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 2004
(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:

- 264 Refereed Publications, Research Papers, Manuscripts
- 202 Non-refereed Publications, Reports, Technical Papers
- 224 Proceedings, Published Abstracts
- 160 Extension Publications
- 357 Invited Presentations
- 345 Education Programs, Field Days, Tours
- 63 Books & Chapters
- 12 Patents
- 91 web pages supported
- 66 Theses, MS/Ph.D. Programs Completed
- 2 post-docs supported; 1 ICN program; 2 committees served; 2 fact sheets published

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

① A pepper research project conducted during 2003 identified 'Aristotle' as producing a similar yield to the current grower standard of 'King Arthur', but a much higher percentage of U.S. #1 (large and well-shaped) bell peppers. A typical price for U.S. #1 peppers is $12.00/bushel and $8.00/bushel for the less desirable U.S. #2, which means that a grower would realize $2,612 more dollars from an acre of 'Aristotle'.

② Research at Iowa State University has identified 32 fungi in the Sooty blotch and flyspeck (SBFS) complex (a disease on apples that causes major economic losses in the eastern half of the U.S) in the Midwest, including 30 that had not been identified previously. This advance has radically changed scientific understanding of the SBFS complex, and opens the door for ecological studies of the newly discovered fungi that will make SBFS control cheaper and less fungicide-intensive.

③ A new low-fiber soy protein concentrate that achieves greater yields and better functionality properties and contains more healthy isoflavones, previously patented and licensed to DuPont/Pioneer, is now being used for commercial products.

④ Iowa family owned and operated apple cider producers who pasteurize their juice on the farm improved the quality and shelf-life of their cider, and 100% of those inspected successfully passed FDA and state inspection.

⑤ We have successfully developed new oat lines with increased β-glucan concentrations that will allow delivery of a nutritionally effective dose of 3-g beta-glucan in only one bowl of oatmeal. The release of these cultivars in the near future will answer a need in the American oat industry for a high beta-glucan oat.

⑥ Several hundred commercial varieties of soybean, corn, alfalfa, oat, barley and triticale were evaluated at more than 25 Iowa locations. Such unbiased information enabled farmers to choose crop cultivars to optimize genetic adaptation to their unique farming system and to produce crops from those cultivars valued at several billion dollars as commodities. GMO-free soybean varieties with unique seed and oil properties were developed. These varieties expand the demand for soy grain and increase the value of the grain because the grain may be traded without restrictions applied to GMO soybeans and the grain is used directly to produce food for human consumption.

⑦ A company has purchased the licensing rights to an anhydrous ammonia manifold developed at ISU. The system received an AE50 award from the American Society of Agricultural Engineers as one of the top 50 agricultural equipment designs of the year. Over 200 commercial units have been sold in the first season. The system has the potential to reduce N application by 5%, resulting in a 50 million pound decrease in nitrogen application into the environment.

⑧ A previously developed insurance product called Revenue Assurance (RA) sold 87,000 policies in Iowa in 2004 and was used as the primary risk management on 12.5 million crop acres in Iowa at an average per acre premium of about $20 per acre. This commercial success probably makes this product the most important ISU research based output for sale to Iowa farmers. This product had nationwide sales of $1.5 billion in premiums.

⑨ Technically aggressive pork production entities have incorporated feeding pantothenic acid into their production management schemes to obtain an additional $.70 to 1.80 return over investment per pig marketed. The results of this work are now being applied in humans as a potential method to minimize obesity development.

- ISU participation in the following multistate research projects also contribute to goal 1: NC0007, NC0094, NC0100, NC0107, NC0125, NC0129, NC0131, NC0140, NC0205, NC0213, NC0215, NC0218, NC0225, NC0228, NC0229, NC0504, NC1003, NC1004, NC1006, NC1007, NC1008, NC1009, NC1010, NC1012, NC1119, NC1142, NE0127, NE1009, NE1010, NE1012, NE1016, NRSP004, NRSP007, NRSP008, S0291, S0292, S0294, S0303, S1000, S1004, S1005, S1007, S1008, S1010, W0171, W0173, W0188, W1168 and W1177.

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 postharvest product losses, ②④
- more efficient use of agricultural chemicals, ②⑦
- yield gains through genetic improvements, ①⑥

- new products and applications, ③⑤⑦⑨
- improved quality and consistency of products, and ①④⑤
- better understanding and adoption of appropriate risk management practices. ⑧

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 $ 9,646,446

FTEs 74.1

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) a 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 order to keep 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, grapes, strawberries, sweet bell peppers, muskmelon, honeydew melon 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.

- Sweet corn research focused on evaluating new cultivars for fresh-market use in Iowa and weed management strategies. Trials identified ‘Providence’, ‘Mirai 301’, ‘Obsession’, ‘276A’ and ‘Renaissance’ as having good production traits and excellent ear quality under Iowa climatic conditions. These hybrids produce ears that are more tender

and sweet than what is commonly shipped in, making Iowa growers more competitive in the market place.

- A high tunnel tomato micro-irrigation project used tensiometers for irrigation management. Water quantity was reduced, fruit yield and quality (reduced fruit cracking) improved, and harvesting efforts eased. Of the growers involved, half of them immediately adopted the system by purchasing the necessary equipment.

- Berry size and quality of table grapes are important factors contributing to the marketability of the fruit. Research on 'Reliance' and 'Swenson Red' grapevines treated with cluster thinning had greater berry fresh weight and diameter than berries in the untreated control. Consumers preferred the cluster shape and berry size of fruit from vines treated with cluster thinning.

- Iowa Fruit & Vegetable Growers Association requested and funded a pepper research project that was conducted during 2003. The cultivar evaluation identified 'Aristotle' as producing a similar yield to the current grower standard of 'King Arthur', but a much higher percentage of U.S. #1 (large and well-shaped) bell peppers. Many commercial markets, like grocery stores, now demand U.S. #1 grade peppers. Measured yields for 'Aristotle' were 1,558 total bushels including 1,022 bushels of U.S. #1. 'King Arthur' produced 1,533 total bushels but only 419 bushels of U.S. #1 grade. A typical price for U.S. #1 peppers is $12.00/bushel and $8.00/bushel for the less desirable U.S. #2, which means that a grower would realize $2,612 more dollars from an acre of 'Aristotle'.

Long-term:

- Sooty blotch and flyspeck (SBFS) disease on apples causes major economic losses in the eastern half of the U.S. A first step toward more cost-effective and environmentally friendly control of SBFS, is to identify the SBFS fungi. Four fungi were known to cause SBFS based on past research. Research at Iowa State University has identified 32 fungi in the SBFS complex in the Midwest, including 30 that had not been identified previously. This advance has radically changed scientific understanding of the SBFS complex, and opens the door for ecological studies of the newly discovered fungi that will make SBFS control cheaper and less fungicide-intensive.

- Molecular studies at Iowa State University have demonstrated that two specific genes, identified as BEL and KNOX transcription factors, can be used to enhance plant growth and yields in potatoes. This application can be used to optimize crop yields or increase the growth rate to shorten cultivation time and save production costs. Information coming from this project will further increase our understanding of the signaling mechanisms by which plants regulate growth.

. 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 the 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, 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:

- NASA FTCSC continues to engage industry and academia to develop food products and processes that will benefit NASA and the public. This year's successes are Arla's thermal stabilized yogurt and dehydrated whole milk with probiotics have been approved for the astronaut menu and they have a two-year shelf life at ambient storage. Microcide Inc., has fruit and vegetable sanitizers, generally recognized as safe (GRAS), and they have just secured a NASA SBIR to develop their product into a wipe to clean utensils and surfaces on the International Space Station. Triple "F" in Des Moines has been selected for NASA SBIR funding to develop a bench top extruder for use on planetary outpost, Moon and Mars. ORBITEC was also selected for NASA SBIR funding and working with Dr. Aubrey Mendonca on the development of a HACCP program for a vegetable growth chamber for the International Space Station. All these NASA SBIRs were accomplished by assistants from the NASA FTCSC.

- During the past year, we characterized a new low-fiber soy protein concentrate, which achieves greater yields and better functionality properties, and contains more healthy isoflavones. Previously, we licensed a patent for this technology to DuPont/Pioneer and they are using the technology for commercial products (market impact is unknown).

- 100% of Iowa family-owned-and-operated apple cider producers, who pasteurize their juice on the farm, received training and were evaluated on their ability to produce the

FDA mandated HACCP documentation. Cider producers improved the quality and shelf-life of their cider and 100% of those inspected successfully passed FDA and state inspection. In 2004, these businesses employed 55 full-time and 66 part-time employees and produced 100,000 gallons of cider, worth $387,000.

Long-term:

- Over the past several years, after an expensive, labor-intensive process, we (agronomist in collaboration with food scientist) have successfully developed new oat lines with increased β-glucan concentrations that will allow delivery of a nutritionally effective dose of 3-g beta-glucan in only one bowl of oatmeal! The beta-glucan is a soluble dietary fiber that has been shown to reduce serum cholesterol and glucose uptake, to decrease the insulin response in the blood and to control weight through prolonged satiety a balanced gastrointestinal function. These functions decrease the incidence of heart disease, obesity, cancer, and type-2 diabetes. The release of these cultivars in the near future will answer a need in the American oat industry for a high beta-glucan oat.

- Our research on soybean processing and utilization, including oil refining and value-added utilization of protein meals, provided much-needed scientific data for companies to market its soy products. The quantitative economic impact of our research is difficult to assess, as the research findings are discussed with many soybean processors, both in the Midwest and other parts of the country. The importance of this research was also recognized by the oilseed processing industry, and resulted in an invitation to discuss mechanical soybean processing and product quality control at the National 71st Annual Oil Mill Operators Short Course in 2003 (in Des Moines).

- We developed a new soy protein fractionation procedure to fractionate the two major storage proteins, one of which is believed to be responsible for cardiovascular benefits. The new procedure is simpler, produces more functional protein in higher yield and purity, and contains more healthy isoflavones. A provisional patent has been filed and we are marketing the technology to industry.

- ISU is continuing its efforts to transfer the soy protein hydrolysate (used to make soy protein-based adhesives) and soy adhesive technology to wood adhesive manufacturers such as Borden, Georgia Pacific and Dynea. Work is ongoing with an industry partner to develop a process to hydrolyze soy protein and provide the hydrolysate to adhesive manufacturers to make the soy protein-based adhesive. In addition to the strategy of working with the wood adhesive manufacturers, the ISU research team believes that we should also investigate working directly with companies that use wood adhesives, such as Bemis, Hon, etc., who are interested in having soy in their product formulations. Our industry partner is in agreement with the strategy to transfer this technology, including the strategy to go directly to the end-users as opposed to working only with the wood adhesive manufacturers. The goal of these efforts is to facilitate the transfer of soy adhesive technology to the wood and fiber-based composite industry.

d. Source of Federal Funds—Hatch

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

Key Theme – Plant Germplasm

Program 4: Plant Germplasm

. Description of activity

This project develops and deploys information, methods and varieties of crop species to improve the productivity, sustainability and profitability of regional agricultural systems.

. Impact/accomplishment

Several hundred commercial varieties of soybean, corn, alfalfa, oat, barley and triticale were evaluated at more than 25 Iowa locations to help identify the subset of those varieties with the best adaptation to the 30 million acres in Iowa annually planted with these species. Such unbiased information enabled farmers to choose crop cultivars to optimize genetic adaptation to their unique farming system and to produce crops from those cultivars valued at several billion dollars as commodities.

GMO-free soybean varieties with unique seed and oil properties were developed. These varieties expand the demand for soy grain and increase the value of the grain because the grain may be traded without restrictions applied to GMO soybeans and the grain is used directly to produce food for human consumption.

. 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

- *Improve understanding of the biology and ecology of weeds in the agroecosystem.* To improve understanding of relationships between crop diversity, weed management practices, and weed population dynamics, data from a field experiment and matrix models were used to examine how contrasting crop rotations affect velvetleaf. Modeling analyses indicated that velvetleaf density in the four-year rotation should decline if cumulative losses of seeds produced in the soybean phase exceeded 40%. Achieving such a level of predation appears possible, given the observed daily rates of velvetleaf seed predation and the fact that no tillage occurs in the four-year rotation for 26 months after soybean harvest, thus favoring seed exposure on the soil surface to predators. Models that included estimates of seed predation indicated that to prevent increases in velvetleaf density, weed control efficacy in soybean must be ≥93% in the two-year rotation, but could drop to 86% in the four-year rotation. These results indicate diverse rotations that

exploit multiple stress and mortality factors, such as weed seed predation, contribute to effective weed suppression with less reliance on herbicides.

- *Identify genetic material or biochemical pathways that help crops maintain dry matter production or limit losses when growing under stressful environmental conditions.* Seeds of maize inbred lines and populations obtained from Agriculture Canada, Switzerland, the plant introduction station, and various cornbelt adapted materials have been produced and studies conducted to establish the initial phases of the development of screening protocols. Preliminary analysis of electrical conductivity, apparent photosynthesis, chlorophyll fluorescence, and xanthophylls compounds of leaf discs to evaluate innate tolerance, acclimation to and recovery from stress, appear promising. The role of pathogens in cold tolerance is currently being evaluated.

- *Alter seed chemical composition to increase marketability.* Metabolic Flux Analysis, originally developed to study metabolism of simple bacterial cells, was adapted for use on developing soybean seeds. This breakthrough technology provides a means to measure the metabolic impact of changes in gene activity (created through classical breeding approaches, using molecular techniques, or in response to environmental queues) at the whole seed level. It is being used to understand the molecular and biochemical bases for genetic variation in protein accumulation in developing soybean seeds.

- *Quantify the potential for gene flow from production systems incorporating transgenic plant materials.* Simulation models were developed to quantify pollen production, kernel formation, and risk of out-crossing in commercial seed production fields. In addition, a pollen dispersal model was created to quantify the long-distance transport of corn pollen from an isolated field. This information is being used to help corn seed industry optimize hybrid production and minimize genetic impurity. The pollen dispersal model is being used to assess the potential for unintended transfer of transgenes from an isolated source field to non-transgenic plants nearby.

- *Identify and solve soybean production problems to improve farmer's economic well-being*. Research is underway to identify key areas where farmers can adjust their production systems to optimize economic return and minimize negative environmental impacts. Variables under study include crop rotations, replant decisions, soil fertility, seed inoculums, and hail injury.

d. Impact/accomplishment

Short-term:

- Replant decision of soybean may be improved by variable costs. Seed and chemical costs account for a large part of the soybean production costs. New herbicide technologies allowed farmers to reduce soybean plant population when replanting in the spring. Managing production cost is critical when producing soybeans today.

Long-term:

- Outcomes of research on risk of out-crossing and gene flow fill critical knowledge gaps needed to improve corn 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.

- Understanding responses of maize to low temperature enables the development of genotypes with less risk of establishment failure or yield reduction. Such studies increase understanding of plant response to external stimuli and their impacts on plant development.

- The shift in U.S. agricultural industry from a commodity-output-based model to one driven by contractual agreements between end users and producers requires access to genotypes with specific traits and quality characteristics of value to end users. Knowledge of genes regulating seed development and composition will accelerate the development of soybeans having seed composition characteristics suited for identity preserved markets of the near future.

- Farmers and agricultural professionals have expressed great interest in research concerning weed ecology and management after results were presented at farm field days and winter meetings. Insights into weed population dynamics provided by this 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. The models developed in this project constitute excellent tools for understanding the impacts of crop rotation systems and tillage practices on weeds.

- Understanding the interactions in the corn-soybean rotation between cropping sequence, pathogens, tillage system, and the environment, enhances the efficiency of crop production in Iowa while improving protection of soil and water resources. A more efficient nutrient management plan for soybean improves farmer's profitability while protecting soil and water resources.

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

Recent technological advances and the Global Positioning System (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 major impediment to widespread implementation of precision agriculture is gathering the requisite information to describe the spatial and

temporal variation of important factors. The second 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.

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. Advances in computational capability and sensor technology, along with reduced component costs, have opened up promising new possibilities for sensing in agricultural and biological systems. In particular, these advancements have made possible the use of multiple dimensions including temporal (e.g. video), spatial (up to three dimensions; e.g. stereo vision), and spectral (e.g. hyper-spectral and spectroscopic sensors) dimensions. A number of these technologies are being explored to develop real-time sensing systems for agricultural production and machinery systems. Research has been conducted on the application of machine vision, and hyper-spectral sensors in the audio, visible and near-infrared of the electromagnetic spectrum for the development of robust agricultural sensing systems. The integration of these sensors with GPS and other information technologies will lead to "intelligent" machines; which not only use information to perform basic agricultural functions (intelligent/advanced control/autonomous vehicles), but also harvest information from the fields for agronomic and environmental management (precision agriculture, environmental protection) and capture data to track inputs and products throughout the production and delivery chain to satisfy increasing regulatory and consumer requirements throughout the food production system (bio-terrorism, food safety, identity preservation, environmental monitoring).

Once the variability is quantified, the spatial and temporal data must be analyzed to understand the underlying causes of the variability in crop production, and the effect of crop production practices on the environment. The objective is to provide decision support systems and analysis tools to determine the important factors limiting crop production, and assess the economic and/or environmental risk of different management strategies in agricultural production systems. As the causes of variability are better understood, this will lead to advances in farming management systems to protect the environment while increasing production efficiency.

d. Impact/accomplishment

Short-term:

- Each year over one billion pounds of nitrogen are applied as anhydrous ammonia to Iowa 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 company has purchased the licensing rights to an anhydrous ammonia manifold developed at ISU. The system received an AE50 award from the American Society of Agricultural Engineers as one of the top 50 agricultural equipment designs of the year. Over 200 commercial units have been sold in the first season. The system has the potential to reduce N application by 5% resulting in a 50 million pound decrease in nitrogen application into the environment.

- WebGro is a web-based soybean decision support system (DSS), that has been developed (http://webgro.ae.iastate.edu). The system enables soybean producers in the Midwestern United States to examine how different stresses interact to limit soybean yield in their fields. These stresses could include soil characteristics, climatic data, cyst nematodes, Rhizotonia root rot infections, herbicide injury and hail damage. The system allows farmers to determine the potential yield loss due to different stress factors and make informed management decisions based on the estimated losses.

Long-term:

- Over 100 million kg of herbicides are applied annually to agricultural crops and reducing chemical applications have significant environmental and economic benefits. Research has shown that during turning maneuvers at the end of fields, application rates can increase to well over 1,000% of recommended application rates. An advanced multi-mode four wheel steering control system has been developed which can significantly reduce these application errors. Based partially on this research, a major sprayer manufacturer is planning to release a product in the relatively near term.

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

Trafficking athletic fields leads to poor turfgrass performance and dangerous playing conditions. Our research ranked the seedling traffic tolerance (best, Kentucky bluegrass = perennial ryegrass > tall fescue = supina bluegrass > creeping bentgrass > fine fescue, worst) of the major cool-season turfgrasses using simulated cleated traffic.

Pollen viability was determined using acetocarmine staining on pollen from preserved flowering spikes of regenerated Indiangrass (Sorghastrum nutans) plants. For all Ro regenerated plants, 95-100% pollen grains were stained, which was similar to the pollen viability of the original, non-tissue-cultured plant. If tissue-culture-regenerated plants of Indiangrass (Sorghastrum nutans) can be selected that are pollen-sterile, cultivars may be developed that extend the usefulness of this ornamental grass species.

Genetic characterization was performed in Poa trivialis and colonial bentgrass using molecular markers. Mapping of genetic factors that are associated with winter hardiness and forage quality in perennial ryegrass was conducted with molecular markers. Isolation and characterization of genes regulating freezing tolerance in perennial ryegrass are being conducted. Evaluation of fitness and performance of Roundup Ready creeping bentgrass and Kentucky bluegrass and studies on techniques of converting existing conventional greens into Roundup Ready creeping bentgrass greens are also being performed.

d. Impact/accomplishment

Short-term:

- Prior to this study, grass selection was based on traffic tolerance ratings of only mature turfgrass species. Since our study evaluated seedling turfgrass traffic, athletic field managers can now select proper grasses to renovate fields during the playing season. The net result has been more turf cover and improved athletic field performance.

Long-term:

- The Poa trivialis and colonial bentgrass study provides valuable information for turfgrass breeding. The perennial ryegrass mapping project provides valuable information on genetic mechanisms controlling freezing tolerance and forage quality and will facilitate marker-assisted selection for these traits. Studies on Roundup-Ready turfgrasses provide information that may assist commercial entities and the USDA-APHIS to determine the safety of Roundup-Ready turfgrasses and provide management protocol for adopting such crops once they are deregulated.

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. Key areas of research within this objective were to improve scientific understanding of physiologic mechanisms affecting reproduction, growth and performance.

d. Impact/accomplishment

Short-term:

- Failure of passive transfer, an immunologic deficiency caused by inadequate consumption of colostrum in the first 12 to 24 hours of life, can be as widespread as affecting 40% of a particular calf population. The widespread availability and use of colostrum replacers has reduced the incidence of failure of passive transfer, and thereby reduced calfhood morbidity and mortality in the dairy and beef industries. It has been estimated that the development of effective colostrum replacers has reduced calf mortality by about 8%, saving approximately 100,000 calves annually. The economic impact of this improved survival rate to the US dairy industry is approximately 15 million dollars.

Long-term:

- Body fat content of pigs significantly influences the wholesale market value of pig carcasses. Ingestion of high amounts of pantothenic acid, a safe-FDA approved-economical compound, was determined to reduce body fat content and raise market value of pigs. Technically aggressive pork production entities have incorporated this technology into their production management schemes to obtain an additional $.70 to $1.80 return over investment per pig marketed. The results of this work are now being applied in humans as a potential method to minimize obesity development.

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:

- Reduction of fatty livers in dairy cows – Subcutaneous injections of glucagon markedly decreased accumulation of lipid in livers during the early post-parturient period of dairy cows. Increased productivity and well being of dairy cows is associated with reduced periparturient diseases.

- Efficacy of winter grazing in beef heifer development – Demonstrated that winter grazing of stockpiled forages at stocking rates of 0.84 and 1.18 heifers/hectare with supplementation of corn gluten feed to maintain body condition score reduced the costs of wintering second-calf beef heifers by 60 to 88% compared with feeding hay supplemented with corn gluten feed in a dry lot system.

- Value of ethanol coproducts and crop residues in a cattle feeding system – Feeding mixtures of corn distillers solubles with chopped corn stalks while on pasture or in the feedlot to replace alfalfa hay did not affect performance or carcass value. These findings provide cattle producers the option of alternative feeds with potential savings in feed cost.

- Effectiveness of soybean hulls as a source of roughage – The role of controlled forage intake on rumen development and forage digestibility were determined in young calves as

well as the effectiveness of soyhulls as a forage for horses. This work expands the use of soyhulls as a feed for young calves and horses, and provides additional feed source options.

- Program feeding supplemental protein to finishing cattle – Reducing the concentration of protein fed as cattle mature during the finishing period reduced the quantity of nitrogen fed 12.6 lbs per head without affecting performance or carcass value. Program feeding supplemental protein can reduce nitrogen excretion from a 500-head feedlot by 6,300 lbs.

Long-term:

- Conjugated linoleic acid (CLA) in milk and meat – Milk and beef produced in grass-based systems contain increased concentrations of CLA compared with grain-based systems. Meat and milk from grass-based systems have greater value in niche markets of these foods.

- Impact of livestock production on air and water resources – Modification of swine diets reduced ammonia emissions 19% without increasing costs and the addition of phytase to swine and poultry diets did not increase potential for pollution of soluble phosphorus in surface waters. These findings provide swine and poultry producers with affordable options for addressing environmental concerns.

. 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 those 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 databases from experimental and producer herds, to development and use of genomic tools to discover the genetic control of traits. Additional emphasis is on the genetics of diseases in companion animals, which can also impact the study of human health. 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:

- Intramuscular fat is an important determinant of meat quality in pigs but difficult to measure on the live animal, limiting genetic selection. A model to evaluate intramuscular fat on the live animal using ultra-sound was further developed and evaluated. This technology reduces the expense and time for evaluating breeding stock.

Long-term:

- Non-productive sow days, i.e. days when the sow is not pregnant or nursing piglets, are an important cost-component to the swine industry. Analysis of one herd using field data suggested that some components of non-productive sow days have sufficient genetic control to respond to selections. In a herd that has practiced such selection, the result was a decrease of 20 non-productive sow days for each of 400 sows in the inventory; a savings of $16,000 per year in production costs.

- Two years ago, six dwarf American Angus calves were born. As dwarfism is a recessive trait, breeders must be able to identify carriers if the disease is to be eradicated. Toward this end, a whole genome scan was performed, which resulted in the identification of markers that were linked to the disease-causing gene. These markers are currently being used to determine the probability that a given animal is a carrier of dwarfism. Availability of a gene test for dwarfism will be crucial to the future of American Angus breed.

- Although many genes and chromosomal regions with effects of traits of interest in livestock have been identified using experimental crosses, their use in commercial breeding programs requires identification of genes or associated markers that segregate within commercial lines. This requires the identification of large numbers of genetic markers that segregate within commercial lines, assessment of the extent of linkage disequilibrium in those lines, and statistical methods for the use of this information to identify important genes or chromosomal regions. In poultry, we participated in the International SNP Consortium, which identified almost three million single-nucleotide polymorphisms in the chicken genome, and demonstrated the following important concepts; these SNPs can be used to speed discovery of the genomic location of sites controlling important traits, making research more economical per practical discovery of marker-trait association; and some of the unique lines of chickens held at Iowa State have diversity not present in the lines studied by the SNP Consortium and, thus, will serve as an additional discovery resource for biodiversity. Also in poultry, analysis of micro-satellite markers in commercial egg-layer breeding populations demonstrated that sufficient disequilibrium is present in these lines so that they can be used to identify genes or chromosomal regions of importance with reasonable marker densities. Finally, algorithms and computer programs have been developed for using multiple markers for detecting and mapping genes that affect quantitative traits by combining disequilibrium and co-segregation information. Some of these methods were used to locate the dwarf gene in the Angus breed and will enable the identification of carriers. In pigs, a one-day industry workshop was organized in association with the National Swine Improvement Federation and a USDA-IFAFS grant, with the aim to transfer technology associated with molecular genetics and marker-assisted selection. This workshop was attended by over

100 industry and academic personnel and has impacted the implementation of molecular genetic technology in the swine industry.

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. The main areas or topics were addressed: international trade in agricultural products, production, distribution, trade and consumption of products produced using genetically modified organisms, swine disease (PRRS), the use of hoop structures in swine production, intellectual property rights, information flows and food safety, precautionary bans in food production, incentives for cooperative forms of ownership, the effect of seasonality on product and market development, and the impact of agricultural research on productivity and social welfare.

d. Impact/accomplishment

Short-term:

- In 2004, the World Bank completed and published a book that summarized a series of studies that looks at the impact of reforming policies in commodity markets and their implication for developing countries. The work included in the book has had high impact beyond the academic community and is referenced by developing countries' leaders, the WTO, and other stakeholders in the current agricultural trade negotiations.

- The Food and Agricultural Policy Research Institute (FAPRI) completed world agricultural outlook activities during fall 2003 and spring 2004. The outlook provided a ten year projection of major temperate crops and livestock products for all major producing, consuming or trading countries. The FAPRI outlook website has been consulted by more than 45,000 visits and 19,000 views in 2004 alone, and it used by academics, producer groups and world industry leaders, such as dairy manufacturer Delaval.

- An ongoing study of the analysis of hoop production systems in the pork industry, in which the use of has expanded rapidly over the past few years, has shown that they are a competitive alternative production system. This information has allowed producers to meaningfully evaluate these systems and adapt them.

Long-term:

- A study on the economic impact of PRRS on the cost of pork production is being used as a baseline for the pork production industry on the need to develop a policy or goal of PRRS control and eradication on the regional level.

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

Seven main areas or topics were addressed: crop, livestock and revenue insurance, the investment behavior of Iowa farms, futures markets, credit unions, the potential sale of a unit of the Farm Credit System, and training for agricultural borrowers.

d. Impact/accomplishment

Short-term:

- Insurance
  - A web tool was developed in 2004 to give information on the cost of Livestock Gross Margin insurance to Iowa hog producers. This website is also used by USDA's Risk Management Agency personnel. The insurance product was greatly revised in 2004 in part because of research that conducted at Iowa State University and presented at USDA's annual outlook conference.
  - Researchers developed a new risk management product called Group Risk Income Protection – Harvest Revenue Option that was available for the first time in 2004 in Central Corn Belt states. This product allows the producer to purchase insurance against declines in county revenues with the provision that the guarantee can increase if prices rise from spring to fall. This product will be available to all important corn, soybean, and grain sorghum states for the 2005 crop year.
  - A previously developed insurance product called Revenue Assurance (RA) sold 87,000 policies in Iowa in 2004, and was used as the primary risk management on 12.5 million crop acres in Iowa at an average per acre premium of about $20 per acre. This commercial success probably makes this product the most important ISU research based output for sale to Iowa farmers. This product had nationwide sales of $1.5 billion in premiums.

- Growth of Credit Unions – A study of the growth of large scale credit unions in Iowa was conducted. Credit unions have significant tax and regulatory advantages over banks that were initially granted to enable credit unions to serve financially disadvantaged households. Bankers are concerned that credit unions are using these advantages primarily to increase their competitiveness. Results from the study were presented to a legislative conference sponsored by the Iowa Bankers Association. Because of this

project, lenders and the general public are more able to address a national public policy issue that redistributes a tax burden estimated at $13 to $16 billion over a ten year period.

- Proposed Purchase of Farm Credit Services of America by Rabobank – The proposed purchase of Farm Credit Services of America (FCSA) by Rabobank on July 30, 2004 was unprecedented. Nearly 50,000 members of FCSA would be affected by the proposed $600 million sale to Rabobank – a $500 billion Dutch financial institution. A series of outreach papers were developed to examine the financial and legal implications of the sale, and made available through a website at http://rabobankbuyout.org. Information on this site was used extensively by public officials and members of FCSA to formulate their responses to the sale proposal. The site became active on September 8, 2004 and received approximately 5,000 hits during the first month of operation. A senior staffer on the Senate Ag Committee said that he used the site as the primary resource for members of Congress and their staffs who were trying to understand the details and the consequences of the sale. The proposed buyout was eventually called off.

- Educational Program – An agreement with the Farm Service Agency (FSA) was reached which will provide mandatory training in financial management to designated borrowers using Iowa State Agricultural Management e-School (AMES). (See http://www.extension.iastate.edu/ames/homepage.html for information on AMES.) A pilot test of the training program was conducted with an enrollment of 35 FSA borrowers. The course offers a convenient and effective way for delinquent FSA borrowers to upgrade management skills and continue to qualify for FSA programs and loans. The material for this training comes from a rich history of research on financial issues as part of this program of work.

Long-term:

- Insurance
  - A new combined crop product was developed that will be introduced in 2007. This product will offer producers of all major U.S crops protection against low yield or low revenue. When it is introduced it will replace all existing individual yield and revenue products for these major crops.
  - Researchers developed an ethanol insurance product for Iowa farmers who participate in ethanol facilities. This product is pending Congressional approval to cover ethanol under the crop insurance act.

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

Sustainable fruit, vegetable, grain and turfgrass production systems continued to be developed for Iowa conditions in 2003-2004. Effective pest management practices for new and existing pest problems will be necessary for the continued viability of sustainable/ organic agriculture in Iowa. Research developed through this project included organically-approved spray treatments causing a significant decrease in soybean aphid (Aphis glycines Matsumura) populations, 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. Screen cages were effective in preventing transmission of aster yellows (MLO) in organic Echinacea herb production by reducing potato leafhopper [Empoasca fabae (Harris)] colonization. Anthracnose in St. John's Wort was adequately controlled with oat straw mulch. Short- and long-term impacts include economic savings and environmental benefits from reduced reliance on synthetic pesticides.

A strawberry cultivar trial was initiated in 2004 at Muscatine, along with completion of the fall-fruiting raspberry cultivar trial. 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. Size and quality of table grapes were found to be important factors contributing to the marketability of the fruit. Research on 'Reliance' and 'Swenson Red' grapevines treated with cluster thinning had greater fresh weight and diameter than berries in the control treatment. Consumers preferred the cluster shape and berry size of fruit from vines treated with cluster thinning.

Work is continuing 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. The validity of common soil test procedures for sand-based root zones on golf course greens and sports fields are being evaluated. Current 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 and vegetable research projects across Iowa, organic crops fertilized with compost produced similar yields to conventional crops, and where organic corn followed alfalfa, yields exceeded conventional. Soil health parameters, including organic carbon pools and microbial biomass, remained high in organic systems, even under multiple tillage operations.

d. Impact/accomplishment

- The impact of improving soil quality in the organic/sustainable systems and in turfgrass fertilized with natural products such as corn gluten meal includes lower pesticide and sediment loading in waterways throughout the state. Organic producers report a 71% decrease in erosion; an 86% improvement in water-holding capacity of soils; and a 55% reduction in nitrate leaching as a result of organic and sustainable production practices.

- 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.

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:

- 34 Refereed Publications, Research Papers, Manuscripts
- 20 Non-refereed Publications, Reports, Technical Papers
- 32 Proceedings, Published Abstracts
- 18 Extension Publications
- 12 Invited Presentations
- 14 Education Programs, Field Days, Tours (750 participants)
- 65 individual consultants
- 1 web page supported
- 5 Books/Chapters
- 2 Patents filed
- 7 theses

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

① Several large commercial plants that produce about 900 million pounds of pork per year have used results of a time of processing and chilling for pork carcasses relative to slaughter study to reduce processing time and improve pork quality.

② Publication of information on the genetic variants of calpastatin associated with pork quality has been utilized by a major swine genetics company for breeding decisions relative to improved meat quality.

③ (Also see item ④ under goal 1): Iowa family owned and operated apple cider producers who pasteurize their juice on the farm improved the quality and shelf-life of their cider, and 100% of those inspected successfully passed FDA and state inspection.

- ISU participation in the following multistate research projects also contribute to goal 2: NC0100, NC0129, NC0136, NC1007, S0292, and S0295.

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 ②③
- 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 $ 724,384

FTEs 3.8

Key Themes – Food Safety and Food Quality

Program 16: Improving the Quality and Safety of Muscle Foods

. Description of activity

The objectives of this program activity are improved quality and safety of muscle foods. Fundamental properties of muscle are being investigated to provide the basis for quality improvements. For example, investigation of calpastatin biology has included study of several key processes in skeletal muscle affecting muscle protein accretion and degradation. These processes affect animal growth efficiency and composition, muscle function, certain muscle diseases and post-mortem muscle changes that impact meat tenderness. Specific interactions between muscle proteins that determine structural properties and changes in muscle are also being studied to clarify the role these changes have on meat quality, particularly water-holding capacity of post-mortem muscle. Evaluation of the quality of irradiated poultry following dietary Vitamin E supplementation, as well as quality of irradiated beef and pork treated with antioxidants, is being studied in a variety of packaging environments. Improvements in the safety of ready-to-eat (RTE) muscle foods is being assessed following the use of organic acids, pediocin, modified atmosphere packaging and irradiation processing as combined barrier systems for better control of the major pathogens, particularly *Listeria monocytogenes*, that are of concern to the meat industry.

. Impact/accomplishment

Short-term:

- The time of processing and chilling for pork carcasses relative to slaughter has been shown to affect color, tenderness and water-holding capacity with improvements occurring when time intervals are correctly utilized. Several large commercial plants that produce about 900 million pounds of pork per year have used results of this study to reduce processing time and improve pork quality.

- Publication of information on the genetic variants of calpastatin associated with pork quality has been utilized by a major swine genetics company for breeding decisions relative to improved meat quality.

- Nonmeat ingredients including lactate, diacetate and pediocin for ready-to-eat processed meat products have been shown to be effective inhibitors of pathogens such as Listeria monocytogenes. Processes, including modified atmosphere packaging and irradiation have been shown to increase the effectiveness of nonmeat ingredients. Several of these approaches have been adopted by the meat industry and these changes have contributed to improved safety of muscle food products, demonstrated by the decreased incidence of food-borne disease outbreaks in 2003-2004. The improved food safety of meat products has been documented by the U. S. Department of Agriculture in their data showing decreased incidences of food-borne illnesses and product recalls.

Long-term:

- Determination of the mechanisms that result in quality changes associated with irradiation of muscle foods has suggested practical ways to reduce or eliminate the quality losses. This information has resulted in increased use of irradiation by the meat industry and is needed to help the regulatory agencies make a final decision on approval of irradiation for RTE meat products. If irradiation is approved for RTE meats, the safety of these products will be improved significantly.

. Source of Federal Funds—Hatch

. 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:

- 34 Refereed Publications, Research Papers, Manuscripts
- 4 Non-refereed Publications, Reports, Technical Papers
- 30 Proceedings, Published Abstracts
- 18 Invited Presentations
- 18 Education Programs, Field Days, Tours (225 participants)
- 26 individual consultants
- 3 volunteers trained
- 3 web pages supported
- 5 Books/Chapters
- 1 Patent filed
- 8 Thesis, MS/PhD Programs Completed

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

① Biofortification, the application of plant breeding and biotechnology to enhance the micronutrient content of staple crops, necessitates the screening of large numbers of maize varieties for provitamin A carotenoid content. An abbreviated extraction protocol was developed to enable rapid, accurate HPLC quantification of the major carotenoids in dried maize kernels. The method was applied to screen 800 maize samples provided by plant breeders from the International Maize and Wheat Improvement Center (CIMMYT; Mexico City, Mexico) and the International Institute of Tropical Agriculture (IITA; Ibadan, Nigeria).

② (Also item ⑤ under goal 1): We have successfully developed new oat lines with increased β-glucan concentrations that will allow delivery of a nutritionally effective dose of 3-g beta-glucan in only one bowl of oatmeal. The release of these cultivars in the near future will answer a need in the American oat industry for a high beta-glucan oat.

- ISU participation in the following multistate research projects also contribute to goal 3: NC0100, NC0170, NC0213, NC0219, NC1001, and W0181.

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 public awareness of health promoting dietary and feeding behaviors, and
- increased dissemination of information through ISU extension project 330 ((Nutrition: choices for healthy FY 2000-2004). (see program 330)

State and Hatch Funds $ 609,434

FTEs 6.0

Key Theme – Human Nutrition

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

d. Description of activity

This project focuses on improving the foods people consume. The scope of the research includes all consumer aspects of foods including 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.

d. Impact/accomplishment

Short-term:

- Biofortification, the application of plant breeding and biotechnology to enhance the micronutrient content of staple crops, necessitates the screening of large numbers of maize varieties for provitamin A carotenoid content. An abbreviated extraction protocol was developed to enable rapid, accurate HPLC quantification of the major carotenoids in dried maize kernels. The method was applied to screen 800 maize samples provided by plant breeders from the International Maize and Wheat Improvement Center (CIMMYT; Mexico City, Mexico) and the International Institute of Tropical Agriculture (IITA; Ibadan, Nigeria).

d. Source of Federal Funds—Hatch

d. 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:

- 53 Refereed Publications, Research Papers, Manuscripts
- 76 Non-refereed Publications, Reports, Technical Papers
- 100 Proceedings, Published Abstracts
- 28 Extension Publications
- 50 Invited Presentations
- 179 Education Programs, Field Days, Tours (13,418 participants)
- 1,381 individual consultations
- 750 volunteers trained
- 1 Books & Chapters
- 32 Web Sites, Multi-Media
- 8 Theses, MS/PhD Programs completed
- 1 CD; 4 US Crop Biosecurity Strategic Planning meetings

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

① Soil erosion remains the largest water-quality problem in Iowa. A web-based tool was developed to give estimates of daily soil erosion and water runoff losses at the township level of resolution. This effort will allow targeting of limited financial resources to the areas in the state most affected by erosion. Another web-based decision support system was developed to calculate potential soil erosion and residue cover under different tillage systems. The site is widely used by producers, getting over 7,000 uses during its first six months.

② During 2004, a year of low aphid populations, soybean aphid management using thresholds prevented unnecessary insecticide applications, saving growers $12-16 in application costs,

and limiting environmental impacts to beneficial insects such as honeybees and ladybird beetles.

③ Iowa State University offered a three-day course designed to train agricultural professionals on Comprehensive Nutrient Management Plan Development (CNMP). The 115 Professional Engineers, Certified Crop Consultants and other agricultural industry professionals who completed the course are eligible for reimbursement nationally by USDA for CNMP development.

④ ISU researchers validated the functional importance of an inline-settling basin that provides for solids capture ahead of the drum filter in a recirculating aquaculture system (RAS). This serves to reduce the environmental impact of aquacultural effluents by optimizing fish production and waste management technologies that capture more solids with reduced resuspension and reduced water use. Information from this study is a valuable addition to fish culturists using RAS system since there are now additional U.S. E.P.A. regulations concerning this culture method.

- ISU participation in the following multistate research projects also contribute to goal 4: NC0094, NC0100, NC0125, NC0202, NC0205, NC0218, NC1005, W0082, W0128, W0170, W0187, 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

- increased utilization of integrated pest management, sustainable, and organic agricultural practices, ①②
- adoption of better manure management practices, and ③
- increased wetland restoration and improved riparian management on public and private lands.

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 $ 3,008,436

FTEs 46.3

Key Theme – Soil Quality

Program 21: Sustainable and Environmentally Safe Management of Soil Resources

. 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.

. Impact/accomplishment

- Mycorrhizae are beneficial soil fungal-plant relationships that can help plants acquire nutrients in a sustainable agricultural system, yet we know little about how variable the fungal species are in a given crop field. Our survey of four different field soils noted high variability in fungal species present when isolated on soybean, with Glomus species dominating. We can now determine if these common species are efficient in providing the plant with nutrients and if some species are better than other species for this purpose.

- Soil erosion remains the largest water-quality problem in Iowa. A web-based tool was developed to give estimates of daily soil erosion and water runoff losses at the township level of resolution. This effort will allow targeting of limited financial resources to the areas in the state most affected by erosion. Another web-based decision support system was developed to calculate potential soil erosion and residue cover under different tillage systems. The site is widely used by producers, getting over 7,000 uses during its first six months.

- The Iowa State University Agronomy Extension soil fertility web site was designed in late 2003, and development completed in 2004. The site was activated for public access on April 19, 2004. The web site is: http://extension.agron.iastate.edu/soilfertility/. The site is arranged into six main categories: nutrient topics, photo gallery, links, weather/climate, ISU soil test lab, and faculty/staff. From approximately April 19, 2004 to August 31, 2004 there were about 31 visitors per day, with about 86 page views per day. During that period there were nearly 12,000 file downloads from the site.

. Source of Federal Funds—Hatch

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

Key Theme – Integrated Pest Management

Program 22: Integrated Pest Management

. 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 2004 included the following:

- Quantitative temporal and spatial epidemiological methods and models are being developed and used to assess the risks and benefits of new agricultural biotechnologies, as well as to predict the risks and potential impacts of new and emerging plant diseases, that threaten U.S. agriculture.

- Research is underway to identify key areas where farmers can optimize their production systems in a more economic and environmentally way. Studies include crop rotation, replant decision, soil fertility, inoculum, and hail injury studies.

- The soybean insect pest-management project focuses on the management of soybean insects, including the soybean aphid, Aphis glycines. The soybean aphid is a major new invasive pest of soybean in North America. First discovered in Iowa during August 2000, it is currently distributed in all Midwestern states. In 2003, approximately four million acres were treated with insecticides to control this insect.

- Efforts are underway to enhance crop production efficiency in Iowa by facilitating the mutual exchange of plant disease information, in particular Asian soybean rust, between scientists, and agricultural consultants and growers.

- Research is being conducted to develop and patent beneficial-insect attractant lures in soybean fields. Deploying the lures in aphid-infested soybean fields could increase the efficacy of predation by beneficial insects; therefore suppressing early-season colonization by soybean aphids. This environmentally benign strategy is designed especially for organic and sustainable soybean growers to reduce soybean aphid damage.

- Studies are being conducted to determine if there are soybean-associated volatiles that serve as attractants to soybean aphid alates. Lure-traps using the volatiles would serve as baits in an easy-to-use surveillance tool.

- The grape colaspis has been an occasional pest of Midwest field crops. During the past several years it has repeatedly injured seed corn in Central Iowa. Research is being conducted to identify economic treatment alternatives.

. Impact/accomplishment

- In the Stewart's disease of corn pathosystem, the seasonal and county-level risk for Stewart's disease has been successfully predicted. GIS disease risk maps provide pre-plant risk information that allows seed-corn producers to select planting sites with a low risk for Stewart's disease.

- Large soybean aphid numbers and poor growing conditions resulted in upwards of 40% yield loss during 2003. Recommendations for soybean aphid management, developed with regional cooperators from North Central states, directed growers to apply decision thresholds when treating for soybean aphids. During 2004, a year of low aphid populations, soybean aphid management using thresholds prevented unnecessary insecticide applications, saving growers $12-16 in application costs, and limiting environmental impacts to beneficial insects such as honeybees and ladybird beetles. Protecting ladybird beetles is significant as recent research suggests that biological control is an important part of soybean aphid population regulation. Field research in 2004 verified that populations below threshold do not result in economic yield loss.

- Approximately 450 agribusiness personnel and 40 Iowa State University Extension Field Staff received specialized training in the identification of Asian soybean rust. These individuals play a crucial role in scouting for Asian soybean rust and the implementation of disease management programs.

. Source of Federal Funds—Hatch; Smith-Lever

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

Key Theme – Agricultural Waste Management

Program 23: Animal Waste Management

d. Description of activity

National Certification Program Memorandum of Understanding established between USDA and ISU: A memorandum of understanding (MOU) between USDA and ISU that recognizing Iowa State University as having a nationally recognized TSP certification program in the area of Comprehensive Nutrient Management Planning. The 2002 Farm Bill expanded the availability of technical assistance to private landowners by encouraging the use of third parties—called technical service providers—to assist USDA in delivering conservation technical assistance services to farmers, ranchers and others. Comprehensive nutrient management plans are required to be prepared by the Natural Resources Conservation Service, or a certified third Technical Service Provider (TSP). Due to the expected number of CNMPs to be written, third party TSPs are expected to play a vital role in the development of the plans. As such it is important that an adequate number of third party TSPs recognized by NRCS are available to producers to meet this need. The MOU will allow specialists certified by the ISU program to provide service nationally. The ISU TSP CNMP Certified Specialist program meets the national NRCS Conservation Planning Policy requirements.

Open Feedlot Runoff Control Model Peer Review Completed: The peer review process for four models, the Effluent Limitations Guideline Model (ELG), Vegetated Treatment Area Model (VTA), Vegetated Infiltration Basin Model (VIB), and the Combined Vegetated Treatment Area / Vegetated Infiltration Basin Model (VIB/VTA), was completed. The use of these models will be required for the successful design and permitting of first alternative treatment systems to be permitted in the nation under the 2003 revised Concentrated Animal Feeding Operation regulations.

Effects of liquid swine manure applications on NO3-N leaching: losses to subsurface drainage water from Loamy Soils in Iowa: This project addresses the challenges of manure application in fields and efficient utilization of nutrients without causing negative impacts on water quality. This project also addresses some of the critical issues in manure handling systems, manure application equipment, and manure application rates. Primary activities of the project were 1) publishing data in refereed journals and 2) work towards promoting the use of liquid swine manure as a plant nutrient and reduce the dependence on commercial fertilizers. Discovery: a) Applications of liquid swine manure, when averaged over six-year period, resulted in significantly greater NO3-N losses with tile flows in comparison with

UAN- applications (26 vs. 17 kg-N ha-1) under continuous corn production system but no differences were observed in corn grain yields, and b) the crop rotation effects, when averaged over six-year period, showed no significant difference in NO3-N leaching losses under manure and UAN-fertilizer applications but significant increased corn grain yield under swine manure.

Subsurface Drainage in Iowa and the Water Quality Benefits and Problems: This project addresses the challenges of using agricultural fertilizers, pesticides, and manure for crop production in intensively farmed areas of Iowa where subsurface water is drained into agricultural drainage wells because of lack of natural outlets negative impacts on water quality. This project also addresses some of the critical issues in chemical application methods and rates, manure handling systems, manure application equipment, manure application rates, and potentially negative impacts on water quality. Primary activities of the project were 1) share the results of this study with crop producers of the area, 2) development of alternative technologies for chemical and manure management provided information to be shared by the Iowa DNR and IDALS personnel for making policy decisions on the future use of agricultural drainage wells, 3) to present data on this study at the state, regional, and national meetings and workshops, and 4) to publish data in refereed journals.

Additional research during 2004 has centered on composting large animal mortalities, environmental management of manure composting sites, gas emissions from bedded livestock and composting systems, and compost utilization in cropping systems.

d. Impact/accomplishment

Short-term:

- National CNMP Certification Course held: Iowa State University offered a three-day course in Indianapolis, Indiana (November 16-18, 2004), designed to train agricultural professionals on Comprehensive Nutrient Management Plan Development (CNMP). The 115 Professional Engineers, Certified Crop Consultants and other agricultural industry professionals who completed the course are eligible for reimbursement nationally by USDA for CNMP development under a USDA – ISU Memorandum of Understanding.

- The study on Subsurface Drainage in Iowa and the Water Quality Benefits and Problems has resulted in several nutrient and pesticide management systems to reduce the leaching of chemicals to groundwater systems. These systems have been promoted for their use to the farmers in the ADW area.

Long-term:

- Open Feedlot Runoff Control Model Peer Review Completed: The successful completion of the peer review process was required before any alternative treatment systems for beef feedlot run-off in Iowa could be permitted. The first alternative treatment system permits for CAFOs in the nation are expected to be issued based on the ISU model results for six beef feedlots in Iowa. These feedlots will then be monitored for a two-year period by ISU

as part of an EPA funded research project to quantify the performance of alternative treatment systems for beef feedlot runoff.

- The results of the study on effects of liquid swine manure applications on NO3-N leaching show that corn-soybean production system is a better system to manage swine manure applications for water quality and crop production benefits.

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. 2003 – Fathead minnow colony was successfully established. The isolation technique for extracting leukocytes from fathead minnow kidney was developed; morphological and cytochemical characterization of prepared leukocytes have been completed.

2004 – ISU researchers have developed and optimized assay for degranulation of primary granules. The assay is capable of detecting handling and crowding stress as well as differences in various stress causing treatments (anesthesia procedures). Baseline values for FHM neutrophil oxidative burst, myeloperoxidase content and degranulation have been established. ISU researchers have tested developed assays on several fish species (catfish, bluegill, largemouth bass). Production of GIS maps to determine possible manure/chemical loads within initiated.

Objective 2. Collection of data for the weir project began with a successful summer field season running from June through August 2004. During these months, fish movement and fish communities were sampled in Turkey Creek, Cass County, IA and macroinvertebrate communities were sampled in nearby Walnut Creek, Montgomery County, IA. designated watersheds has been

To document fish movement and describe fish communities in Turkey Creek, two hoop nets and two minnow traps were set at each of seven stations for periods of twenty-four hours throughout the summer. By the end of the summer field season, 858 fish from the four target species (channel catfish, yellow bullhead, black bullhead, and creek chub) had been fin clipped and there were 285 recaptures of fin clipped fish. All four weirs within the sampled reaches of Turkey Creek were of a 1:4 backslope design throughout the summer field season.

In late July 2004, macroinvertebrates were sampled from 20 sites in Walnut Creek, which contains numerous weirs of a 1:20 backslope design. These sampled stations consisted of five sites within the weir rip-rap, five sites upstream of weirs, five sites downstream of weirs, and five sites not associated with weirs. Lab sorting and identification of these macroinvertebrates is currently being conducted.

Fall community sampling of Turkey Creek occurred during October 2004. Ten sites of 280 meters each were electroshocked with two backpack units to increase recapture numbers and evaluate fish communities living in reaches associated with weirs and reaches not closely associated with weirs. Lab identification and measuring of minnows collected from this sampling is currently being conducted.

Objective 3. Currently there are a variety of data and research products available through IRIS (http://maps.gis.iastate.edu/iris). Information retrieval in IRIS is based on a fish species or reach (river or stream segment) centric interface. One of the primary data sources is the 12,000+ record Iowa fish study database. This database is a compilation of different fish sampling records from the 1800s to present day and was created for the Iowa Aquatic Gap Analysis Program. Users are able to query the database and obtain information for different species. Summaries are provided by several geographic enumeration units such as reach segment, river, hydrologic unit and county. Access to other information in the database is provided by queries which focus on a particular study, investigator and collection gear type. In addition to the database access much of the work that Iowa Aquatic GAP has and will be producing will appear in some format on IRIS. Currently users can access individual species range maps. Ranges are represented by the eight-digit hydrologic unit code (HUC) boundary.

Work has been done with the Iowa DNR's Watershed Atlas program to allow users to obtain information reach-based data from IRIS. Users on the Watershed Atlas use a tool provided on the Watershed Atlas to link to information about a particular reach. Reach-based data on IRIS is continually updated to allow for ease of information retrieval between both systems.

Objective 4. In anticipation of the issuance of EPA rules, ISU held a workshop October 9, 2003 to provide an overview of the issues and options for Best Management Practices (BMPs) to meet the new regulations. The presentations at the workshop have been published: Proceedings, Aquaculture Effluents: Overview of EPA Guidelines and Standards and BMPs for Ponds, Raceways, and Recycle Culture Systems. A CD version (#104) is available from the NCRAC Publications Office.

The issue began with a settlement with the Natural Resources Defense Council and others, in January 1992, wherein EPA agreed to a consent decree that established a schedule by which EPA would consider regulations for 19 industrial categories including aquaculture. On June 30, 2004 EPA finalized rules for effluents from concentrated aquatic animal production (CAAP) facilities (i.e., fish farms). Issuance of the rules completes all regulations addressed under the settlement agreement.

A new project funded by the Iowa Department of Natural Resources addresses the BMPs for channel catfish culture in ponds. This project entailed ponds located at the Rathbun State Fish Hatchery as well as the recently developed ISU ponds located at the ISU Horticulture Station. The foci for this project were to evaluate stocking density as well as feed protein levels upon fish production as well as water quality. Results indicated the need to limit stocking densities to allow for best fish growth as well the use of lower protein diets that decrease ammonia and phosphorus outputs.

d. Impact/accomplishment

Short-term:

- To reduce the environmental impact of aquacultural effluents, there is a need to optimize fish production and waste management technologies that capture more solids with reduced resuspension, and reduced water use. ISU researchers also validated the functional importance of an inline-settling basin that provides for solids capture ahead of the drum filter in a recirculating aquaculture system (RAS). Information from this study is a valuable addition to fish culturists using RAS system since there are now additional U.S. E.P.A. regulations concerning this culture method.

- There is a need to both improve the survival and growth as well as the consistency of results arising from fish culture operations. Information garnered from past ISU studies on fish culture operations in plastic-lined ponds have now been incorporated into agency protocol (e.g., Iowa Department of Natural Resources). The result has improved the survival of walleye to a fairly consistent 75% compared to the 30-50% typical in culture operations.

Long-term:

- To-date there has been a limited amount of information related to fish's ability to navigate bridge-protection barriers. Data garnered from this research is yielding valuable information related to fish movement in Midwestern streams that have these structures in place. Based on this information, the Iowa Department of Natural Resources and other watershed alliance groups are redesigning riverbanks and bridge barriers to allow fish to navigate waterways unimpeded.

d. Source of Federal Funds—Hatch

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

Key Theme – Natural Resources Management

Program 26: Improving Environmental Quality in a Changing Landscape

c. Description of activity

The overarching objective of this research is to investigate the natural processes that influence the distribution, abundance, and diversity of animal and plant species in agroecosystems, how the processes are affected by the spatial characteristics of landscape cover, and how the natural processes are linked to economic, social and external environmental factors. Often we use GIS classifications linked with species data to broadly predict species distribution and abundance and to dynamically model populations under current conditions, and those conditions predicted under large scale factors such as global climate change, and severe habitat loss. We also investigate detailed species ecology to build an understanding of ecological mechanisms from which we can more reliably predict population and community responses to changes such as fragmented habitat.

The research has practical implications that range from management of invasive species, integrated pest management, and economic valuation of wildlife. A major challenge is developing general framework and methodology to link the ecological changes to economic value and public policy that feeds back to management of the landscape and the common resources in the ecosystem. We worked in a wide variety of nationally-prominent as well as locally important ecosystems, including the Rocky Mountains, the Great Plains, the Southeast, the Gulf Coast, and most prominently the corn belt of Iowa, especially in landscapes that are combinations of working lands with interspersed natural habitats such as prairies, wetlands, and riparian areas interspersed in the landscape. We had extramural funding from NRCS, USFS, USGS, NPS, USFWS, USEPA, IADNR, and IADOT. We expend considerable effort on outreach to the public, in one case actively involving them in data collection.

c. Impact/accomplishment

- Studies of insects, birds, and mammals within landscapes revealed that the size, shape and linkages among habitat patches had substantial influence on the ecological processes. For example, predation on ground nesting birds was most intense near edges or in intermediate sized patches. We project landscape configurations under various scenarios on landscape maps using GIS and then model population responses (http://www.eeob.iastate.edu/faculty/ClarkW/html/poweshiek.htm). Resource managers in the Natural Resource Conservation Service, Forest Service, Geological Survey, and Iowa Department of Natural Resources have used these results to "design" habitat projects that protect the productivity and diversity of animal populations.

- We have extended information about both the ecological data and the value of biodiversity to the public using a variety of outreach mechanisms, in one case actively involving them in data collection. Nature Mapping combines data collected by ordinary citizens with data compiled by Iowa GAP on species distributions. Around the State of Iowa, workshops were conducted to train volunteers in wildlife habitat and identification and in how to collect and submit data, and have expanded the training capability with a "train the trainer" program that now has six cooperating trainers across the state. The result has been compilation of nearly 32,000 records of wildlife sightings by hundreds of volunteers. The program is designed to actively engage citizens with data on biodiversity and stimulate cooperation with public agencies and conservation organizations. There is an interactive and educational website to enter and retrieve data by volunteers and the public: (http://www.extension.iastate.edu/naturemapping/Nature mapping/).

c. Source of Federal Funds—Hatch

c. 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:

- 65 Refereed Publications, Research Papers, Manuscripts
- 35 Non-refereed Publications, Reports, Technical Papers
- 10 Proceedings, Published Abstracts
- 14 Extension Publications
- 64 Invited Presentations
- 7 Education Programs, Field Days, Tours (25 participants)
- 15 individual consultations
- 2 web pages supported
- 10 Books & Chapters
- 16 Theses, MS/PhD Programs Completed

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

① Results of a survey on small retailer computer and Internet use was presented to the Iowa Retail Federation (IRF). This group is the primary trade organization that represents the retail industry in Iowa. Their membership is comprised of approximately 3,000 Iowa retail firms, the majority of which are independently owned and operated. Assessing small Iowa retailers' technology learning and integration provides baseline information necessary for effective business assistance. Survey findings are being used to guide the IRF in development of business consulting and training programs targeted to the specific technology needs of small rural retail firms.

② Findings from the MidWest Child Care Quality study have contributed to the proposals by Governor Vilsack for significant expansion of Iowa funding for early childhood programs, and have also guided Iowa's proposed Quality Rating System for child care programs.

③ Results from an assessment of the role of housing and transportation factors in rural community vitality and employment may guide local community priorities for infrastructure decisions.

④ Recent results from the analysis of risk and resiliency in rural aging with respect to home modifications, disease and disability process variations for mental health, and related economic burden, will guide the development of community support programs for rural elderly populations.

⑤ With re-authorization of federal welfare reform looming, the results about the impacts of welfare reform will help inform policy makers.

- ISU participation in the following multistate research projects also contribute to goal 5: NC0100, NC0222, NC1001, NC1002, NC1011, NE0167, NE1011, NE1012, S0296, and W1133.

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

- communities supporting development projects; increased capacity of communities, families, and individuals to improve their own quality of life, ②③④
- 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] ①
- enhanced education of decision-makers at local, regional, and state levels; those initiating development projects; and those setting policies. ①②③④⑤

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 $ 1,496,195

FTEs 19.3

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 outreach.

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 outreach, 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.

The research also focuses on the factors that explain rural economic and employment growth in the Upper Midwest (Iowa plus the states bordering Iowa). Important factors that have been identified include knowledge creation, outdoor recreation amenities, water quality, growth in livestock activity, and less reliance on agricultural incomes. In particular, the development of knowledge creation and outdoor recreation amenities are being analyzed in a spatial context with indications that local spillovers are important in explaining rural growth. Further, we are doing real options analyses of ethanol and wind energy to determine viable scales for bio and other renewable investment when adding value in rural areas.

The gender and small business project found that the gender gap in small business success is greater in urban than rural areas. Success is explained by women's ownership of businesses in less profitable industries and women owner's lower levels of civic involvement than men. The Social and Economic Trend Analysis Office collected, analyzed, interpreted, and disseminated information on social, economic, and demographic trends in Iowa. The food irradiation study found that negative information acquisition decreased symbolic adoption; but over time this negative effect was mitigated by compliance with endorsements from opinion leaders. The study of the impact of new state prisons on small town economies received much attention from the press, as well as from individual communities and grassroots organizations. Research on capital and sustainable development found that rural communities that invested in multiple capitals achieved more sustainable development, specifically, better rural water management, than communities that invested in only one capital, such as financial or human capital. The project on agriculture, food systems, and community health conducted survey work within Iowa, analyzed U.S. mortality data, and received two grants totaling $66,292 that funded six community surveys. An investigation into social and demographic trends that have altered the stepfamily composition and stepfamily life corrects common misconceptions about stepfamilies and provides recommendations for improving stepfamily quality of life. Research focusing on women farmers and farmland owners completed a pilot participatory research project with women land owners. Research on life stress and health among adults at midlife found that drug and alcohol use and overall psychological disorders do not significantly differ between rural and urban areas, but male rural suicides continue to increase over time whereas they are declining in urban places. The rural housing research found that social and political environments are important influences on the quality of rural housing stock. The project examining the relationship between community social capital and community response to economic shocks experienced since 1990 completed surveys of residents and telephone interviews with key informants in 100 Iowa rural communities. The Iowa Self Sufficiency Wage study calculated that in 2002, between 134,000 and 194,000 of Iowa's children were in families with insufficient incomes to cover basic household and work-related expenses while one or both parents worked full time. A GIS-based interactive map that includes information on the geographic distribution of human needs and available social services was developed for use by community leaders to expand outreach efforts to under-served households. The entrepreneurship research supplemented data from in-depth interviews with community leaders on the role of community coalitions in promoting and supporting local entrepreneurship. The Iowa Farm and Rural Life Poll surveyed over 2,000 Iowa farmers to obtain information on health insurance, the future of farming, tax policy, water quality, philanthropy, and quality of life.

d. Impact/accomplishment

- The gender and small business project resulted in dialogue on the role of small businesses in rural Iowa and factors for their success.

- The Social and Economic Trend Analysis Office informed citizens, academics, economic leaders, and state legislators about demographic trends in Iowa.

- Community leaders have used the research on the impact of new state prisons on small town economies to help them understand the potential impact of such institutions on their communities.

- Local leaders are using data from six Iowa communities on food access and food insecurity to assess local food issues such as transportation for elderly, gardening initiatives, and food banks.

- Findings from research focusing on women farmers and farmland owners resulted in modification of the design, content, and delivery of a statewide series of workshops.

- To address the issue of adequate rural housing, state government is interested in planning a summit on Diversity and Economic Development with community housing being one of the key issues.

- The GIS-based community resource and human needs map contributes to the ability of social service agencies and volunteer groups to secure grants for programs and identify areas in which to expand their outreach.

- Findings from the entrepreneurship research were used to enhance the efficacy of a national program on training and supporting entrepreneurs.

- A publication in which calculations were made of the self sufficiency wage (the wage that would be necessary to cover the bare necessities of a family) in each Iowa county and for the state as a whole for various family compositions was prepared and disseminated.
  - United Way of Central Iowa is using the Iowa Self Sufficiency Wage study to focus part of its fundraising around improving the well-being of residents in Des Moines low income neighborhoods.
  - The study is being utilized by the Story County League of Women Voters as documentation in support of establishing a living wage ordinance for Story County and/or the City of Ames.

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 during the reporting period addressed several key project objectives: 1) To enhance individual, family, and community socio-economic development through the advancement of information, products, and services related to textiles and clothing, and 2) To facilitate

development of fiber products or industry processes to advance global exchange. The impact of technology adoption and integration was a central theme throughout many of the projects.

Campbell and Parsons continued their research on the Digikids project, analyzing the effectiveness of marketing digitally printed children's garments through the Internet. Other elements of their research included applications of digital printing technology to the co-design process (customer driven) for mass customization of apparel products.

Damhorst collaborated with Campbell and Parsons to assess consumer response to two versions of the Digikids mass customization Internet site. In NC-222 research, Damhorst analyzed longitudinal panel data on rural and small town consumers' shopping behavior (Internet and other distribution channels) to assess change in information search over time for food and fiber products. This project terminated October 1, 2004 after six years of activity.

Fiore's survey research focused on how new forms of technology (i.e., virtual model technology and mass customization technology) used on apparel websites and in traditional stores affects the consumer. Consumer hedonic and utilitarian aspects of the shopping experience are affected during the use of these new forms of technology and these aspects have an effect of consumer responses towards the evaluation of the retailer and willingness to purchase from the retailer.

Niehm's study addressed small Iowa retailers' use of computers and the Internet at home and at work, and their use of the Internet for commercial buying and selling of goods and services. A major goal of the study was to determine the degree to which the Internet is facilitating retailing in the state of Iowa and to assess the e-commerce technology needs of small retail businesses in the rural Midwest.

Park initiated research that examines the impact of customer brand experience (e.g., satisfaction on service, product quality – sizing and fitting), knowledge, loyalty, and trust on intentions for multi-channel apparel shopping (e.g., Internet, catalog) by traditional mall shoppers.

d. Impact/accomplishment

- Linda Niehm presented results of her survey on small retailer computer and Internet use to the Iowa Retail Federation (IRF), Urbandale, IA. This group is the primary trade organization that represents the retail industry in Iowa. Their membership is comprised of approximately 3,000 Iowa retail firms, the majority of which are independently owned and operated. Assessing small Iowa retailers' technology learning and integration provides baseline information necessary for effective business assistance. Survey findings are being used to guide the IRF in development of business consulting and training programs targeted to the specific technology needs of small rural retail firms.

d. Source of Federal Funds—Hatch

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

Program 30: Quality of Life

. Description

This program focuses 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.

Analyses of data from home observations for pre-kindergarten children are proceeding, in collaboration with the Early Head Start National Research Consortium. New funding has been obtained to examine the validity of child care quality rating systems in Iowa, Kansas, Nebraska, and Missouri. Analyses of survey data from 2,400 mothers and their children living in poverty and experiencing a new welfare regime found that for adolescents, family welfare receipt was related to a decrease in cognitive achievement and behavioral problems, particularly among sanctioned families. Census survey data research found that recent gains in poverty eradication are tempered by rising wage inequality while welfare reform generally had little impact on poverty, and the expansion of the Earned Income Tax Credit accounted for half of the poverty reduction. Community transportation survey results documented significantly higher levels of transportation problems among low-income nonworking adults compared to their employed counterparts; residence adjacent to a metropolitan area has a positive effect on working. Preliminary results suggest that rural community vitality is affected by changes in housing inventory and housing-decision aids. For rural elderly, the number of home modifications affects well-being, as does income, age, ability to function physically, and community service support. Research on resiliency among the old and very old demonstrates that disease and disability effects on depressive symptoms are mediated through subjective health. Longitudinal analyses of subjective and objective economic well-being and the burden of economic support for Centenarians are in progress.

. Impact/accomplishment

- Findings from the MidWest Child Care Quality study have contributed to the proposals by Governor Vilsack for significant expansion of Iowa funding for early childhood programs, and have also guided Iowa's proposed Quality Rating System for child care programs.

- With re-authorization of federal welfare reform looming, the results about the impacts of welfare reform will help inform policy makers.

- Results from an assessment of the role of housing and transportation factors in rural community vitality and employment may guide local community priorities for infrastructure decisions.

- Recent results from the analysis of risk and resiliency in rural aging with respect to home modifications, disease and disability process variations for mental health, and related

economic burden, will guide the development of community support programs for rural elderly populations.

. Source of Federal Funds—Hatch

. 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:

- 15 Refereed Publications, Research Papers, Manuscripts
- 137 Non-refereed Publications, Reports, Technical Papers
- 14 Proceedings, Published Abstracts
- 97 Extension Publications
- 398 Invited Presentations
- 1,676 Education Programs, Field Days, Tours
- 53,403 one-on-one consultations
- 30 Books and chapters
- 0 Patents
- 7 Theses, MS/PhD Programs Completed
- 5,061 web pages supported
- 1,235 volunteers trained
- 2 CD Rom's developed
- 6 feasibility studies completed
- 5 software programs developed

① Thirteen workshops were presented in central Iowa explaining five different ways to calculate rent and how to set up variable cash rent leases. Two hundred and eighty people attended. The average response for the value of the program to the individuals was over $1,200 each.

② Techniques to improve nitrogen application rate and application uniformity, without negatively impacting corn yields, were developed by Iowa State University (ISU) through invention of the Impellicone anhydrous ammonia manifold. The adoption of this manifold by producers and resulting uniform application techniques resulted in reducing anhydrous ammonia nitrogen application by five percent to over four million acres in two states.

③ From October through March, 63 "Winning the Game" workshops were held, with 1,660 participants. A follow-up evaluation of ten percent of the participants yielded an estimated benefit of $12,279,480, with essentially no additional costs. While 2004 was an unusually favorable year for forward pricing grain, the lessons learned can be applied to future years, as well.

④ Outside of Iowa, 5,200 sports turf managers were trained in 36 educational programs and in 16 educational programs within Iowa. Of the 5,200 sports turf managers trained, 49% get their information from the ISU Turfgrass Extension Specialist (5,200 × 0.49 = 2,548 managers using extension information). These 2,548 field managers each spend an average of $1,276 on field care, thus ISUs Extension Turfgrass Education has impacted the decisions on the spending of over $3.2M in field care.

⑤ The Iowa Beef Center emphasized production and information management and marketing systems, focused on nutritional management of corn co-products, performance benchmarking, and the National Animal Identification System and electronic record-keeping. In addition, special emphasis was placed on feedlots required to comply with revised CAFO regulations to help them evaluate their options and compliance requirements. Twenty-nine percent of producers attending the educational meetings reported a cost savings of $15 per head or more in their cattle operation. They also reported saving time and being more confident in their decisions.

⑥ The IPIC-provided Sow Longevity Spreadsheet, available for breed-to-wean and farrow-to-finish operations in both English and metric versions, was announced through a news release on March 26. In the first week, the spreadsheet program was requested by and sent to producers and other industry-affiliated representatives representing 13.3 million sows. As of Sept. 30, 2004, spreadsheets had been sent to people on six continents (North America, South America, Europe, Asia, Australia, and Africa), representing more than 21.4 million sows. The spreadsheet application helps producers determine optimum time for keeping sows in their herds.

⑦ ISU Extension developed a persistent exterior dry off and pre-fresh barrier teat dip. Two 14-month field trials showed a 40% reduction in mastitis at calving and a 60-70% reduction in environmental mastitis. This barrier teat dip is now used on six continents and in over 60 countries. Since the product first came on the market, it has reduced losses from mastitis of more than $133 million in herds implementing the strategy in North America alone.

⑧ Iowa State University Extension (ISUE) has been a key provider of information and education to farmer owned cooperatives starting ethanol production plants in Iowa. Programming has included writing feasibility studies, educational meetings, Web sites, reviewing loan applications and assistance in all facets of development of the industry since the first producer-owned plant was built in 1997. In Iowa there are 16 farmer-owned ethanol facilities in production, under construction or planned as of September 2004. The total production of ethanol in Iowa will be 855 million gallons and will utilize 320 million bushels of Iowa corn. There are 5,340 farm investors in the plants, with $71 million of equity invested by the producers. The value of corn purchased from local farmers is more than $870 million. The economic impact to the state is significant. The cost to construct the 12 plants will reach $500 million. Corn utilization by the industry will provide a 12 cent per bushel increase in value to all Iowa corn farmers valued at $156 million. There will be 400-plus jobs and $63.5 million of annual payroll from the plants. The direct and indirect job creation will total 3,900 jobs valued at $363 million.

⑨ Iowa State University Extension has been working closely with the research arm of Iowa State University in expanding the seed supply of the new varieties of low linolenic acid soybeans. Two local Iowa farm producer groups have picked up the project and are expanding the seed supply and arranging processing and final markets for the new soybean oil. One of the groups has moved up the value chain and is partnering with local agricultural cooperatives to merchandise seed and contract acres to be crushed with another value chain partner—Cargill the soybean crusher and refiner. They have also moved up the value chain further by making marketing agreements with oil distributors to market the product. The group sells a branded oil product and operates as a LLC. Another local Iowa producer group is also expanding the seed supply and working on developing processing and marketing partners up the value chain. Iowa State University Extension has been very active in assisting these groups in all phases of organization, development, and execution of their program. Impacts for the State of Iowa have included better health alternatives and a major economic impact for the State of Iowa. Farmers are receiving a $.75 to $1.00/bu. premium for growing the beans, processors are getting business, and marketing profits are going back to Iowa Investors.

⑩ The Iowa Master Gardener Program is an educational and volunteer service program of ISU Extension and the College of Agriculture. This year 680 adults were trained to become Master Gardeners at 36 locations. In calendar year 2003, Iowa's Master Gardeners reported over 80,000 hours of volunteer educational service to their communities. Assuming a value of $11.46 per hour for volunteer time, the Iowa Master Gardener program provided over $900,000 of education and service to local communities.

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 program is designed to increase the strategic and organizational management skills of Iowa farm managers as well as the capacity of Iowa farm families to respond positively to structural and technological change. The ultimate goal of the program is to increase the competitiveness of Iowa's commercial farm businesses. In FY 2004, the focus of program activities was on business strategy for women farm operators, farm leasing changes required because of changing farm programs and technology and estate planning.

b. Impact/accomplishment

- Landlords and tenants want to know how to estimate and calculate what fair rental rates are. There are $20 billion of farm program subsidies that are now being transferred to landlords in the form of higher rents since the 2002 Farm Bill. Landlords and producers need to understand how this impacts rental rates and to what extent. Thirteen workshops were presented in central Iowa explaining five different ways to calculate rent and how to set up variable cash rent leases. The program also looked at the estimates of current land values based on three different sources. The program also provided information on trends in farm size and farm income, government payments, and land ownership from the 2002 Census of Ag data that was just released. Two hundred and eighty people attended. The average response for the value of the program to the individuals was over $1,200 each. Participants commented on the need for information on costs of production and government program payments to help both parties determine fair rental rates.

- Annie's Project is a comprehensive educational program and support network for Midwestern farm women. Work during FY 2004 extended and enhanced Annie's Project educational efforts in Iowa, Missouri and eight additional North Central Region states. Annie's Project develops a practical, strategic vision of farm business management. The designed curriculum develops management skills relevant to the farm business, promotes group dynamics by developing support networks, enhances interpersonal skills, and introduces participants to the best available technologies to manage a farm business. In addition, they learn how to implement these skills to increase their effectiveness as a farm business partner. Participants clearly state that they have increased their confidence and involvement in managing the farm business. They claim a higher level of understanding and self confidence in applying strategies utilizing the information technology, human resources and risk management skill learned during the course. Additionally, participants speak of the value of support networks and friendships developed with other course participants.

b. Source of Federal Funds—Smith-Lever

b. Scope of impact—State Specific

Key Theme – Plant Production Efficiency

Program 103: Crop Nutrient Management

. Description of activity

Having nutrients readily available for plant uptake is essential for crop production. 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

- *Improving the Efficiency of Anhydrous Ammonia Application.* Farmers respond to nitrogen product application variability that can occur with conventional anhydrous ammonia equipment by over applying this nitrogen source to ensure all plants receive a minimal needed amount. Fertilizer flow is often non-uniformly divided across the application equipment which causes some corn plants to receive two to three times the amount of nitrogen as others. This discovery is significant because each year over one billion pounds of nitrogen is applied to cornfields in Iowa as anhydrous ammonia. Techniques to improve nitrogen application rate and application uniformity, without negatively impacting corn yields, were developed by Iowa State University (ISU) through invention of the Impellicone anhydrous ammonia manifold. The adoption of this manifold by producers and resulting uniform application techniques resulted in reducing anhydrous ammonia nitrogen application by five percent to over four million acres in two states.

- *Reduction of Sulfur Applications.* Although research data and demonstration information from ISU and other Midwest land grant universities has shown little if any benefit to the addition of sulfur with fertilization programs for row crop production, growers and ag chemical dealers wanted localized and unbiased research-based information on whether or not to apply sulfur fertilizers. Results from seventeen southwest Iowa demonstration sites conducted over a period of four years were shared by ISU Extension crop specialists with clients through educational meetings, publications, and crop e-mail notes. Follow-up surveys conducted with clients revealed that 5,600 acres receiving regular sulfur applications prior to implementing the education programs and disseminating this research information no longer have sulfur application, resulting in a savings of $22,400.

- *No-Tillage Soil Conservation Practice and Nutrient Management.* Farmers in southwest Iowa are apprehensive about adopting no-tillage conservation practices on their highly erodible lands (HEL) because of concerns with nutrient management associated with using this conservation tillage practice. A field day was organized by ISU Extension and held prior to spring crop planting to address the issue of nitrogen, phosphorous, potassium, and limestone management in no-tillage systems. Over one hundred farmers, along with twelve fertilizer, ag chemical and seed dealers, attended a five-hour educational program at a farm practicing no-tillage crop production. Twenty-three participants responded to post-program phone interviews and written evaluations. Eighteen respondents indicated changing their nitrogen management on 11,970 corn acres, with an average net savings of $3.68 per acre, or a total of $44,050. Thirteen growers indicated changing P, K, and lime management practices through improving soil sampling, using lower cost products, and changing application rates. These thirteen growers estimated they saved an average of $4.37 per acre on 15,990 acres for a total savings of $69,876. The total economic impact from this field day was $113,926.

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

Opportunities to price corn and soybeans exist both before and after the crops are harvested. Repeated research has shown that the most profitable marketing opportunities usually come during the spring months prior to harvest. However, many producers are reluctant to price their grain that early because (1) they are afraid that they may not produce as many bushels as they forward price, and (2) they lack a marketing plan, with specific signals that will trigger grain sales.

A joint educational effort was organized among ISU Extension farm management and marketing specialists, the Iowa Farm Bureau Market Education Division (Ed Kordick, contact), and the Center for Farm Financial Management (CFFM) at the University of Minnesota. Half-day workshops called "Winning the Game" were scheduled over the entire state. The focal point was a simulated marketing exercise in which specific price or time targets were set that would trigger pre-harvest grain sales. Participants were organized into small groups, and made their own marketing decisions. Results were compared at the end of the session. The CFFM provided educational materials and training, and Ed Kordick coordinated scheduling of the workshops and distribution of materials. Most of the workshops were sponsored by regional or county Farm Bureau staff, or local lenders. Recruitment was largely in the hands of the sponsors. Teaching teams consisted of one Extension educator and one Farm Bureau educator, or two Extension educators.

. Impact/accomplishment

From October through March, 63 workshops were held, with 1,660 participants. A follow-up evaluation of ten percent of the participants yielded the following information: 73% said that they developed a pre-harvest marketing plan for their 2004 crop as a result of attending the workshop; 73% of those who developed a plan said that they carried it out. On average, participants increased the percent of their corn crop that was forward priced from 27% in 2003 to 38% in 2004. Those who forward priced corn reported an average selling price of $2.78 for those bushels. The Iowa Ag Statistics office reported an average cash corn price of $1.75 in October, so forward pricing netted an additional $1.03 per bushel. The additional number of bushels priced by the respondents was estimated to be 1,147,763, so the additional revenue earned can be estimated at $1,182,196, or $7,578 per respondent. Extending this to all 1,660 participants yields an estimated benefit of $12,279,480, with essentially no additional costs. While 2004 was an unusually favorable year for forward pricing grain, the lessons learned can be applied to future years, as well.

. Source of Federal Funds—Smith-Lever

. Scope of Impact—State Specific

Program 106: Commercial Greens Industry

k. 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, turfgrass 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, city, county, and state public lands, and private woodland owners. Program 106 has focused on three important issues for performance goals: (1) increase the quality and percentage of marketable crop per acre and increasing profitability of businesses without harming the environment; (2) improve and enhance the quality of life for all Iowans through the use of horticultural and forestry crops; and (3) insure 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.

k. Impact/accomplishment

- *Performance Goal 1.* (see http://www.ag.iastate.edu/iaexp/POW.pdf, Program 106 for goals)

    - ISU Extension Forestry organized and helped present three regional forestry stewardship conferences in Nebraska City, Nebraska (which attracted 175 woodland owners from Iowa, Missouri, Nebraska and Kansas), Keokuk, IA (which attracted 200 woodland owners and managers from Iowa, Illinois and Missouri), and Sinsinawa, WI (which involved 500 Iowa, Illinois and Wisconsin woodland owners and managers). Primary partners in these conferences were the Bureau of Forestry and NRCS in Iowa. During evaluations, participants of the stewardship conferences were asked if they have received benefits from past stewardship conferences and asked to tell how they benefited. From the many responses, twelve listed specific economic gain totaling $98,000. The economic gain was related to the following factors: Animal control, weed control, timber stand improvement, site planning, tree felling, and timber sales techniques.

    - Iowa's grape and wine industry is still relatively new. The majority of Iowa's wine-grape vineyards and native wineries have been established over the last four years. Most of these vineyard and winery owners have started out with little or no knowledge of vineyard and/or winery management. There is a huge demand for vineyard and/or winery management information in Iowa. ISU Extension has

responded by producing a well-received educational viticulture web page, by presenting information at over 50 vineyard grower meetings and individual consultations representing over 5,000 individuals, consulting with over 200 existing vineyards and 16 wineries, and advising and administrative support for Iowa Grape & Wine Commission and the Iowa Wine Growers Association. Information learned through these contacts has resulted in immediate use by the vineyards and/or wineries. Iowa's wine-grape industry has grown dramatically since 1999 when there were five vineyards and two native wineries in the state. Iowa now has over 200 vineyards and 16 native wineries and approximately 40,000 gallons of native wine were produced at these native wineries during the last year accounting for approximately two million dollars in sales.

- *Performance Goal 2.*

  - ISU Extension Councils and more than 100 citizens who attended a town meeting identified water quality as a priority issue in Northwest Iowa. A working group, formed in response to the town meeting, determined that a priority was to educate homeowners about the environmental cost of improper lawn care. In response to that need, an ISU Extension Commercial Horticulture Field Specialist, and CEED assumed the leadership role in the planning and implementing the "Good Stewardship Lawn Care" as part of an EPA Educational Grant. They designed the demonstration plots and selected the sites. The objective was to demonstrate sustainable lawn care practices. Field days, as well as the goals and results of the project were publicized with print, radio, and TV coverage. The field days conducted in the fall 2003 and spring 2004 attracted over 100 individuals interested in learning more about sustainable lawn care. Over 650 turf grass brochures were distributed from sign attachments at each site. A summary of the surveys taken at the meetings showed that the participants saved an average of $14 in fertilizer cost and lawn care expense because of the information. The project demonstrated how each citizen can make decisions that positively effect the environment. End-of-program surveys indicated that as result of attending one of the field days, on average the attendees felt that they would save in excess of $100 by not over-applying pesticides or fertilizers. The total impact of the program was estimated to be at least $10,000.

  - Four Oaks is a not-for-profit human service agency serving over 4,500 children and families throughout the state. Four Oaks has residential treatment programs for children ages 5-18 who are referred from the Dept. of Human Services or the Juvenile Court System. Four Oaks wanted a fund-raising event that encouraged character building, cooperation, entertainment, and a quality product. ISU Extension responded by helping build a coalition to grow pumpkins among Four Oaks, Kirkwood Community College, a commercial pumpkin grower, and ISU Extension. Three acres of pumpkins were planted south of the Four Oaks facility in former unimproved pasture. A plan was implemented to soil test, add and incorporate amendments, prep soil for planting, acquire high quality hybrid disease tolerant pumpkin varieties, planting, weed control, scouting, and harvesting. Approximately 3,000 twenty pound pumpkins were harvested and sold as part of

the fundraising event. Those youth involved with the project all had a sense of accomplishment, which resulted in a heightened level of self-esteem. There was wide exposure for this first-time two-weekend festival event during October at Four Oaks in newspaper, radio, and television. The festival is now considered a yearly event.

- *Performance Goal 3.*

    - Sports played on athletic fields are an important part of society, and the safety and quality of athletes is directly related to the condition of the field. During the three-year period from 2002–2004 the ISU Extension Turfgrass Program has focused on athletic field care by developing 16 athletic field management electronic guides. Outside of Iowa, 5,200 sports turf managers were trained in 36 educational programs and in 16 educational programs within Iowa. The national impact is extrapolated using the following results from the Iowa Turfgrass Survey that was prepared by the National Agricultural Statistics Service. Of the 5,200 sports turf managers trained, 49% get their information from the ISU Turfgrass Extension Specialist (5,200 × 0.49 = 2,548 managers using extension information). These 2,548 field managers each spend an average of $1,276 on field care, thus ISUs Extension Turfgrass Education has impacted the decisions on the spending of over $3.2M in field care (i.e. field management expenses related to chemicals, fertilizer, topdressing, seed/sod, contracting services, etc). ISU's Extension Turfgrass Education has influenced $3.2 million of athletic field decisions over the past 3 years ($1,276/person × 2,548 field managers = $3,251,284).

    - 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

y. 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, along with applied researchers from five departments from 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 this program.

b. Impact/accomplishment

- *BSE Response.* The discovery of a BSE-infected cow in Washington State on December 23, 2003, set off a number of issues that affected Iowa beef producers, including nose-diving markets, loss of export markets, and a consumer scare. The Iowa Beef Center responded to this situation with a series of daily market updates, the creation of a website resource, a nationally-televised satellite broadcast, and spotlighting the subject during winter meetings. As a result, responses showed that producers gained knowledge about the nature and circumstances of BSE and felt more confident about making management decisions in the wake of the crisis.

- *Software Development.* Ration and genetics decisions are increasingly complicated. The Iowa Beef Center developed BRANDS (Beef Ration and Nutrition Decisions Software) to enable all cattle producers to reduce feed costs by technically evaluating feeding alternatives. The Estrus Synchronization Planner and Sire Sort software programs allow cow/calf producers to compare synchronization programs and multiple sires to best achieve their breeding goals. Producers and allied industries are better prepared to make technically sound and economically viable decisions.

- *Environmental Education.* Iowa has approximately 180 beef feedlots that are required to get a NPDES permit. The Iowa Beef Center worked with Iowa DNR and Iowa Cattlemen's Association to develop a systematic approach to moving beef CAFOs into regulatory compliance. In addition, we educated producers on best management practices, facility designs, and nutrient management to cost effectively protect water quality. As a result, producers have identified a system that meets their limited resources while meeting their state and federal regulations.

- *Educational Programs for Cow/Calf Producers.* Iowa cow herds protect fragile soils through forage and grazing systems. Their success depends largely on minimizing winter feed costs and improving calf marketing. The Iowa Beef Center educated producers on nutritional management, including pasture walks, featuring forage management and extended grazing systems and ration software to reduce winter feeding costs as well as documenting management strategies to improve calf prices. Producers are better aware of changing management requirements and are more conscious of alternative winter feeding systems. Specific examples include:
  - National Animal Identification Education
  - Northwest Iowa Preconditioned Sales Reporting and Analysis
  - Fescue Management Series
  - Grazing Management Programming
  - Cornbelt Cow-Calf Conference
  - Iowa Forage and Grasslands Conference

- *Educational Programs for Feedlots.* The cattle feeding industry is highly competitive. As production technology and information management changes, Iowa feeders must identify systems that work best in their smaller, diversified farm feedlots. The Iowa Beef Center emphasized production and information management and marketing systems, focused on nutritional management of corn co-products, performance benchmarking, and the National Animal Identification System and electronic record-keeping. In addition, special emphasis was placed on feedlots required to comply with revised CAFO regulations to help them evaluate their options and compliance requirements. Twenty-nine percent of producers attending the educational meetings reported a cost savings of $15 per head or more in their cattle operation. They also reported saving time and being more confident in their decisions. Specific examples include:
  - Custom Feeding in TCSCF, Southwest Iowa
  - Feedlot Conference and Winter Series (6 meetings)
  - Environmental Compliance Meetings with Iowa Cattlemen's Association

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 Extension (ISUE) and the Iowa Agriculture and Home Economics Experiment Station (IAHEES). 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 College of Agriculture, and the College of 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 IPIC 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, Iowa Communications Network (ICN), and Internet resources.

A series of three environmental education meetings held in different Iowa locations helped provide a variety of current information to Iowa pork producers. Speakers and topics included Eldon McAfee, legal counsel for the Iowa Pork Producers Association, "Legal and regulatory information in the areas of avoiding nuisance cases, manure management, air quality, construction, and compliance audits," and Chris Murray from USDA-NRCS,

"Managing manure with the phosphorus index, including a walk-through of the P-index program and what information is needed to utilize the P-index." IPPA, IPIC and ISU Extension sponsored the meetings in an ongoing effort to keep members of the Iowa swine industry appraised of research findings and regulations that apply to the industry.

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 the use of hydrogen peroxide as a replacement for antibiotics for finishing swine, the efficacy of estrus synchronization with Regumate®, 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

IPIC faculty and staff members conservatively reached an estimated 30,000 people from Iowa, the Midwest, the U.S. and the world in a variety of settings. Constituent groups include producers, youth, consumers, veterinarians, packers and processors, scientists, international audiences, allied industry professionals, and students.

The February 2005 edition of the annual series of Iowa Pork Regional Conferences (co-sponsored with Iowa Pork Producers Association) focused on improving profitability in swine operations and attracted approximately 150 people to five locations. Average annual marketing of evaluation respondents was 2,588 weaned pigs, 2,771 feeder pigs, and 7,988 finisher pigs. All sessions were rated at least 3.78 on a scale of 1 to 5, with 1 being "not at all beneficial" and 5 being "very beneficial." Seventy-two percent said they estimated their operation's income would increase from $1,000 to 10,000 by applying knowledge they gained at these conferences.

The IPIC worked with Iowa Pork Producers Association and faculty from the ISU Veterinary Diagnostic and Production Animal Medicine department in the College of Veterinary Medicine to develop a 12-week program on developing and refining stockmanship skills. The program was composed of three course components and held February through April 2004. All participants received a CD with entire set of course materials and resources. The approximately 340 total attendees included individual and company swine operation owners, managers, and employees. On a scale of 1 to 4 (1 being poor and 4 being excellent) respondents rated the series an average of 3.29.

The IPIC provided a spreadsheet application to help producers determine optimum time for keeping sows in their herds. The availability of the Sow Longevity Spreadsheet, available for breed-to-wean and farrow-to-finish operations in both English and metric versions, was announced through a news release on March 26. In the first week, the spreadsheet program was requested by and sent to producers and other industry-affiliated representatives representing 13.3 million sows. As of Sept. 30, 2004, spreadsheets had been sent to people on six continents (North America, South America, Europe, Asia, Australia, and Africa) representing more than 21.4 million sows.

. 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

l. Description of activity

- The primary concerns of Iowa dairy producers are issues affecting profitability, while consumers want safe, nutritious foods. Both are concerned about air and water quality. Consequently the most important dairy-related issues affecting Iowa are (1) human resource management; (2) risk management; (3) business planning and arrangements; (4) improving production practices; (5) environmental quality;(6) food safety and quality; and (7) structure of agriculture and public policy.

l. Impact/accomplishment

- Milk quality and food safety
  - Milk quality and food safety is a major concern to the dairy industry. National annual losses are estimated to be over $1 billion. Fifty percent of mastitis starts in the dry period and studies have shown over 50% of heifers are infected. The industry needed a simple, low cost method(s) of preventing infection during these critical periods. ISU Extension developed a persistent exterior dry off and pre-fresh barrier teat dip. Two 14-month field trials showed a 40% reduction in mastitis at calving and a 60-70% reduction in environmental mastitis. This barrier teat dip is now used on six continents and in over 60 countries. Since the product first came on the market it has reduced losses from mastitis over $133 million in herds implementing the strategy in North America alone.
  - Peer groups gained knowledge and understanding of food quality and safety in six group session with 34 persons. Pre-and post surveys showed a 48.2% increase in awareness of regulation and political forces that affect U.S. dairy development and use of antibiotics; a 50.4% increase in their ability to be informed and ready to answer questions on antibiotic use in dairy herds.
  - Milker training on five large NW dairies involved 64 employees using bilingual flip charts and Spanish videos on milk let-down and milking procedures. These five herds reduced their herd average SCC by 150,000, which resulted in bonuses from $.25 to $.75 per hundredweight of milk, thereby increasing milk income by $15,292 to $42,810 per month for the 3,670 cows represented.

- Business planning and arrangement for young potential dairy families has been addressed from numerous perspectives.
  - Nine farm units were assisted in decision-making processes that brought about new joint farming agreements. Strategic planning was used to assist 50 dairy producers in determining ten-year goals for their operations.

- Twenty-three beginning farm families from ten NE Iowa counties were assisted in developing plans to enter the dairy business. Eleven have started farming with the remaining twelve still in the planning stage.
- Assistance by a Field Specialist in assimilating Hispanic workers into Iowa dairies has been provided to two farms, plus ISUE responded to questions from several more dairy managers. Advisor/expert roundtables have been initiated with three dairies.
- In-depth dairy farm financial analyses were done for nine operations. One herd owner, who was contemplating exiting the dairy business, decided to continue his operation, which has an annual gross income of $500,000. A second owner decided to expand, brought in an additional $225,000 gross income to the community. Half of the 50 dairy producers who participated in a strategic planning workshop responded to a survey and all indicated that the workshop would strengthen their dairy operation and said the workshop gave them take-home information they could use in one-to-three months.
- Dairy women peer groups have initiated two projects: "The Iowa Dairy Story" as a booth at county fairs; and the other formed a non-profit group dedicated to setting up school milk vending machines. Five have been started and another ten schools are on the waiting list pending funds for the coolers.
- Beginning dairy farm models have assisted over 360 clients to increase their knowledge of practices for profit in dairy farming, 30 smaller operations have been assisted in the transfer to low cost parlors and grazing. Twelve farmers use Dairy Trans software to evaluate annual profits. Over 1,000 copies of the SHARE MILKING manual have distributed in 14 states and Canada. More than 40 farm couples have attended the "Farm Couples Getaway" and are implementing their farm goals and dreams.

- Feed accounts for 40 to 60% of all costs of producing milk. Mistakes in diet formulation, mixing, and delivery can impact performance and profits. Two day-long pilot workshops were conducted on farms in NE and NW Iowa. The program involved the host dairy family, consulting nutritionist, veterinarians, and ISU dairy field and state specialists. Thirty-eight individuals from 22 operations attended. Herd size ranged form 75 to 1,200 cows. Attendees indicated they increased profits on average of $35 per cow per year due to feed savings, and adoption of more effective feed management practices.

f. Source of Federal Funds—Smith-Lever

f. Scope of Impact—State Specific

Key Theme – Adding Value to New and Old Agricultural Products

Program 121: Value-Added Agriculture

l. Description of activity

Value Added Agricultural programming at Iowa State University (ISU) has focused on working with producer groups and individual entrepreneurs to build long-term economic, environmental and socially sustainable capacities. Emphasis this year has been on working

with existing value-added ag groups, development of value chains, and working to develop quality systems to ensure accountability and safety in the food system.

Additional programming has included:

- Capacity building and training for producing value-added ag groups, with a special emphasis on beginning farmers. An in-depth tour with follow-up mentoring was held to acquaint beginning farmers with value added ag opportunities.
- Through consultation on feasibility, marketing and business plans, ISU staff worked with groups starting a value added ag business. ISU Extension conducted six in-depth feasibility studies for farmers this year starting value-added ag businesses. They included a meat processing facility, aquaculture production facility, export business, a soy-based enterprise and a composting facility.
- Development of niche value markets for producers. Working with nine pork marketing groups, ISU Extension has been assisting 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. Particular emphasis this year was with a pork niche group, which is working to attain the Agricultural Marketing Service, Process Verified Certification. Work continued with established ISO groups and organizations to help in maintenance and expansion of membership.

l. Impact/accomplishment

- *Ethanol Industry in Iowa*. Iowa State University Extension (ISUE) has been a key provider of information and education to farmer-owned cooperatives starting ethanol production plants in Iowa. Programming has included writing feasibility studies, educational meetings, Web sites, reviewing loan applications and assistance in all facets of development of the industry since the first producer-owned plant was built in 1997. In Iowa there are 16 farmer-owned ethanol facilities in production, under construction or planned as of September 2004. The total production of ethanol in Iowa will be 855 million gallons and will utilize 320 million bushels of Iowa corn. There are 5,340 farm investors in the plants, with $71 million of equity invested by the producers. The value of corn purchased from local farmers is more than $870 million. The economic impact to the state is significant. The cost to construct the 12 plants will reach $500 million. Corn utilization by the industry will provide a 12 cent per bushel increase in value to all Iowa corn farmers valued at $156 million. There will be 400-plus jobs and $63.5 million of annual payroll from the plants. The direct and indirect job creation will total 3,900 jobs valued at $363 million.

- *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 University's (ISU) processed meat short courses. In July 2004 ISU's Sausage and Processed Meat Short Course program celebrated its 26th anniversary. Since the inception of ISU'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 ISU's 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. Iowa State University was recently named the top university for Meat & Poultry Programs by *Meat & Poultry Magazine.* The ranking is based on the quality and variety of workshops, conferences and short courses available at universities throughout the United States.

- *Value Chain with Low Linolenic Acid Soybeans.* Iowa State University Extension has been working closely with the research arm of ISU in expanding the seed supply of the new varieties of low linolenic acid soybeans; they were developed by Walt Fehr, who is a professor at Iowa State University. These soybeans have positive health benefits that allow soybean oil to be used in industry applications without being hydrogenated. The hydrogenation process produces trans fatty acids, which have been deemed undesirable for human health by the FDA. The FDA is requiring that trans fats be labeled in packaged foods starting January 1, 2006. The pending labeling requirement has spurred a great interest in finding alternatives to using hydrogenated soybean oil. Two of the local Iowa farm producer groups that the Value Added Agricultural Program at Iowa State has been working with for a number of years has picked up the project and are expanding the seed supply and arranging processing and final markets for the new soybean oil. One of the groups has moved up the value chain and is partnering with local agricultural cooperatives to merchandise seed and contract acres to be crushed with another value chain partner—Cargill the soybean crusher and refiner. They have also moved up the value chain further by making marketing agreements with oil distributors to market the product. The group is ISO certified and maintains a traceable trail from seed to end user. The group sells a branded oil product and operates as a LLC. Another local Iowa producer group is also expanding the seed supply and working on developing processing and marketing partners up the value chain. ISUE has been very active in assisting these groups in all phases of organization, development, and execution of their program. Impacts for the State of Iowa have included better health alternatives (foods without or with less trans fat) and a major economic impact for the State of Iowa. Farmers are receiving a $.75 to $1.00/bu. premium for growing the beans, processors are getting business, and marketing profits are going back to Iowa Investors. At the present time four FTE jobs have been created and more will follow.

l. Source of Federal Funds—Smith-Lever

l. Scope of Impact—State Specific

Key Theme – Home Lawn and Gardening

Program 146: Consumer Horticulture

. Description of activity

According to the National Gardening Association, 78% of the U.S. population participates in one or more types of do-it-yourself indoor and outdoor lawn and garden activities. Further,

gardening consumers spent $38.4 million in retail sales for lawn and garden products in 2003, or an average of $465 per household. The Iowa State University Extension (ISUE) 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.

. Impact/accomplishment

- The Iowa Master Gardener Program is an educational and volunteer service program of ISUE 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 680 adults were trained to become Master Gardeners at 36 locations. In calendar year 2003, Iowa's Master Gardeners reported over 80,000 hours of volunteer educational service to their communities. Assuming a value of $11.46 per hour for volunteer time, the Iowa Master Gardener program provided over $900,000 of education and service to local communities.

- Sudden oak death, a deadly disease of oaks and other woody plant species recently introduced into the U.S., has been confirmed in forests in California and Oregon. It has also been discovered in several large nurseries in the western United States. Because of the possible threat of this disease to oaks and other woody plant species in Iowa, steps were taken to participate in a Sudden Oak Death National Survey, implemented in an effort to control the spread of economically important disease to nurseries across the United States and to natural settings. Approximately 70 samples were collected from Iowa nurseries for testing. A small percentage of these samples tested positive in the general ELISA test for the fungus Phytophthora. However, specific PCR testing showed these samples to be negative for *Phytophthora ramorum*. The survey and activity of testing for this pathogen helped to create an awareness of an important disease and a trained readiness to respond to suspect samples.

- ISUE partnered this year with Iowa Gardening Magazine to produce timely gardening educational videos for distribution to television stations in Iowa. Twenty six, two-minute gardening segments were developed. Each week, three television stations in Iowa (in major market areas) aired the gardening videos. These stations cover 90–95% of the state as well as reaching viewers in southwestern Wisconsin, northwest Illinois, and eastern Nebraska. Because of the popularity and quality of the segments produced, at least one station has committed to extend the program beyond the initial offering of 26 segments. In addition, this station (which commands a significant market share for news in central Iowa) is interested in offering year-round gardening segments for 2005. Video clips are also available for viewing on the web directly at the Gardening in the Zone webpage http://emms-ws12.exnet.iastate.edu/gardening/ and are linked from the Iowa State University Extension main page and Yard and Garden Online, the main page for consumer horticulture. http://www.yardandgarden.extension.iastate.edu. Extension publications associated with each archived segment are linked on the Gardening in the

Zone webpage. These segments provide research based information to a large audience which traditional Extension programming might not otherwise reach.

. Source of Federal Funds—Smith-Lever

. Scope of Impact—State Specific

Goal 2: A Safe and Secure Food and Fiber System

and

Goal 3: A Healthy Well-Nourished Population

Overview

Iowa's state Plan of Work 330 "Choices for Health" covers Federal Goals 2 and 3 through several programming efforts including Expanded Food and Nutrition Education (EFNEP), the Food Stamp Nutrition Education Program (FNP), food safety, and nutrition education for families and at risk populations.

a. Output/Impact

NUTRITION

- 51,980 individuals participated in nutrition education, including youth and adults
- 8,500 adults and 3,000 youth in Iowa participated in Lighten Up Iowa and Go the Distance
- 302 uninsured/underinsured women ages 40-64 participated in the WiseWoman cardiovascular risk reduction program, a series of 12 healthy lifestyle sessions for a total of 1,441 total session contacts
- 357 individuals participated in regional Team Nutrition workshops to promote healthier school environments in the K-12 education system
- 200 individuals participated in a 4-H judges food safety/nutrition training at 15 sites across the state via the Iowa Communications Network
- The Food and Nutrition website is maintained and updated weekly.

FOOD SAFETY

- 2,721 individuals were consulted about food safety.
- 543 volunteers were trained in safe food handling.
- 54 food processors received information about food safety/HACCP
- 24 food processors received information about food processing security
- ISU Extension cooperated with the Iowa Turkey Grower's Cooperative to develop and implement a three-phase Food Safety Training program for potential plant employees. 715 people have been trained in Level One to-date.
- 110 food safety education programs were held for 2,945 Iowans including the at risk populations of senior citizens and youth.
- There were 631 participants in 45 ServSafe® training programs sponsored or co-sponsored by Extension.

- 193 restaurant and foodservice employees participated in a DineSafe sponsored or co-sponsored by Extension.
- 248 school foodservice managers and lead employees of child nutrition programs attended Extension-sponsored short courses. Managers report they are responsible for more than 120,000 daily school foodservice meals.
- 3 food safety websites were supported and updated daily/weekly:
  Food Safety Project - http://www.extension.iastate.edu/foodsafety/
  Iowa HACCP Information Center - http://www.iowahaccp.iastate.edu
  Food Safety Consortium - http://www.foodsafety.iastate.edu

EFNEP/FNP

- Number of enrolled program families for FY 04 –2,927 (32% minority)
- Number of youth with 6 or more hours of nutrition education 16,011 youth (30% minority)

b./c. Outcomes

NUTRITION

- Of 787 respondents (n = 1008, response rate 78%) in face to face nutrition education programs, 81% reported adopting one or more nutrition and health behaviors
- Of adult teams reporting weight in Lighten Up Iowa, 19,000 pounds were lost
- Of adult teams reporting physical activity in Lighten Up Iowa, 2.3 million miles of activity were logged
- Of youth teams reporting physical activity in Go the Distance, 605,000 miles of activity were logged
- Preliminary results of WiseWoman participates indicates a greater fiber, fruit and vegetable intake ($p<0.00$) greater physical activity ($p<0.00$) and less fat intake ($p<0.02$)

FOOD SAFETY

- 97% of those responding to follow up surveys indicated that they had adopted one or more safe food handling practice (588 surveyed, 436 responding).
- 100% of apple cider processors inspected by FDA and State of Iowa regulators have passed (n = 17 processors producing 100,000 gallons of cider).
- 100% of processors receiving food security information indicated changes to their operations.
- The ISUE Food Safety web site had 256,238 visitors who had 1,315,649 page views through the ISUE Food Safety Web site; 4,041,611 hits were recorded during the last year**.**
- 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. The assessment tool for the lessons was downloaded 45,000 times.
- Ninety-two percent (580 of 631) of ServSafe® participants received a passing score and were certified.

EFNEP/FNP

- Results from surveys of 1,672 graduates taken at the beginning and at the end of the program show that 94 percent of the participants had a positive change in at least one food group.
- The percentage of 1,672 program graduates who reported diets that contained food from all five food groups increased from 18% at the beginning to 51% at the end of the program.
- 86 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);
- 82 percent of participants 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); and
- 66 percent of participants showed improvement in one or more food safety practices (i.e., thawing and storing foods properly)
- 26 percent of 5,191 youth from 227 groups increased their knowledge of the essentials of human nutrition
- 23 percent of 5,167 youth from 225 groups improved practices in food preparation and safety.
- 17 percent of 757 youth from 35 groups increased their ability to select low-cost nutritious foods

d. State's Assessment of Accomplishments—Original performance goals 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. Description of activity

Researchers at Iowa State University (ISU) with the assistance of local Extension staff and community partners, and funding through Iowa Department of Public Health (IDPH) and the Iowa Nutrition Network (INN), have been conducting research studies to benchmark community and household food security and food deserts in Iowa. Nearly 500 policy makers and professionals in the areas of food, nutrition, public health and others have participated in workshops and conferences about resources and strategies to lessen food insecurity and hunger. In addition, a video entitled, "Food for All? Status on Hunger in Iowa", developed by a partnership between ISU, IDPH and the INN, has been shown to over 800 people to increase awareness and understanding of individual, community and societal issues surrounding food insecurity and hunger and possible action steps for individuals and communities. 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. The web site is averaging 17,600 hits a month. In the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), 57 paraprofessionals delivered

nutrition education to 3,239 adults in small group settings or individually in the home, and 16,506 youth in the schools.

b. Impact/accomplishment

- 1,291 participated in programs which addressed food security issues
- 800 people viewed the "Food for All? Status on Hunger in Iowa"
- 82% of participants 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%) program families 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. Description of activity

Extension worked with 2,945 food safety program participants including the at-risk populations of elderly and youth. 543 citizens were trained in food safety and 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, Area Agencies on Aging, 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 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. Fifty-four food processors received information and training in HACCP and food safety and security. Iowa State University Extension (ISUE) and the Iowa Turkey Grower's cooperative have formed a partnership to create a workforce knowledgeable and capable of providing safe food from plants in SE Iowa. Seven hundred and fifteen people have been trained to-date in Level One of Food Safety at the plant, resulting in employment. A second and third level of training are implemented as employees end three months of employment and then again at the end of the year. In 45 ServSafe training sessions, field specialists trained 631 restaurant and foodservice personnel in safe food handling. The passing rate on the exam was over 90%. More than 256,000 visitors had over 1.3 million page views of content on the ISU Food Safety Web-site home page or one of its links to total over four million hits last year**.** Over 2,500 teachers downloaded on-line food safety lesson plans with over 45,000 assessment tools for the lessons downloaded.

b. Impact/accomplishment

- 110 food safety programs were done for 2,277 consumers including youth and adults.
- 45 ServSafe® food safety training programs with 631 participants. Ninety two percent of participants received a passing score and were certified.
- 54 food processors received food safety and security training.
- 715 potential employees were trained in Food Safety level one program (16 hours) for the Iowa Turkey Grower's Cooperative.
- 248 school foodservice managers and lead employees of child nutrition programs attended Extension sponsored short courses. Managers report they are responsible for more than 120,000 daily school foodservice meals.
- 3 food safety web-sites were supported and updated daily/weekly*:
  Food Safety Project www.extension.iastate.edu/foodsafety/
  Iowa HACCP www.iowahaccp.iastate.edu
  The Iowa State University Food Safety Consortium 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.
- 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).
- 25 percent of 2,152 youth from 89 groups improved practices in food preparation and safety.

l. Source of Federal Funds—Smith Lever 3b and c

- Extension is participating in another $500,000 project on irradiated foods. Contract from the Iowa Turkey Grower's Cooperative.

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), seven 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.

Key Theme – Human Nutrition

a. Description of activity

Nutrition and health programs were offered in 185 communities in 89 counties. Targeted audiences were adults, youth, employees at worksites, older adults, child-care providers, primary and secondary school staff 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. Lighten Up Iowa and Go the Distance are an

adult and youth program designed to encourage more physical activity and healthy eating habits among Iowans using friendly team competition. Lighten Up Iowa had 8,500 adult participants and Go the Distance had 3000 youth participants in 2005.

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 continued this year. A total of 302 women were enrolled in the program and attendance at the 12 lifestyle sessions resulted in a total of 1,441 total session contacts. Data collection for this research study is in progress. Extension staff actively participated in 72 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 five EFNEP units funded through a WIC Special Project Grant brings together experience in applied community nutrition and nutrition education research to increase the nutrition levels in children two-to-five 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.

b. Impact/accomplishment

- Of 787 respondents (n = 1008, response rate 78%) in face-to-face nutrition education programs who were surveyed, 81% reported adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products. Of teams reporting weight loss, a total of 19,000 pounds were lost by Lighten Up Iowa participants; of teams reporting physical activity, a total of 2.3 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 participants graduating from the program.
- Results from the food behavior checklist of 1,834 graduates showed 84% 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).

c. Source of Federal Funds—Smith-Level 3b & c: WISEWomAN (CDC grant) $183,050, Team Nutrition grant (USDA grant) $10,000

l. 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:

- 6 Refereed Publications, Research Papers, Manuscripts
- 37 Non-refereed Publications, Reports, Technical Papers
- 31 Proceedings, Published Abstracts
- 76 Extension Publications
- 69 Invited Presentation
- 596 Education Programs, Field Days, Tours
- 38,168 attended meetings and conferences
- 19 Web pages supported
- 1 book/chapter completed
- 99 media and radio presentations
- 27 minigrants to farmers and staff

② The Crop Advantage series reaches producers at day-long winter meetings, at a time when many crop-input-management decisions are made. In 2004, twenty-three state specialists interacted with producers about 28 topics at ten locations throughout Iowa. More than 1,700 producers attended. Participants indicated an average per-acre savings of $8.04, ISU had an impact on Iowa agriculture from these meetings of at least $2 million.

③ The private pesticide applicator training program conducted 335 meetings with 18,861 participants from December 2003 to April 2004. 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, 86% now observe a minimum of 50 feet as a setback from wells, water sources, or surface waters when mixing, loading and applying pesticides. In addition, 73% of respondents maintain that they now use a drift reduction nozzle in their sprayer to assist in reducing pesticide drift. This evaluation indicates private pesticide applicators are making the decision to adopt and actively employ safer pesticide use practices in Iowa.

③ Rock Valley has saved about five million dollars because they have not had to install an N treatment plant. Nitrate levels have been reduced in almost all wells, and sites for future low nitrate well locations have been identified. Nitrate levels in Rock Valley's water are now consistently below the safety standard.

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 an ongoing threat to Iowa 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. In addition, an IPM school program that was recently established to address the increase in stakeholders concerned about the environmental quality in schools has grown in popularity, and also elements of the ISU IPM/ICM program are employed in a new Extension Urban Agriculture program.

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. This will increase the efficiency of IPM and ICM techniques, particularly those involving pesticides
- To increase awareness of IPM and promote adoption of IPM in schools and other non-production-agriculture environments

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 address emerging pest issues, including the soybean aphid, western bean cutworm, issues with transgenic crop use, and planning for the arrival of Asian soybean rust (ASR). 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 delivered through the private and commercial pesticide applicator continuing instructional courses that reach approximately 28,000 individuals each year.

The urban IPM school program that addresses stakeholder concerns about the environmental quality in schools expanded in 2004. A landscape and turfgrass IPM pilot effort partnered with five public school districts, and with the ISU landscape staff on campus. Also, ISUE

hosted a train-the-trainer workshop in Ames, which was attended by 36 extension IPM staff and school partners from nine states in the North Central region.

b. Impact/accomplishment

- The Crop Advantage series (CAS). The CAS reaches producers at day-long winter meetings, at a time when many crop-input-management decisions are made. In 2004, twenty-three state specialists interacted with producers about 28 topics at ten locations throughout Iowa. More than 1,700 producers attended, and evaluation responses are instructive. For instance, at Sheldon, the program impacted crop management decisions on almost 53,000 acres. A question was asked about impacts and behavioral changes from the previous year's program, and participants indicated an average per-acre savings of $8.04, meaning a total cost saving of $263,760 saved from that meeting alone. From these meetings, ISU had an impact on Iowa agriculture of at least $2 million.

- Agricultural IPM. 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 continued the scouting and reporting network established in 2003. A website allowed for sharing of information gathered from farm-placed pheromone traps across Iowa so that scouting, and treatment based on that information, could happen. Eighteen aerial pesticide applicators reported in November 2004 that these data were instrumental for them to understand WBC, and to correctly time insecticide applications. WBC has apparently established itself as a significant pest of corn in western Iowa, and in 2004, ISU documented that its range has spread east as far as Monmouth, IL and south to Kirksville, MO.

- Sudden oak death is a disease that kills oaks and other woody plant species. Because of the importance of oaks in the Iowa landscape, ISU extension and research staff participated in a national survey (UDSA-APHIS) to find infected nursery stock in Iowa. Over 70 samples were collected and tested with quick ELISA test for the causal organism, Phytophthora ramorum. Although several Iowa samples were positive by ELISA, follow-up specific PCR testing was negative for all samples from Iowa. The survey, coupled with the collaborative information network among the nursery industry, regulatory personnel, ISU staff and citizens, has enhanced a readiness to respond to this disease.

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

. Description of activity

Federal and state law requires that all people who purchase and apply restricted use pesticides and any applicator that 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, 37 programs were provided to 7,992 commercial applicators in 23 certification categories and subcategories.

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 112 students enrolled in this course including a core background on pesticide application and specialization in agriculture, forestry and horticultural pesticide application.

The primary focus for the private pesticide applicator was program development (August–November) and delivery (December–April). During the training season, 335 programs were conducted in all 99 counties in the state. In addition, initial training for private pesticide applicator certification was provided to 31 individuals throughout the state of Iowa.

. Impact/accomplishment

The private pesticide applicator training program conducted 335 meetings with 18,861 participants from December 2003 to April 2004. A post-training evaluation indicated the program was successful. Overall, 97% of the respondents indicated that the program was excellent or good. In addition, 96% of the respondents strongly agreed or agreed 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 safer pesticide use practices. After receiving information on section 18 and 24(c) labels, 62% of the respondents indicated they would now make sure copies of the section 18 or 24(c) labels were in their possession at the time of application if using that type of pesticide.

In addition, this post-training evaluation examined whether 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, 86% now observe a minimum of 50 feet as a setback from wells, water sources, or surface waters when mixing, loading and applying pesticides. In addition, 73% of respondents maintain that they now use a drift reduction nozzle in their sprayer to assist in reducing pesticide drift. This evaluation indicates private pesticide applicators are making the decision to adopt and actively employ safer pesticide use practices in Iowa.

. Source of Federal Funds—Smith-Lever

. Scope of Impact—State Specific

Key Theme – Sustainable Agriculture

Program 147: Sustainable Agriculture

. Description of activity

ISU Extension Sustainable Agriculture (SA) programming is coordinated centrally through campus by ISU Extension and serves and supports 99 local county offices and field based-Extension staff state-wide. It is integrated closely with the Extension Value-Added program, The Leopold Center for Sustainable Agriculture, The ISU Organic Program, The Graduate Program in Sustainable Agriculture, and The Extension Pest Management and Environment Program (Extension PAT and IPM). Particular areas of strength of the Iowa SA program are: organic agriculture, local food systems, NGO partnerships, community supported agriculture, alternative swine production systems, and value-chains. The Iowa SA program is guided by stakeholder input from two active committees that meet annually. ISU SA cooperates and works closely with three NGO's for enhanced program development and delivery impacts. Training and updating of skills is encouraged in Iowa through participation in local SA opportunities and events. Training and educational opportunities in SA include print materials, SAN publications, workshops, demonstrations, conferences, web page, field days, videos, on-farm research, mini-grants, underserved audiences, and impact evaluation. Iowa SA coordinates closely with and supports multi-state regional research and education through SARE.

. Impact/accomplishment

- Local Extension staffs do not have available, use, or generally make SA reference materials available to clientele. SAN print materials (no cost) were sent to offices in counties and web-based documents were made available for staff to access for client inquiries. A 2004 survey shows that now 85% of Iowa Extension field staff (have modified their behavior) to now make SA materials available upon request to clients.

- Farmers desire research funds to undertake on-farm research and demonstration but lack proposal development knowledge and skills. ISUE developed and held three grants development workshops at Ames, Chariton and Fairfield for a total of 95 participants. In 2004, 15 Iowa farmer grant proposals were submitted for funding to SARE; five were awarded.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Program 150: Environmental Stewardship

. Description of activity

Protecting soil and water resources through conservation practices. Iowa State University Extension (ISUE) provides information and education for soil management, conservation practices, erosion control, residue management, and related soil and water quality

information. The objective was to help farmers and communities in Iowa and elsewhere by providing practical research-based information to improve management practices and sustain our natural resources. These efforts include environmentally sound and bio-secure disposal of livestock mortalities, drainage management practices, phosphorus management, and drinking water resource management.

- An interactive website allows users to calculate residue cover and soil loss for site specific conditions (http://extension.agron.iastate.edu/soilmgmt). Additionally, a series of publications (PM 1901 a-f) that are often utilized at field days and other training events throughout the state by ISUE and NRCS personnel have been developed.
- 27 composting test units containing 54 tons of cattle carcasses were monitored for internal temperatures & oxygen concentrations; air, soil, and water quality impacts; & virus retention & survival;
- Mortality management materials that have been developed include: a web site describing project methods, results, and recommended emergency procedures (see www.abe.iastate.edu/cattlecomposting/); producer guidelines for emergency mortality composting; a presentation of emergency and non-emergency large animal composting procedures.
- 30 Iowa Department of Natural Resources field and central staff have been trained on emergency composting procedures;
- Awareness on drainage management practices was increased through statewide presentations addressing: Drainage Design, Water Management, and Sub-irrigation.
- A three-year project demonstrated best management practices to improve utilization of liquid swine manure P for corn and soybean production using 30 fields. Approximately 250 one-to-one contact meetings were conducted during the three-year period with the cooperating farmers and manure applicators. Project activities and results, as well as general manure P management issues, were discussed at 52 field days or winter meetings, some of which were specifically developed for the project and many were integrated with other Extension meetings and programs. Three articles describing the project were written in the Odor and Nutrient Management Newsletter.
- In Rock Valley, an advisory team was assembled involving city staff, along with representatives of their engineering firm, NRCS, Iowa Geological Survey Bureau, DNR, and ISUE. ISU's part of this plan was to help educate as to the concerns of nitrate contaminant, help train the three different project coordinators over the project, offer nutrient management workshops and individual assistance with agricultural producers in the watershed, hold demonstrations of reduced N use on lawns, and continue to assist the planning group with follow-through on this project. The planning committee continues to meet and give direction for the project.

Preparing animal industries for environmental regulations by taking a proactive approach to compliance. Air emissions continue to be a prominent challenge facing livestock producers. The need for the industry to quantify and mitigate aerial pollutants emissions, predominantly ammonia, from production facilities continues to rise. In the future ammonia may face federal regulation under the Clean Air Act (CAA) because it is a principal precursor to particular matter 2.5 μm that is a regulated pollutant under the CAA. Furthermore, the State of Iowa approved a hydrogen sulfide standard in July 2004.The objective was to prepare producers for meeting environmental regulations by taking a proactive approach.

- The United Egg Producers (UEP) has established a 12-member environmental scientific panel (ESP) that consists of experts and representatives from land-grant universities, USDA-CSREES, USDA-ARS, EPA, and the egg industry. Iowa State University (ISU) is represented on this panel.
- In addition, ISU was represented at each of three committees organized by the Iowa Department of Natural Resources to address air quality issues. Each committee was to develop a report back to the DNR leadership that addressed questions posed to the committee. Iowa State University took the lead in developing materials that served as the basis for the Best Management Practices committee.

. Impact/accomplishment

Protecting soil and water resources through conservation practices.

- The Iowa Department of Natural Resources has included composting in the Iowa Foreign Animal Disease Response Plan. The agency now also allows use of composting for emergency livestock and poultry disposal resulting from fire, ventilation failures, and other non-disease related livestock losses. The Iowa Department of Natural Resources has awarded ISU a $30,000 grant to develop five regional composting demonstration sites, and a statewide program on emergency livestock mortality disposal.
- The use of drainage management practices could reduce subsurface drainage volumes as much as 20-40%, and in some areas improve yields. This reduction in volume would produce a similar percent reduction in the mass of nitrate exported which could have a positive environmental impact locally and regionally.
- Farmers have gained trust on the value of manure P and on current recommendations establishing no need for manure or fertilizer P in high-testing soils. All farmers said the project results changed they way they would look at manure management in their fields, with the only exception for five farmers who were already applying best manure management practices. An important outcome of the efforts in phosphorus management was that more than 90% of the farmers' cooperators expressed that this type of project was much more useful to them than traditional efforts based only on field days or winter meetings. Better farmers' understanding of the value of P in manure and of the value of careful manure management is having a significant impact on efforts to improve use of this valuable resource and both farm profitability and water quality in the state.
- Rock Valley has saved about five million dollars because they have not had to install an N treatment plant. Nitrate levels have been reduced in almost all wells, and sites for future low nitrate well locations have been identified. Well monitoring shows where high N plumes exist, and the surface treatments in those areas are now designed to reduce this problem further. Nitrate levels in Rock Valley's water are now consistently below the safety standard. Several livestock sites of concern now have better manure management storage and application plans in place, one site was moved from a high risk area to another much further away from the city well site. Over 300 acres around wells have been seeded to native grasses to reduce N flow through the soil profile, and upstream in the watershed area more buffers and conservation practices have been put into place to reduce N movement into the stream flowing into Rock Valley's watershed. Nutrient management plans are now a part of several producers' operations on 1,295 acres, as well. In town, more slow-release fertilizer is being sold - reducing the amount of N being

used on lawns. The city also uses lower N levels on all of their city parks and ball fields - also helping to reduce excess N levels in soil water.

Preparing animal industries for environmental regulations by taking a proactive approach to compliance.

- The educational/outreach activities have further enhanced the industry's awareness about the magnitude of ammonia emissions from various housing and management practices. More and more egg producers are becoming proactive in implementing or seeking means to mitigate ammonia emissions. It is expected that the UEP Board of Directors will seriously consider and adopt the recommendations of the ESP. While the exact dollar figures are difficult to estimate, adoption and implementation of these recommendations are expected to have major, long-lasting economic impacts on sustainable development and prosperity of the American egg industry.
- These materials and the resulting report have been used to develop policy and a preliminary plan by the DNR to address non-compliance with recent air quality regulations. Iowa State University's leadership in this activity ensured that the report, and resulting policy that may evolve, was science-based and addressed the issues at hand.

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
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	10,126
Number of farm workers that received farm safety training	835

Number of youth participating in youth farm safety activity taught by extension	5,161
Number of youth participating in youth safety activities coordination by extension	4,035
Number of individual consultations	57
Number of youth that received hazardous occupation certification	95
Refereed publications, research papers, and manuscripts	1
Non-refereed publications, reports, and technical papers	0
Proceedings and published abstracts	2
Number of Thesis (MS/PhD programs competed)	2
Extension publications	4
Books and chapters	1
Videos	1
Number of Web pages supported	5
Media release and popular press articles	23
radio interviews	58
Participation on state, national, and professional societies safety committees	33

This overview covers work done for Iowa's Plans of Work, 300-340.

a. Output/Impact

- 1,513 Iowans participated in ISUE-sponsored learning opportunities relating to later life issues.
- 8,052 individuals received child care training and education, onsite training and consultation. 1,011 providers received training through the child Care that Works Self study program reaching individuals in 49 counties.
- 266 childhood education programs were assessed with nationally recognized Early Childhood Rating scales for the purpose of improvement.
- ISU Extension hosts and manages the National Network for Child Care (NNCC) Web Site. NNCC received an average of 148,499 visits by unique users per month for a total of 1,781,992 per year.
- Staff conducted 21 ROWEL Poverty Simulations for 1,162 participants.
- In our CYFAR community efforts, youth spent 420 hours in an after school program at Le Clair House in Davenport developing citizenship, leadership, literacy and life skills. Hipsaincs united fro Perry sponsored a fall Latino Festival that drew 1,200 participants. The Westside Resource Center in Sioux City provided resource and referral services to 3,294 people.
- 63 communities actively participated in distributing resources to build awareness about the importance of quality child care through our statewide campaign, Child Care Lasts a Lifetime.
- 16,450 Iowans learned about resource management by participating in a wide range of learning activities. 9,450 Iowa high school students in 202 schools enrolled in the High School Financial Planning Program.
- Parenting education programming efforts reached 9,669 Iowans.

b./c. Outcome/Impact

- 90% (333 surveyed; 313 responding) of participants in Adult Children and Aging Parents: Conversations between Generations responding to follow-up surveys reported being much better prepared to make family decisions related to later life issues after the classes.
- 78 playgrounds were improved with technical assistance or consultation from ISUE.
- 305 new child care centers, early childhood and family home child care programs were started as a result of Extension involvement. These programs serve 2,086 children
- 1,818 existing childhood programs and businesses were strengthened with Extension involvement.
- 379 individuals were employed as a result of new or expanded programs or businesses.
- Poverty Simulation participants show increased awareness and sensitivity to needs of families.
- 83% of those completing evaluations (173) about their attendance at public issues forums, reported follow-up action resulting from their participation.
- 88% of participants in consumer credit workshops took steps to reduce debt
- 74% of participants in retirement planning workshops gained greater control of their current spending, saving and financial security
- 23% projected their personal retirement financial needs
- 20% increased contributions to an employer-based retirement plan
- 7% increased contributions to a personal retirement investment
- In a three-month posttest of a national sample of high school students who completed the High School Financial Planning curriculum, 36.5% “almost always” set aside money for the future; 24% “almost always” set goals for managing money; 80.5% knew the difference between needs and wants; and 37.5% reported they “almost always” felt confident about making financial decisions.
- 79% (n = 1,211) of individuals who participated in parenting education programs reported that they adopted one or more recommended practices.
- 85% (n = 128) of parents who participated in The ISU Extension Strengthening Families Program for Parents and Youth 10-14 (SFP 10-14) reported letting their child know specifically what they expect regarding alcohol and drug use most of the time or a good bit of the time after participating in SFP 10-14, as compared to 68% (n = 97) before participating in SFP 10-14.
- 62% (n = 75) of youth who participated in SFP 10-14 reported using the Peer Pressure steps when they are pressured to get into trouble most of the time or a good bit of the time after participating in SFP 10-14, as compared to 43% (n = 52) before participating in SFP 10-14.

Overview – 4-H Youth Development Programs

This overview covers work done for 410-460.

a. Output/Impact

- A total of 124,370 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 11,631 youth and adult volunteers contributed their time, energy and expertise to helping youth learn life skills.
- A total of $96,000 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 1,998 educators, school teachers, school administrators, and parents participated or were trained in science related extension 4-H sponsored youth curriculum.
- A total of 2,448 youth, 4,576 adult volunteers, and 743 other adults were trained in leadership, parenting and other topics.
- All 100 counties report involvement in out-of-school time programming. 52,231 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:

- 83% stated 4-H helped them consider how their actions affect others. (62% reported in 2001)
- 77% stated 4-H helped them to volunteer their time for community service. (62% reported in 2001)
- 81 % stated 4-H help them value the contributions of others. (59% reported in 2001)
- 90% stated 4-H helped them to be friends with people who are different from them. (57% in 2001)
- 91% stated 4-H helped them to avoid risky behaviors. (74% 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

f. Description of activity

In FY04, a total of 1,513 Iowans participated in ISUE-sponsored learning opportunities relating to later life issues. Sequential workshops on decisions and relationships in later life (Adult Children and Aging Parents: Conversations between Generations) and on self-care and efficacy for caregivers of older adults, (Powerful Tools for Caregivers) reached 375 mid-life and older adults with 75 contact hours of education. 1,138 adults attended additional informational presentations or workshops on caregiving, interpersonal communication and intergenerational relationships.

ISU Extension introduced the Powerful Tools for Caregivers curriculum for family caregivers in Iowa by implementing a class leader certification training for extension staff and partners from community organizations. Twenty-four ISUE field staff and professionals from Iowa area agencies on aging, hospitals, elder housing, hospice and faith-based organizations were certified as class leaders. Two ISUE staff received further training and were licensed as master trainers to teach and certify additional Powerful Tools for Caregivers class leaders in Iowa.

b. Impact/accomplishment

- 90% of 313 (N = 333) participants in Adult Children and Aging Parents: Conversations between Generations responding to follow-up surveys reported being much better prepared to make family decisions related to later life issues after the classes.
- Powerful Tools for Caregivers class leaders implemented the education series for family caregivers in six communities. Four area agencies on aging provided time and travel expense for caregiver support specialists to be trained as class leaders in the ISUE sponsored training. A regional caregiving coalition in one area of the state successfully obtained funds to train two additional Powerful Tools class leaders.
- 83% of participants in one Powerful Tools for Caregivers series and 100% of the caregivers in another series were more confident of their caregiving skills such as using positive communication techniques, using weekly action plans for self-care and linking with community resources.

c. Source of Federal Funds—Smith Lever 3b & c, state and local funds; SAMSHA funds were also used for training staff and clients in the Powerful Tools program

d. Scope of Impact—Statewide

Key Theme – Child Care

b. Description of activity

8,052 individuals received child care training and education, onsite training and consultation. 1,011 providers received training through the Child Care that Works Self study program reaching individuals in 49 counties. Providers participating in this program received Iowa Department of Human Services credit for licensing requirements. Center based programs accessed 57% of the self study kits, 43% were accessed by home-based child care programs. 14,319 study video kits have been checked out to providers since the program's inception in 1997.

825 Iowans attended Better Kid Care satellite programs conducted in collaboration with Penn State University. Infant and toddler caregiver training was conducted for 376 individuals and literacy training was provided for 588 individuals. Health and safety training was conducted for 696 individuals. Iowa State University Extension is actively involved in a national research study with the Midwest Child Care Research Consortium. During the 2003-2004 program year, Extension staff conducted 146 assessments of child care centers and programs for this study.

Iowa State University hosts and manages the National Network for Child Care Web Site. During the 2003-2004 program year, NNCC received an average of 148,499 visits by unique users per month for a total of 1,781,992 per year. International visits represent 11% of all visits, visits from the U.S. average 66 percent and visits from unknown origins represent 23 percent. Currently, there are 2,079 peer reviewed resources on nncc.org that represents information from universities in all 50 states. ISUE also provides oversight and management of the Early Childhood section of the CYFERnet web site for the Children, Youth and Families Education Research Network (CSREES).

b. Impact/accomplishment

- 78 playgrounds were improved with technical assistance or consultation from ISUE.
- 305 new child care centers, early childhood and family home child care programs were started as a result of direct Extension involvement. These programs serve 2,086 children
- 1,818 existing childhood programs and businesses were strengthened with Extension involvement.
- 379 individuals were employed as a result of new or expanded programs or businesses.
- 266 childhood education programs were assessed with nationally recognized Early Childhood Rating scales for the purpose of improvement.
- 63 communities participated in the Child Care Lasts a Lifetime Campaign

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

d. Scope of Impact—programming in-state, child care assessments/evaluations four Midwest states, NNCC national and international.

Key Theme – Children, Youth and Families at Risk

b. 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 7,132 visits per month. The LeClaire project in Davenport offers youth summer and after-school programming and community gardening. Hispanics United for Perry (HUP) a 501C legal, nonprofit group, focuses on three priorities: (1) full citizenship participation among Hispanics; (2) more parent involvement with their children; and (3) 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 2003 through September 2004, ISUE staff conducted 21 simulations for 1,162 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 2003 to September 2004, youth spent a total of 420 hours to develop citizenship, leadership, literacy, and life skills at LeClaire House in Davenport. HUP sponsored a fall Latino/a Festival that drew over 1,200 citizens. The Westside Resource Center provided resource and referral services to 3,294 people.

c. Source of Federal Funds—Federal CYFAR dollars, also state and local support and federal Smith-Lever 3b&c funds

d. Scope of Impact—State and national

Key Theme – Family Policy

. Description of activity

927 individuals increased their understanding of public issues by participating in poverty simulations, moderated community issue forums, or related activities.

63 communities actively participated in distributing resources to build awareness about the importance of quality child care through our statewide campaign, Child Care Lasts a Lifetime. Eleven individuals conducted face-to-face interviews with 39 individuals from around the state to learn more about their views related to quality child care - their concerns and what they believe should be done to ensure quality care. From these interviews a frame with alternative approaches will be created for use in community forums.

A team of eight field and campus staff participated in a regional conference, Grassroots and Groundwork: Practical Models for Reducing Poverty and Rebuilding Communities. The team is developing plans for framing the issue of poverty for further community dialogues/ forums, and subsequently developing local projects that address poverty.

b. Impact/accomplishment

Eighty-three percent of those completing evaluations (173) about their attendance at public issues forums, reported follow up action resulting from their participation. Seventy-three individuals participated in community conversations/forums about health care. Three common themes emerged for future steps as a result of the six forums in Iowa.

- Citizens need to talk more about health care issues.

- Individuals need to take more responsibility for their own health and health care with increased communication among all involved.
- Citizens need to communicate with legislators and policy makers regarding concerns about the issue of health care.

c. Source of Federal Funds—state and Federal Smith Lever 3b & c funds

d. Scope of Impact—selected Iowa communities and statewide

Key Theme – Community Development

. 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 eight additional communities; b) *ad hoc planning and visioning,* locally-supported efforts to address one or more elements of community capital in 27 counties and 13 communities; c) *Resident-led watershed planning,* facilitation and organizational development support to citizen-based planning in three watersheds; d) *Community Voices,* a program for new Spanish-speaking residents to the state in ten communities reaching 400 residents; e) *Land Use Planning and Geographical Information Systems,* assistance provided to 11 communities and nine counties.

. Impact/accomplishment

- 37 inter-organizational collaborations formed
- Three comprehensive community development plans adopted
- One bond issue passed
- 317 business entrepreneurs trained
- 217 organizations assisted and strengthened

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

. Scope of Impact—State specific.

Key Theme – Family Resource Management

d. 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. A total of more than 16,450 Iowans learned about resource management by participating in a wide range of learning activities. 13,970 Iowans participated in ISU Extension financial management workshops or individual consultations that emphasized preventive education in the "basics" of financial management—budgeting, record keeping, credit management, homebuyer education, privacy, savings and investing,

and retirement planning. More than 900 of those learners participated in workshops on financial security in later life and 369 received a PowerPay debt reduction computer analysis. 2,172 consumers participated in individual consultations about their finances, including 1,158 who visited the ISU Financial Counseling Clinic. Since its inception, 27 persons have received financial counseling certification, and 9,450 Iowa high school students in 202 schools enrolled in the High School Financial Planning Program.

In addition, limited resource Iowans were targeted in Earned Income Credit (EIC) campaigns and child health insurance outreach efforts, reaching 1,205 in face-to-face EIC workshops and 1,277 learning about the Healthy and Well Kids in Iowa (HAWK-I) program—Iowa's Child Health Insurance Program for uninsured low- and moderate- income children.

d. Impact/accomplishment – The following outcome data are reported from surveys of program participants.

- More than 16,450 Iowans participated in family resource management programs.
- 88% of participants in consumer credit workshops took steps to reduce debt
- 74% of participants in retirement planning workshops gained greater control of their current spending, saving and financial security
- 23% projected their personal retirement financial needs
- 20% increased contributions to an employer-based retirement plan
- 7% increased contributions to a personal retirement investment
- In a three-month post-test of a national sample of high school students who completed the High School Financial Planning curriculum, 36.5% "almost always" set aside money for the future; 24% "almost always" set goals for managing money; 80.5% knew the difference between needs and wants; and 37.5% reported they "almost always" felt confident about making financial decisions.

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

d. Scope of Impact—State specific – "Secure Your Dreams" retirement curriculum is linked on the Financial Security in Later Life national initiative website.

Key Theme – Farm Safety

d. Description of activity

The Iowa farm fatality summary ten year average for 1988 to 1997 was 48 deaths per year. The farm fatality summary continues to show a decrease in the number of these fatalities. The number of deaths recorded for 1998 to 2003 were 42, 49, 38, 22, 26, and 38 respectively. 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.

The most effective method of reaching the target audience of youth in Iowa has been the farm safety day camps. ISU Extension staff hosted 34 farm safety day camps and educated over 4,000 youth between 7 to 13 years old. The average attendance for these camps is about

110 youth per camp. Extension 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 delivered education to public schools with our in-school programs. Extension staff in 28 counties presented in-school farm safety programs that reached about 5,161 students. These in-school programs combined with the tractor and machinery certification programs are structure 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. Six counties in Iowa sponsored the program with 95 students.

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. The radio interviews provided over 76 minutes of quality radio programming. 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 contribute to the media campaign by providing current and timely information to both the county extension offices and Iowans. The address of the page is <www.abe.iastate.edu/safety >. 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

- 95 youth ages 14-16 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.

- 4,035 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 108 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 – Leadership Training and Development

a. Description of activity

Iowa citizens were taught leadership skills from a portfolio of six programs that were organized in-state around Building Human Capital.. The development of human and social capital is central to the ability of communities to solve their problems. In FY 2003, 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 (two 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) Horizons, an intensive three-community organizing leadership and poverty reduction project supported in part by the Northwest Area Foundation; f) Municipal Clerks' Institute, a three-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, two-level, three-day workshops for county auditors and staff to better manage Iowa's elections; h) Township Trustee Training on the official role and responsibilities of these elected officials.

a. Impact/accomplishment

Extension leadership training and development was available in each of Iowa's 100 Extension districts and specific programs were held in 22 counties and 14 communities. During the year, 211 organizations were assisted or strengthened, 34 service providers were certified, and 2,647 community leaders or local government officials, 107 service providers, and 825 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.

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

a. Scope of Impact—State specific.

Key Theme – Parenting

. Description of activity

Iowa State University Extension (ISUE) continued to train professionals, volunteers, and parents to implement sequenced parenting education, as well as individual parenting workshops. In addition, hundreds of parents, professionals and volunteers were reached through individual consultations and workshops on various parenting topics. Together, ISUE parenting education programming efforts reached 9,669 Iowans.

1,199 individuals were trained to deliver sequenced parenting education programs. 734 individuals from 24 different states were trained to deliver The Strengthening Families Program (SFP) (for parents and youth 10-14). Other sequenced programs individuals were trained in include: Girl Talk/Guy Talk (designed to increase communication about sexuality issues between parents and teens); Celebrate Families (program for parents and school-age children); Great Beginnings for Families (program for parents of children 0-5 years); The Incredible Years (program for parents of children 2-7 years); and Partnering with Parents (training series designed to strengthen the core competencies of parenting educators).

4,020 parents and professionals were reached through the following: Kindermusik, an educational series promoting parent/child interaction and child socialization; Family Storyteller, a parent/child interaction and literacy program for families with preschool-age children; workshops focused on fatherhood, and other various parenting topics (e.g., managing temper tantrums, helping children cope with anger, discipline). In addition, approximately 3,000 professionals and volunteers were reached through Cultural Perspectives on Parenting, a two-part national satellite series.

Iowa State University, in collaboration with Pennsylvania State University, is in its third year of a five-year research/extension project (PROSPER, Promoting School Community and University Partnerships to Enhance Resiliency). This project (funded at $21 million from the National Institute of Drug Abuse) 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

- 9,669 individuals participated in parenting education programs facilitated by ISU Extension.
- 1,199 professionals and volunteers received in-depth training to deliver parenting education from ISU Extension.
- 1,450 individuals received parenting education through individual consultations.
- 79% (n = 1,211) of individuals who participated in parenting education programs reported that they adopted one or more recommended practices.
- 85% (n = 128) of parents who participated in The ISU Extension Strengthening Families Program for Parents and Youth (SFP 10-14) reported letting their child know specifically what they expect regarding alcohol and drug use most of the time or a good bit of the time after participating in SFP 10-14, as compared to 68% (n = 97) before participating in SFP 10-14.
- 62% (n = 75) of youth who participated in SFP 10-14 reported using the Peer Pressure steps when they are pressured to get into trouble most of the time or a good bit of the

time after participating in SFP 10-14, as compared to 43% (n = 52) before participating in SFP.

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

d. Scope of Impact—State specific; PROSPER project includes Pennsylvania; Partnering with Parents online training reached educators in nine states; ISU Extension Strengthening Families Program for Parents and Youth 10-14 reached individuals in 24 states; Cultural Perspectives on Parenting reached individuals in 28 states.

Key Theme – Rural Mental Health

a. Description of activity

This was the final year of the two-year Iowa Rural Mental Health project, funded in part by SAMHSA, Grant # 1 H79 SM 54584-01. Key efforts included: (1) Extension's collaboration with Ecumenical Ministries of Iowa to promote mental health through faith-based community partnerships; (2) ongoing information and education on reducing stress, getting a grip on finances, eating and health habits, developing community as a support system; (3) health screenings in partnership with local health providers; (4) programming targeted to mental health needs of youth; (5) two distance ed conferences on mental health research for staff and mental health partners; (6) training professionals in the Powerful Tools for Caregivers program; (7) intergenerational dialogues about mental health issues and concerns within communities; and (8) a national rural behavior conference in Kansas City, co-sponsored with other states.

Output

- Displays, newspaper, television, and radio ads, and other media are used to market the Iowa Concern hotline, http://www.extension.iastate.edu/iowaconcern/.
- "The Clock is Ticking for Rural America", was held May 29-30, 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.
- Four Intergenerational Dialogues were held in Central Iowa, involving more than 90 individuals
- Nineteen teams (160 youth and adults) were trained in the Circle of Support materials; sixteen teams continue into the FY 2005 year.
- Information about grant-underwritten mental health services was distributed to 2,300 congregations in Iowa.
- 1,200 individuals were reached by group financial education workshops taught by a combination of volunteers and staff.
- 22 families received personalized assistance from a team of staff in southeast Iowa, as part of the Quality of Life project, averaging over 31 hours of consultation times per family.
- 1,000 individuals participated in health screenings.
- More than 5,000 participants viewed educational displays and participated in workshops on mental health.

- Thirty-seven counselors were trained across the state in the ISU Extension Volunteer Financial Counselor Certification Program
- The Iowa Concern hotline averages 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.

b. Outcomes/Impact

- Circle of Support team evaluations indicate teachers, students and support staff had increased skills in using appropriate conversation openers to help teens, and were more able to validate feelings. School systems have institutionalized changes such as integrating mental health and teen depression into the health curriculum.
- 2,436 individuals and families received mental health counseling funded by the grant.
- 289 individuals and families received financial counseling using PowerPay, a computer program that assists families in making wise financial decisions.
- Over 400 farm businesses received Farm Business and Financial Analysis through Extension.
- ISUE Volunteer Financial Counselors provided financial counseling to over 370 families.

c. Source of Federal Funds—Smith-Lever 3b & c; SAMHSA

d. Scope of Impact—State specific

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

- Over 200 non-Extension staff (paid and volunteer) trained in youth development principles.
- Over 15 program assessments conducted using youth development assessment instruments.

- Over 600 Extension volunteers trained in youth development principles and best practices.
- Over 150 youth obtained a decision-making role within their community or organization as a result of training and consulting work done by 4-H Youth development staff.
- Over 210 Extension staff trained in youth development principles and best practices.
- Over 115 collaborations and/or co-sponsored youth events were conducted by Extension staff.

Following are comments that indicate the impact these trainings and experiences had on individuals.

- "My relationship with the students changed as we took the training together."
- "It is more fun to come to school when the focus is on the positive things you do."
- "This is very needed and critical to our youth."

Behavior improved as reflected in the Student-Wide Information System:

- 25 of 30 adults report they see youth as more important resources in the community
- 22 of 30 adults report they know more about how to encourage youth in decision-making
- 23 of 30 adults report more likely to involve youth in decision-making roles
- 11 of 18 youth report they know more about community decision-making and leadership
- 10 of 18 youth report more likely to become involved in their community
- Survey results indicated that the five critical components needed for a vibrant youth program were present in the county 4-H Youth Development program

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, Food and Fitness Craze, 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:
  - 83% stated 4-H helped them consider how their actions affect others.

    - 77% stated 4-H helped them to volunteer their time for community service.
    - 81% stated 4-H help them value the contributions of others.
    - 90% stated 4-H helped them involve others in sharing leadership responsibilities.
    - 91% stated 4-H helped them to avoid risky behaviors.
- Iowa State Extension provides programming to meet the needs of youth locally. Linn, Benton and Iowa Counties, initiated with support from the community, two week-long camps for migrant worker children.
    - Staff learned about working with youth in this environment.
    - Youth shared appreciation for well controlled fun activities.
    - Youth shared that they would be doing unconstructive things (watching TV, sleeping, being bored) if not attending.
    - Through example, staff shared skills in working with youth audiences with migrant camp day care providers.
- Governor's AmeriCorp After-School Initiative in nine school districts for at-risk middle school youth reached 788 middle school students.
    - AmeriCorps members and community volunteers provided 525 middle school students tutoring assistance.
    - As a result of participation in tutoring services and 4-H educational enrichment, the average quarterly G.P.A.s increased .40 points, attendance by 9%, and students problem-based school referrals decreased 12%.
    - 498 middle school students participated in a total of 4,913 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.
    - 200 volunteers were recruited to assist with tutoring and the organization of enrichment activities. The volunteers provided 5,215 volunteer hours.
- Food and Fitness Craze impact:
    - 373 adults and 236 teen volunteers were trained to lead activities.
    - 3,880 youth received nutrition, fitness or health education.
    - 5,266 youth contacts across the state "got up and moving." With an average of 15 minutes of physical activity per contact, youth got moving for 1,316 hours.
    - Nutritious snacks reached 5,743 youth.

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 ISU E-SET (Extension – Science, Engineering and Technology)

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.

b. Impact/accomplishment

- E-SET curriculum presentations were made at NAE4-HA Annual Conference, ISSEC, Iowa 4-H Youth Conference, CYFAR National Conference, AEA and LEA Teacher workshops, and area leader trainings. 18,243 youth and adults were reached directly through E-SET programming through these and other efforts.
- Youth Reached through E-SET Educational Programs include: 16,532
- Youth Enrolled in Science and Technology Project Areas: 3,424
- E-SET partnered with AEA 10, College of Engineering, Office of Biotechnology, Space Education Initiatives, Nature Mapping, Iowa Conservationists, Illinois Extension, Texas Regional Education Office, and others.
- USDA/Army Partnership: 340, Growing in the Garden, or Where we Live, Food, Fiber and Environmental Science Programs
- 9,528 youth participated in at least six hours of lessons
- 651 adults (teachers, youth program leaders, naturalists, etc) were trained.
- Teachers reported that, "My students learned the importance of caring for our environment; learned how important agriculture is to us/our families, and had more opportunities to practice communication and cooperation."

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) 43 youth and adults participated in the North Central Region forum in Peoria, IL; 3) 45 high school age youth from across Iowa served on the State 4-H Council; 4) 80 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 5) A club survey designed to strengthen youth as partners programming in Iowa 4-H community clubs was completed by 32 clubs, 438 4-H'ers and 76 adult leaders and parents.

b. Impact/accomplishment

- $6,340 was granted by the Iowa Commission on Volunteer Service to ISUE 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. Twenty-seven grants we refunded. The original $6,340 grant resulted in projects totaling $41,000, aided by 320 youth volunteers and 221 adult volunteers working together for 3,075 volunteer hours.
- One hundred people were recognized for their outstanding contribution to the 4-H program by their induction into the 2004 Iowa 4-H Hall of Fame. Over 1,000 4-H members, alumni, and supporters were present at the induction ceremony at the Iowa State Fair to honor these volunteers and staff members.
- The state 4-H staff developed training on the eight essential elements of positive youth development. Two hundred and forty Extension staff participated in the day long training. During the training, participants learned how the eight essential elements can be used in planning county and area programs that meet the developmental needs of youth and were given tools to work with different groups such as Extension Councils, youth committees, 4-H volunteers, and other youth organizations.

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

- 39,289 youth participated in 4-H Youth programs in the seven urban counties. This represents 19.5% of school age youth in the seven urban counties.
- Programming involving partnerships and collaborations continued 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, Adventure Learning Center, 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.

- AmeriCorp program sites are established in three urban centers – Davenport (Scott County), Dubuque (Dubuque County), and Sioux City (Woodbury County). Positive Behavioral Supports demonstration sites are operating in two urban centers – Des Moines (Polk County) and Dubuque (Dubuque County). An additional PBS site in located in an urban suburb – Central City (Linn County).
- New 4-H clubs reaching an underserved audiences were established in Waterloo (Longfellow School), and Scott County (2 clubs within the JC Penney After school program grant)
- 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, pregnancy prevention, healthy relationships, problem solving, and teamwork.
- 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, cleaning and beautifying community and state parks, and conducting a community neighborhood assessment survey

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 (ISUE) 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 conducted a complete review of its projects and resource allocations. The subsequent report, which assembled programmatic and expenditure information for a snapshot of our recent research, was shared with stakeholders, and input was solicited 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. As stakeholders reviewed the information, they were 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.

- A Stakeholder Advisory Panel helped to guide research and extension efforts in federally funded research on muskmelon pest (disease, insect, and weed) management. The melon Advisory Panel, including commercial growers from Iowa and Colorado, met in December 2003 in Ames, IA, to review 2003 field research and demonstration efforts and provide input on revising plans for the 2004 season. Suggestions from the Panel's growers led the project team to change to way melon plants were transplanted in June 2004.
- Iowa Fruit & Vegetable Growers Association requested and funded a pepper research project that was conducted during 2003.

- Program 4.
  - The Iowa Soybean Promotion Board approved and supported research to improve resistance to diseases and nematodes and grain quality. The Iowa Corn Promotion Board approved and supported research to identify key genes for agronomic traits of corn. The Iowa Corn Promotion Board organized a national meeting to develop strategies needed to determine a complete DNA sequence of a corn genome. Several ISU faculty were invited to attend and contribute to the development of the strategy for that project, a portion of which is conducted at ISU.

- Program 5.
  - Studies on hail injuries were designed and conducted after consultation with the National Hail Insurance Company. Outcome from these studies will be distributed to Iowa farmers and hail adjusters to help assess hail injuries on soybean.
  - Studies conducted to determine the physiological and molecular bases for variation in soybean seed composition were designed and conducted after consultation with the Iowa Soybean Promotion Board and Illinois Soybean Production Committee.
  - Studies conducted to model maize pollen dispersal were formulated in response to USDA-CSREES Office of Biotechnology Services request for scientific input on gene flow in production systems producing plant made pharmaceuticals and plant made industrials. Results of this research program will impact the development of regulations guiding the field-scale production of these agricultural products.

- Program 6. The sensors and machinery design projects have all been supported by industry partners, and involved substantial collaboration. In both cases, the industrial partner participated in the research and provided feedback on the objectives of subsequent work. The success in technology transfer has resulted in the commercialization of products based on this research.

- Program 9. A state 4-H equine stakeholder committee works to enhance the youth horse program. The committee was directly involved in development of leader training programs, youth activities and written materials. Also, an Equine Task Force was developed with input from Patty Judge, Secretary of Agriculture. The Task Force will be involved in conducting a census and economic impact study of the horse industry in Iowa.

- Program 10. This program addresses stated priorities of stakeholder organizations, which are regularly consulted to learn of their highest priority needs for molecular genetics research

relevant to their industry, which is then incorporated into decision-making on research topics. For example, swine genetics companies have pointed out the serious nature of sow longevity problems and this year, we initiated efforts to look for gene markers on sow longevity. Stakeholder input from producers and niche marketing firms was used to increase efforts in refining techniques to estimate intra-muscular fat on the live animal using real-time ultrasound. Also, research to determine the heritability of health traits was started at the request of Angus breeders. In poultry, we respond by development of research proposals to meet the research priorities developed by the Midwest Poultry Consortium survey of industry representatives and university scientists.

- Program 11.
  - A team composed of Iowa cattle producers, Iowa-DNR, USDA-NRCS, faculty from Dordt College, area livestock extension specialists, and ISU research and extension faculty continue to serve as an advisory group to identify project areas of importance to beef cow-calf production to be addressed in the forage grazing research program.
  - 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 ISU 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 investigate the effects of consumption of milk, milk products and meat produced from grass-based ruminant systems on parameters of human health in support of on the farm research to enhance the conjugated linoleic acid content of milk and beef.

- Program 13.
  - Outlook activities conducted by the Food and Agricultural Policy Research Institute (FAPRI) seek and formalize the influence of stakeholder input in the annual FAPRI DC reviews occurring each year in December, during which stakeholders from producer groups, industry and government an international agencies provide input and feedback on world agricultural outlook activities. These reviews are then integrated into the outlook activities in the following month of January.
  - Baseline data for the analysis of PRRS on the cost of pork production was obtained directly from pork producers and industry personnel. A case study of 12 pork producers was conducted, using the actual farm records to document production efficiency impacts from a PRRS outbreak. A second approach was a survey conducted of pork industry personnel to obtain their insight into pig production efficiency impacts.
  - 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 hoop project results are based on actual on-farm production efficiency of the systems.
  - 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.

- Program 14.
  - Iowa Farm Bureau was an important collaborator on the Livestock Gross Margin Insurance rating updates and website. Crop insurance agents gave valuable feedback on the Gross Margin Insurance website. Crop insurance companies gave direction on how Group Risk Income Protection should be modified to better meet the needs of farmers.
  - The Credit Union project was requested by the Iowa Bankers Association (IBA). A task force made up of bank presidents provided input into the project design and made sure the analysis was answering questions they had about credit union competition. Over the course of the study, considerable negotiation with the IBA staff was required to ensure that the results of the study were accurately and fairly presented to the public and to IBA members.
  - Similarly, the FCSA/Rabobank project obtained input and evaluation from most of the interested parties – FCSA, Rabobank, Farm Credit Administration, members and opposition groups. The groups were not uniformly happy with the analysis, but theire input was carefully heeded in the analysis.

- Program 16. Collaborations with the Alternative Swine Production Systems Initiative Team, has developed research in response to farmer/stakeholder inputs on a need for information on effects of various bedding and production systems on pork quality. A specific question concerning the influence of utilizing deep-bedded production systems on meat composition and quality for pork has been addressed in a research project design, and information is currently being developed to answer the question.

- Program 18. The ENAM (Enhancing Child Nutrition through Animal Source Food Management) study objectives required local, national, and international stakeholder participation in data collection to identify the constraints to consumption of animal source foods and identify potential interventions. A multidisciplinary team from Iowa State University (ISU) and the University of Ghana (UG), with backgrounds in nutrition, public health, anthropology, sociology, economics, agricultural extension, animal science, and veterinary science, were involved in the study. At the regional and community levels, stakeholders included program directors and community agriculture, health, and nutrition workers from both government and non-government organizations. At the household level, stakeholders were caregivers of preschool age children as well as community opinion leaders who served as key informants on identified constraints.

- Program 20. 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 be conducted on soybean aphid and soybean rust management. Stakeholder involvement has increased the applicability of research, including on-going evaluation of the program.

- Program 21. We are working with the Natural Resources Conservation Service on two different projects - one involving water quality in the Yellow River Watershed and the other on remote sensing of land surfaces to determine tillage practices previously used. In the

Yellow River water quality study as we are using NRSC data and are cooperating with them on the research protocol.

- Program 22.
  - A Consortium of Seed Corn Companies was formed to support IPM research concerning Stewart's disease of corn, resulting in a new insect sampling protocol and a model that predicts the seasonal and county-level risk for Stewart's disease of corn. Based upon Stakeholder feedback, research is being conducted that will provide information concerning field-level (site-specific) risk for Stewart's disease of corn.
  - Studies on hail injuries were designed and conducted after consultation with the National Hail Insurance Company. Outcome from these studies will be distributed to Iowa farmers and hail adjusters to help assess hail injuries on soybean.
  - Through financial support from and discussions with the Iowa Soybean Promotion Board, research objectives were developed that addressed grower interest in combining different classes of insecticides (organophosphate and pyrethroid) to optimize soybean aphid management. By including these grower selected treatments within the aphid-research management project, it was revealed that the type of insecticide was not as important as optimizing the coverage of a given product. Preliminary data suggests that using a best-practice for insecticide application will allow growers to select the most economical product for their production system without experiencing a significant difference in soybean aphid management.

- Program 23. Stakeholder input from agricultural professionals who attended the 2004 Iowa State University Comprehensive Nutrient Management Plan Development course has been used to modify the CNMP course curriculum to be used in the 2005 course offering. All course participants were asked to complete a course survey that focused on what information is most needed by the stakeholders (agricultural consultants) to be the best prepared to develop CNMPs. A select number of course participants were asked to attend a post course meeting and provide even more in-depth input on how to improve the course. The course instructor team has completed modifications on the course curriculum that include more in-depth coverage of the National Resources Conservation Service (NRCS) Conservation Planning Process, as well as the inclusion of more in-class hands-on learning examples in the curricula to be used in 2005.

- Program 24. To address concerns related to bridge stabilization in southwest Iowa, the ISU weir project was initiated by the Iowa Department of Natural Resources. The Hungary Canyon Alliance, located in Oakland, Iowa, has provided input into the project as well as contributed $10,000 to the ISU project.

- Program 27.
  - The goal of the Squaw Creek Watershed Coalition, a voluntary community organization, is to protect the water quality of Squaw Creek through partnerships, education, and community projects. This coalition initiated the ISU partnership to document the transformation of an ISU research plot into farmable wetlands. One result of this partnership was the creation and distribution of a 50 educational CDs to help urban and rural residents to learn about the steps involved in protecting their watershed through the

creation of an on-farm wetland. The on-video demonstration and farm field day resulted in almost 40% of the participants stating an interest in monitoring the water near their farm or home.
    - Stakeholder input has been very important throughout the investigations on rural economic and employment growth in the Upper Midwest. Feedback has been obtained directly from stakeholders when the projects were initiated, during the investigations, and at presentations of the preliminary results. Stakeholder input has been critical in designing the analyses, assessing the impacts, and interpreting the results. Occasionally, stakeholders questioned our measures and results pertaining to their county or region and we went back and verified or corrected the outcome. Finally, the actual interpretation of the findings benefited from the insights of local stakeholders, especially in appreciating the underlying mechanism of growth impacts.

- Program 29. 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. NASA FTCSC also works directly with several Iowa-based companies to develop the next generation space foods and food processes.
    - The Center for Crops Utilization Research (CCUR) has created an industry/stakeholder advisory board to guide its work. The first meeting was held December 2004. CCUR is part of the Plant Sciences Institute, which also has an industry advisory board that provides feedback. CCUR is also a part of the Bioeconomy Initiative and collaborates with the NASA FTSCC, each of which has an industry advisory board. As a result of advice given by the Plant Sciences Institute advisory board, we created five research platforms on which to focus investments. A workshop on plant oils as feedstocks for bioenergy and biobased products was held in which industry and stakeholders participated and we identified four research areas in which to focus research efforts.
    - Stakeholders are a vital part of soy-based adhesives research efforts. Beginning with the soybean farmers that supported the research, the company that has planned to produce the hydrolysate and the company that produces the enzymes that are used to produce the hydrolysate. Furthermore, adhesive manufacturers and end users of the adhesive are also a vital part of the research by outlining the properties of the adhesive that are required for their manufacturing operations.

Extension:

- Program 101. All major programs directed toward business strategy and relationships involve stakeholder groups in planning, design, and delivery. Key groups include farm and commodity organizations, organizations supporting farm women, and the lending community.

- Program 104. The initial idea for carrying out the “Winning the Game” workshops came from the Iowa Farm Bureau Market Education staff, which represents a large proportion of Iowa farmers. Two pilot workshops were held, and feedback from farmers who participated in them resulted in several modifications to the materials and teaching format.

- Program 106. All programming is at least in part derived from conversations and surveys from current and potential clients. The comprehensive Iowa Turfgrass Survey is regularly consulted when programming is designed for the Iowa Turfgrass Industry. See: http://www.iowaturfgrass.org/survey/surveyhome.htm. The turfgrass area alone represented 43 education programs, field days, and tours representing over 6,100 participants.

- Program 107. After the discovery of a BSE-infected cow in December of 2003, Iowa Beef Center staff met to discuss ways to best address the concerns and questions of beef producers. Extension livestock specialists throughout the state indicated that a live, televised satellite broadcast would be the best way to get timely, relevant information to producers in all counties. As a result, the broadcast was viewed by more than 400 Iowans at county locations, viewed nationally on cable and satellite station RFD-TV, and by at least 16 university extension programs throughout the United States.

- Program 108.
  - Based on input through seminar evaluations and directly from producers, the Iowa Pork Regional Conference series will focus on the grow-finish stage and will be expanded to eight locations over a five-day period in 2005. This will provide more producers throughout Iowa with closer geographic access to information from a diverse group of experts.
  - The past year has seen an on-going challenge from the budget standpoint. Realizing that industry support is essential for the longevity of our programs, the Iowa Pork Industry Center leadership led efforts to solicit and procure industry assistance. Support has been generated from the National Pork Board and the Iowa Pork Producers Association. As a direct result our established pork industry efforts have been expanded, as have the overall POW 108 activities.

- Program 109.
  - A Mennonite advisory committee involving couples from each religious sect assist Extension CEEDs and FSs in planning useful educational programs in Chickasaw, Mitchell, Howard and Floyd Counties.

- Program 142.
  - A formal survey in winter 2003-2004 was conducted to learn the recognition of agronomic information sources. Among farmers, 92% identified private industry as a main source of corn and soybean production information. However, 86% of certified crop advisers surveyed indicated that ISU extension and research programs are private industry's primary information source.
  - The agricultural IPM and ICM programs in Iowa currently focus primarily on field corn, soybean and alfalfa. During FY2004, ISU initiated the Corn-Soybean Initiative (CSI) that is designed to partner ISU Extension and Research programming with statewide vendors of agricultural information to producers. As of December, 2004, 20 business partners representing 98 discrete outlet locations have each pledged to work with ISU ICM programs with producers. Each will commit to educational programs with ISUE that affect at least 15,000 acres.

- Iowa State ICM/IPM staff engaged in survey activities designed to learn the emerging needs of Iowa grape producers. ISUE contacted 215 growers, and 125 responded (58.1%). The survey asked about cultural and pest management needs in vineyards, which is a growing industry in Iowa.
- A survey through the Iowa Agricultural Statistics Service of 2,481 Iowa farmers was conducted to establish a baseline of statewide pesticide use. These data are used to compare with other information sources and provide Iowa State University and other peer agencies with data to base educational and some regulatory program guidance.
- Local surveys included a needs assessment of the west central Iowa ag industry about pest management issues in that area. Five hundred and one farmers were contacted to gain perspective on pest management needs in that part of the state. These and informal contacts with stakeholders helps direct effective extension IPM/ICM programming.
- A planning meeting was held to improve the western bean cutworm trapping and information network with eight certified crop advisers and western Iowa ag service dealers in March. Also, a meeting was held with 16 interested stakeholders about management of leafy spurge, an invasive weed with increasing prevalence especially in parts of western Iowa.
- ISUE has an on-going dialog with the Iowa agriculture industry, with several staff serving formally and on ad hoc basis with representative boards. Examples are: the Iowa CCA Board, representing approximately 1,400 certified applicators; the board of the Agribusiness Association of Iowa; and many of the Extension Field Specialists—Crops serve on outlying research farm association boards.

- Program 143. 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 pest concerns were addressed, including: Asian soybean rust, cowpea aphids 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. In addition, two modules focused on the corn rootworm and insect resistance strategies. These presentations provided growers with information on the new insect resistance management stewardship requirements mandated by the Environmental Protection Agency.

- Program 145. 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 stakeholder 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 serve as a transfer mechanism to distribute safety information through their organizations and out to the population they represent.

- Program 147. Sustainable/Organic Agriculture: A new stakeholder committee was formed in 2004 composed of farmers and NGO representatives to assist in priority setting for the SA program. As a result of this program *increased funding* was made available to four NGO partners for shared programming needs of Iowans in sustainable agriculture for the 2005 SARE POW.

C. Program Review Process:

There has been no change in the review process.

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

3) 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.

3) 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 1.
  - A cooperative project between Iowa State University, South Dakota State University, and the tribal college, Sinte Gelska University, Mission, South Dakota, is being developed to evaluate the production and utilization of sage as a cultivated crop for Native American tribal land, and assess its chemical and sensory properties for culinary, medicinal, and ceremonial purposes.
  - A number of Amish growers participated in a high tunnel tomato micro-irrigation project using tensiometers for irrigation management. The growers maintained daily records of tensiometers readings that assisted them in understanding the soil moisture level. Water quantity was reduced, fruit yield and quality (reduced fruit cracking) improved, and harvesting efforts eased. Half of the growers immediately adopted the system by purchasing the necessary equipment.

- Program 11. The alternative swine housing effort has targeted small and medium-sized producers participating in niche markets. The grass-based beef and dairy work was targeted towards small beef and dairy producers in Northeast Iowa and Southwest Wisconsin.

- 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. Youth BBQ Day was again conducted in 2004 for over 30 inner city minority children from Des Moines, IA, to demonstrate technical and practical principles of safe food processing and preparation. The impacts of this program included increased awareness and interest in agriculture by a client group that is relatively uninformed about Iowa agriculture.

- Program 18.
  - The objective of the High Beta-Carotene Maize Initiative is to enhance the vitamin A nutritional status of traditionally underserved populations in Sub-Saharan Africa. The project not only affects the underserved populations in Sub-Saharan Africa, it involves the transfer of technology to scientists in Africa.
  - Nutrition-related studies among the HIV-infected population have focused mainly on adults and problems of wasting while little is known about the adolescent population. This study documented a high prevalence of obesity and low intake of specific anti-oxidants among an US HIV-infected adolescent population. Given the increased survival rate of patients and the increased prevalence of chronic diseases among overweight young adults, these results demonstrate the need for health professionals to address health risks of obesity in addition to infection-related issues with HIV-infected youth to improve the quality of life of patients and reduce health costs.
  - Poor complementary feeding practices are a primary cause of malnutrition in young children in low-income countries. This study documented the practices of child feeding in Ghanaian and Peruvian communities that have similar breastfeeding practices but access to different foods. Energy from human milk and complementary foods was similar between the two communities; however, feeding styles (feeding frequency, use of snacks, and use of nutrient-rich foods) differed and may have important consequences for micronutrient status and growth. Results may assist health professionals in making culturally appropriate recommendations to improve child health and growth.

- 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 23. Work with hoop structures directly targets the small farm owners who preferentially adopt this technology.

- Program 27.
  - The Food in Your Community project targets low income households and elderly who are potentially at risk of food insecurity. Our research provides community leaders with an assessment of food insecurity issues.

- The research and extension programs focusing primarily on women farmers and women farmland owners also focuses on operators of smaller farms and owners of smaller landholdings. Knowledge of the intersection between women in farming and farm size resulted in successful inclusion of smaller landholdings in a survey of women landowners in Polk County.
- An action research project works with the Hopi tribe and a Hopi-based not-for profit organization on Hopi agriculture.
- A research and action agenda examines community support for new migrants, with special focus on Hispanics.
- A project with United Tribes Technical College aims to design training for tribal economic development officials in eight states.
- A project with five tribal colleges seeks to increase civic engagement for increased educational access and equitable economic development.

- 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 in 2004 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 101. Annie's Project is a comprehensive educational program and support network for Midwestern farm women.

- Program 106.
  - The Greens committee supported the diversity garden projects in three communities (Red Oak, Lenox, and Osceola) in counties with increasing Hispanic populations. These involve about 28 families and over 100 clients of all ages. Impacts included more than $12,000 per year in estimated value of produce harvested and consumed by the families or sold at local farmers markets.
  - Greens committee members produced five additional horticulture Extension publications in the Spanish language (this is in addition to ten produced in 2002 and 2003) 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>:
    - PM 1891(S) Maíz Dulce [October 2003]
    - PM 1892(S) Melones [October 2003]
    - PM 1894(S) Ajo [October 2003]
    - PM 1895(S) Tomatillos [October 2003]

    - PM 1896(S) Las Coles [October 2003]
  - The Amish/Mennonite communities had recently started produce auction houses in three areas of Iowa in 2004. These were initiated 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. ISU Extension Field Specialists, CEEDS, and campus-based staff helped educate nearly 200 participants at four meetings, and over 100 individual consultations and field visits. Produce quality, yields, and price were all improved over the 2003 growing season.
  - The Four Oaks project worked with at-risk children ages 5–18.
  - Have also provided support to honeybee operators, produce auctions, and the Iowa wine-grape industry.

- Program 107. Many Iowa Beef Center activities are with limited resource clients, farm couples, and female producers. The center of Iowa's cow-calf industry is located in southern Iowa, a region with an aging population and low income levels. The Iowa Beef Center is serving this client base with one-to-one assistance in business arrangements such as custom grazing and cow share leasing, as well as cost reduction strategies featuring extended grazing and balanced cow wintering rations. More programming is offered via web site and non-traditional meeting times to better serve clients with off-farm employment.

- Program 109.
  - Three women's dairy peer groups have been formed in NW Iowa involving over 60 women. They have been identifying and developing programs to assist in milk consumption (milk machines in schools) and understanding their industry (Dairy Story at County Fairs).
  - A special project to assist a paraplegic dairy farmer (in Allamakee County) return to the active operation and management of his dairy farm has involved local NRCS, Easter Seals of Iowa, ISU Bio-Systems Engineering, ISUE Field Specialists, and local farmers.
  - Grazing workshops have been conducted with Old Order Amish dairy farms in Buchanan County.
  - A Mennonite advisory committee involving couples from each religious sect assist Extension CEEDs and FSs in planning useful educational programs in Chickasaw, Mitchell, Howard and Floyd Counties.

- Program 146.
  - The Iowa Master Gardener Program trains approximately 700 adults per year to become Master Gardener volunteers. Training is provided to accommodate adult learners with physical limitations. In the past, we have used closed captioning and hearing assistance devices for hearing impaired learners. This year, special efforts were made to accommodate mobility impaired learners at county extension offices, Iowa Communications Classrooms and campus. Accommodation allowed volunteers to successfully complete the course and to serve their community through horticulture volunteer service.

    - The ISU Polk County Master Gardeners continue a special project to assist persons with disabilities through a demonstration enabling garden in Altoona IA. This garden has been professionally designed with input from Master Gardeners. Construction has been accomplished using professional and volunteer labor. When completed, the garden will provide opportunities for people of all ages and abilities to share the beauty of nature and the joy of gardening. The enabling garden will feature level and firm pathways, raised beds, vertical gardening and barrier free gardening with containers.

- Program 147. The Iowa SA program obtained and distributed the Spanish language SARE bulletin on profitable pork production to all counties for use in local programming to meet Spanish-speaking needs.

- **Certified Financial Counselor Assisting Rural Families.** ISU Extension Certified Financial Counselors in SE Iowa, trained on funds provided by the Rural Mental Health grant, provided information to several groups and organizations through displays and presentations. In exchange for cost of the certification, each counselor will provide 30 hours of financial counseling and teaching back to the community. One-on-one counseling services include decision-making related to insurance coverage, future college expenses, late charges, and general decisions for better money management to individuals and families. Rural families receiving assistance included low income couples across the life span, and families dealing with severe family illness and/or disability.

- **Family Financial Education Leads to Homeownership.** An ISU Certified Financial Counselor in NE Iowa began working with a disabled female veteran suffering from MS and car accident injuries helping her learn to cover monthly expenses with her disability check. After working with the counselor for three years, the client became the first Section 8 participant in Iowa to become a homeowner. The relationship that developed between that community's Housing Services and ISU Extension led to a $25,000 counseling contract which pays for services provided to 45 families and has been renewed for a third year starting October 2004.

- **Iowans Save Program.** Sioux County Extension is a sponsoring agency for the Iowans Save Program where income-eligible families can open an account that allows each holder to save up to $3,000 and have that amount matched dollar for dollar when the savings goals is reached. The holder agrees to save at least one deposit into the savings account per month, receive education leading to purchasing the asset, and make the purchase. One couple opened their account in July of 2002. Each adult managed to put $3,000 in the account and, in July 2004, withdrew that money, plus a $5,000 match for use as a down payment for their first home. Extension's role included helping the couple establish a budget that enabled them to save the needed down payment, begin to clean up their credit report, and find a lender who would work with them. During the past year, five families have reached their Iowans Save goal of purchasing a home.

- **Earned Income Tax Credit (EITC) Outreach Project.**
    - Fifty-three staff members of agencies serving low-income families participated in a one-hour training on EITC, sponsored by ISUE in North Central Iowa area counties,

ISED, and the Annie E. Casey Foundation. Thirty-four tax returns were prepared by these volunteers with refunds totaling $38,338, including $18,700 in EITC and Child Tax Credit.
    - In the rural SW area, EITC resource packets were developed in both Spanish and English. Extension assisted families with information and education on recordkeeping, budgeting, and saving. 66 families had taxes prepared and 39 qualified totaling $58,835. They received $15,225 in Child Tax Credit, $3,505 in Child Dependent Tax Credit, and $208,114 in Federal Tax Returns.

- **New Food Pantry Helps Families Following Loss of an Industry.** In Allamakee County, Extension staff met with community leaders and six months later a new food pantry opened in Postville, Iowa, a community which had suffered loss of a major industry due to fire. Twenty to 40 families use the food pantry each week during its open hours (7 hours). The majority of families using the food pantry are immigrant families.

- **Family Story Teller Program Increases Literacy Skill in Hispanic Families.**
    - A Family Story Teller who teaches the ESL program in Columbus Junction Schools, was recruited by Extension to teach the Family Story Teller Program to Spanish–speaking families and groups in the SE area. Thirty-four Spanish-speaking families enrolled in the three-series program. Parents report that literacy skills by both parents and children are increasing.
    - Clark County Extension and a Hispanic church in Osceola provided the Family Storyteller program to develop Extension relationships in the Spanish speaking community and nurture language and literacy skills of the families in SW Iowa. Families learned new reading techniques and received books, language activities and art materials. The church offered a family activity for members and guests. Interpreters/translators received compensation for services, and Spanish-speaking families learned about Extension.

- **Parenting Knowledge and Behaviors Improve with Age-Paced Newsletters.** Four counties in NE Iowa received Empowerment Area designation and accompanying state appropriations. With funding and the need established to help parents understand guidance and nurturance of children 0-5 years, Extension began the parent newsletter project in early 2001, also highlighting local services available to families in the four-county area. Over the past three years, 792 families received the newsletters. Parents reported the newsletter as a welcome addition to their homes, giving them new ideas, in an easy-to-read format. When funding ran out, families were transitioned to Extension's new parentinginfo.org website, developed by ISU Extension to assist counties and states nation wide.

- **Youth Improve Nutrition With Community Gardening.** In Black Hawk County, the Jesse Cosby Neighborhood Center is next door to the Kid's Café program, an after school program operated by the NE Iowa Food Bank. Extension started a garden at the site. Quakerdale and Kid's Café youth helped plan, plant and water the 30x60 ft garden. Growing in the Garden lessons were held weekly. Youth learned basic gardening skills along with vegetable preparation. At the end of the season, a garden party was held for

families where 74 individuals enjoyed barbequed chicken, baked beans, sweet corn and fried green tomatoes grown and prepared by the youth.

- **Long Distance Dads Program Helps Inmates with Parenting Skills.** Extension conducted Long Distance Dads programming for inmates at the Iowa Medical and Classification Center in Oakdale in early 2004. Nine men completed 15 hours of the 18-hour course. All indicated significant changes in attitude and behavior in regards to parenting and fathering roles: some comments included: "more strength and confidence behind my decisions," "more open-minded," "letting the other finish speaking before responding," "noticing what makes my children happy," "paying more attention to my children's activities," and "getting along better." The inmates who completed the program will continue as an advisory group for future programs.

- **Powerful Tools for Caregivers.** Seven caregivers from SW Iowa completed Powerful Tools for Caregivers, the first one held in Iowa. During the six-week course, participants learned 25 tools needed to take care of themselves as they care for older adults including: reducing stress, making tough decisions, and locating helpful resources. Over half of the participants rated the tools as very or extremely helpful.

- **Nutrition Education Improves Snack Habits of Hispanic Families.** Polk County Extension developed a nutrition demonstration program in the largest Mexican grocery store in Iowa, La Tapatia Tienda, for six months, which focused on fruits and vegetables as snacks in place of high fat and sugar snacks. Each demonstration lasted between three-five hours, reaching 40-60 participants per session. Families were more open to trying different healthy foods and changing behavior after seeing others try them. Employees also gained knowledge of value of different fruits and vegetables.

- **Dealing with Job Loss.** Budgeting on a Shoestring was presented in Lenox (Southwest Iowa) in English and Spanish to 16 female and three male employees laid off at a local business. Evaluations indicated all learned where to check for savings and other income sources. A request was made on retirement planning and five requested the PowerPay form. The HR Manager asked for info on Earned Income Tax Credit to share with employees. A request was made by the plant for more programming in the spring.

- **Mexico Immersion Program for Community Leaders and Extension Staff.** Three travel experiences to Mexico, planned by Extension staff took place in 2004, for purposes of encouraging improved community understanding, programming and services for immigrants. Thirty-five SE Iowa community leaders and 20 Extension field and campus staff from across the state participated in the immersion programs. Impacts from these trips included greater sensitivity to immigrants' dealings and situations after leaving their home country as well as improved programming and services at the community level.

3) 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.

3) 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:

0. NASULGC/NELD/NCCEA

The National Association of State Universities and Land-Grant Colleges (NASULGC) assessed fees to promote national initiatives. During FY 2004, Iowa State University Extension paid fees totaling $33,744 to support e-Extension as well as $2,687 to directly support NASULGC. The total paid in FY 2004 came to $36,431.

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. In addition to the national program, there is also a NELD program supported by extension in the North Central Extension region of the country. Iowa Extension has staff currently participating in both the national and regional. Expenses paid by Iowa for these staff amounted to $18,818 during FY 2004.

The North Central Cooperative Extension Association (NCCEA) assessed fees in FY 2004 to cover their services of providing a forum for the 12 states in the North Central region. NCCEA represents the Directors/Administrators of the State Cooperative Extension Service in the North Central Region. NCCEA works to *"Bring consensus among members by developing programs that expand the quality and effectiveness of individual member state Cooperative Extension Services and their impact in the states of the North Central Region and represents and provides service to the individual State Directors/Administrators on matters of regional, national and international concern."* NCCEA also plans, monitors, and coordinates reports of regional Extension activities, including projects, cooperative efforts, and communications. Costs incurred by Iowa State University Extension totaled $16,453 in FY 2004.

0. 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 2004.

0. Agriculture and Natural Resources Extension Program Director

The Senior Associate Dean for the College of Agriculture spent time during FY 2004 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 1.5% of the Senior Associate Dean's time, which as equal to $2,082 in salary during FY 2004.

Dr. DeWitt spent time on multi-state and national programs and activities in FY 2004 that included: Regional SARE Administrative Council membership, Regional SARE PDP proposal review committee, Region VII PAT manual planning committee, Serves as vice-chair of NCR 201 Committee, serves as representative to NC IPM coordinators group, serves as Iowa representative to NC SARE PDP coordinators group, serves as NC regional representative to National SARE 2006 Conference planning committee, and serves as representative to NC PAT coordinators group. This represents approximately 9.8% of Dr. DeWitt's time or equivalent to approximately $11,035 of salary support.

The Associate Dean for Extension Programs and Outreach spent time during FY04 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. Research and Education on Watershed Nutrient Sources and Management as Related to Water Quality. In addition, the Associate Dean also represented the four-state Heartland region to the USDA CSREES National Water Quality Program. These activities represent about 1.5% of the Associate Dean for Extension Programs and Outreach time, which is equal to $1,813 in salary during FY 2004.

0. Families Extension Program Director

The State Director for Extension Families programs in Iowa spent time during FY 2004 year on national and regional programs/activities. These efforts included hosting a two day, NCR Families program director meeting in Iowa during spring 2004; work in support of the National Network for Children, Youth and Families and the National Network for Child Care; assistance with spreading the Iowa Strengthening Families Program nationwide and

internationally; providing a Mexico in-service opportunity that included staff from Michigan, Missouri and Wisconsin; supporting the Iowa Housing Maintenance Hotline for interested states in the region; the Iowa/Minnesota coordination of Answer Line; support for hosting the national satellite program on parenting and bullying. Also, the Director spent two days in Michigan working with staff on developing policies related to revenue generation . These activities represented eight percent of the Families Program Director time in FY 2004, or $9,285 in salary.

0. 4-H Youth Extension Program Director

The State Director for Extension 4-H Youth programs in Iowa spent time during FY 2004 on national and regional programs/activities. The Director served on the National 4-H Cooperative Curriculum System Board of Directors and has a member of the North Central 4-H Administrators Council. Other activities by the Director included national and regional meetings with ongoing efforts in the areas of staff development, volunteer development, and curriculum development. This represented 9.3% of the Director's time, which equals $8,400 in FY 2004.

0. Iowa Cooperative Extension Directors

The Director of Extension for the State of Iowa is involved with many committees dealing with regional and national Extension activities. During FY 2004, participation and presentations at regional and national meetings included the National Water Quality Conference; National Center for Food and Agricultural Policy (NCFAP); ECOP Directors and Administrative Meeting; National Agricultural Research, Extension, Education, and Economics (NAREEE) Advisory Board meeting; and National Association of State Universities and Land-Grant Colleges (NASULGC) meetings; and the National Multi-State Coordinating Committee (NMCC). During FY 2004, salary paid for multistate extension activities totaled $2,472.

In addition, the Associate Vice Provost for Extension also participated in regional and national Extension activities. Meetings and duties included the following: Multi-State Cooperation in Land-Grant University Agricultural Programs; National Association of State Universities and Land-Grant Colleges (NASULGC) meetings; North Central Cooperative Extension Association meetings; as well as time spent as Vice Chair of the ECOP Budget and Legislative Committee, and Acting Interim Program Director for NCRDC activities. During FY 2004, salary paid for multistate extension activities came to 1.5% equaling $1,938.

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		
NASULGC/NELD/NCCEA	10,899	22,034	21,144	18,211	71,702
North Central Regional Center for Rural Development	2,553	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	14,930
Families Prog Director (Nat'l & Regional Resp.)		7,892	7,988	8,386	9,285
Youth Prog Director (Nat'l & Regional Resp.)		7,519	7,688	8,170	8,400
Director of Extension				8,928	4,410
Total	54,126	81,172	80,447	71,885	111,280

_____ _____
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.

Significant redirection was planned for 2004; however, those changes did not occur as quickly as anticipated. Thus, while overall expenditures met our overall goal, they did not synchronize with the plan in programmatic terms as much as we had hoped.

Most multistate research projects (all newer ones) contain an outreach/education plan – a plan for how the results of the project are to be made available in an accessible manner to the intended users of the information via publication, workshops, field days, etc. Therefore we consider most multistate activities to be integrated in nature. We have chosen to take a conservative approach and, other than administrative costs, have only include expenditures related to specific research committees where participating faculty from Iowa State University hold at least a partial extension appointment.

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

Food Crops:
- NC-140: See outreach plan and annual SAES-422 reports in the National Information Management and Support System (NIMSS), incorporated by reference.
- W-128: This multistate activity was written prior to the requirement for an outreach/education plan; however, Dr. Henry Taber holds an extension appointment and meets regularly with fruit and vegetable growers to share research results.

Crop Production and Management:
- NC-1012: See outreach/education plan in the National Information Management and Support System (NIMSS), incorporated by reference.
- NC-504: No outreach plan, but the committee objectives include developing education materials for soybean rust identification to hand out to growers, commodity groups, consultants, scouts, etc.

Improved Grazing Systems:
- NC-225: See outreach/education plan in NIMSS for NC-1020 (the replacement project), incorporated by reference.
- S-1005: See outreach/education plan in NIMSS, incorporated by reference.

Animal Physiology:
- NE-1009: See outreach/education plan in NIMSS, incorporated by reference.

- NC-1119: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.

Animal Genetics:
- NC-1004: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.
- S-1008: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.

Food Safety:
- NE-1009: See outreach/education plan in NIMSS, incorporated by reference.
- S-292: This multistate activity was written prior to the requirement for an outreach/education plan; however, Dr. Dong Ahn holds an extension appointment and regularly provides information to the poultry industry through one-on-one consultations and provides technology transfer through individual meetings and consultations.

Integrated Pest Management:
- NC-215: This multistate activity was written prior to the requirement for an outreach/education plan; however, Dr. Greg Tylka holds an extension appointment and meets regularly with soybean producers to share research results.
- NRSP-4: This committee has an extensive outreach component via IR-4. See <http://ir4.rutgers.edu/>.
- NC-205: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.
- S-1010: See outreach/education plan in NIMSS, incorporated by reference.

Animal Waste Management:
- S-1000: See outreach/education plan in NIMSS, incorporated by reference.
- S-291: This multistate activity was written prior to the requirement for an outreach/education plan; however, Dr. Wendy Powers holds an extension appointment and regularly shares information and research results with livestock producers via a web site and through extension publications.

Rural Development:
- NC-100: See outreach/education plan and annual SAES-422 reports in NIMSS for NC-1100, where these activities currently reside, incorporated by reference.
- NC-1001: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.
- NC-1011: See outreach/education plan in NIMSS, incorporated by reference.
- NE-1011: See outreach/education plan in NIMSS, incorporated by reference.

Grain Quality:
- NC-213: See outreach/education plan and annual SAES-422 reports in NIMSS, incorporated by reference.

Poultry Production Systems:

- NE-127: This multistate activity was written prior to the requirement for an outreach/education plan; however, Dr. Hongwei Xin holds an extension appointment and meets regularly with producers to share research results on ammonia emissions.

Seed Science:
- W-1168: See outreach/education plan in NIMSS, incorporated by reference.

Administration ($75,000, approximately 73.8% of the total expenditures for these two expenses):
- Regional dues are a required expenditure for Iowa Agriculture and Home Economics Experiment Station participation in the above activities.
- Multistate Travel Funds support the travel of Iowa Agriculture and Home Economics Experiment Station administrators, administrative advisors, and authorized representatives to annual and other meetings where integrated planning efforts take place.

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: http://www.choicesmagazine.org/
- Distance learning programs and courses such as the Agricultural Management e-School (AMES): http://www.extension.iastate.edu/ames/
- Direct interaction with print and broadcast media

Dr. Jolly's recent research activities have focused on 1) quantifying the relationships between financial management and the competitiveness of the farm firm and related agribusinesses, and 2) examining the competitiveness of agricultural credit markets and institutions serving agriculture and rural areas. Specific projects for FY04 include:

- Monitoring 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.

- Identifying and measuring 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.
- Developing 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.
    - Developing a model to examine the role of value-added investments in farmers' portfolios. The key issue in this project was to examine the appropriateness of horizontal (expanding the farm business) versus vertical (investing in value-added projects) growth strategies for specific farm businesses. This project was undertaken at the request of Extension staff working on value-added businesses.
    - Analyzing the impact of the Rabobank (July, 2004) offer to purchase the Omaha-based Farm Credit Services of America. This was an unprecedented event that directly impacted 50,000 FCSA members. I assembled a small team of ag economists at Iowa State and the University of Illinois to prepare information and analysis on the proposed transaction. This information was made available through a dedicated website. Our research results appeared in all major farm press outlets. The website was also used by Congressional staffers as a source of information for public officials and agency staff.
    - Examined the impact of the growth of credit unions on credit markets in Iowa. Recent legislation has allowed credit unions to serve a significantly broader segment of the public and still maintain their tax exempt status. Special treatment of credit unions creates a competitive advantage not enjoyed by banks or thrifts and may impact the availability of credit in rural markets. This project was requested and supported by the Iowa Bankers Association. A contract with the IBA ensured that the research was objective and that all publication of results was controlled by ISU faculty.
    - A research project was undertaken at the request of the Iowa Soybean Association to examine the impact of the expansion of ethanol production in Iowa and in the US on the soybean industry. Results from this project will be available in FY05.

In all of the examples, Dr. Jolly's research projects are driven by the needs of his outreach programs and, in most cases, involve 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 training provided to Iowa's nursery

and landscape professionals wishing to earn the title of Iowa Certified Nursery Professional. On January 21, and again on August 3, 2004, participants received landscape plant identification skills training in preparation for a certification test. Everyone choosing to participate in the training eventually passed the test and were awarded the title of ICNP. Because the training sessions were so beneficial to participants, it will be offered again in 2005. The title of ICNP is important because it signifies to the gardening public that persons earning this distinction have a mastery of relevant subject matter.

Mark Gleason: During October 2003-September 2004, Mark Gleason conducted research and extension activities on a previously unknown leaf spot disease of Japanese tree lilac (Syringa reticulata), a popular small tree for Midwest landscapes. The disease has caused severe leaf loss on trees in Iowa, Idaho, and Minnesota since 2000. We have identified the causal agent as a Cercospora sp. fungus and have begun to characterize its environmental biology with the aim of developing effective management recommendations for nurseries, retailers, landscape managers, and homeowners. We described the disease in a fall 2003 newspaper column distributed statewide in Iowa; as a result, several homeowners called us to indicate that their Japanese tree lilacs were suffering from this disease, and helped us to obtain infected leaves for our research. We also increased public awareness of the disease at a June 2004 meeting of the Iowa Nursery and Landscape Association (INLA) Research Committee, and in Iowa Pesticide Applicator Continuing Education sessions for commercial landscape professionals in November 2003. The INLA Research Committee has supported this research with grants in 2003 and 2004.

Turfgrass research consisted of fungicide trials on golf greens. Diseases targeted in these field trials in summer 2004 included brown patch (pathogen: Rhizoctonia solani) and dollar spot (pathogen: Sclerotinia homoeocarpa). Results were shared with turfgrass management professionals at the ISU Turfgrass Field Day in July 2004.

Program 107. Iowa Beef Center

Dan Morrical: In FY 2005, my Iowa Beef Center efforts in the grazing area focused on technology transfer of best management practices to extend the grazing season. I serve as the Animal Science representative for Iowa Forage and Grassland Council and the Iowa Grasslands Initiative. One part of my duties are to identify producer problems in the grazing area and assist research faculty with development of projects to address those concerns.

Additionally, through educational programs best management practices developed from research findings are presented at multiple educational events. Specific areas of emphasis this past year were grazing research field days, the annual Iowa Forage Conference, and multiple pasture walks throughout the state. Further technology transfer was carried out via a Frequently Asked Grazing Questions on the Iowa Beef Center Web site. I also contributed articles to the IFGC quarterly newsletter on grazing research results. Time was also devoted to planning a cooperative educational series with NRCS on Advanced Pasture Management for EQUIP contract holders.

Dan Loy: The Iowa ethanol industry continued to be a major emphasis for the extension beef program. Demonstration projects evaluating storage and consistency of the wet co-products 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 ethanol plants under construction and planning.

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

BRANDS (Beef Ration and Nutritional Decision Software) - Nutritional software for the beef industry was developed by Garland Dahlke, Daryl Strohbehn, and Dan Loy. This software integrates models published by the National Research Council with new research concepts in a format that is easily used by producers. Researchers Allen Trenkle and Jim Russell assisted in model development for this program.

Program 108. Iowa Pork Industry Center

Tom Baas: Improving overall consumer satisfaction or the eating experience should be one of the single most important goals for today's pork producers. Consumers generally desire attractive, economically priced products with desirable color, which are nutritious and healthy, tender, juicy, and flavorful, with no fat or additives. Intramuscular fat has been identified by consumers as an important component of pork quality, specifically in the palatability and flavor of cooked pork, and is in high demand by export markets. As a result, moderate to high amounts of intramuscular fat will continue to be demanded by consumers, both in the U.S. and internationally.

One of the problems with improving intramuscular fat has been the necessity to slaughter the pig in order to obtain a muscle sample and the high cost of measuring the trait in the laboratory. Consequently, a selection project to increase intramuscular fat percentage using real-time ultrasound to measure the trait in the live animal was initiated at the Bilsland Memorial Swine Breeding Farm at Iowa State University in 1998. A control line and a select line were established and selection was based on estimated breeding values for intramuscular fat. Three generations of selection have been completed and an increase of 0.54% intramuscular fat has been realized in the selection line when compared to the control line. These research results have been used to advise producer groups regarding their breeding programs and have also been presented at several extension programs. Two journal papers, five abstracts, and five research reports and conference proceedings have been published on the topic. This work is of special interest to producers who are targeting pork niche markets that require higher amounts of intramuscular fat. This research will continue to benefit the industry by also providing a better understanding of the relationships among the important indicators of pork quality, including intramuscular fat.

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 address all avenues possible to reduce their cost of production. One such area that has not been addressed from a genetic standpoint is in reducing non-productive sow days (NPSD) through genetic selection.

The first step in making genetic progress in reducing NPSD is to determine the genetic control of the trait. This has been addressed using data directly from stakeholders (pig producers). Most of

the business-oriented pig producers utilize computerized data management systems to monitor their reproductive records. Dr. Mabry has developed procedures for data extraction from each of the most popular software packages so that datasets could be created from stakeholder swine herds that have the NPSD performance and pedigree information in one file. The next step was to utilize mixed model technology to estimate the genetic variances and covariances between NPSD and other traditional reproductive traits in swine. This has been done using the data from several swine herds and it has been found that the weaning to first service interval (W2E) portion of NPSD is an easily measured trait that also has heritability in the range of 0.15 to 0.25.

The next step was to include this non-productive sow day trait in the selection programs of our stakeholders, in conjunction with the most accurate breeding value estimation technology, BLUP. 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. In his extension role Dr. Mabry has started a pilot project testing the use of the BLUP breeding value estimation software on NPSD 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.

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 called BLUP Sow Indexing was the first to include NPSD in a genetic evaluation program 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 2004 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. Information gained from these studies is used to identify methods of using existing technology to provide more consistent weed control. There has been a

significant increase in the reliance on postemergence herbicides in both corn and soybean production. A concern among farmers and agronomists is how to use this technology while achieving maximum crop yields. Research has been initiated to determine: 1) how long can postemergence herbicide applications be delayed without suffering crop yield loss due to early season competition between crops and weeds, 2) the benefit of combining preemergence and postemergence herbicides to enhance postemergence application windows, and 3) determine the cost of delaying applications beyond the critical period. These studies will allow the development of management rules that can be used to determine the appropriate management tactics for fields with differing weed infestations.

The growing reliance on glyphosate for weed management in both corn and soybeans has raised questions on the sustainability of this system. Research was initiated to determine the impact of past weed management systems on weed communities occurring in farmers' fields. This survey may provide insights into weed shifts caused by repeated glyphosate applications and drive the adoption of more integrated management systems before widespread glyphosate resistance develops.

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 2004, 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 a new series of research projects being implemented with members of the Iowa Prairie Network. A member of that organization reported that one of his efforts to establish a diverse prairie restoration was in an old alfalfa field. His observation was that there was enough recovery of alfalfa the year following the prairie planting that he could recover some economic return form the alfalfa for at least one year, to defray some of the cost of the prairie restoration. Two research projects have been started with members of the Iowa Prairie network to quantify the alfalfa yields while prairie species are establishing, and to determine the feasibility of the opposite scenario, establishing an alfalfa or red clover stand in an existing prairie planting as a dual cropping system that can produce a harvested forage crop while maintaining the soil, water and wildlife conservation been fits of a diverse prairie. Funding has been obtained from the Leopold Center for Sustainable Agriculture for conducting the project. Input from stakeholders was highly valued when planning the various treatment alternatives, and will be used in evaluating the research and assisting in the education and demonstration programs being planned around the projects. The findings will be of interest of a wide array of private and public organizations and agencies with an interest in prairie restoration in the Midwest U.S.

Marlin Rice: Research results were integrated into Extension efforts during 2004 using a broad array of delivery techniques.

- First, 31 articles were published in the *Integrated Crop Management* newsletter 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/. Dr. Rice has served at the Executive Editor of this extension publication for 16 years.

- Second, results from current research and field observations on pest populations were presented on two different topics at the Integrated Crop Management Conference. These included 1) biology and management of western bean cutworm in corn, and 2) performance of neonicotinoid insecticides. 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 51 Extension clinics or workshops were conducted which presented research information. Most of these meetings were under one of three extension banners: Crop Advantage Series, Ag-Chem Dealer Meetings, or the 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. Seven of these research/Extension meetings were invited presentations to groups such as Pioneer Hi-Bred International, Monsanto Company, University of Illinois and Purdue University.
- Fourth, educational information was delivered in six extension publications. These focused on 1) soybean aphids in Iowa, 2) controlling corn insect pests with Bt corn technology, 3) alfalfa insect management, 4) western bean cutworms, 5) neonicotinoid insecticides, and 6) alfalfa insect identification. Most of these publications were the result of collaborative efforts with other extension specialists and were directed at answering pest management questions from agribusiness clientele and farmers.
- Fifth, there were 13 contributions to the popular farm press and five presentations on radio relating to insect pest management in Iowa.
- Sixth, a pesticide use survey was conducted to help determine the impact of soybean aphids during the outbreak of 2003. A telephone survey of 2,481 Iowa farmers, representing all 99 Iowa counties, revealed that 2.9 million acres were sprayed with an insecticide and at least 57.7 million bushels of soybeans were lost to this pest. This information is being used develop educational information on managing the pest. This survey was a cooperative effort with Carol Pilcher.

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. A Ph.D. student is finishing a three-year research project on these two pests which concentrates on management tactics. This research as been supported by the Iowa Soybean Promotion Board and we receive annual suggestions from them on research directions.

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 2004 included "Toolbox Training for Organic Weed Management" and a ten-session "Iowa Organic Conference" reaching 320 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. A continuing 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. Four meetings with organic advisory committee and producer groups helped focus research and extension plans in FY 2004. 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 45 presentations at Extension/research meetings and field days reached an additional 2,284 agricultural professionals in all sustainable agriculture programs in FY 204. 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. All research results are posted on the ISU Organic Ag webpage and 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 in 2000 to well over 400 acres in 2004. 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/home.html) was created. In the spring of 2002, a grape cultivar by management system trial supported by a grant from the Leopold Center for Sustainable Agriculture was established at two sites representing different soil and climatic conditions. The trial included ten wine cultivars and five seedless table cultivars which are being grown under three levels of pest management (calendar-based, IPM, organic approved). In 2003, a second cultivar trial sponsored by a grant from the newly formed Iowa Grape Growers Association was established to include two additional regionally diverse sites. This trial is evaluating 20 wine cultivars with cultivars from the 2002 trial being included at the new sites. Results from these

trials have reported at state-wide grape conferences and regional meetings; published in annual progress reports and posted on the ISU Viticulture and Research and Demonstration Farms web sites. The plantings have served as a resource for field days, pictorial essays demonstrating planting a vineyard and installing a vineyard trellis that are posted on the Viticulture Home Page, for developing videos demonstrating cultural practices, and for obtained photographs and images of various pests and cultural practices. The plantings are also serving as a valuable resource for individual growers to visit to observe the various cultivars and cultural practices.

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	19,397
Plant Germplasm	627	1,534	1,627		
Crop Production and Management	20,009	28,538	2,172	16,377	17,250
Green Industry	4,000	1,640	1,341	1,031	
Improved Grazing Systems	43,868	56,223	56,600	63,018	88,318
Animal Physiology	6,589	9,385	9,842	13,599	18,212
Animal Genetics	92,036	88,147	92,949	88,366	74,676
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	36,456
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	53,739
Animal Waste Management	4,339	20,599	20,758	35,554	12,971
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	66,535
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	38,270
Poultry Production Systems	7,750	10,955	9,706	13,764	7,636
Seed Science	22,555	27,491	20,267	18,979	13,744
Administrative					75,000
Total	489,481	500,523	511,862	521,292	522,204

_____ _____

Director **Date**

Form CSREES-REPT (2/00)

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	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Beef Center	54,243	96,029	127,646	113,420	111,471
IPM/ICM	43,614	171,784	206,151	174,821	164,766
Pork Center		40,310	56,549	79,948	94,736
Consumer Horticulture		62,692	79,705	81,401	60,727
Sustainable Agriculture			23,706	38,960	62,634
Program 101, 104 Strategic Advantage and Ag Financial Management				20,227	24,158
Total	97,857	370,815	493,757	508,776	518,492

_____ _____
Director **Date**

Form CSREES-REPT (2/00)