data at http://latrodectus.ent.iastate.edu/westernbeancutworm/, a website that allowed for sharing of information so that scouting, and treatment based on that information, could happen.

- Program 143. Pesticide Applicator Training: Stakeholder input is important for the development of the optional topics presented at the commercial and private pesticide applicator training meetings. Each year, the state staff elicits topic ideas from producers and state field crop specialists. The optional programs for the private pesticide applicator training meetings are directly related to current concerns and emerging issues throughout the state. Last year, several emerging insect concerns were addressed, including: soybean aphid, bean leaf beetle, and western bean cutworm. These programs emphasized proper identification of the pest, accurate scouting techniques to determine pest populations, use of thresholds to make sound management decisions, and implementation of safe and effective management practices.

- Program 145. Farm Safety: Iowa State University has developed and maintains cooperative relationships with Iowa Center for Agricultural Safety and Health (I-CASH) at the University of Iowa, the National Education Center for Agricultural Safety (NECAS) at the Northeast Iowa Community College, and other farm safety focused organizations. These organizations have input mechanisms for stakeholders that are used in developing the farm safety programming. Iowa State University Extension Farm Safety Leader also uses an advisory group that has members who are farmers, insurance company representatives, equipment dealers, health departments and health care professionals. This informal group advises the farm safety program leader as to the priority of needs and serves as a transfer mechanism to distribute safety information through their organizations and out to the population they represent.

- Program 147. Sustainable/Organic Agriculture: Organic Advisory Committee meetings were held with organic farmers, industry and Extension stakeholders to obtain input on research and extension needs in Iowa. A discussion on research to date was followed by input about the organic business climate, concerns, and future research needs. Stakeholders requested that research on soybean aphid and soybean rust management be conducted. Stakeholder involvement has increased the applicability of research, including on-going evaluation of the program. A survey of 400 producers was conducted to provide guidance and priorities on research and Extension activities.

C. Program Review Process:

There has been no change in the review process.

D. Evaluation of the Success of Multi and Joint Activities:

0) Did the planned programs address the critical issues of strategic importance, including those identified by stakeholders?

The planned programs were based on input from stakeholder groups and scientists who identified the most critical issues. In many cases, stakeholders are involved in the implementation of applied research efforts and educational/demonstration programs. In other situations, stakeholders through their commodity groups, provide additional funding to address issues of strategic importance.

0) Did the planned programs address the needs of under-served and under-represented populations of the state?

Examples of work with underrepresented and underserved groups: In general, all research programs have a multicultural group of graduate students.

- Program 3: The program faculty has an active partnership with Tuskegee University to provide laboratory research experience to undergraduates considering agricultural research as a career. This program is funded by a grant from the National Science Foundation to Tuskegee University. The host program designated three students during the summer of 2003 for mentors at Iowa State University. Two of these students were hosted in laboratories of members of this Plan of Work program for eight weeks. Also one of the program members served as the mentor for a minority undergraduate student serving a summer research internship through the ISU program for Women in Science and Engineering. (Other programs also have close interactions with the 1890 and 1994 land-grant institutions and provide research internships for minority undergraduate students.)

- Program 4: An increasing segment of producers and consumers prefer GMO-free varieties of crops. The development of such varieties is emphasized by this program. Such emphasis serves minority populations and creates markets for their crops because most of the U.S. soybean and maize crops are not GMO-free.

- Program 10: As part of a joint of a USDA capacity building grant at North Carolina A&T University, a seminar was given in a biotechnology symposium for 100 minority students and farmers. As part of the Science Bound program, 25 minority high-school students participated in a workshop on animal genetics.

- Program 11: Interacted with six small family farmers in Northeast Iowa while conducting on-farm research funded by a USDA SARE grant.

- Program 13: The Beginning Farmer Center works with small, disadvantaged, and beginning farmers. Hoop systems for pork production are designed to allow those with limited capital get started in swine production and thus are most applicable to disadvantaged farmers.

- Program 16: One educational program, Youth BBQ Fund Day, conducted on November 16, 2002, was directed specifically toward 32 Des Moines, IA inner city minority children. The impacts of this program included a new development of interest in Iowa agriculture and food processing technology by those clients. In addition, six educational

programs were developed and delivered to operators of small and very small meat processing plants in Iowa.

- Program 20: Activities with minority agricultural scientists and stakeholders included continuation of the USDA Organic Transition grant program with Tuskegee University. This program involves researching methods for minority farmers for non-toxic weed management strategies in order to sell crops under a certified organic label. Research has identified poultry litter soil amendments and organic weed management strategies as effective components of organic vegetable systems in the South.

- Program 27: Conducted workshops and training helping low-income persons obtain adequate housing. Iowa Community Voices Program helped Hispanic populations in Iowa develop organizational linkages in their communities. Worked with low-income women as they attempted to provide adequate health care for their families.

- Program 28: Stone reported survey data analyses that concerned responses from older women. Stone found many similarities in understanding of sun safety strategies among younger and older consumers, but that many lacked knowledge about use of textiles for sun protection. Damhorst is exploring minority consumer use of and attitudes toward the Internet for shopping as part of the NC-222 project.

- Program 29: NASA-FTCSC Outreach Mission Specialist, Dr. Aubrey Mendonca is leading the center's efforts to build ties with Tuskegee University and other 1890 Universities. He visited two 1890 Universities this past year and has several visits scheduled for the coming year.

- Program 30: The research programs on child care quality, risk and resilience among the rural elderly, intergenerational caregiving, and rural transportation for employment all include subpopulations that have physical or mental disabilities. Also, the rural transportation study is focused entirely on individuals with limited resources.

The following examples provide support to the fact that ISU Extension is committed to working with traditionally under-served and under-represented populations, and in doing that works closely with researchers at ISU and across lines in multi state efforts:

- Program 104: All farm operators and landowners in Iowa were required to enroll in the 2002 FSRIA commodity program in order to receive benefits. Special care was taken to contact senior citizens who owned farmland, and explain the choices and consequences to them, through newsletters, press releases and direct mailings.

- Program 106:

    - The Greens committee supported the diversity garden projects in four communities (Red Oak, Lenox, Osceola, Marshalltown) in counties with increasing Hispanic populations. These involve about 36 families and over 130 clients of all ages. Impacts included more than $15,000 per year in estimated value of produce harvested and consumed by the families or sold at local farmers markets. Greens committee

members produced 15 horticulture Extension publications in the Spanish language that are now available in hard copy from county Extension offices and from Continuing Education and Communication Services, as well as on the Internet at the ISU Extension publications website <http://www.extension.iastate.edu/pubs/ga.htm>.

- The Amish/Mennonite communities initiated produce auction houses in three areas of Iowa in 2003 to provide an additional marketing channel for fresh grown Iowa fruit, vegetables, flowers, and plants. Many of the producer participants were new or had limited experience in produce production. Most had no previous contact with Iowa State University. An ISU Extension Commercial Horticulture Field Specialist, helped educate them at five meetings and 24 field visits representing 325 participants. One of the more experienced Amish growers who had moved to Iowa a couple of years ago from Pennsylvania said that the Commercial Horticulture Field Specialist was the only person he had met in Iowa that knew anything about growing vegetables.

- Program 107: Many Iowa Beef Center activities are with limited resource clients, farm couples, and female producers. For example, the Chariton Valley Beef program targets smaller cattle operations to help producers effectively combine their animals into large group sizes (e.g., truckload lots) before selling and/or assure greater market access. Additionally, Calving Time Management Schools were targeted at part-time or low-resource producers by holding the meetings on evenings or weekends to accommodate producers with off-farm jobs. In addition, this program was taught at entry-level for the less-experienced producer and was attended by several women and young/future producers.

- Program 109:

  - A Mennonite Advisory Committee was established in four counties in NE Iowa, partly in response to serving the educational needs of the approximately 75 Mennonite dairy families in the area. Bi-annual meetings help focus Extension programming on issues the Mennonite families face. These include forages, corn silage, and garden produce raising and marketing..
  - Larger dairy farms are utilizing Latino/Hispanic workers in order to meet the labor needs of the operation. This presents challenges due to cultural and communication problems. To date, two one-on-one on-farm programs have been conducted where the information was delivered in Spanish. Topics included milk quality, parlor management, cow handling, and English as a second language. Demand for this type of program delivery is increasing as producer/owners see it as a valuable way to improve the efficiency of their operation, as well as breaking down cultural and language barriers.
  - Three dairy women peer groups and 2 dairy producer peer groups were active in NW Iowa in FY03, involving 46 farms. Participants indicated that their involvement improved their quality of life by putting them in touch with others dealing with similar challenges in managing a dairy farm, and improved self-image by realizing a sense of belonging to a profession.

- Program 146: Use of a captionist to provide closed captioning on the state-wide interactive video conferencing system (the Iowa Communications Network, ICN) and

hearing assistance devices for class-on-campus experiences allowed two hearing-impaired individuals to successfully complete the Iowa Master Gardener Program, which trains more than 700 adults per year to become Master Gardener volunteers. These changes have opened the doors for those who are hearing impaired to expand their knowledge of horticulture and in turn help instruct others who may be hearing impaired. The volunteers continue to serve their community through horticulture volunteer service.

- Program 147: Activities with minority agricultural scientists and stakeholders included continuation of the USDA Organic Transition grant program with Tuskegee University. This program involves researching methods for minority farmers for non-toxic weed management strategies in order to sell crops under a certified organic label. Research has identified poultry litter soil amendments and organic weed management strategies as effective components of organic vegetable systems in the South.

- Housing Fair & Power Pay Analysis. Buena Vista County businesses and agencies are concerned about their growing Hispanic population and its treatment in the housing market. A Housing and Information Fair was organized after a Spanish language service at church for attendees to gain information and ask questions. Approximately 1200 people attended. Six months later, three families sought financial analysis from ISUE by using Power Pay. One visitor asked for assistance in paying off creditors, and another requested more information on savings.

- Food Safety Training for New Food Processing Plant. Mt. Pleasant Foods (Iowa Turkey Growers Coop) wanted assistance from ISUE in developing and delivering Food Safety Training to potential, corporate and current employees in Sigourney and West Liberty.
  - 21 corporate employees received the 3-day training and passed the test with a score of 88% or higher.
  - 54 of 55 potential employees received the training and passed the test with a score of 90% or higher.
  - ITGC has elected to continue with the program and include ISUE personnel in delivery.
  - Extension receives ongoing reimbursement for program delivery and is negotiating to develop a Phase 2 and Phase 3 Food Safety Training program.

- Hispanics United for Perry (HUP) Builds Leaders. Hispanics participated in focus groups in Perry, Iowa to determine needs of migrated families to the rural community. As a result, HUP (Hispanics United for Perry) was formed to increase citizen participation amongst Hispanic immigrants, reduce language barriers and increase parental involvement within the family structure. Four leadership classes were taught in Spanish: instruction on ways to tell one's personal story to promote intercultural understanding, personality characteristics and strengths to be used in various types of community work; ways to deal with controversy and the role personal values play in disagreements, and community resources involving health care. Participants learned what to do to become a board of education or city council member. Changes in participant community involvement are being tracked.

- Layoff Seminars Help Henry County Families Cope. Workforce Development contacted Henry County Extension for assistance in providing financial seminars on basic money management, budgeting, credit and credit reports, debt management, and communication with family to laid-off workers, due to plant closings in Henry County. Extension provided four seminars to eleven individuals on needed topics. A three-month follow-up revealed that all had: completed at least one item on their things to do list to improve their financial situation; communicated with family members about way to make life less stressful; verified the seminar provided useful information; would recommend the program to others. Ten identified spending leaks and cut back on expenses. Five established a spending plan; 2 cancelled unused credit cards.

- Pre-release Financial Education for Inmates Multiplying Extension's Inputs. Individuals incarcerated for a period of years face many challenges when released, one is to successfully manage money. Staff of the Fort Dodge Correctional Facility began pre-release education for inmates and sought assistance from ISUE to provide the money management component.

  Beginning in the fall of 2001, 2-hour workshop gave inmates practice in making financial choices and recognizing the consequences. Correctional staff concluded that additional time for money management education would be helpful. It was revised to include six hours of money management instruction and nutrition information.

  Nearly all inmates (N=116) responded positively during the workshops and staff report inmates' comments show they are applying many principles taught. Inmates are from all over the state but follow-up evaluation will only be possible for inmates released to Polk County residences, due to funding. Even without formal evaluation, it is clear this effort is contributing significantly to individual, family and societal well-being.

- DADs Groups. Non-custodial fathers face many challenges that limit interaction with their children. ISUE Family Life Specialist, with a team of community agency staff, worked to design fathers-only parenting classes. The first DADS group was held in June 2002, funded by a Bureau of Collections grant. It includes importance and uniqueness of fathering and benefits for children, father/child activity ideas, child development, guidance and discipline, anger management, and communication skills. It has reached over 50 fathers. Fathers say they spend more fun times with their families, wait to deal with problems until calm, teach problem solving skills to children, read to children several times a week. Other counties are pursuing similar programs.

- AgrAbility Program. 105 farm families received technical assistance to accommodate their disabilities, improve farming operations, and enhance living environments through the Iowa AgrAbility Project, a collaborative effort with the Rural Solutions Program of Easter Seals Iowa. More than 850 Iowa farm families affected by disabilities have received assistance since the Iowa AgrAbility Project began in 1991. ISUE has received nearly $1.5 million in competitive grants from USDA for this effort during the past 13 years.

- Nearly 6,000 people learned about assistive technology and ways to improve farm and home accessibility at 111 education and awareness events throughout Iowa during 2002-03.
- 10 veteran AgrAbility consumers were trained as "Neighbor-to-Neighbor" volunteers to provide support and encouragement to newly disabled individuals.
- 12,244 unique users visited the Iowa AgrAbility Web Site to lean ways to make improvements to their home and farming operation to accommodate a disability.

0) Did the planned programs describe the expected outcomes and impacts?

The planned programs developed specific outcomes that would occur over a period of five years. In some programs, outcomes and impacts have occurred in the first year but many impacts will occur throughout the five-year period and beyond. Under each Goal, specific progress towards the outcomes and impacts are documented.

0) Did the planned programs result in improved program effectiveness and/or efficiency?

At ISU, research and extension programs have had a historic and strong connection that increased the effectiveness of both programs. In most programs, the results of extension education and demonstration activities inform the research agenda while all extension education programs are research-based. Specific examples of the effectiveness of integrated programs are described under section F of this report.

E. Multistate Extension Activities:

3. NELD

The National Extension Leadership Development Program (NELD) was created to enhance leadership in Cooperative Extension at all levels and to provide current and future extension leaders with the vision, courage, and tools to deal with a rapidly changing world. This program is a part of extension's overall national leadership effort. During FY 2003, Iowa Extension supported the National NELD program with a payment of $3,687. There is also a NELD program supported by extension in the North Central Extension region of the country. In addition to the National NELD program, Iowa Extension has staff currently participating in the North Central NELD Program. Expenses paid by Iowa for these staff amounted to $14,254 during FY 2003.

3. North Central Regional Center for Rural Development

The North Central Regional Center for Rural Development (NCRCRD) is a cooperative program among the 12 states in the North Central Extension region. NCRCRD initiates and facilitates rural development research and education programs in the region. NCRCRD also provides regional and national leadership in rural development by identifying, developing and supporting programs on emerging issues. Iowa Extension supported the multi-state work of NCRCRD through a payment of $2,553 during FY 2003.

3. Agriculture and Natural Resources Extension Program Director

The Senior Associate Dean for the College of Agriculture spent time during FY03 on national and regional programs/activities. These activities included a regional dairy conference and a series of teleconferences to develop a proposal for joint research, extension and teaching programs in dairy. Other activities included serving as administrative advisor to NCR-201 (a joint extension and research north central committee), serving as a representative to the North Central IPM Center (a joint extension/research center), serving on the Board of the North Central Regional Community and Rural Development Center (a joint extension/research center) and serving on the committee to establish extension and research programs through the National Swine Research and Information Center. This represented about 6% of the Senior Associate Dean's time, which as equal to $9,015 in salary during FY03.

The State Director for Extension Agriculture and Natural Resources (ANR) programs in Iowa spent time during FY2003 on national and regional programs/activities. These activities included sustainable agriculture, integrated pest management, pesticide application training and general ANR program coordination among the state ANR program directors. This represented about 9% of the ANR Director's time, which was equal to $10,754 in salary during FY2003.

The Associate Dean for Extension Programs and Outreach spent time during FY03 on national and regional activities. These activities included serving as the administrative advisor to NCR-3, Soil Survey, and NCR-59, Soil Organic Matter: Formation, Function and Management. Also, represent the Dean, College of Agriculture, as the administrative advisor to NCR-9, Midwest Plan Service. Other activities include serving as a member of the Board of Directors for: 1) the National Center for Manure and Animal Waste located at North Carolina State University, 2) the Animal and Poultry Waste Management Center at North Carolina State University, 3) the North Central Regional Aquaculture Center and, 4) serve as a committee member to NCT-193, Research and Education on Watershed Nutrient Sources and Management as Related to Water Quality. In addition, represent the 4-state Heartland region to the USDA CSREES National Water Quality Program. These activities represent about 5% of the Associate Dean for Extension Programs and Outreach time, which is equal to $5,868 in salary during FY03.

3. Families Extension Program Director

The State Director for Extension Families programs in Iowa spent time during FY 2003 year on national and regional programs/activities. These efforts included service on the SAMHSA Rural Mental Health Policies Review board; work in support of the National Network for Children, Youth and Families; assistance with spreading the Iowa Strengthening Families Program nationwide; the Housing Maintenance Hotline; the Iowa/Minnesota coordination of Answer Line; the development of a purchase agreement by the North Central Region states for the ROWEL Poverty Simulation (not successful); support for hosting the national satellite program for USDA/CSREES on long term financial security; and the hosting of the national satellite program on parenting and diversity. These activities represented about 8% of the Families Program Director time in FY 2003.

3. 4-H Youth Extension Program Director

The State Director for Extension 4-H Youth programs in Iowa spent time during FY 2003 on national and regional programs/activities. The Director served on the National 4-H Council Board of Trustees and the Associate Director served on the National 4-H Cooperative Curriculum System Board of Directors. Other activities included national and regional meetings with ongoing efforts in the areas of staff development, volunteer development, curriculum development, and science education. This represented about 5% of the Director's time and 3% of the Associate Director's time, which equals $8,170 in FY 2003.

3. Director of Extension

The Director of Extension for the state of Iowa is involved with many national committees dealing with Extension activities. Time was spent attending and making presentations at meetings with NASULGC, ECOP, BAA, and NEDA. During FY 2003, salary paid for multistate extension activities totaled $8,928.

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: Iowa State University
State: Iowa

Check one: X **Multistate Extension Activities**
____ **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**
Midwest Plan Service	22,248	22,248	22,248		
NELD	10,899	22,034	21,144	18,211	
North Central Regional Center for Rural Development	2,553	2,553	2,553	2,553	
Pork Industry Handbook	7,926	7,926	7,926		
Ag Prog Director (National & Regional Resp.)	10,500	11,000	10,900	25,637	
Families Prog Director (Nat'l & Regional Resp.)		7,892	7,988	8,386	
Youth Prog Director (Nat'l & Regional Resp.)		7,519	7,688	8,170	
Director of Extension				8,928	
Total	54,126	81,172	80,447	71,885	

Director **Date**

Form CSREES-REPT (2/00)

F. Integrated Research and Extension Activities:

Hatch Act Funds:

A significant portion of our integrated activities is determined by participation of faculty with split (research/extension) appointments in multistate activities. Occasional adjustments are made in faculty appointments, and from time to time the Iowa representation on and participation in multistate activities changes. Thus, some unplanned movements in resources have and do occur. While the overall expenditure of resources for integrated activities meets our planned commitment, there is some shifting among the various programs and activities.

Brief statements follow on the integrated activities funded from Hatch funds:

Food Crops (Program 1):

- Funds were used to purchase research equipment (which was needed to better understand the physiology of critical food crops) for Drs. Paul Domoto and Kathleen Delate, who give numerous extension programs/presentations in the food crop/sustainable area.

Crop Production and Management Strategies (Program 5)

- New thrusts to incorporate applicable research to production issues were established. The Crop Advantage Series brought ISU research to more than 1700 Iowa farmers. Soybean yield issues were discussed at length and an aggressive effort in soybean research and outreach was established. Concerns about weed management in corn and soybean continue to surface and programs to understand the evolution of herbicide resistant and adapted weed species continue to provide Iowa Agriculture with practical information. Also issues about trait introgression were addressed. Fertilizer research provided Iowa growers with optimum amounts of nutrients to maximize production efficiency and profitability. Evaluations of soybean varieties, particularly genetically modified varieties were conducted across Iowa. Information resulting from the research was used to generate extension publications, production recommendations, and bulletins. Meetings were conducted to provide growers with this information, field days were scheduled across Iowa, and questions answered via the telephone and email.

Green Industry (Program 7)

- These funds were used to support a program that allows Iowans to gain unbiased information from a team of green industry experts at the university. Research information is disseminated at the Turf Field Day, the Iowa Turfgrass Conference and the Shade Tree Short Course.

Develop and Integrate Nutritional Knowledge to Enhance Animal Production (Program 11)

- Integrated activities included research on alternative swine production systems, a rapidly expanding national movement. Grass-based production of milk and beef was shown to be an effective management system for increasing the conjugated linoleic acid content of milk and beef, allowing producers to add value to milk and beef in niche markets. Stakeholder groups have benefited from the education on the management of grazing to increase profitability and

to reduce environmental degradation. Outputs included invited national and international presentations to targeted audiences of agribusiness and university scientists, and publications in trade and scientific journals on research results. Training programs transferring research results educated more than 300 producers, extension and agency personnel.

International Economic Competitiveness and (Program 13)

- Exploring and explaining the effects of the 2002 farm bill on the competitiveness of U.S. agricultural products has been a major effort by Center for Agricultural and Rural Development. The combination of crop insurance and commodity program payments has largely insulated many U.S. crop farmers from the effects of adverse market and weather conditions. CARD helped Senate and House Agricultural Committee staff understand that this insulation has increased the competitive position of U.S. crop farmers and that there is less need for yearly ad hoc disaster payments. These results were presented at multiple extension meetings around Iowa.

- The *FAPRI and U.S. and World Agricultural Outlook* is available at the FAPRI website www.fapri.iastate.edu. In 2003 the Center for Agricultural and Rural Development developed a searchable database of the historical data that serves as the basis for the FAPRI projections. Historical data on production, stock, consumption, trade, prices for multiple commodities for more than 70 countries and regions is now available on the FAPRI website.

- Four issues of the *Iowa Ag Review* synthesized a portion of the economic competitiveness research. The Iowa Ag Review is disseminated on the CARD website www.card.iastate.edu and mailed directly to more than 5,000 users. A new effort to notify potential *Iowa Ag Review* readers with articles of interest was begun in 2003.

- A potential source of a lack of competitiveness of U.S. meat exports is the advances that other countries have made in moving toward an animal identification system. Case studies of these advances in Canada, Norway, Denmark, New Zealand, and Australia were conducted. The information collected in these case studies facilitated ISU's response to requests for information about the impacts of the finding of BSE in Canada and the impacts of the United States adopting Country of Origin Labeling regulations.

Agricultural Risk Management (Program 14)

- Increased crop insurance premium subsidies have increased farmers' purchases of low-deductible crop insurance policies. This response of producers allowed estimation of the importance of crop insurance in meeting producers' risk management needs relative to the importance of crop insurance in providing additional farm income. Congressional staff of the Senate and House Agricultural Committees were briefed on the estimates made by Center for Agricultural and Rural Development researchers on the relative importance of these two benefits.

- Iowa cow-calf producers face the vagaries of weather without the benefit of an insurance safety net. Guided by input from Iowa cow-calf operators, researchers in the Center for Agricultural and Rural Development have undertaken an effort to design a new weather-

based insurance product that can cover the financial risk caused by inadequate pasture conditions.

Food Safety (Program 17)

- Integrated activities included research with swine to determine the importance of timing of specific processes on the quality of pork and operating efficiency. Several large pork plants have utilized this information to improve the handling of their products. Other stakeholder groups have benefited from studies of antioxidant properties of a natural rosemary extract in its inclusion in fresh sausage products as an alternative to synthetic antioxidants. Stakeholder groups are benefiting from demonstrations of how a low-value pork meat component may be used to improve texture of processed meat products, and providing consumers with better products at a lower cost. Outputs included many invited national and international presentations, as well as publications of research results in both trade and scientific journals. Training programs transferred food safety information to more than 300 people, and short courses transferred information on improved meat quality and safety to more than 2000 people in industry.

Improving Human Foods (Program 18)

- Outreach efforts to cider producers have assisted them in implementing good manufacturing practices (GMP), standard operating procedures (SOP), and hazard analysis critical control points (HACCP) plans. Three videos were completed on preventing apple cider food-borne illnesses and HACCP. Implementation of the HACCP plans increased the shelf life of raw and pasteurized ciders (with and without preservatives). A cider quality project studied shelf-life characteristics of natural and irradiated products and a sensory project addressed possible flavor changes following irradiation bacterial-decontamination treatment. Dr. Wilson and his colleagues have worked directly with Iowa Cider Producers to develop strategies for safely processing apple cider that will work for Iowa processors.

- Methods were developed and adopted by an Iowa company to toast full-fat soy flakes for food ingredients, and to utilize the flakes in reduced-fat soymilk production. Optimization of a blanching process for Edamame soybeans was completed and the technology has been transferred to several frozen-food operations. As part of the NASA Faculty Fellowship Program, a soybean cultivar and a Soymilk, Tofu, Okara, Whey Processor (STOW) processing system was evaluated for Lunar and Mars Mission applications. The results of this study have been adopted by NASA. Dr. Wilson works with the Iowa companies and Dr. Pometto works with NASA to help get the Iowa soybean products developed to meet the needs for space travel.

Soil Resources Management (Program 21) and Sustainable Agriculture

- Integration continues through cooperative research/extension planning and execution, field days, resource sharing and participation in cooperative trainings and publications.

Integrated Pest Management (Program 22)

- Department of Entomology: A corn rootworm project on area-wide pest management evaluated the coordinated efforts of producers in 16-square-mile areas to eliminate soil-applied insecticides. Aerially applied insecticides for adult rootworms were utilized instead. Research on two major soybean pests also integrated research and extension efforts by our faculty and staff. The bean leaf beetle effects on soybeans early and late in the season were evaluated, as were control strategies and over-wintering success of the beetle. The effectiveness of the beetle to vector the pod mottle virus among soybean plants was also a focus of the integrated research. The other major pest addressed was the soybean aphid. Sampling, damage thresholds, control methods, and over-wintering were topics of the research/extension program.

- Dr. X.B. Yang:

    - Computer simulation has been done to model the potential dispersal of soybean rust from South America to North America. The potential arrival and survival of soybean rust in North America was determined through computer modeling and risk maps of soybean rust survival have been generated and published. This research generated information critical for the ability of the soybean industry to manage the risk of rust. At the request of industry (Agronomy Society of America, seed companies, Iowa soybean producers, Iowa Soybean Promotion Board), numerous extension meetings have been conducted at regional, state and national level to disseminate the information to the producers and agriculture business people.
    - A pre-season soybean white mold regional warning system has been developed and published. With further validation and evaluation, the system could be used for producers to make disease management decisions months before a growing season.

- Dr. Greg Tylka:

    - Public and private soybean varieties were evaluated for agronomic performance and resistance to the soybean cyst nematode, and the results of these experiments were made available to seed companies and the public through an ISU Extension publication, in a special insert in the statewide grower magazine titled Iowa Farmer Today, and on an ISU web site (www.isuscnvarietytrials.info).

    - Numerous soil amendments currently being sold in Iowa for use in managing the soybean cyst nematode were tested in a field experiment for effects on soybean cyst nematode and soybean growth and yield. The results of these experiments were presented to growers at Extension and agribusiness meetings conducted throughout Iowa and used to answer questions posed by growers and agribusiness personnel in one-on-one conversations.

Animal Waste Management (Program 23): Funds set aside for integrated activities provide support for faculty in the Department of Agricultural and Biosystems Engineering.

- Jeff Lorimor: Primary activities were 1) publication of manure treatment and odor control white papers, and 2) work toward achieving acceptance of alternative technologies for control and mitigation of pollution potential of open feedlot runoff. The white paper activities included primarily leading a multi-university team to summarize past research and extension

efforts to publish the papers. Research into the feedlot runoff alternative technologies provided information used to work with EPA and Iowa DNR personnel to convince them that the alternatives provide equal pollution protection to traditional total containment systems

- Stu Melvin: Stu is participating in the effort to enable open lot animal feeding operations to utilize alternate technologies rather than conventional (storage basin and irrigation) systems to control runoff from feedlots. This has included working with computer models to simulate feedlot hydrologic conditions and to develop criteria where alternative systems can be utilized. A proposal for constructing 6 alternative feedlot sites has been submitted to NRCS and a monitoring component for this has been submitted to EPA during the past year.

- Thomas Richard: This project's research addressed the challenges of efficient and cost effective utilization of the nutrients, energy, and fiber that are embedded in manure. Several projects address critical control points in manure handling systems, including management and maintenance, as well as technical needs such as more accurate manure application equipment. Promising alternatives ranging from anaerobic digestion to bedded manure handling systems have been critically analyzed with respect to both environmental impact and economic cost.

  An economic feasibility analysis of anaerobic digestion systems for Iowa livestock demonstrated limited opportunities for this technology under current energy price and policy constraints. Dairies have the most potential, becoming feasible in the range of 250 to 500 cows, while swine systems require 5000-20,000 head to achieve economies of scale. Policy analysis indicated green power premiums and other financial incentives are needed to significantly increase the number of economically viable anaerobic digesters in Iowa. Our group demonstrated the first U.S. use of tracer gases to quantify ammonia and greenhouse gas emissions from naturally ventilated livestock buildings, as part of a nutrient mass balance study of swine hoop structures. A key finding of this research is that the majority of manure bedded pack N losses are in gaseous forms, including NH3, N2O, and N2. These losses provide a benchmark and incentive for development of new management systems to reduce this environmental impact. Work with hoop structures directly targets the small farm owners who preferentially adopt this technology. 10 such farms have collaborated through on-farm research.

Improving Water Resources Management in an Agroecosystem (Program 24)

- Yimin Liang has been involved in the last year with the Iowa Lakes Project, funded by the Iowa Department of Natural Resources and the USEPA. He has helped with virtually every stage in the design and implementation of the surveys conducted over the past year. The lakes project is aimed at investigating the usage of and value placed on Iowa's lake resources. As part of the project, two surveys have been conducted to date, one for 2002 and one for 2003. The development of the surveys have involved interactions with local community leaders (e.g., Clear Lake and Storm Lake) and with the Iowa DNR, to better understand the local issues regarding the lakes and the information that will be of most use to resource managers and regulators. The project is investigating the extent to which physical water quality measures are important to Iowans in choosing which lakes to visit. Results to date indicate that Iowan's place considerable value in Iowa lakes and that they do alter their

visitation patterns based on physical attributes. Roughly 62% of Iowans visit lakes on an annual basis, with the average number of visits per year of over eight. Based on our preliminary analysis of usage patterns in 2002, the average Iowan household would be willing to pay nearly $5 annually to remove all of the lakes from the impaired water quality list (for a total state-wide willingness to pay of $5.6 million annually). However, it is also clear that Iowans would be willing to pay considerably more for substantial improvements to lakes (i.e., beyond simply getting them past the minimum impaired water quality standards). The information from the surveys was quoted extensively by the head of the Iowa DNR at Government Tom Vilsack's water quality summit.

Rural Development (Program 27)

- Beverlyn Allen (with Lois Wright Morton collaborating) coordinated a survey to determine the extent of and training needs for shared leadership in 114 Iowa communities. Groups surveyed included fire and rescue services, the United Way, churches, community Empowerment Boards, Chambers of Commerce, Soil and Water Conservation District offices and offices of Human Services. Several types of training for expanding shared leadership among volunteer and paid staff for were identified. The survey showed that there was considerable openness to a shared leadership perspective, but that a significant minority of staff members was in need of sharpening skills that are essential for implementing shared leadership. The results were presented in a Sociology Extension technical report that was distributed to field staff (all CEEDS and Extension to Communities staff). We believe that in some cases the training recommendations have been acted on.

- Betty Wells took the lead for ISU Extension on the Cass County Women Landholders Project, which conducted research on women landowners in Cass County in order to strengthen outreach to women landowners (who at the time the project was conceived, in both Iowa and the nation, were leasing agricultural land in greater numbers that men) by increasing understanding of their needs, management practices, and decision-making processes. Among the outcomes were the creation and strengthening of local networks and partnerships, emergence of new leadership, enhanced gender sensitivity on the part of local agencies, and the development of a model that could be applied in other counties or communities. Impacts included the creation of a space in which women were able to voice their concerns, share ideas and gain needed information. It is now serving as a model for similar projects, local and statewide.

- Food in Your Community is a research/outreach project coordinated by Lois Wright-Morton in Sociology with full collaboration of the CEEDS and Nutrition field specialists in the counties where the project was conducted. The goal of the study was to assess the food environment – the normal food system (grocery stores) and safety net institutions –, patterns of food shopping, food insecurity, and health. County extension offices worked closely with the research team in conducting the Food in my Community project. This gave Extension the opportunity to provide a discussion forum (focus groups) for community leaders regarding food issues low income residents might be experiencing related to the food environment. Local extension offices will use these reports to work with local organizations (e.g., food pantries, churches), food system businesses (grocery stores, farmer markets, and farmers), government agencies (WIC, food stamps, Office of Elder Affairs), and community groups

(health alliances, transportation committee). In addition, this report provides the opportunity for extension to link farmers and farmers' markets to the normal food supply needs of elderly and low-income households.

Value Added Agriculture (Program 29)

- An internet website (www.ag.iastate.edu/centers/ccur) was maintained and a quarterly electronic newsletter was published to disseminate advances made in developing value-added products from corn, soybeans and other Midwestern-grown crops. Approximately 60 different economic development groups, industry client groups and international visitor groups were hosted to educate them on opportunities to add value to agricultural materials. A display on value-adding opportunities was maintained and taken to several conferences. Sets of processing sample cards were produced to assist with a variety of educational programs for students, extension personnel, and other interested parties to enhance their understanding of processing opportunities to add value. Artwork on value-adding opportunities for various book chapters and scientific journal publications was developed.

- In cooperation with Genencor International (Palo Alto, CA), enzyme technologies were developed to enhance soy protein products. Enzymatic hydrolysis produced protein hydrolysates with improved adhesive properties. This hydrolysis procedure is much more environmentally friendly than the traditional alkaline hydrolysis method, and an Iowa company is interested in commercializing the hydrolysis process to make soy protein adhesives for building products. Genencor provides enzymes directly to Dr. Murphy and Johnson for testing and Genencor works with Iowa companies to develop uses for the technologies.

Activities:

Grain Quality

- NC-213: In 2003 the corn stewardship poster project was expanded to include nine Midwestern states and a national website. Thirty-seven partners from university extension programs, corn producer organizations, grain handler associations, and three seed companies cooperated on the project that promoted the channeling of Market ChoicesSM corn. NIRGrainNet software was tested, using corn and soybean samples on which moisture and protein was being measured with 3 Foss Infratec 1225/1229 analyzers. Spectral data and predictions on three models (PLS, LWR, and ANN) were reported in real time and compared. The nonlinear models were more accurate than the PLS models, but the best accuracy (25% improvement over any model individually) was obtained by either selecting the best model for each sample/constituent situation or by averaging the results of the three models. An Iowa grain company and Iowa State University have created a guideline procedure for upgrading entry level quality management systems to ISO 9000-2000. The ISO system expanded the initial system to include management supervision and feedback, in addition to operationally based requirements. Spreadsheet inventory management and traceability tools were developed. U.S. soybean producers, representing 30 soybean production states, provided 1204 samples of 2003 crop soybeans for protein and oil analysis. Average U.S. protein and oil contents for 2003 were 35.65% and 18.66% respectively (on a

13% moisture basis). These are slightly above the long-term U.S. averages of 35.42 % protein and 18.60 % oil. The variability (standard deviation) within states, regions, and the U.S. was substantially higher than in 2002. There has been virtually no change in soybean quality over the 19 years of the survey despite steady yield increases. Oil and protein are inversely correlated, but with varying magnitudes and statistical significance among years and regions. The tradeoff between protein and oil has ranged from 4:1 to 1:1. About 20-25% of samples in any situation will be above average in yield and above average in total components (protein plus oil).

Seed Science

- The money was spent on communications regarding grant opportunities and preparing proposals, which have been successful.

- Funds were utilized for the Seed Science Center external advisory board members to meet and to provide guidance on strategic issues. The input of the advisory board members is a key consideration on program initiation and implementation for seed quality research and extension issues.

- Research at the Seed Science Center has supported an active extension program directed at seed industry professionals. The Seed Science Center conducted a number of short courses to train industry employees on how best to use sophisticated seed conditioning equipment and on seed quality, health and GMO issues.

Smith-Lever Act Funds:

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

Program 101. Strategic Advantage: Management Development for Iowa's Farm Businesses
Program 104. Agricultural Financial Management

Robert W. Jolly: Research forms the basis of Dr. Jolly's outreach programs in agricultural finance and agribusiness management. His educational and professional development programs are targeted to farmers, lenders, financial regulators, agribusiness mangers, public officials and Extension field staff. The primary means used to transfer research-based information to these client groups are:

- In depth professional development programs such as the Agricultural Credit School: http://www.ucs.iastate.edu/mnet/agcreditschool/home.html
- Targeted short-term training programs directly organized by Extension or by trade and professional associations and private firms.
- Internet-delivered publications and data such as *Choices* magazine: www.choicesmagazine.org/current/2003-4-02.htm
- Distance learning programs and courses such as the Agricultural Management e-School (AMES): www.extension.iastate.edu/ames/
- Direct interaction with print and broadcast media

Dr. Jolly's recent research activities have focused on quantifying the relationships between financial management and the competitiveness of the farm firm and related agribusinesses. Specific projects include:

- Monitored the financial status of Iowa's farm businesses to examine the impact of and their response to changing economic and policy conditions. Farmers and lenders remain concerned about the differential impacts of policy and economic changes on the financial status of farm businesses. This work demonstrated that larger, well-managed commercial farms are growing at significantly higher rates compared to the majority of farm operations.
- Identified and measured the role of specific financial performance factors on the ability of farm businesses to sustain a competitive advantage under varying price and policy regimes. This work was undertaken because of the need expressed by agricultural lenders for sound risk rating systems that can also identify managerial strategies that would improve farm financial performance.
- Developed financial models of value-added agribusinesses to examine risk and returns to farmer-investors, timing of investments in response to anticipated policy changes and dividend policy and its relationship to risk management strategies. Lenders and farmers requested analytical tools that produce objective, independent assessments of value-added investments.

In all of the examples, Dr. Jolly's research projects are driven by the needs of his extension programs and direct interaction with stakeholders. In turn, the research results are directly disseminated through training and informational programs.

Program 106. Commercial Greens Industry (Consumer Horticulture)

Jeff Iles: Research projects led to improved methods of landscape plant installation, enhanced awareness of adapted landscape plant species, varieties, and cultivars, and the development of efficient and cost-effective management techniques that sustain landscape plants and reduce their need for fertilizers and pesticides. Integration between research and extension was achieved by rapidly disseminating this information to industry professionals during Iowa Nursery & Landscape Association functions, Iowa Turfgrass Field Day, Iowa Turfgrass Conference, and the ISU Shade Tree Short Course. Particularly noteworthy was a Landscape Troubleshooting Tour held in Iowa City (September 19, 2003) co-sponsored by ISU Extension and the INLA. The idea for this event was borne out of a series of discussions with the Board of Directors of the Iowa Nursery & Landscape Association. This one-day event featured presenters from ISU Departments of Entomology, Horticulture, and Plant Pathology, the Iowa Department of Natural Resources, staff from Iowa City, and professionals from the nursery and landscape industry. Participants were led to a variety of sites to view and react to problems representative of those facing nursery and landscape professionals.

Mark Gleason: During 2003, Mark Gleason conducted research and extension on crown rot (pathogen: Sclerotium rolfsii var. delphinii), an important disease of hosta, which is the leading herbaceous perennial in the U.S. and is widely grown in Iowa. The research field-tested practical ways to suppress the disease by manipulation of organic mulches, and lab-tested techniques to make breeding for crown rot resistance cheaper and faster. This research was completed in 2003. It has involved significant collaboration with the hosta nursery industry regionally. For example,

Gleason delivered presentations on the research results to the Iowa Hosta Growers Organization in Des Moines in April 2003 and to the Midwest Hosta Hybridizers Group in Ann Arbor, MI in November 2003. He published trade-audience and general-audience articles on the research findings in the Michigan Landscapes magazine and the journal, HostaScience. An emailed note from a stakeholder, in reply to one of these articles, led Gleason to publish another article in HostaScience in late 2003 to explain why he had changed the common name of the disease to avoid confusion with another hosta disease.

Turfgrass research consisted of fungicide trials on both golf course turf and lawn-type turf. Diseases targeted in these field trials in 2003 included brown patch (pathogen: Rhizoctonia solani), dollar spot (pathogen: Sclerotinia homoeocarpa), and fairy ring (various basidiomycete fungi). Results were shared with turfgrass management professionals at the ISU Turfgrass Field Day in July 2003.

Program 107. Iowa Beef Center

Dan Morrical: Efforts in the grazing area during the FY 2004 focused on technology transfer of best management to practices to extend the grazing season. Research results of Jim Russell et al have demonstrated the winter feed costs can be drastically reduced by the incorporation of stock piled grazing into the beef cow production systems in Iowa. This method of production is very nontraditional for producers, and this has required some innovative educational programs to transfer this lower cost of production.

The major shift in delivery has been to redefine stock piled grazing. Efforts in forage research have developed year round grazing systems. However this concept is so out of the box for cow calf producers that winter grazing educational efforts now are described as extending the grazing season versus year round grazing. Educational presentations on grazing management were made at several pasture walks in Iowa. Additionally, stock piled grazing of bred heifers was presented at the Iowa Forage and Grassland Conference. Beef specialists are actively involved in the Leopold Animal Issue Team which has identified research priorities for cow calf producers in Iowa. Furthermore we have been heavily involved in research project design. Lastly efforts to more rapidly transfer research findings to producers are being accomplished through publication of the Iowa State University Animal Industry Report available via the web or by CD.

Dan Loy: The Iowa ethanol industry continued to be a major emphasis for the extension beef program. Meetings were conducted in cooperation with Midwest Grain Processors of Lakota, IA and Tall Corn Ethanol in Coon Rapids reaching over 100 producers. Additional presentations were made on the topic of feeding ethanol coproducts to beef cattle at the Corn Belt Cow-Calf Conference, the Iowa Farm Bureau Beef Advisory Committee and several local and area cattle feeders meetings. Completed a chapter in the book Corn: Chemistry and Technology on feeding corn and corn coproducts to livestock. Demonstration projects evaluating storage and consistency of the wet coproducts were continued. These programs were coordinated with on campus research led by Dr. Allen Trenkle. This program is expected to continue to be an area of emphasis for the foreseeable future with more plants under construction in West Burlington, Mason City, Hanlontown, Iowa Falls, Aston, Steamboat Rock and Denison.

A cattle feeders shortcourse was conducted through the summer at the Armstrong Farm in Lewis Iowa. Participants met approximately monthly to learn topics related to efficent feedlot beef production by following pens of cattle thought a feeding cycle. A demonstration trial was developed with input from shortcourse participants.

Program 108. Iowa Pork Industry Center

Tom Baas: Pork quality is an important issue in an ever-changing pork industry. Improvement in quality traits offers numerous opportunities for niche and value-added markets to expand their production. An important challenge is the development of genetics that will excel in quality traits and also be above average in production and carcass traits. The National Barrow Show Progeny Test, conducted by Hormel Foods Corporation in cooperation with the National Association of Swine Records, has tested and evaluated pure breeds and lines for 13 consecutive years. Under the leadership of Dr. Baas, ISU has assisted with data collection, meat quality evaluation, and compilation of final results. In 2003, this test was moved to the Iowa Swine Testing Station under the direct supervision of Dr. Baas and his graduate students. Research results have been presented at numerous extension programs and have been used to advise producers regarding choice of genetics and breeding programs. The test will be conducted again in 2004.

An additional program that demonstrates the use of research results to develop educational programs is the Iowa State 4-H Derby Program. This program places emphasis on educating 4-H members about the economics of practical pork production and has been supervised by Dr. Baas since its initiation in 1998. Prediction equations that are the result of research conducted by Iowa State University in conjunction with the National Pork Board are used to rank the animals in this program. Animals in the carcass contest are evaluated for carcass merit and pork quality. Final reports that explain the rankings and procedures are distributed to 4-H members and their families. Results are also used in extension programs by Field Livestock Specialists to educate producers regarding the efficient production of quality pork.

John Mabry: The pork industry has become highly competitive in the commodity product sector as profit margins are very thin. In order for a producer to survive, they must utilize all cost effective technologies that have the potential to reduce their cost of production. One genetic technology recently developed is BLUP (Best Linear Unbiased Prediction) breeding value estimation methodology for selection and culling decisions.

This BLUP technology was first utilized in the 1980s by the dairy and beef industries. In the 1990s this technology was adapted for use in pig populations by Dr. John Mabry (with funding from the National Pork Board). Dr. Mabry has adapted this technology for use in pig populations on personal computers, and under his leadership this was implemented by the National Swine Registry for use in their purebred populations. At the same time, in his extension role Dr. Mabry was working with commercial pork producers to increase the usage of computerized reproductive management programs such as PigChamp and PigWin. He then started a pilot project testing the use of the BLUP breeding value estimation software on data collected at commercial swine farms. The first producers to try the software were in NW Iowa. Their experiences with the software were essential in modifying the programs for maximum ease of usage and to document success. Stakeholder input was an essential part of this product development.

In the 1990s the pork production industry was exposed to the PRRS virus, and most commercial herds suffered losses. This has recently led to a major movement in the commercial pork production sector to closed herds. The closed herd approach is when the pork producer quits purchasing their replacement females from other herds, stops all introductions of animals from outside herds, and makes their replacement females within the herd. When doing this, the producer needs to identify the genetically superior sows in the herd to use for maternal matings to produce their replacement females. Knowing that the BLUP technology was the most accurate for identifying genetically superior animals, Dr. Mabry then developed an interface between the reproductive management software and the BLUP programs for the pork producer to use. This package of software is called BLUP Sow Indexing and is now available from the Iowa Pork Industry Center at Iowa State University. This is an example of how research can be integrated with extension for the good of the pork industry. This software has been highlighted in invited presentations to the Pork Academy at the World Pork Expo, the American Association of Swine Veterinarians annual meeting, the International Pig Veterinary Society Congress, the Iowa Pork Congress, IPIC regional seminars and several international invited presentations.

Goal 4: An agricultural system that protects natural resources and the environment

Program 142. Integrated Pest and Crop Management (IPM/ICM)

Robert Hartzler: The primary delivery of research results for Dr. Hartzler during FY 2003 was through the extension weed science webpage. This provided a direct conduit to deliver field research results to producers and agribusinesses. The webpage also provided updates on research in progress that pertained to specific problems during the growing season. The webpage was also used to deliver research results from beyond Iowa State. Many of the articles were reviews of papers from journals such as Weed Science or Weed Technology. This proved to be a useful link to transmit research results from a larger body of researchers back to producers who can utilize the information in actual production.

A primary research focus has been to identify biological characteristics of weeds that favor their survival in agricultural habitat. Most persons involved in weed control assume weed survival is directly related to the species tolerance to herbicides that dominate weed management systems in row-crop production. Our research has documented that other factors are as important as herbicide tolerance to a successful weed. One characteristic found to be critically important to the success of a weed is a prolonged emergence pattern. A cooperative three-state project has documented that emergence patterns in giant ragweed vary across the U.S. Corn belt. In eastern states, where giant ragweed is considered the worst weed, the species has a long emergence duration. However, biotypes from Iowa emerge in a narrow time frame, simplifying weed management and minimizing problems encountered with this species. We documented that in Illinois both biotypes, short and long emergence patterns, are present. This research suggests either a migration in the extended emergence pattern trait or that this trait is being selected by current weed management strategies, and that it is likely that the biotypes possessing the prolonged emergence will appear in Iowa. Extension programming has focused on providing information on effective management of giant ragweed. A poster was developed that provides information on weeds of increasing importance in the region, and giant ragweed was included among the species described.

Interactions with growers and agribusiness through grower meetings, field days, and field/office calls emphasized many current topics, which were of concern to these groups. An increasing number of questions concerning common waterhemp control influenced research to focus on studies that could aid in developing better ways of managing this late emerging weed. In response to new management practices influenced by precision farming, research has also explored many common questions about the use of precision farming for weed control.

Stephen Barnhart (faculty member in Agronomy on joint appointment between research, extension and teaching): Dr. Barnhart is a Forage Production and Management Specialist. Forages are integral to crop, livestock and conservation enterprises in Iowa. During FY 2003 he contributed forage species and management recommendations and experimental treatment suggestions in several on-going, cooperative research projects. He also served as Principal Investigator on applied research projects. Extension clientele are included in research planning discussions, the selection of study treatments, and, serve an important role in advising during the development of educational materials and Extension outreach programs. One example of stakeholder involvement is the on-going research and demonstration work with new forage species and varieties at the Neeley-Kinyon Research Farm near Greenfield, Iowa. A local stakeholder organization, the Henry A. Wallace Foundation, made up of produces, the business community, and local citizens, provides input into the kinds of research being done on the research farm located in their community. Dr. Barnhart participates as a member of the Foundation's Forage and Livestock Advisory Committee. Producers in the area are very familiar with the forage grasses and legumes that are well adapted to their local site and forage/livestock production enterprises, however these producers are reluctant to make economically risky changes in their productions systems. Before they make significant changes ion their farms, they want to know whether any of the heavily advertised, new forages might be of use to them. The research and demonstrations being conducted on the research farm in their community provides a low-risk opportunity to observe and evaluate new and different forage species that might be complimentary to those that they currently use. Input from producers on the advisory committee and suggestions from clients met at field days and local Extension education meetings was highly valued when planning and evaluating the research and demonstration results on the farm. These producers also provided guidance in the forage-related Extension education activities on the farm and in the surrounding communities.

Marlin Rice: Research results were integrated into Extension efforts during FY 2002 using a broad array of delivery techniques.

- First, information was published in the Integrated Crop Management newsletter. Approximately 50 articles were published on the biology and management of insect pests of corn, soybeans, and alfalfa. Research relevant to chemical, cultural, and mechanical methods of insect control were included in the newsletter when appropriate. Additionally, this information was posted on the Integrated Crop Management webpage at http://www.ipm.iastate.edu/ipm/icm/. During a 12-month period, this newsletter receives approximately 440,000 actual page views from clientele searching for crop management information.
- Second, results from current research and field observations on pest populations were presented on four different topics at the Integrated Crop Management Conference. These included 1) management of bean leaf beetle and bean pod mottle virus, 2) potential benefits

of transgenic Bt corn for corn rootworm control, 3) bean leaf beetle ecology, and 4) minor insect pests of 2002. This two-day annual conference hosted approximately 900 agribusiness professionals and provided them an opportunity to hear the latest research on these topics. These presentations were published in the *Proceedings of the Integrated Crop Management Conference*.

- Third, a total of 48 Extension clinics or workshops were conducted which presented research information. Most of these meetings were under one of three educational banners-Crop Advantage Series, Ag-Chem Dealer Meeting, or Field Extension Education Laboratory (FEEL). Here corn and soybean producers and agri-business professionals were presented crop management information and given opportunities for interaction and discussion. Fifteen of these research/Extension meetings were invited presentations to groups such as Iowa Soybean Promotion Board, Pioneer Hi-Bred International, Garst Seeds, Iowa Independent Crop Consultants Association, and Agribusiness Association of Iowa.
- Fourth, there were six contributions to the popular farm press and ten presentations on radio.

Recent research has primarily focused on the ecology and management of the bean leaf beetle and bean pod mottle virus complex in soybeans. This research was initiated after Dr. Rice, while working with soybean producers in Woodbury County, discovered that the virus was apparently widespread in the area and possibly one of the causes of declining soybean yields. A collaborative research team was assembled to investigate this problem. The team, consisting of Drs. Pedigo (now retired) and Rice in entomology, Dr. John Hill in plant pathology, and Dr. Mark Westgate in agronomy, has worked on this pest complex since 2000. One Ph.D. student has completed research on characteristics of bean leaf beetle flight capacity, potential primary inoculum sources of bean pod mottle virus, and using planting dates as a potential cultural practice to manage both the insect and the disease. A second Ph.D. student is continuing research on these two pests-concentrating on management tactics. This research as been supported by the Iowa Soybean Promotion Board and continues to receive annual suggestions from them on research directions.

Gary Munkvold: Gary Munkvold was involved in several research and extension projects to enhance the management of corn diseases. One project involved the identification of factors that can be used to predict the severity of gray leaf spot of maize; another tested fungicides for the control of corn seedling blights and leaf diseases; a third evaluated hybrid corn for gray leaf spot resistance. The results were published in professional journals and provided to crop consultants and others in Fungicide and Nematicide Tests, the Integrated Crop Management newsletter, ISU Extension Publications, appropriate websites and oral presentations.

Program 147. Sustainable Agriculture

Kathleen Delate: All research projects in this program have an integral extension component. Research under this program has focused on methods of improving soil quality and pest management in organic and transitioning systems. Integrated research and extension activities for Program 147 during FY 2003 included Toolbox Training for Organic Weed Management and a 15-session Iowa Organic Conference reaching 795 persons total. Partners in these activities included Extension, USDA-Natural Resources Conservation Service (NRCS), Risk Management Agency (RMA), Farm Services Agency (FSA) and the Iowa Department of Agriculture and Land Stewardship. An additional partnership with Tuskegee University in Organic Integrated Weed

Management included organic research, extension and educational training to assist limited resource students and farmers in organic farming activities. Five meetings with organic advisory committee and producer groups helped focus research and extension plans in FY03. Stakeholders have provided valuable input in shaping the sustainable agriculture research and Extension agenda by advocating for practical solutions adapted for local conditions, including new weed management techniques. A total of 44 presentations at Extension/research meetings and 23 field days reached an additional 3,254 agricultural professionals in all sustainable agriculture programs in FY03. Impacts of these integrated research and Extension activities included adoption of organic practices, leading to increases in beneficial insect populations on these farms, an increase in soil quality, and a decrease in soil erosion.

The ISU Organic Ag webpage continues to be an excellent venue for dissemination of sustainable/organic agriculture information, reaching a total of 11,000 individuals since its inception in 2002. In addition, all research results are posted on the national USDA-Organic Ag. Consortium (OAC) webpage, OrganicAgInfo.

Paul Domoto: Research projects have allowed commercial fruit growers to remain competitive through the selection of better adapted cultivars and rootstocks, and the adoption of cultural practices that promote early production, improved quality and sustainability. Integration between research and extension by rapidly disseminating this information to the industry during the Iowa Fruit and Vegetable Growers Association conference, Iowa Grape Growers Association conference, and regional extension seminars and workshops. The research plots serve as a focal point to field days and allow growers to see cultivars perform under local conditions and the fine points associated with a new cultural practice. Research progress reports are prepared and published in the Annual Fruit/Vegetable Progress Report (ISUE FG-601 revised), in annual progress reports published for the ISU Research and Demonstration Farm on which the research is conducted, and are made available on the world wide web. Particularly noteworthy has been getting information out to the rapidly growing grape industry which has gone from less than 30 acres to well over 200 acres in three years. With little research base, and working with clients that had little knowledge of the crop, it was critical to provide information on adapted cultivars and cultural practices as quickly as possible. The ISU Viticulture Home Page (www//viticulture.iastate.edu) was created, and grape cultivar trials were initiated in 2002 and 2003. The research plots have served to develop pictorial essays on vineyard planting and trellis construction that have been posted on the web site. Progress reports have been presented at grape grower conferences and meetings, and posted on the web site.

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: Iowa State University
State: Iowa

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**
Food Crops	26,852	23,793	26,771	24,299	
Plant Germplasm	627	1,534	1,627		
Crop Production and Management	20,009	28,538	2,172	16,377	
Green Industry	4,000	1,640	1,341	1,031	
Improved Grazing Systems	43,868	56,223	56,600	63,018	
Animal Physiology	6,589	9,385	9,842	13,599	
Animal Genetics	92,036	88,147	92,949	88,366	
Alternative Livestock	6,400	1,099	2,563		
International Economic Competitiveness	31,864	16,474	33,011	21,387	
Agricultural Risk Management	33,477	16,474	33,011	40,025	
Agricultural Information Technology	3,770	71			
Food Safety	3,830	5,781	5,893	29,490	
Improving Human Foods	17,575	22,526	23,152	3,775	

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Soil Resources Management	21,518	28,233	28,535	16,377	
Integrated Pest Management	30,635	40,655	45,650	31,024	
Animal Waste Management	4,339	20,599	20,758	35,554	
Water Resources Management	6,650	5,229	8,421	8,231	
Environmental Quality	6,750	9,182	4,544		
Rural Development	47,444	36,247	35,301	42,760	
Fiber-Related Products (Textiles and Apparel)	16,266	15,046	17,160	15,418	
Value Added Agriculture	7,330	9,441	10,206	5,642	
Quality of Life	587				
Grain Quality: Marketing & Delivery	25,760	25,760	22,382	32,176	
Poultry Production Systems	7,750	10,955	9,706	13,764	
Seed Science	22,555	27,491	20,267	18,979	
Total	489,481	500,523	511,862	521,292	

Director **Date**

Form CSREES-REPT (2/00)

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Check one: ____ **Multistate Extension Activities**
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	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Beef Center	49,000	96,029	127,646	113,420	
IPM/ICM	40,000	171,784	206,151	174,821	
Pork Center		40,310	56,549	79,948	
Consumer Horticulture		62,692	79,705	81,401	
Sustainable Agriculture			23,706	38,960	
Program 101, 104				20,227	
Total	89,000	370,815	493,757	508,776	

Director **Date**

Form CSREES-REPT (2/00)