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 2006
(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:

- 291 Refereed Publications, Research Papers, Manuscripts
- 166 Non-refereed Publications, Reports, Technical Papers
- 284 Proceedings, Published Abstracts
- 93 Extension Publications
- 291 Invited Presentations
- 149 Education Programs, Field Days, Tours (12,905 participants)
- 1909 individual consultations
- 950 Volunteers
- 58 web pages supported
- 29 Books & Chapters
- 16 Patents
- 82 Theses, MS/Ph.D. Programs Completed
- 2 software developed; 4 educational television segments; 4 general audience publications

- ISU participation in the following multistate research projects also contribute to goal 1: NC0007, NC0100, NC0107, NC0140, NC0213, NC1003, NC1004, NC1006, NC1007, NC1008, NC1009, NC1010, NC1119, NC1020, NC1021, NC1023, NC1024, NC1026; NC1131, NC1142, NE1010, NE1016, NE1020, NE1022, NRSP007, NRSP008, S0294, S1007, S1008, S1010, W0173, W1045, W1128, W1168 W1171, W1177 and W1181.

Assessment of accomplishments as measured against POW. The following performance goals were met or exceeded:

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,
- more efficient use of agricultural chemicals,
- yield gains through genetic improvements,
- new products and applications,
- improved quality and consistency of products,
- better understanding and adoption of appropriate risk management practices.

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 $ 12,057,160

SYs 77.9

Key Theme – Adding Value to New and Old Agricultural Products

Program 1: Food Crops

a. Description of activity

Research focuses on:
- Better adapted fruit and vegetable cultivars.
- Greater understanding of basic plant biological processes.
- 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, commercial food crop producers must adopt new cultivars that are more tolerant to abiotic and biotic stresses and develop improved cultural systems that promote sustainability. These producers also need to look at postharvest handling practices to improve crop utilization and product safety.

b. Impact/accomplishment

Advances in the knowledge base:

- With Iowa's rapidly expanding wine grape industry, cultivar testing is needed to identify those plants best adapted to this state's regional growing conditions. This testing identifies cultivars not adapted to the colder regions of Iowa. With vineyard start-up costs of more than $5,600 per acre, grape growers must use the most appropriate plants.

- Different plant spacing and populations of Aphrodite and Eclipse muskmelon were evaluated to determine the effect on fruit size and yield. Results indicated that Aphrodite matured first and should be planted at high plant populations – one plant every 11 inches within the row – for maximum yield while maintaining a desirable fruit size of 6.0 lbs. Eclipse produced its best yield with average fruit size of 5.7 lbs. at one plant every 21 inches. Optimum plant spacing can increase early and total yield of both varieties, increasing gross returns per acre by 50- to 100-percent.

- The residual effect of a new sweet corn herbicide – mesotrione – also was evaluated for potential harm to rotational vegetable crops the following year. Results showed that the label recommendation of 18-month rotational restriction for cucumber, muskmelon, watermelon and green beans must be honored. Growers were informed through field days and reports.

- Genes in potato that affect plant growth were identified. When those genes are over-expressed, tuber formation is enhanced. Controlling the expression of those genes in transgenic lines increases tuber yields and decreases the time of field cultivation.

c. Source of Federal Funds—Hatch

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

Program 29: Value Added Agriculture

a. Description of activity

Agriculture is the most important industry in Iowa. Adding value to agricultural crops will promote economic development. This project has three goals:

- Identify and develop value-added uses for commodities and waste streams in food and industrial applications.

- Improve the quality and safety of commodity and processed products to maintain or increase their value in the marketplace.

- Strive to transfer the technology developed from any successful research efforts to the marketplace to facilitate economic development by providing employment and improving the profitability of Iowa farmers and industry.

b. Impact/accomplishment

The research team developed systems for rapid cytometric detection of Listeria in soy-based foods. The fluorescence in situ hybridization (FISH)-based assays is based on the detection system platform of Advanced Analytical Technologies, Ames, IA (AATI). These assays have attracted attention from industry (food and pharmaceutical companies) and government (US Army) users currently working with AATI's technology.

Research to address consumer demand for fresh-like products with an extended shelf life that are minimally processed and additive free has led to the development of a non-traditional food processing technique referred to as high pressure processing for use on soy-based products and meat. The processing technique increases microbial quality without altering product quality.

Resistant starch and maltodextrins, both forms of valuable dietary fiber for the human diet, were developed from corn. The resistant starch displayed more than 70% enzyme resistance, and the resistant maltodextrins displayed up to 96% enzyme resistance. Human feeding studies showed that consumption of the resistant starch reduced blood glucose and insulin production by about 50% compared with a white bread control. The products will be useful for intervention in the treatment of obesity and diabetes.

A system has been developed to bio-convert corn wet-milling waste water into value-added fungal products. Plastic composite supports (PCS) were used as a natural form of immobilized cells to bio-convert waste water into value-added fungal products that serve as a

natural source of chitin/chitosan and single celled protein for animal feed. The PCS bio-film reactor significantly out performed the conventional suspended-culture continuous-stirred-reactor (CSTR).

Soy products with enhanced nutritional benefits (increased isoflavone content as a natural hormone replacer and cancer preventative) and good taste are being developed. Soy protein isolate extracts were less astringent and had less off-flavor than soy flake and soy germ extracts in water at the same total isoflavone concentration, according to sensory evaluation panelists. The distribution of the isoflavones and other related chemicals (saponin) may be responsible for the flavor differences in the soy matrices.

Chemical modifications of partially hydrogenated soybean oil were carried out to improve the cohesiveness of the material for use in various industrial applications. For example, the modified oil can replace petroleum paraffin in making free-standing candles.

ISU is one of the national leaders in developing soy protein-based adhesives for the wood products industry through the research efforts of the Biocomposites Adhesives Research Team in the Center for Crops Utilization Research Center (CCUR). Research efforts have demonstrated that the enzymes used in the hydrolysis process can influence the reaction of the hydrolysate with the synthetic chemical components in a phenol formaldehyde adhesive formulation. Hydrolysates can be made to react optimally with specific adhesive formulations, allowing the hydrolysate manufacturers to make a variety of hydrolysates for a variety of different adhesive formulations, unlike the conventional chemical process that can only produce one type of hydrolysate.

c. Source of Federal Funds—Hatch

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

Key Theme – Plant Genomics

Program 3: Fundamental Plant Sciences

a. Description of activity

Significant effort and resources are directed to fundamental plant science research. Work focuses on long-term applications in the improvement of crop species and plant agriculture. Research is distributed by several College of Agriculture units, including the departments of Genetics, Development, and Cell Biology (GDCB); Biochemistry; Biophysics and Molecular Biology (BBMB); and Plant Pathology.

Success is best measured in the plant sciences by the number and variety of peer reviewed publications, external competitive grant funding and invited research presentations at leading institutions. Faculty and staff members have been published in many leading plant science journals, including *Plant Cell*, *The Plant Journal*, *Plant Physiology*, *Plant Molecular Biology*, and others. External grant funding is substantial and highlighted by two major grants from the NSF 2010 program for Arabidopsis genome research and two others from the

prestigious NSF Plant Genomics program. Members also hold multiple competitive grants from the USDA and the DOE Energy Biosciences Program.

Graduate student training also is an important activity. Program faculty have participated in several Ph.D. training programs, including Plant Physiology; Biochemistry; Genetics; and Molecular, Cellular, and Developmental Biology. Research efforts have provided postdoctoral scientists to many other research programs thereby contributing to the continued development of fundamental plant sciences and agricultural advancement.

b. Impact/accomplishment

- A goal of crop sciences research is to understand, at the molecular level, the events responsible for the evolution and domestication of crop species. This information may lead to establishing new plant breeds targeted to specific agricultural needs. In studies of the mechanisms that determine floral shoot branching in maize, analysis of mutants that improperly produce many more tassel branches than normal has provided molecular details about the developmental functions that have been selected in maize as it was bred for its agricultural applications. This information has provided new insight into how this important crop species has come to its current state through the processes of evolution and domestication. In turn, the new knowledge will be applied in long-term investigations by agronomists, plant molecular biologists and researchers in other plant science disciplines to develop new cereal crops. One potential application is the domestication and breeding of new grass species to be used as bio-renewable resources, particularly in fuel production.

- An improvement in the nutritional quality of maize starch is needed to combat the rising incidence of obesity in areas with typical modern Western diets. Building on molecular information gained in earlier work and using transgenic means to change the process of starch biosynthesis, attempts to rationally modify the structure of maize kernel starch so it will become a more nutritious food for humans have resulted in a novel starch with a greater population of longer glucose chains. This material is now being tested as a food source in the human diet. It may have the effect of releasing glucose into the blood stream at a slower rate and for a longer period of time than normal starch. There are significant nutritional advantages to this effect to benefit certain diabetic patients and potentially could be useful to help address the strong raise in obesity.

This research will contribute to an increase in the understanding of crop species and our ability to modify them for particular purposes. Via a combination of fundamental research and transfer of that knowledge to the private sector for implementation, we are creating ways to meet emerging needs and solve specific problems in agriculture.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Agricultural Profitability

Program 5: Crop Production and Management Strategies for Iowa

a. Description of activity

- *Identify and solve soybean production problems to improve farmer's economic well-being*. Preliminary research suggests current soybean management plans in Iowa may need to be adjusted. Efforts need to be made to localize recommendations because of Iowa's diverse soil.

- *Improve understanding of the biology and ecology of weeds in the agro-ecosystem*. From 2003-2006, synthetic N fertilizer use was 59 % and 74 % lower in the three-year and four-year systems, respectively. Similarly, herbicide use was reduced 76 % and 82 % in the three-year and four-year systems. Despite those reductions, corn and soybean yields were as high (2003 and 2004) or higher (2005 and 2006) in the LEI systems as in the conventional system. Without subsidy payments, net returns to land and management during 2003-2006 were the highest for the four-year system ($499 ha-1 yr-1), lowest for the three-year system ($420 ha-1 yr-1), and intermediate for the two-year system ($427 ha-1 yr-1). Higher profitability of the four-year system compared with the two-year system derived from a 23 % reduction in production costs. Those results indicate that certain types of diversified LEI systems may contribute to farm profitability while reducing requirements for herbicides and N fertilizer. Experimental and registered herbicides were evaluated for crop phytotoxiciy and weed control in several field studies in 2006. Generally, favorable environmental conditions in 2006 resulted in crop phytotoxicity that was not unusual and good to excellent herbicidal activity on the weeds evaluated. Results from the inbred corn study showed the relative crop safety of the experimental herbicide compared registered herbicides with the same mode of action.

- *Develop technologies to improve yield and genetic purity in hybrid seed production.* A conceptual approach for analyzing maize female flowering responses to genetic and environmental variation in plant growth was developed. This approach is applied to resolve contrasting genotypic behavior under a range of environmental conditions. The model is based on well-established population dynamics and captures intrinsic plant-to-plant variability within maize canopies. Specific genotype parameters were identified that integrate biomass production and partitioning into a framework to describe the flowering response of a particular genotype in a particular environment.

b. Impact/accomplishment

- *Biology of seed development*. Knowledge gained through corn seed frost injury studies has helped Iowa seed companies make science-based business decisions following an early frost in the fall 2003. Frost damage seed lots could be segregated early and millions of dollars in seed sales were protected by early detection of frost injury.

- *Quality and value of agricultural products*. Corn lines selected for high nutritional value in a conventional production system have the same high nutritional value when produced

in an organic or sustainable production system. Organic and sustainable production farmers can transfer breeding selections made in a conventional system directly to their organic production system without loss of nutritional value in the grain.

- *Soybean production*. Enhanced interactions between management systems, pest and pathogens will lead to improved yield stability and profitability. Replant decisions 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 reduce soybean plant population when replanting in the spring. Understanding corn-soybean rotation between cropping sequence, pathogens, tillage system and the environment will enhance the efficiency of crop production while improving protection of soil and water.

- *Weed ecology*. Measurements of weed seed losses to rodent seed predators indicated that an average of 72 % of velvetleaf and 62 % of giant foxtail seeds were consumed from November 2005 until March 2006. Population dynamics models indicate that seed losses of this magnitude strongly contribute to the success of weed suppression in diversified crop rotation systems receiving lower-than-normal doses of herbicides. The results in 2006 supports previous research findings that reliable, environmentally safe and economically sustainable weed control strategies can be achieved. Those strategies are being adopted and implemented by producers planting an ever increasing acreage of genetically modified corn and soybean and specialty trait crops.

- *Modeling kernel formation*. Accurately quantifying developmental relationships between whole plant and reproductive growth has important implications for understanding yield formation in maize. The model developed is a novel approach to evaluate genotype x environment interactions and a framework to evaluate genes regulating flowering dynamics.

- *Meeting industry needs*. A team researcher was contacted by the Iowa subsidiary of a chemical seed treatment company to research unusual seed quality changes of insecticide-treated corn seed. The researcher initiated a study to investigate that request. A mechanism was found to modify existing seed testing protocols to permit assessment of seed quality. This research saved the chemical company and the seed industry millions of dollars in otherwise un-saleable carryover seed by providing means for assessing its quality and thus, the seed's true commercial value.

c. Source of Federal Funds—Hatch

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

Key Theme – Precision Agriculture

Program 6: Precision Agriculture

a. Description of activity

Technological advances and Global Positioning Systems (GPS) have improved precision agriculture. A barrier preventing the full benefit of precision agriculture is an inability to accurately describe spatial and temporal variations.

This research works to eliminate that inability with the development of sensor technologies so that variability can be quantified in crop fields. Research continues on the development of remote sensing technology for detection of soil and plant parameters, including soil moisture, plant population and density, onset of corn pollen production and sensing of crop residue cover. Previous work on real time, ground-based sensors continues, including plant population and soil sensing systems.

In addition, work on intelligent systems for advanced control and autonomous vehicles continue. This includes the use of GPS and digital elevation models for advance control of vehicle operations and precision application equipment for control of agricultural inputs, particularly ammonia fertilizer. Another focus area is the preservation and development of machinery sanitation procedures for prevention of cross contamination of GMO and other crops, particularly during harvest.

b. Impact/accomplishment

Advances in the knowledge base:

- The effectiveness and economic tradeoffs of precision irrigation in Central Iowa has been demonstrated through use of a crop growth models.

- Virtual reality simulation architecture for rapid prototyping of agricultural automatic guidance systems is being deployed across the business units of a major agricultural equipment manufacturer. This has the potential to improve the performance and precision of GPS-guided vehicles.

- A patent has been issued for “Approach and method for reducing anhydrous ammonia application by optimizing distribution” (Patent # 6997400).

- Three training modules were created for USDA-APHIS on equipment sanitation for identity-preserved grain production. Those modules have received a blue ribbon educational award from the American Society of Agricultural and Biological Engineers.

- The patented work on the Impellicone anhydrous ammonia manifold has been licensed to a company that has successfully developed a product for market. This product received the 2006 Rain Bird Engineering Concept of the Year Award from the American Society of Agricultural & Biological Engineers.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Ornamental/Green Agriculture

Program 7: Green Industry

a. Description of activity

Research focuses on the development, selection and maintenance of sustainable and environmentally sound production and management practices. The work deals with green industry plant systems and related services (lawn care, golf courses, athletic fields, sod producers, production nurseries, landscape design, maintenance, installation firms, retail garden centers, arborists, greenhouse crops, etc).

Oregano oil was evaluated as a potential pesticide to control Silvery Thread moss, a major weed problem on creeping bentgrass (Agrostis stolonifera) putting green. Oregano oil treatment resulted in 24-hour burn-down of both moss and bentgrass, with the bentgrass making a full recovery in 5- to 10 days. Quantitative trait loci (QTL) affecting winter survival, as well as forage quality of perennial ryegrass (Lolium perenne), were identified. A regulatory gene for freezing tolerance in plants, CBF (C-repeat Binding Factor), was isolated and characterized for perennial ryegrass. Studies were initiated to determine the causes of summer-induced chlorosis in Kentucky bluegrass turf grown on sand-based media. Work also was begun on evaluating alternative forms of corn gluten meal for inhibition of root growth of seedling grasses and broadleaf weeds. Work also was completed on the spreading characteristics of Roundup ready Kentucky bluegrasses. Plantlets of Indiangrass (Sorghastrum nutans), regenerated from tissue cultures, were grown out during early spring and were transplanted to pots, and then to the field. Of 82 transplants established, no male sterility was observed on any plants. No selections were made in 2006. Inflorescences were harvested from stock plants for another round of selection using a mutagen. Including controls, 96 plantlets were regenerated from recovered cultures and were transferred to greenhouse conditions, in preparation for field-planting and evaluation in 2007. Research was conducted to learn how abiotic and biotic factors impact the natural ecology, invasiveness, rarity and use of several horticultural taxa. Dehardening resistance and rehardening capacity protect plants against frost that may follow unseasonable warm spells during winter or spring. Research showed significant differences in dehardening kinetics and rehardening capacity among azalea species adapted to diverse habitats. Expressed Sequence Tag (EST) study of cold acclimation revealed several low abundance cDNAs with potentially important role in cold acclimation physiology of rhododendrons. Intron-flanking EST-specific markers were evaluated as potential tool to conduct phylogenetic analysis and parentage identification of Rhododendron species and hybrids. Thirty-six two-minute video segments on gardening were developed by ISU Extension and Iowa Gardening Magazine that are televised weekly (from March - October) by six television stations in Iowa. “Gardening in the Zone” columns highlighting the television segments were published by 13 newspapers in Iowa. Video clips were made available for viewing on the Web and via pod-casting and were linked from the Iowa State University Extension main page and Yard and Garden Online page. Research that led to improved methods of landscape plant installation, enhanced awareness of adapted landscape plant species, varieties, cultivars and the discovery of efficient and cost-effective management strategies that sustain landscape plants and reduce their dependence on fertilizers and pesticides was disseminated to green industry

professionals at Iowa Nursery and Landscape Association functions, the Iowa Turfgrass Field Day, Iowa Turfgrass Conference, ISU Shade Tree Short Course, Iowa Arborist Field Day and the Iowa Community Tree Steward Conference.

b. Impact/accomplishment

- Use of Oregano oil offers turf managers an environmentally safe means of removing Silvery Thread moss from putting greens. Spot treatment with this oil reduced moss cover from 90% to 10%.

- Research on perennial ryegrass will lead researchers in developing more winter hardy ryegrass.

- Study of soil testing methods of sand-based media, such as golf greens and sports fields, will likely lead to changes in the way soil tests are conducted. The patent on using corn gluten meal as a natural herbicide continues to be licensed nation-wide, and, to date, has generated more than $1.2 million in royalties.

- Pollen-sterile Indiangrass selections may lead to improved cultivars and utilization of this native grass by people with grass-pollen allergies. Additionally, any useful mutations could lead to wider use of native ornamental grass cultivars.

- Ecological research on woody taxa impacts the potential for commercial use of North American members of the Rhamnaceae. This research also helps to explain the mechanisms of invasiveness of Eurasian members of that plant family and provide information on factors responsible for the rarity in nature of selected species of genera Alnus and Dirca.

- Work on azalea will help breeders to select dehardening resistant and rehardening competent germplasm for developing winter-hardy cultivars. Cold acclimation research in rhododendron highlights the importance of also investigating low abundance ESTs for identifying stress-related genes. Use of intron-flanking EST markers offers a novel molecular tool for phylogenetic and parentage analyses.

- Gardening in the Zone has 100% coverage of the state and also reaches viewers in southwestern Wisconsin, northwest Illinois, eastern Nebraska and northern Missouri. In 2006, the “Gardening in the Zone” segments reached approximately 153,000 viewers each week, i.e., 5,355,000 gross impressions during the 36-week season. The innovative use of pod-casting for this project was highlighted in seminars by The Ohio State University and the University of Minnesota as an excellent example of innovative Extension programming at the 2006 American Society for Horticultural Science national meeting.

c. 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

a. 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.

b. Impact/accomplishment

Advances in the knowledge base:

- It has been a quest for nearly a century, and finally 'Cell Secretion,' the universal and most fundamental of cellular processes, has been unraveled. The critical breakthrough came with the discovery of the 'porosome,' the universal secretory machinery at the cell plasma membrane. Combined studies using atomic force microscopy (AFM) and transmission electron microscopy (TEM) clearly demonstrated no change in the total number of secretory vesicles following secretion in GH cells. The research showed that fusion pores or porosomes in porcine GH-secreting cells are cone-shaped structures at the plasma membrane and that secretory vesicles dock and fuse at porosomes to release vesicular contents. Immunogold labeled TEM was used to determine the total number of secretory vesicles in resting and in GH-stimulated porcine pituitary cells. Resting GH cells contained more than twice as many filled vesicles than did the stimulated ones. Immunogold labeling further revealed localization of GH only in electron dense vesicles in both resting and stimulated cells. These results are consistent with a mechanism that, after stimulation of secretion, vesicles transiently dock and fuse at the fusion pore to release vesicular contents. Growth hormone (GH) is critically involved in growth, reproduction and lactation that increase production efficiencies in livestock species and impact human health. Stimulation of GH secretion from pituitary cells clearly required transient fusion of secretory vesicles at the cell plasma membrane and expulsion of vesicular contents, without a change in the total number of secretory vesicles. Our article "Growth Hormone Secretion: Molecular and Cellular Mechanisms and In Vivo Approaches" on Google™ search [growth hormone secretion] ranked No. 5 out of 1,300,000 hits (2/14/2007), and is one of the 50 most-frequently read articles for 32 months in Experimental Biology and Medicine.

- Work with a leading veterinary pharmaceutical company has studied the drinking behaviors of nursery pigs in regards to the correct administration of a vaccine to combat the occurrence of Enterisol® Ileitis FF that has been estimated to cost the swine industry $98 million a year. According to recent on farm results, producers need to administer Enterisol® Ileitis for a four- to six-hour period to ensure that 100% of all the nursery pigs have ample opportunity to visit the drinker for at least a five second drinking bout. Work with the second largest pig producer in the U.S. has been comparing a new loading gantry system for the finisher swine. The reason for this focus is that pig mortalities from the

farm to the harvest facility have been estimated to cost the U.S. swine industry more than $55 million annually. Antibiotic use in livestock feed is being debated. Pigs without antibiotics consumed their feed quicker. Respiration rates and rectal temperatures were not different. Pigs without antibiotics had better ADG. Pigs with antibiotics consumed more feed per day but there were no differences in feed efficiency. In conclusion, by adding 50% more fat to a nursery pig diet, it may be possible to remove sub-therapeutic antibiotics without adversely affecting pig behavior, physiology or performance.

- Analyzed the immune response in young and aged mice vaccinated with corn-derived antigen against Escherichia coli heat-labile enterotoxin. Low dose exposure and immunogenicity of transgenic maize expressing Escherichia coli heat-labile toxin B subunit also was determined.

- Research focuses on swine and beef production in bedded systems. Swine systems are of interest to producers because the facility cost is roughly one third of more conventional housing systems. Beef producers are interested because bedded systems would limit the need for runoff control structures. The objective is to evaluate the productivity, environmental impact, economics and management considerations of swine and beef raised in a bedded system in order to provide producers with information necessary to make decisions on production system.

- Manipulating skeletal muscle growth to improve the efficiency of meat production and the quality of the product requires an understanding of the fundamental mechanisms that regulate embryonic muscle development. Researchers have previously demonstrated that ADP-ribosylation, a covalent protein modification, functions in regulation of skeletal muscle differentiation in vitro. The work now has characterized the embryonic expression of the enzymes that are responsible for ADP-ribosylation and removal of the ADP-ribose from proteins in an animal model, providing additional evidence for the function of this important regulatory mechanism in muscle growth and development.

- The researchers developed a line of mice with reduced expression of the transcription factor, PPARgamma. These animals will sever as a model to study the regulation of gene of expression in the ovary by PPARgamma. Because PPARgamma is activated by dietary factors and their metabolites, understanding how it impacts ovarian gene expression will elucidate how diet and metabolic status can influence female fertility. The studies of gene regulation in the ovary and the impact of dietary and metabolic factors on ovarian biology may lead to improved diet formulation and/or management programs to enhance fertility in dairy and beef cows.

- Significant progress has been made in determining the nature of the specific protein-protein interactions involved in establishing and maintaining the structural integrity within muscle cells. This knowledge base should ultimately lead to the availability of higher quality meat in human diets.

- Overall objective is to improve the cellular efficiency of energy utilization in food producing animals and to evaluate the role of oxidative stress on the efficiency of feed utilization in pigs. The researchers monitor expression of genes and cell signaling

molecules involved in the processes of cellular oxidative stress in animals expressing low and high efficiency of feed utilization. These animals systemic expression of oxidized lipid biomarkers and metabolomic profiles also will be monitored.

- The incidence of mastitis is 50% in the dry or non-lactating period and shortly after calving. A major paper and five invited (one international) presentations were delivered on this topic. Also, ISU extension received two more patents on an external teat sealant (non-antibiotic) for prevention of mastitis during this period. Estimates show 18% of herds in North America is using an external sealant and 22% are using an internal sealant (40% combined). Research indicates a 20% decrease in overall mastitis (40% of dry period mastitis) resulting in reducing mastitis losses by $216 million in herds implementing this technology. In heifers, research shows > 50% of heifers calving with mammary infection or mastitis. Also, a field study was conducted evaluating treatment of heifers prior to calving. Results showed a significant reduction in mastitis in heifers at calving and resulted in ~ 600 lb more milk production in first lactation or $15,600 increased farm income for the trial herd. (200 heifers @ 600 lb milk @ 0.13/lb milk).

- Researchers quantify the impact of stocking density and group size on behavior, bioenergetics and thermoregulation of laying hens kept in cages. Work also assesses space requirements of laying hens via motivation test. Evaluation preference of laying hens between gaseous and thermal environments also was studied. Environmentally controlled indirect animal calorimeters are used to measure the metabolic rate of laying hens. The hens will be kept under different stocking densities and group sizes at thermoneutral to heat challenge conditions. Core body temperature of the hens will be continuously measured using a telemetric system.

- Research is focused on enhancing embryonic survival and reproductive efficiency in domestic mammalian livestock species by 1) determining efficacy of gonadotropin releasing hormone (GnRH) to control the time of ovulation in mares and to monitor via daily transrectal ultrasound and assessment of serum LH levels, 2) determining reasons for lower cryosurvival in preimplantation embryos produced in vivo in Jersey dairy cattle and well as embryos produced in vitro A variety of vitrification protocols will be evaluated for their ability to attain adequate pre-cryopreservation dehydration and post-thaw survival.

c. 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

a. Description of activity

This program seeks 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.

b. Impact/accomplishment

Advances in the knowledge base:

- Colicins, a type of bacteriocins that are protein-based antimicrobials, were effective against multiple strains of pathogenic E. coli as well as Listeria monocytogenes on meat surfaces.

- A single nucleotide polymorphism in the thioesterase domain of fatty acid syntase is associated with myristic acid content of beef indicating that genetic selection might be used to improve healthfulness of beef.

- Compared with continuous stocking with full stream access, restricting stream access of summer grazing fall-calving cows to a stabilized stream crossing or to rotational stocking reduced the percentage of bare ground and increased stability of stream banks as well as increased forage mass within 34 m of the stream.

- Cows in pastures grazed by continuous stocking with restricted stream access or rotational stocking spent less time within 34 m of the stream.

- 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 and improved health and reproductive performance.

- The efficiency of feed utilization and body growth of young pigs were negatively associated with oxidative stress in the body, whereas accretion of body fat was positively associated with level of oxidative stress.

- The research and outreach related to alternative swine production (feeds and housing) formed the basis of the niche pork market in the United States. Currently there are 35 niche pork markets in Iowa – the largest group has 400 producers.

- Feeding cattle mixtures of corn distillers solubles with chopped corn stover while on pasture or in the feedlot to replace alfalfa hay or corn silage provide cattle producers an option of utilizing alternative feeds with potential savings in feed cost.

- Replacing corn in a corn-based diet for steers with 25 or 47% modified wet distillers grains did not affect performance or carcass measurements.

- Economic analysis indicated that DGS in excess of 40% of dry matter should not be fed when price is equal to or greater than corn on a dry basis, but high levels of DGS when priced at 75% or less of corn can be fed at all prices of corn ranging from $2.50 to $4.00/bu.

- Up to 10% of the diet as crude glycerol can be fed to 21 d-old pigs without effects on growth or performance and crude glycerol can be a source of energy for growing and finishing pigs.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Animal Genomics

Program 10: Genetic Enhancement of Agriculturally Important Animals

a. Description of activity

Research is being done to identify and characterize the genetic control of important production, quality and health and welfare traits of domesticated animals. The work also examines the development and evaluation of methods for statistical analysis and utilization of phenotypic, molecular and genomic data in genetic improvement of livestock, and on transfer of research results to stakeholders. Emphasis is on traits related to product quality, disease and production efficiency in dairy and beef cattle, poultry and swine, and on companion animals. Research ranges 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 genetics of diseases in companion animals. The latter, along with research on model animal species such as mouse and rat, also are used for comparative purposes and as models for 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 focus on transfer of research results by assisting stakeholders, including producer organizations, individual producers and genetics companies with design and implementation of genetic systems that will enhance genetic progress for important traits.

b. Impact/accomplishment

- *Sow longevity*. Several genes and genetic markers affecting sow longevity were identified, which account for improvements that are worth several million dollars. It was also found that leg conformation at 100 kg can be used to improve sow longevity and a series of three posters and a pocket guide were developed to help pork producers select replacement females with proper feet and legs that was distributed to 26,000 people.

- *Software development*. Meat quality is important in pork production but genetic selection requires data to be collected on live animals. Software was developed for ultrasound measurement of intramuscular fat on live animals in conjunction with a private company. The software enables the industry to select for increased pork quality. Three training and education sessions were held to assist users in implementation. The software is now used by the two leading breeding companies in the U.S. and in three foreign countries. In addition, two genes were discovered that affect meat quality, which should also be worth millions in retail sales value.

- *Feed efficiency*. With increasing demands on land and crops for biofuel production, improvements in feed efficiency is essential. To identify the genetic basis of feed efficiency, selection for residual feed intake has increased feed efficiency in a selection line by 7 percent and multiple genes were identified whose expression differs between pigs with high- and low-efficiency and when subjected to restricted feeding.

- *Micro-array gene expression technology*. This is the simultaneous analysis of the expression of thousands of genes in a tissue to investigate genetic mechanisms controlling traits. A pig gene expression database is being developed and was used to demonstrate that data from different technology platforms can be integrated, which allows efficient combining of array data to best use such data for genetic improvement. Methods are being applied to investigate gene expression profiles during embryo implantation in the Yorkshire and Meishan pig breeds. In dairy cattle, sire selection is an effective means to minimize life-threatening events and to optimize health and well-being.

- *Metabolic stress*. Declining health and fertility are becoming critical concerns to the dairy industry. One potential contributor to these problems is a lack of energy reserves to support those physiological processes, which leads to metabolic stress. Genes that are differentially expressed in adipose tissue of cows with high- versus low-genetic merit for milk yield were identified. In addition, dystocia and perinatal mortality were identified as genetically correlated events.

- *Bovine Pink Eye prevention.* Bovine infectious keratoconjunctivitis (pink eye) is important to beef production from both an economical and animal welfare stand point. Corneal scaring on a single eye was found to result in a loss of 26 lbs of weaning weight, which is valued at $72 million per year. A data collection strategy and genetic evaluation methods were developed that will allow producers to begin to select for cattle that are more resistant to pinkeye infection.

- *Food safety, especially with Salmonella*. Salmonella enteritis (SE) is a food-safety pathogen that can infect chickens, hatching and table eggs, and poultry products. Differential expression of genes between infected and non-infected birds demonstrated that different biochemical/cellular pathways (metabolic, apoptotic and immune defense) are utilized in distinct genetic lines in response to infection. These results may lead to development of rational vaccine strategies and genetic selection of breeding stock to help reduce bacterial disease and contamination of poultry products.

- *Bacteria resistance in chickens*. Gallinacins are naturally-produced antimicrobial peptides. Thirteen genes in the Gallinacin cluster were analyzed for associations with SE colonization in the gut and spleen of infected chickens, in F8 advanced intercross lines. Two recombination breakpoints were identified within the gene cluster and one region was found to be associated with bacterial colonization level, which demonstrates that Gallinacin gene variation may be used to genetically select chickens that are innately more resistant to bacteria.

- *Genetic selection of chickens*. Stringent genetic selection of broiler chickens for growth is thought to negatively impact immune response, in particular because most genetic selection takes place in high-hygiene environments, while the offspring must perform well over a range of environmental conditions. Associations of single-nucleotide polymorphisms (SNP) in 15 genes (myostatin, plus 14 immune-related genes) were studied, in collaboration with industry and university partners, in three broiler breeder lines raised under both high-hygiene or commercial hygiene conditions. Results demonstrated that many of those genes were associated with typical broiler production performance (survival, growth, support organs and yield), but that the effects were often specific to the genetic line and environment. This information informs breeders which gene effects are environment- and/or line-specific, thereby aiding the accuracy and efficiency of commercial selection programs.

- *Genetic traits in dogs*. Research with genetic markers in the dog has revealed that a single gene is responsible for some spotting in several dog breeds. This will help breeders who discourage acceptance of all white dogs in some breeds and may help lead to causes of deafness in some breeds. Canine and feline models of human genetic diseases are increasingly being used to evaluate rare but serious and sometimes fatal genetic diseases in humans.

- *Gene therapy research*. In addition to the two canine colonies in existence at ISU (MPS I, and MPS IIIB), we also have begun work on gene therapy treated canine leukocyte adhesion disorder dogs, and have acquired breeding stock for canine factor VII deficiency, and canine von Willebrand disease, two rare bleeding disorders. We also continue breeding studies in a feline colony of congenital glaucoma, and feline congenital hypothyroidism, which are leading causes of blindness and retardation. To develop therapies for some of these disorders, we have begun collaboration with the Pasteur Institute in Paris on Gene Therapy for canine MPS IIIB.

- *QTL*. Statistical designs and methods that allow more cost-effective study of genes for economic traits through selective transcriptional profiling and pooling were developed, as were methods for analysis and use of high-density SNP methods for QTL detection and for genomic selection with additive and non-additive models. A Bayesian statistical method to detect dramatic selection events, e.g. domestication, was developed also and shown to outperform other existing methods.

The study of genetic traits to identify desirable attributes in domesticated animals introduces new and innovative tools, including computer software, to be utilized to raise livestock with leaner meat, less susceptibility to diseases and viruses and more adaptability to changing environments. Use by both academic and private industry researchers and producers will provide a solid base for identifying and promoting the genetic traits specific to individual breeds and markets.

c. Source of Federal Funds—Hatch

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

Key Theme – Agricultural Competitiveness

Program 13: International Economic Competitiveness

a. Description of activity

Researchers developed economic models to analyze a variety of economics issues related to the competitiveness and efficiency of the U.S. agricultural sector. The main areas or topics addressed were animal disease and food safety, beginning farmers, cooperatives in agriculture, information sharing in food processing, labor use and wages in the pork production industry, the market for bio-fuels, niche markets for pork, potential bias in cattle grading, technical barriers to international trade and value-added agriculture.

b. Impact/accomplishment

- *Animal Disease and Food Safety*. Researchers have developed a framework for understanding the role of incentives in determining the levels of endemic diseases afflicting animal agriculture and, in particular, are investigating how incentives at the farm level affect food safety measures in pork production throughout the system. They are also developing ways to characterize, measure, and prevent farm-to-farm spillovers in infectious animal disease.

  Researchers have also developed a model to show ways in which extension and other forms of communication can reduce infectious disease outbreak risks. They have also completed a study on how scientific information should affect food production and processing activity regulations.

- *Beginning Farmers*. Faculty and staff worked with a large number of beginning, returning, and retiring farmers to facilitate the transfer of agricultural assets to individuals with the skills, education, and drive to be successful in producing and distributing agricultural products. ISU personnel provided workshops, materials, and hands-on training to individuals and groups with the goal of maintaining the profitability and competitiveness of U.S. farmers.

- *Cooperatives in Agriculture*. Researchers found that bargaining cooperatives frequently make demand and price information available in a way that benefits final consumers. This potential benefit may ease concerns about the anticompetitive distortions that may be caused allowing bargaining cooperatives to exercise market power by their control of supply.

  Researchers found that the internal incentives often created within a cooperative may improve their access to credit markets and may help explain their relative success in obtaining loans when privately owned firms are driven out of the same market. This may be very relevant as cooperatives, partnerships and corporations compete in the bioeconomy. From a social welfare standpoint, these issues are important as some types of cooperative may be better able to provide services that would otherwise not be provided by investor-owned firms.

Researchers analyzing the incentive structures of many cooperative found that managers are not always given individual incentives that are consistent with the best interests of cooperative members. These researchers suggest a "code of good practices" for the governance of farmer cooperatives that would make them more efficient and help promote their competitiveness.

- *Information Sharing in Food Processing*. Researchers developed a conceptual model showing that information sharing in processing always increases expected grower and consumer welfare. This work along with other work on cooperatives indicates the need for more appropriate use of cooperatives by entrepreneurs and wiser use of legislation by governments when seeking to foster a more efficient food production system.

- *Labor Use and Wages in the Pork Production Industry*. Pork producers have indicated that one of the biggest problems they face is finding and retaining employees. As operations change the need for labor and more specialized labor expands. Information on wage rates, benefits, incentive plans, and industry trends is needed. To address this need, pig producer and employee surveys were conducted in 1990, 1995, 2000, and 2005. These surveys show that wages in the pig production industry are increasing and becoming more competitive with other industries. This has helped attract employees to the industry and retain employees. Education, gender, and experience were key factors that affected wage rates. Results of this work have been featured in special issues of National Hog Farmer magazine as well as via a live web cast. This information is important to producers who supply about 30 million pigs annually to Iowa slaughter plants.

- *Market for Bio-Fuels*. Researchers developed a model of the market for gasoline, gasoline additives and gasoline substitutes specifically to analyze the market for ethanol. This market has a variety of regulations related to clean air and the use of additives, explicit subsidies for ethanol and other renewable fuels, and import restrictions. The model develops an indicator of competitive position, the cost difference between ethanol imports from Brazil and domestic production in the United States under ideal conditions without tariffs in the ethanol market. The model shows that biomass fuel could replace 20% of current gasoline usage without major land conversion and about 45% of current usage with land conversion. Results of this study have been made available via professional papers, on the web, and via web casts.

- *Niche Markets for Pork*. Work was conducted with niche pork producers and marketers. For one organization the pork product pricing and premiums paid were evaluated and information provided on potential adjustments in payments received by producers.

  A product inventory tracking, pricing, and payment program was developed for another organization. This program allows tracking of product to distributors and back to pig producers. Product prices can also be tracked.

  A report was prepared which compares and contrasts the two pork niche organizations that produce and market natural pork products. The report focused on structural organization and adjustments that were made over time.

Both pork niche production and marketing organizations implemented some of the recommendations suggested. The natural pork product tracking, pricing and payment program has been implemented and is currently used.

c. Source of Federal Funds—Hatch

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

Key Theme – Risk Management

Program 14: Agricultural Risk Management

a. Description of activity

Several areas or topics were studied: crop, livestock and revenue insurance, price basis, ethanol margins, and risks facing the biofuels industry.

b. Impact/accomplishment

- *Insurance*:
  - Livestock Gross Margin (LGM): LGM insurance was expanded to cattle in 17 states and to hogs in 16 states, in addition to Iowa (the original state to have LGM). Also, researchers developed LGM for dairy cattle and submitted the proposal to the Federal Crop Insurance Board of Directors for review.
  - Risk Management Agency (RMA): Rating methods were created to determine premium rates for the new, all-inclusive, crop insurance product to be rolled out in 2008. This product has optional coverage options for revenue insurance, revenue insurance with a harvest price option and yield-only insurance. The methods allow crop insurance companies to calculate rates consistent with existing rules
  - Group Risk Income Protection (GRIP) and Revenue Assurance (RA): Two revenue insurance products developed by the researchers – Group Risk Income Protection (GRIP) and Revenue Assurance (RA) – had combined sales in 2006 of approximately $1.9 billion in premiums. Premiums for GRIP more than doubled from 2005 levels to $436 million. A study specifically compared offering GRIP through the crop insurance program or offering GRIP a commodity program through the farm bill. Results indicate that taxpayer costs could be reduced by giving farmers a GRIP policy rather than subsidizing its delivery through the crop insurance program. If such a change were made, crop insurance premiums could fall by more than 50 percent.

- *Price Basis and Ethanol Margins*: Two new Web-based tools were added to the Center for Agricultural and Rural Development site.
  - Price Basis: Basis maps for Iowa corn and soybean prices are updated daily. Producers and buyers now can estimate current basis and compare those figures to historical data. Maps show both current and new-crop basis.
  - Ethanol Margins: The other tool shows current and projected ethanol margins. The degree to which ethanol plants cover costs determines the incentive for investing in new facilities and the ability of current plants to stay in business are calculating much easier now.

- *Risk Factors Facing the Ethanol Industry*: Expansion of U.S. biofuels production in the short- and medium-term depends on expansion of corn-based ethanol production. A study to understand the source of financial risks that could cause expansion of corn-based ethanol to stall was conducted. On the cost side is the price of corn. The report showed that the long-run price of corn will eventually rise to a level that will cut off any incentive to expand ethanol production, but not before aggregate ethanol production makes a significant contribution to the nation's fuel supply. This conclusion rests on the assumption that the price of crude oil remains at $60 per barrel. Because expansion of the corn-ethanol industry will be the driver of corn prices, a drop in the price of crude oil will result in a drop in the break-even price of corn and the amount of ethanol that U.S. industry will produce. This study has been downloaded more than 5,000 times.

c. Source of Federal Funds—Hatch

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

Key Theme – Organic Agriculture

Program 20: Sustainable/Organic Agriculture

a. Description of activity

Sustainable fruit, vegetable, grain and turf-grass production systems continued to be developed for Iowa conditions in 2005-2006. Effective pest management practices and new cultivars are necessary. Research focused on organically-approved spray treatments for codling moth in organic apples, with a multi-pronged approach of mating disruption and a spinosad-based natural insecticide performing best. Beneficial insect populations may be affected by spray treatments and need to be monitored. Screen cages were effective in reducing aster yellows in third-year organic Echinacea herb production by reducing potato leafhopper [Empoasca fabae (Harris)] colonization and MLO transmission.

Interest in commercial grape plantings, including organic grapes, continues to increase. The identification of grape cultivars adapted for Iowa winters and humid summer conditions allows growers to avoid significant losses. A grape cultivar by management system trial comparing straw mulch to herbicides for weed control was established at two sites representing different climatic and soil conditions in 2002. Lower pruning weights and cordon establishment were associated with the use of the straw mulch at the colder site, but not at the warmer site. At the warmer site, vines with a straw mulch had lower yields and smaller clusters than vines treated with herbicides.

Work continues on corn gluten meal as a natural herbicide. The meal is marketed as both a natural weed control and nitrogen source. The researchers also licensed the sprayable corn gluten hydrolysate to Environmental Factor Inc., Ontario, Canada, and are in the process of developing a sprayable weed control and nitrogen source.

Also, organic crops fertilized with compost produced similar yields to conventional crops. Where organic corn followed alfalfa, yields improved. Soil health parameters, including organic carbon pools and microbial biomass, remained high in organic systems, even under

multiple tillage operations. A new organic No-Till system was tested in 2006 for organic tomatoes, corn and soybean crops. Organic tomato yields were outstanding but corn and soybean yields were reduced due to drought and competition with the cover crop.

b. Impact/accomplishment

Farmers avoiding petroleum-based fertilizers and pesticides in growing organic crops will result in input cost savings of $300/acre. Environmental benefits include reduced nitrate leaching from the use of compost in place of highly mobile synthetic nitrogen. Revenue that can be generated from medicinal herbs can be up to $1000/acre, compared to $540/acre for conventional corn. In addition, the patent on the corn gluten meal material has brought in more than $1,200,000 in royalties to ISU.

c. Source of Federal Funds—Hatch

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

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:

- 23 Refereed Publications, Research Papers, Manuscripts
- 22 Non-refereed Publications, Reports, Technical Papers
- 39 Proceedings, Published Abstracts
- 17 Extension Publications
- 25 Invited Presentations
- 301 individual consultations
- 65 Volunteers
- 4 web pages supported
- 7 books, chapters
- 2 theses, MS, PhD completed

- ISU participation in the following multistate research projects also contribute to goal 2: NC0100, NC1024, NE1009, S0295 and W1045.

Assessment of accomplishments as measured against POW. The following performance goals were met or exceeded:

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,
- greater public understanding of the principles of food safety and quality, and
- greater understanding of chemical, physical, and biological hazards to food safety.

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	$ 819,522
SYs	3.5

Key Themes – Food Safety and Food Quality

Program 16: Improving the Quality and Safety of Muscle Foods

a. Description of activity

Fresh pork quality. The contribution of lipid (determined chemically) and pH to fresh pork loin tenderness, chewiness and juiciness was determined. The results suggest that high pH product (above pH 5.8) is superior to lower pH product with regard to sensory quality, texture and cook loss. In general, at high pH, greater lipid content does not improve sensory tenderness, chewiness, juiciness or star probe values. At low pH (below pH 5.5), pork is of inferior quality in virtually every category. At low pH, greater lipid content does not improve sensory quality.

Postmortem muscle biochemistry and quality. The rate of pH decline in muscle directly impacts inactivation of calpain proteinases. Our laboratory also has demonstrated that oxidizing conditions inhibit calpain activity. The results demonstrate that pH decline and protein oxidation is heretofore undefined sources of variation in postmortem proteolysis and associated development of meat water holding capacity and tenderness. The work completed in 2006 provides convincing evidence to support the hypothesis that degradation of specific proteins is critical for development of water holding capacity.

Meat Protein Functionality-Quality Effects. Texture of meat products is dependent on the gelation characteristics of myofibrillar protein. Work in the laboratory has documented that lower pH (5.6, 6.0, 6.5, and 7.0) significantly alters gelation properties of myofibrillar protein in solution. The results of the current work document that myofibrillar protein from different muscle types respond differently to pH. Muscle protein profile variation due to different muscle fiber types may contribute to the response. Regardless of muscle type or pH, gel firmness after cooling is primarily dependent on the gel properties determined during heating.

Poultry Product Quality. Dietary supplementation of 200 IU/kg vitamin E, 0.3 mg/kg selenium (Se), and 2.5 % conjugated linoleic acids (CLA) was shown to improve the performance of growing turkey. Dietary supplementation of vitamin E+Se, vitamin E+CLA, vitamin E+Se+CLA improved the storage stability of raw turkey breast. Also, dietary supplementations of vitamin E, Se, CLA, and their combinations improved the quality defects caused by irradiation. These results indicated that dietary supplementation of vitamin E, selenium, CLA and their combinations can be used as a tool to improve quality of irradiated meat.

Starting with liquid egg yolk, optimal conditions for continuous separation of immunoglobulin, lipids, phospholipids and yolk proteins have been determined. The phospholipids and neutral lipids produced were relatively high in purity. Some of the separated egg yolk components are already commercialized. Producing functional ingredients from the separated components will further increase the value of egg and diversify the use of egg and egg products.

Product Safety. Research on safety improvements for meat products included practical strategies for control of food-borne pathogens through use of irradiation, antimicrobial ingredients, high pressure processing and modified atmosphere packaging. Combining these treatments with packaging systems has been shown to provide a greater barrier to pathogens. This project also examined the effects of acid adaptation on the thermal tolerance of Escherichia coli O157:H7 and Salmonella enterica. The results showed that acid adaptation may enhance the thermal tolerance of both pathogens but the effect is dependent on storage temperature and time. This project also determined the presence of antibiotic resistant bacteria on hog carcasses from both conventional herds and herds that had not been treated with antibiotics. In general, higher populations of antimicrobial resistant bacteria were isolated from carcasses from herds that had not been treated with antimicrobials. A Beef Irradiation Education Manual was developed for a user-friendly Web site, http://www.ageds.iastate.edu/meat, to teach students and consumers about the benefits of irradiation for food safety. Additional topics introduced on the site include: Understanding bacteria, the food chain, increasing the safety and shelf life of food, the economic impact of beef irradiation and the study of food borne disease outbreaks. A food irradiation flash animation that demonstrated how irradiation works was included with a quiz testing the user's understand of food irradiation.

b. Impact/accomplishment

The work has addressed practical research questions regarding how the timing of specific processes influences color, tenderness and water-holding capacity of pork large commercial plants (total production approximately 900 million pounds of pork per year) have utilized results from these studies to reduce processing times and improve chilling of pork carcasses.

Improved separation methods for egg components are providing new opportunities for the egg industry. Separation of several components of egg yolks and egg whites allows these components to be developed as separate functional ingredients for uses in other products. This increases the value and diversifies the use of eggs and egg products.

Eight-hundred-and-ninety-nine people participated in HACCP training, processed meat short courses and West Liberty Foods food safety training. These training programs have impacted consumer food safety by improving quality and safety of ready-to-eat meat products.

c. Source of Federal Funds—Hatch

d. 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:

- 11 Refereed Publications, Research Papers, Manuscripts
- 4 Non-refereed Publications, Reports, Technical Papers
- 22 Proceedings, Published Abstracts
- 13 Invited Presentations
- 4 Education Programs
- 20 Individual consultations
- 3 Books/Chapters
- 9 Thesis, MS/PhD Programs Completed

- ISU participation in the following multistate research projects also contribute to goal 3: NC0100, NC0170, NC0219, NC1025.

Assessment of accomplishments as measured against POW. The following performance goals were met or exceeded:

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	$ 768,668
SYs	6.4

Key Theme – Human Nutrition

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

a. Description of activity

For understanding the health benefits of food, Bifidobacteria strains showed no difference in their viability in milk during refrigerated storage and could hydrolyze lactose in the milk. This indicates it is possible to produce a fluid milk product containing adequate levels of Bifidobacteria to provide health benefits.

For understanding nutrients and disease, the use of dextran sodium sulfate administered with azoxymethane (AOM) to induce colon tumorigenesis in female CD-1 mice has been evaluated. Tumors were present in 100% of the animals within 12 weeks of AOM injection.

It also was found that mice fed soy isoflavones had lower expression of COX-2 in the colon compared to mice fed a control diet. This correlates with lower colon tumor expression with isoflavone intake and therefore may provide a biochemical role for isoflavones in the colon.

Additional cancer studies used alfalfa that was genetically modified to accumulate resveratrol, a known cancer preventative compound. Early, pre-cancer lesions were inhibited when an enzyme was added to the diet to increase the bioavailability of the resveratrol.

Projects directed at understanding the health benefits of soy in postmenopausal women has demonstrated that soy protein with native phytate significantly reduced circulating levels of homocysteine, transferrin saturation, and ferritin, whereas soy protein with native isoflavones had no effect. Those results suggest that phytate-rich foods may protect postmenopausal women from cardiovascular disease by reducing homocysteine and excess body iron.

Obesity-related studies have shown that the inflammatory response to palmitate is alleviated by adiponectin in cultured adipocytes, as is apparent in the suppression of NFkB translocation to the nucleus. Furthermore, it was established that adiponectin receptors are down-regulated in adipocytes treated with IL-6, a major pro-inflammatory cytokine, and that lipoxygenase products facilitate this response.

Studies targeting nutrition and diabetes have found that a type 1 diabetic condition results in the aberrant expression of key proteins involved in the regulation of methyl group and phospholipid metabolism, processes that when perturbed are associated with cardiovascular disease and cancer development. Moreover, optimal folate status appears to attenuate those changes.

For nutrient metabolism and bioavailability studies, a candidate fecal microbe has been identified that is associated with slow gut transit time (GTT) in humans. Because slow GTT combined with rapid in vitro fecal isoflavone degradation rate limited apparent isoflavone uptake, this fecal bacterial species may be a biomarker for individuals who would be less likely to benefit from isoflavones or require greater doses.

In other studies, it has been determined that substituting soy milk for cow’s milk has a detrimental effect on some indicators of vitamin B-6 status.

Lastly, a human metabolic study to determine a retinol activity equivalence value for carotenoids from high beta-carotene maize has been completed.

b. Impact/accomplishment

- When hamsters were fed soy protein, only those that statistically clustered as high absorbers of isoflavones experienced cholesterol lowering by the soy protein. This demonstrates that stable differences in absorption of isoflavones profoundly affect the health consequences of these compounds and might well obscure such effects if not controlled for. The bioavailability-based approach taken to studying isoflavone efficacy in this study may help to resolve the controversy over cholesterol-lowering components in soybeans.

- Diabetes is a chronic disease that is rapidly becoming a national health crisis. A number of complications are associated with diabetes, including cardiovascular disease and cancer development. Research has shown that disruption of specific metabolic processes may be a significant contributing factor to those complications. Thus, subsequent work has identified dietary supplement strategies that will be of benefit to diabetics by minimizing some of the adverse complications associated with the disease.

- Assistance has been provided to a food company to help refine their nutrition labeling information.

c. 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:

- 108 Refereed Publications, Research Papers, Manuscripts
- 88 Non-refereed Publications, Reports, Technical Papers
- 102 Proceedings, Published Abstracts
- 43 Extension Publications
- 170 Invited Presentations
- 456 Education Programs, Field Days, Tours (19,230 participants)
- 1915 individual consultations
- 2315 volunteers trained
- 6 Books & Chapters
- 150 Web Sites, Multi-Media
- 20 Theses, MS/PhD Programs completed
- 1 international conference; 1 U.S. conference

- ISU participation in the following multistate research projects also contribute to goal 4: NC0100, NC0205, NC0218, NC1005, NC1012, NC1017, NC1119, NE1021, NRSP004, S1000, S1004, S1025, W1082, W1133, W0170, W0187, and W188.

Assessment of accomplishments as measured against POW. The following performance goals were met or exceeded:

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,
- adoption of better manure management practices, and
- 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 $ 2,411,343

SYs 22.0

Key Theme – Soil Quality

Program 21: Sustainable and Environmentally Safe Management of Soil Resources

a. Description of activity

Research focuses on:
- Management of crop nutrients in soils.
- Function of microorganisms and their products in soils
- Assessment and sustainable management of soil resources.
- Transport and fate of chemicals in soils.

b. Impact/accomplishment

- *Soil erosion*. The erosion rate remains unacceptable across Iowa. However, the average citizen has little knowledge of neither how severe that erosion is nor any way of obtaining such information. Through a combination of three technologies – NEXRAD radar, WEPP erosion prediction model and the National Resources Inventory – a daily erosion estimate is made for each township in Iowa. Those estimates are made available for the public via the Internet. This information should help identify the primary targets for remediation (cost targeting), potential water-quality problem areas based on water runoff and erosion losses, and soil loss graphically for public education on the loss of topsoil.

- *The Iowa Learning Farm Project*. The Iowa Learning Farm Project was established in 2004. This project is a partnership between Extension and several state and federal agencies. The project looks to increase the adoption of conservation systems to improve water quality. Research, education and Extension activities are used. During 2006, this program reached thousands of farmers and citizens. Several producers' farms are used as a demonstration sites for conservation practices. The development of a mobile rain simulator to show the value of conservation systems for protecting water quality was a big success during field days and water festivals across Iowa, where the majority of the audience indicated they learned about conservation systems and water quality.

- *Mycorrhizae and soybeans*. Mycorrhizae are beneficial fungal-plant associations that help plants assimilate nutrients and water. Research shows that fungi differed in their associations with specific soybean cultivars and five of the 12 fungal field isolates were rated as aggressive because they represented a large proportion of the spore populations in soils after grown with soybeans. Tailoring specific cultivars of soybean to specific fungi could lead to reduced P applications for soybean production.

- *Measuring chemical transport properties of field soils*. Researchers developed and field tested a dripper-time domain reflectometry technique for determining chemical transport properties of surface soil. Chemical transport properties were measured for different soil management zones in tillage plots. Management zones included no-till non-trafficked, no-till trafficked, chisel plow non-trafficked and chisel plow trafficked. The chemical transport properties measured were immobile water fraction, mass exchange coefficient, average pore-water velocity, mobile dispersion coefficient and dispersivity. All five properties showed significant differences among management treatments. Mass exchange and mobile dispersion coefficients were similar according to tillage, while mean pore water velocities were similar according to traffic. The immobile water fraction was largest for the no-till, non-trafficked zone. Those results represent one of very few reports for field measurement of chemical transport properties and the first test of this approach for comparison of chemical transport properties across management zones.

c. Source of Federal Funds—Hatch

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

Key Theme – Integrated Pest Management

Program 22: Integrated Pest Management

a. Description of activity

The development of quantitative, temporal and spatial epidemiological methods and models that integrate GPS and GIS technologies 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 pathogens that threaten U.S. (and Iowa) agriculture was researched. Also, the development of sampling, detection and remote sensing diagnostic tools (coupled with GPS and GIS technologies) to provide: (1) An early warning system for threatening plant pathogens, and (2) Sampling and statistical tools for post-introduction forensics.

Satellite image processing and analyses techniques have been developed that can detect, monitor and quantify the impact of Asian soybean rust disease intensity. The analysis of multiple satellite images obtained over time from Argentina, Brazil and South Africa has enabled researchers to differentiate Asian soybean rust from other plant diseases based upon temporal and spatial signatures extracted from specific wavelength bands that are unique to Asian soybean rust.

The laboratory group has shown that the Iowa State Model that program researchers developed to forecast (pre-plant) the risk of Stewart's disease of corn is considerably more

accurate than previous models (Steven's, Steven's-Boewe). Moreover, the research has successfully predicted the seasonal and county-level risk for Stewart's disease in Iowa since 1999.

Research is underway to identify risks associated with feeding co-products of ethanol production to livestock, particularly due to mycotoxins.

Soybean research: 1) Improved disease management strategies to minimize losses due to Phytophthora root rot of soybeans are being evaluated. Studies include evaluation of pathogen diversity, fungicide treatments, and screening for novel resistance. 2) Research is focused on control of disease caused by the soybean viruses soybean mosaic and bean pod mottle. Approaches include insect vector management, identification of field resistance/tolerance, molecular biological approaches to identify genes involved in disease resistance, and digital methods of assessing bean leaf beetle injury in soybean. 3) Soybean cyst nematode (SCN)-resistant soybean cultivars were evaluated in field experiments to assess the agronomic performance of the cultivars as well as their effect on population densities of the nematode. 4) A new research project involving Iowa State University and the University of Illinois was initiated to determine how SCN and soybean aphid (SBA), Aphis glycines, interact. 5) Field microplot and growth chamber experiments were conducted to study the interaction between SCN and the soil-borne, vascular, fungal pathogen Cadophora gregata, the causal agent of brown stem rot (BSR) of soybean.

Ecology of western bean cutworm research focuses on inter-specific competition of ear feeding Lepidoptera in maize, flight potential of adults, pheromone trapping techniques, and pathogen infection rates of adults across the Midwest.

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 studies, replant decision studies, soil fertility studies, inoculum studies, and hail injury studies.

The northern corn rootworm has overcome crop rotation through the selection of a variant that has a 2-year lifecycle and the western has adapted to crop rotation by laying eggs in soybeans. 29 rotated fields of corn were monitored during 2006 for the presence of rotation-resistant corn rootworms.

b. Impact/accomplishment

- The project has provided new technologies that are being used to detect and monitor Asian soybean rust epidemics in other soybean-producing countries, as well as the southern U.S.

- The GIS disease risk maps for Stewart's disease of corn provided pre-plant risk information that allows seed corn companies and their producers to select planting sites with a low risk for Stewart's disease. This forecasting model also alerts where (and for which growing seasons) the risk for Stewart's disease is high, thereby giving seed corn producers advanced warning for the need of insecticide seed treatment and foliar insecticide sprays to reduce disease risk.

- The Iowa Soybean Disease Survey Project has provided quantitative disease intensity data for 10 foliar diseases, nine stem diseases and two virus diseases of soybean for the 2005 and 2006 growing seasons. Quantitative data and disease risk maps are currently being used by the Iowa Soybean Association to prioritize future soybean disease management research, as well as by extension specialists and farmers (via the Iowa Soybean Disease Survey Web site (www.soybeandiseasesurvey.info) to obtain seasonal and county-level disease risk information that alerts growers of soybean diseases that will require disease management. The soybean disease with the highest disease prevalence (among soybean fields) and disease incidence (within soybean fields) in 2006 was bean pod mottle virus. In a yield loss study, BPMV-infected samples infected at the R1 (reproductive) growth stage had a 27.3% reduction in soybean yield in 2006 (Robertson and Nutter).

Overall, the research has saved producers and seed companies money, time and loss of economic vitality by accurately predicting certain risk factors for some soybean diseases while also providing a solid base for future research on early detection of the emerging problem of Asian soybean rust in this country.

- Nine new races (pathotypes) of P. sojae were identified and multiple pathotypes were recovered from single fields. It was found that 47% of the isolates are able to defeat the Rps1-k gene which is currently the most commonly used Phytophthora resistance gene in commercial soybean varieties.

- Soybean virus disease has been an increasing problem for producers. For the first time, field tolerance to virus disease has been discovered. This will allow industry to reduce loss in yield and reduction in grain quality caused by disease.

- Unbiased and comprehensive information on the utility of soybean cyst nematode (SCN)-resistant soybean cultivars for long-term and economically sustainable soybean production in SCN-infested fields were widely publicized in the agricultural media and provided Iowa soybean growers and agribusiness personnel with critical information.

- Replant decisions for soybeans are being improved. Seed and chemical costs account for a large part of the soybean production costs. New herbicide technologies allow farmers to reduce soybean plant population when replanting in the spring.

- Growers have been surveyed to determine how well they have received recommendations regarding the need to scout fields and apply insecticide when aphid populations reach an economic threshold. Over 70% of surveyed growers report employing this threshold. As a result, foliage-applied insecticide use has decreased and growers have reduced input cost while preventing 10-40% yield reductions when soybean aphid outbreaks occur. Therefore, research that developed the current recommendation has resulted in millions of dollars saved within Iowa alone.

- Corn root worm research led to the recommendation that growers scout soybean fields for adult western corn rootworms using the sticky traps and, if the numbers exceed the

economic threshold, corn planted the following year be protected from rootworm larval feeding.

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

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

Key Theme – Agricultural Waste Management

Program 23: Animal Waste Management

a. Description of activity

This research program seeks to:

- Maintain and increase the value of animal agriculture while maintaining quality soil, water and air by improving animal waste management.
- Develop and identify manure management systems that are environmentally sustainable, economically feasible and socially acceptable.
- Focus on surface and groundwater protection issues.
- Study and seek solutions for gaseous emissions and odors.

b. Impact/accomplishment

- *Drainage water quality*. Animal manure is often used as a replacement for commercial fertilizers, improving the economic return for producers. However, manure, when applied similarly to commercial products, experiences the same nitrate-nitrogen loss. Information summarizing the impacts of manure application prior to corn and soybeans has been provided to state and regional agency personnel and stakeholders.
- *Strategy for disposing of carcasses in the event of disease or agro-terrorism*. Work to comprehensively demonstrate and scientifically document the feasibility, environmental impacts and bio-security of composting large numbers of carcasses has lead to a proven plan to retain and inactivate viruses, such as Newcastle Disease and avian encephalomyelitis.
- *Development of baseline emission information for U.S. animal feeding operations*. Results continue to be disseminated to the egg and broiler industry, allied industries as well as academic communities. Information was presented in local, regional, national and international education workshops, professional meetings and technical publications.
- *Evaluation of ammonia emissions from laying hen manure*. These studies provide management strategies to reduce air emissions from production facilities and data for development and/or validation of process-based models used to assess the impact of production condition on air emissions. Results have been shared with the stakeholders through educational workshops and publications.

- *Potential solutions to air quality issues for swine producers*. Workshops teaching the basic science of air quality included case studies examining siting implications and mitigation techniques that include bio-filters, vegetative environmental buffers and diet manipulation. Attendees were from NRCS, Iowa DNR and swine producers. Producers who filled out the post-meeting survey produced 87,000 finishing pigs per year and had 35,000 sows. Self-evaluations of those meetings showed participants benefited the most from the siting, vegetative environmental buffers and bio-filters sessions. Participants said the monetary benefit ranging from $1,000 to $10,000 per year.

- *Concentration and extraction of phosphorous from swine manure*. Struvite can be used to extract phosphorous from swine manure slurries. A bench scale phosphorous precipitation and recovery system was developed and tested for use in reducing and recycling phosphorous from swine wastes. The bench system can remove up to 98% of the soluble phosphorus concentration. A pilot scale unit has been designed and will be constructed and tested during 2007.

This research is expanding the knowledge base of animal waste management on all levels. Through creative partnering with the private sector and policymakers, the work is introducing new ways to increase producer incomes while balancing concerns for the environment and water quality. The work also is pioneering innovative concepts for bio-security and containment of viruses and diseases.

c. 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

a. Description of activity

A flow path analysis for Iowa has been partially completed and review is ongoing. Data on fish kills and Iowa Department of Natural Resources fish community sampling was requested and is included in the GIS analysis. Laboratory testing of manure effects on neutrophil function also is ongoing.

Nearly 400 rock riprap grade control structures (GCS) recently were placed in streams in western Iowa to reduce stream bank erosion, protect bridge infrastructure and shield farmland. In this region, streambeds have silt and sand substrates and normally support low macro-invertebrate abundance and diversity. GCS riprap provides critical habitat for benthic macro-invertebrates. Macro-invertebrate abundance and diversity were greatest at sites with coarse substrates (cobble/boulder), including GCS sites and one natural riffle site. Densities of several macro-invertebrates responded positively to increased substrate particle and were abundant on GCS riprap.

The presence of GCS in streams of western Iowa is pervasive, with nearly every low order stream containing at least one in-stream structure. To sustain fish populations, management efforts should focus on constructing or modifying GCS to allow fish passage.

Poor water quality in lakes and reservoirs is a serious concern throughout the Midwest. This work investigates the relationships between water quality and fish population dynamics in lakes and reservoirs. Results of this work show that catch rates, condition and size structure of common carp, black bullhead and bluegill are positively related to nutrient concentrations (e.g., total phosphorus, total nitrogen) and inversely related to water clarity. An opposite responses was observed for largemouth bass.

The Iowa Rivers Information System (IRIS) is a tool for both professionals and the public to obtain information about rivers and streams in Iowa. It also shows the diversity of natural resources they support. Maps, data and research are available through IRIS, as well as related links. Most of the information is geo-referenced for mapping and analysis in IRIS or for download and import to GIS software.

To be successful at producing an advanced fingerling walleye or yellow perch, pond-run fish have to be habituated to commercial feed. The success of the habituation process depends on many variables – light source, light duration, temperature, feed, stocking density and size. Among those variables, diet contrast/visibility may be the most important. Walleye in the clear treatment had higher survival than the turbid treatment. Yellow perch exhibited the opposite survival results. These results demonstrate that the addition of clay may enhance the contrast of the feed and thus improve the habituation process.

b. Impact/accomplishment

From fishery biologists seeking information to evaluate a stream's potential as a smallmouth bass fishery, to the water quality analyst searching for clues to explain differences in stream nutrients and biological integrity, to the science teacher helping students learn about flowing water ecosystems, IRIS is an important and versatile tool. The Web interfaces IRIS to anyone with Internet access. Users can view and customize maps, query or download databases or, from external sites, view or download reports and publications, or link to other sites. The URL is: http://maps.gis.iastate.edu/iris/

Next, researchers will develop tools that allow managers to evaluate water quality using fishery information. In addition, nutrient criteria in Iowa lakes and reservoirs will be studied.

The Iowa Department of Natural Resources is developing nutrient standards for their lakes and reservoirs. This research is being used to help identify nutrient concentrations that result in high quality sport fisheries.

GCS are necessary to stabilize bridges and stream banks in southwest Iowa. To date, there is little information available to evaluate impacts of GCS on populations and communities of aquatic organisms. GCS can enhance macro-invertebrate abundance and diversity, resulting in additional food resources to fish.

Wetlands are often constructed to filter pollutants from surface water, but biological factors influencing their effectiveness in pollutant-sequestration are not well understood. By generating statistical relationships among biological and non-biological wetland components, improved wetland knowledge will be gained.

This work is leading to new techniques and improved communication tools for all users to better understand the complex mechanisms between fishing habitats and water quality while also providing needed research data and positioning information for further study of Iowa's lakes, streams and rivers.

c. Source of Federal Funds—Hatch

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

Key Theme – Weather and Climate

Program 25: Interaction of Biosystems with Weather and Climate

a. Description of activity

Increased climate variability has contributed to large year-to-year variations of crop production throughout the Midwest in the last two decades. In comparison, the Fifties through the Seventies was a relatively "benign" period with little fluctuations. A concern is that natural or human-induced climate changes, as suggested by observations and global climate models, could have marked impact on crop production. There is a particular need to address climatological trend interpretation and climate change at regional scales, especially warm season rainfall, which is of great importance to agricultural interests. Because of the interconnection of the global climate system and the global agricultural economy, it also is important to understand climate variability in other regions of the world that may affect markets and agricultural competitors.

b. Impact/accomplishment

Our research on flow fields in and around agricultural shelterbelts led to a commissioned paper entitled "Protective Functions of Coastal Forests and Trees Against Wind and Salt Spray" at the Workshop on Coastal Protection in the Aftermath of the Indian Ocean Tsunami: What Role for Forests and Trees?, United Nations Food and Agricultural Organization (Rome), Khao Lak, Thailand, Aug. 28-31 2006. Workshop report will be used by Southeast Asian countries, particularly those nations bordering the Indian Ocean for coastal reforestation in the aftermath of the devastating 2004 tsunami.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Natural Resources Management

Program 26: Improving Environmental Quality in a Changing Landscape

a. Description of activity

This work brings together diverse research capabilities to study how large-scale environmental changes – such as changes in the landscape of agro-ecosystems, global warming or energy development – impact on natural processes that influence the distribution, abundance and diversity of animal and plant species. Research also looked at the possible linking of physical and ecological parameters of water quality in agricultural landscapes. Adopting environmentally-friendly farming practices can be costly and the research provides estimates of benefits as well as cost-effective ways to guide water quality improvements.

New research was begun into the role that naturally-occurring seed predators – such as mice and insects – play in affecting weed populations under various agricultural tillage practices. Another new effort was initiated on the potential value of using ecological principles to design integrated use of fire and grazing management for livestock production and wildlife diversity benefits in southern Iowa.

The integrated project looks to increase the understanding of ecological mechanisms that may impact environmental change on biodiversity. The research has practical links to the economic forces that shape large-scale environmental trends such as changes in landscape composition and climate change. Spatial statistical tools are essential to quantifying the ecological processes. Nationally prominent and local ecosystems, including the Rocky Mountains, the Great Plains, the Southeast, the Gulf Coast, and most prominently, the Corn Belt of Iowa are studied. Additional funding was from the USDA NRI, NRCS, USFS, USGS, NPS, USFWS, USEPA, IADNR, and IADOT.

b. Impact/accomplishment

- The modeling system that captures the complex interactions between economic decisions, land use, conservation practices and water quality is sufficiently detailed that it can be used to evaluate alternative practices and their placement on the landscape. For the watersheds covering the majority of Iowa, annual costs of practices range from $303 to $321 million and predicted benefits of sediment, total phosphorus, and total nitrogen reductions range from 6%-65%, 28%-59%, and 6%-20%, respectively. These projections are valuable to decision-making regarding meeting state and federal water quality regulations.

- Lake water quality is of immense importance to the quality of life in Iowa. This year, the team collaborated to estimate the non-market value of Iowa waters using contingent value and revealed preference analyses. This work was viewed as being instrumental to the Iowa Legislature in justifying a new $50 million lake water quality restoration program.

- Studies of insects, birds and mammals within landscapes may reveal that the landscape composition and configuration have substantial influence on the ecological processes.

However, it is often difficult to quantify the mechanisms by which these effects are manifested. Using data on nesting birds and predators, we have developed spatially-explicit statistical tools that enable detailed prediction of the interactions (http://www.eeob.iastate.edu/faculty/ClarkW/html/predator.html.) The approach is general enough that it could be used to understand many ecological processes (nest success, crop pest invasions, loss of biodiversity) at many spatial scales (within fields or across landscapes).

c. Source of Federal Funds—Hatch

d. 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:

- 42 Refereed Publications, Research Papers, Manuscripts
- 25 Non-refereed Publications, Reports, Technical Papers
- 10 Proceedings, Published Abstracts
- 16 Extension Publications
- 76 Invited Presentations
- 33 Education Programs, Field Days, Tours (844 participants)
- 145 individual consultations
- 177 volunteers trained
- 106 web pages supported
- 7 Books & Chapters
- 1 Internet discussion group established
- 20 Theses, MS/PhD Programs Completed

- ISU participation in the following multistate research projects also contribute to goal 5: NC0100, NC1001, NC1011, NC1014, NC1016, NC1100, NE0167, and NE1011.

Assessment of accomplishments as measured against POW. The following performance goals were met or exceeded:

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,
- improved cooperation between the university, state and federal agencies, industries and communities to transfer technology that will lead to industrial growth and rural development [also see value added program under goal 1], and

- enhanced education of decision-makers at local, regional, and state levels; those initiating development projects; and those setting policies.

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 $ 1,530,546

SYs 13.7

Key Theme – Impact of Change on Rural Communities

Program 27: Rural Development

a. Description of activity

This program develops 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 informs on 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 rural communities, relationships between rural and urban sectors and the bio-economy. Topics studied include assessing the image of agriculture and the quality of health and rural life among rural residents; evaluating environmental issues; training rural leaders; educating rural residents through outreach; considering the increased diversity in the rural population and job market; educating future scientists while also sharing research ideas and results with the general public; and examining potential implications of policies related to rural areas.

b. Impact/accomplishment

- The Business Networks and Rural Community Economic Development project studies small business networks using institutional theory and social capital theoretical frameworks to explain network formation and member behavior. When compared to other business networks, effective networks had a newsletter, higher status members, and interaction among members. In partnership with collaborators, four new business networks were created: A Hispanic business network in a small Iowa town, an entrepreneurship network in a small Iowa town, an Iowa state-wide network of agricultural producers for alternative markets, and a retail store owner network in Nebraska small towns.

- The Southeast Iowa Targeted Industry Assessment resulted in a comprehensive report on the development potential of that region. This research provided sets of industrial assessments heretofore not conducted in Iowa and demonstrated how those assessments could be used to focus industrial recruitment efforts. The research has been extensively used in support of marketing grants, area economic development planning, and as n

recruitment tool. The research also was used in obtaining a marketing grant from the Iowa Department of Economic Development.

c. Source of Federal Funds—Hatch

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

Program 30: Quality of Life

a. Description

Work focuses on sustaining and enhancing rural quality of life by investing in community and social services and support to families and individuals. The investments that the program's research has analyzed respond to challenges from rural population aging and employment needs, changing family structure and the devolution of social service policy and support responsibility to the community level. Specific efforts during the past (and final)year of the project have focused on research to address risk and resiliency for rural aging, food security for low-income rural populations and evaluation of child care quality and accessibility.

b. Impact/accomplishment

- *Child Care Study*: The results of a four-state child care study were presented to several local, state, regional and national organizations. The work provided the impetus for Iowa legislation creating a child care quality rating system. Several child care consultants received training for early childhood programs to enhance early care for rural areas and children with disabilities. Several Iowa family child care providers completed the process to obtain ratings from the Iowa Quality Rating System (QRS).

- *Iowa County Level Poverty and Food Security Profiles*: Profiles were prepared for the entire state (see www.extension.iastate.edu/hunger). A group of workshops were presented to several hundred professionals and policy makers and implications of food insecurity for families and communities were distributed by newsletter to 6,000 church leaders and shared in workshops for poverty simulations with 360 community leaders.

- *Rural Aging Risks*: Project investigators cooperated with the Iowa Consortium on Aging Programs for a conference on rural aging risks at the University of Iowa School of Public Health for several gerontology and geriatric professionals from Iowa and Kentucky. A Web site was developed to provide Iowa county-specific quality of life indicators for rural elderly populations in collaboration with the Iowa Department of Elder Affairs. Class leaders were trained to provide the Powerful Tools for Caregivers curriculum to assist families of elderly Iowans requiring long-term care. Research project findings concerning nutrition and exercise deficits in rural elderly populations were incorporated as course content for the Great Plains Interactive Distance Education Alliance M.S. degree program in gerontology.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

1862 Extension

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

Overview

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

- 77 Refereed Publications, Research Papers, Manuscripts
- 87 Non-refereed Publications, Reports, Technical Papers
- 49 Proceedings, Published Abstracts
- 116 Extension Publications
- 572 Invited Presentations
- 1,421 Education Programs, Field Days, Tours (89,420 participants)
- 55,598 one-on-one consultations
- 1,465 volunteers trained
- 7,089 web pages supported
- 4 Books and chapters
- 2 Patent
- 7 Theses, MS/PhD Programs Completed
- 4 newsletters
- 15 powerpoint presentations developed

Assessment of accomplishments as measured against 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

Each Annie's Project site has a unique approach to covering five risk areas. Subject priority and speaker suggestions are provided by a local committee. Annie's Project is a six-session, 18 contact hour program with up to 12 different speakers. Annie's Project participants are evaluated by a standard risk awareness document. Evaluation shows that financial and market risk awareness levels are enhanced more than the human resource, production or legal

risk awareness levels. Confidence to work with agricultural professionals is enhanced by the selection of local female agricultural professionals as the primary speaker core. Decision-making skills increase with group discussion of specific management decisions. Local networks are built or strengthened as participants share a program designed to meet their unique needs as a female farm decision maker. Iowa State University Extension provides centralized support services for the program.

b. Impact/accomplishment

From October through September, 273 Iowa women participated in Annie's Project at 13 sites. The project is designed to empower farm women to be better business partners via networks and by managing and organizing critical information. In the reporting period, 1,091 women in 10 states participated in Annie's Project.

Annie's Project is building a business foundation that allows women to become stronger partners or owners of farms and other agricultural endeavors. It also builds self-confidence and a support network of both peers and women involved in other ag business sectors. The result has been improved incomes and efficiency among participants.

c. Source of Federal Funds—Smith-Lever

d. Scope of impact—State Specific and Multi-State KY, IA, IL, IN, MN, MO, NE, ND, OH, WI

Key Theme – Plant Production Efficiency

Program 103: Crop Nutrient Management

a. 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. Using manure, for example, will help Iowa producers optimize systems for comprehensive farm planning and maintain long-term economic viability and environmental stewardship.

b. Impact/accomplishment

- *Iowa Manure Matters-Odor and Nutrient Management Newsletter*. Manure management and related concerns, such as soil and water quality and odor management, are important to Iowa crop and livestock producers, their technical advisors, agency staff, researchers, agribusinesses, local government officials and veterinarians. It is imperative that information regarding these topics be available to assist in management decisions based on sound science and economic data as well as to help meet the ever-changing and complex regulatory requirements. The objective of the Iowa Manure Matters-Odor and

Nutrient Management Newsletter is to provide timely educational articles relating to those issues. The newsletter is published quarterly and distributed by direct mail to 6,015 subscribers. The newsletter also is available on-line with an average of 5,100 visitors monthly. Based on a survey to evaluate the impact of the newsletter, 44 percent of respondents replied the newsletter improved their ability to make management decisions and 74 percent of respondents said the newsletter contained information that was not available to them elsewhere. Readers said that newsletter information prompted 13 percent to change their odor management practices; 22 percent to change their manure application rate; four percent to implement regulatory requirements; and 17 percent to substitute manure for commercial fertilizer.

- *Manure Applicator Certification Program Evaluation*. ISU is designated to provide the educational portion of the manure confinement and commercial applicator certification programs required by state law. In 2006, 2,145 confinement site applicators participated in the educational program. Of this number, 1,295 returned program evaluations indicated that:
  - 60 percent reported they have already developed and implemented a manure sampling plan, whereas 25 percent reported they plan to develop one in the next 12 months.
  - 40 percent reported they developed and implemented a feed management plan to address manure nutrient levels and air quality concerns and 23 percent reported they plan to adopt a feed management plan.
  - 16 percent reported they have developed and implemented other best management practices, such as bio-filters to address air quality concerns and 20 percent reported that they plan to adopt those strategies.

- In 2006, 1,400 commercial applicators participated in an educational program. Of this number, 670 returned program evaluations that indicated:
  - 57 percent reported they have analyzed their hauling and pumping charges based on distances and services while 16 percent planned to adopt those practices.
  - 51 percent reported they have worked with employees to address health issues concerning manure application while 25 percent planned to address this issue.
  - 50 percent reported they have adjusted application rates based on soil infiltration capacity and 20 percent plan to adopt this practice.

- *Regional Nitrogen Rate Guidelines for Corn*. Coordination of nutrient guidelines on a regional basis is becoming more important with government conservation and nutrient management programs now crossing state boundaries. Providing research-based information on nitrogen fertilization rate for corn production helps crop advisers and producers make input decisions. A regional approach to nitrogen rate guidelines was developed in cooperation with land-grant university soil fertility research and extension personnel from seven states in the U.S. Corn Belt. An extension publication, “Concepts and Rationale for Regional N Rate Guidelines”, and an on-line web-based tool “Corn Nitrogen Rate Calculator,” was produced from the regional effort for use by agribusiness professionals, certified crop advisers, state agency personnel and producers. The regional approach allows uniformity of nitrogen guideline development across the Corn Belt, but tailors rate guidelines to specific state situations based on local research information.

Since development of the web-based calculator, there have been 17,660 visits to the site and 75,510 page views.

- *RUSLE2 an Iowa Phosphorus Index Workshops*. Producers, agronomists and technical service providers generally are not trained on use of the USDA-NRCS Revised Universal Soil Loss Equation (RUSLE2) and important soil conservation principles related to the Iowa P-Index. Several workshops on use of RUSLE2 and the Iowa P-index were provided in collaboration with Iowa-NRCS, with a total of many participants from Iowa, Illinois, Minnesota, Nebraska, Kansas and Canada. The majority of participants were consultants and service providers. Workshop evaluations indicated participants managed approximately 1.39 million acres and worked with 2,490 clients on an annual basis. They also reported developing more than 1,690 nutrient management plans annually. Participants indicated an average gain of $400 per client or $0.71 per acre as a result of the workshop participation.

- Web sites supporting multiple programs in the plan of work:
  - Compendium of Research Reports on Use of Non-Traditional Materials for Crop Production Web Site (http://extension.agron.iastate.edu/compendium/index.aspx).
  - Iowa Manure Management Action Group (http://extension.agron.iastate.edu/immag/).
  - Iowa Manure Matters-Odor and Nutrient Management Newsletter (http://www.extension.iastate.edu/Pages/communications/EPC/).
  - Corn Nitrogen Rate Calculator (http://extension.agron.iastate.edu/soilfertility/nrate.aspx).
  - Soil Fertility (http://extension.agron.iastate.edu/soilfertility/).

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

a. Description of activity

About 60 percent of Iowa farmland is operated by tenants. Successful tenant-landlord relationships require careful planning, good communication and current information. Recent increases in corn and soybean prices have created a great deal of uncertainty about appropriate cash rental rates. ISU provides information on: rental rates and terms, legal issues, alternatives types of leases and methods for determining rental rates to owners, tenants and agribusiness persons. Delivery methods include group meetings, individual consultations, educational bulletins, mass media articles and interviews, Internet fact sheets and electronic spreadsheets

b. Impact/accomplishment

Forty-nine percent of landowners and tenants who attended ISU Extension farm leasing seminars reported that they were likely or very likely to make a change in their leasing agreement in the next 12 months. The most common changes identified were

Increase rents	24%
Recalculate or renegotiate rental rates	21%
Change from a crop share to a cash rent	13%
Other general rent changes	10%
Rent land out	10%
Have a written lease	4%

The increase in knowledge about farm leasing arrangements by participants in the farm leasing programs was strong. A summary of responses from participants showed the following:

Area of knowledge	Weighted average before*	Weighted average after*
Trends in farmland values	3.31	4.19
Trends in farmland leasing	3.03	4.13
Determining a fair cash rent	2.95	4.12
Legal issues related to leasing	3.09	3.99
Resources available from ISUE	3.14	4.27

*Level of knowledge was self-rated on a 5-point scale, with 1 = poor and 5 = excellent.

The number of acres owned, operated or managed by program participants was estimated to be 208,205. If the benefits of the program are estimated conservatively at $10 per acre, total benefits come to more than $2 million per year.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Program 106: Commercial Greens Industry

a. Description of activity

The production, marketing, installation and maintenance of horticultural and forestry crops creates jobs for Iowans. Examples include, timber, fruit, nut, herb, flower and vegetable producers; lawn care companies; golf courses; school and professional sport athletic fields; corporate grounds care; turf-grass sod producers; production wholesale nurseries; landscape design and installation firms; retail garden centers; landscape maintenance companies; arborists; greenhouse crop producers; retail florists; and Christmas tree growers. Other important clients include public utilities; city, county and state public lands; and private woodland owners.

The work focuses on three important issues for performance goals:

- Increasing the quality and percentage of marketable crop per acre and increasing profitability of businesses without harming the environment.

- Improving and enhancing the quality of life for Iowans using horticultural and forestry crops.

- Insuring the safety of commercial horticulture workers and all users of the cultivated and managed landscapes they design, build and maintain.

The Commercial Greens Industry group is a multi-disciplinary group of scientists and Extension professionals dedicated to solving problems.

b. Impact/accomplishment

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

    - A high tunnel workshop and field day was June 21, 2006, at the ISU Armstrong Research and Demonstration Farm near Lewis. Participants learned about the maintenance and management of high-value horticulture crops growing in the field compared to the same crops inside a high tunnel. Participants toured the newly constructed high tunnel planted with tomatoes, blackberries, red raspberries and other crops. Participants had an "All-Iowa" dinner featuring produce grown on the farm. More than 50 percent of the participants indicated that their base-line knowledge was low (avg. 2.9) ranging from 1-9 (on a 1-10 scale; 1 = little knowledge to 10 = very knowledgeable). The Knowledge gained from the information presented was assessed at 6.0 (avg.) and ranged from 3 - 10. The most frequently reported score for initial knowledge was 1.0 (mode) while the change in behavior expressed as knowledge gained was 6.0 (mode). This data suggests that participants' behavior was modified by the information presented. Forty percent of the participants indicated that they are considering commercial horticulture production. Economic benefit was estimated based on attendees' response to questions about technology adoption and on predicted net income from high tunnel enterprises. The multiplier effect of products supplies, and services purchased and sold locally was not included in this computation. The estimated economic benefit of is $95,000.

- *Performance Goal 2.*

    - In 2006, 36 two-minute video segments on gardening were developed by Iowa State University Extension and Iowa Gardening Magazine. Those "Gardening in the Zone" segments aired weekly March to October. The work disseminates timely information to the consumer and commercial horticulture gardening public via multiple outlets (live television airing, pod-casting and online viewing through the Iowa State University Extension main page and Yard and Garden Online page). In 2006, the segments reached more than 153,000 viewers each week, which are 5,355,000 gross impressions over the 36-week season.

- *Performance Goal 3*

    - Safety training programs were developed and presented to Iowa landscape workers in cooperation with OSHA. The result is a more educated and aware horticulture workforce which reduces both stress and injuries.

c. Source of funding—Smith-Lever

d. Scope of impact—State specific and Integrated Research Extension

Key Theme – Animal Production Efficiency

Program 107: Iowa Beef Center

a. Description of activity

The Iowa Beef Center's 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. The center delivers statewide conferences, published materials, local meetings, one-on-one consultations and a dynamic user-friendly Web site. 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 across Iowa to identify the priority areas.

b. Impact/accomplishment

- *Risk Management for Beef Cow-Calf Producers*: In response to a need for producer financial and marketing education, a grant was written and funded by the USDA Risk Management Agency. A curriculum was developed for beef cow-calf producers focused on production, financial and marketing risk management. It was delivered via two-day workshop or a five-part correspondence course and it was later converted to Web-based delivery. When we spoke to participants after the programs, we found that there was greater understanding of the production, marketing and financial risk management principles. More than 90 percent of respondents are confident that they understand forage production and grazing system management and that they can manage risk in their grazing systems. Eighty-four percent of respondents agreed that because of these education activities they know why it is important to have a marketing plan. More than 80 percent of the respondents had a better understanding of financial risk management. Of those interviewed, 86 percent agreed or strongly agreed with the statement that they had benefited from participating in the program. Eighty-eight percent are interested in participating in a similar program in the future and 90 percent would recommend this program to other producers.

- *Growing Iowa Feedlot Industry*: Iowa is the leading ethanol producing state and the state with the fastest growing ethanol production sector. The co-product from ethanol production – distillers' grains and solubles (DGS) – is a feedstuff that is high in protein, energy and fiber and can be advantageous for beef feedlot rations. As a result, producers

are eager to learn new strategies for feeding DGS and are interested in growing their business to take advantage of the expanding ethanol sector.

A conference on growing Iowa's cattle feeding industry was held June 5, 2006, and was attended by several hundred people, including producers and economic development leaders. Participants learned about the technical aspects of feeding DGS and facility design, Iowa's competitive position, developing business plans and alternative businesses models for farm growth. More than 90 percent of those attending found the information useful or very useful and two-thirds anticipated making changes to their cattle feeding operation. In addition to this event, feedlot cash flow model and business plan templates were developed to assist producers in planning expansion and a feedlot design manual was updated. Hundreds of producers have attended meetings and subscribed to a newsletter to learn more about feeding DGS.

A conference, "Managing Quality Holsteins Steers," to address the specific nutritional, facility, management and marketing needs of the Holstein steer was held in November 2–3, 2006. It was the first of its type since 1991 and drew a national audience of agricultural professional. A fourth printing of the 400-page proceedings has been done along with a CD version of the proceedings. A major objective of the Holstein steer conference was to train the trainer. This objective was successfully met as industry professionals and extension personnel accounted for approximately 75 percent of the attendees.

- *Environmental Protection*: Cattle producers are facing increased regulations and expectations of their impact on water quality. Rules and regulations regarding feedlot design and nutrient management are changing and many producers want to expand their operations due to recent profits and to capture the advantages of available distillers' grains and solubles. The Iowa Beef Center has an active and diverse program on environmental management for feedlot and cow-calf operations.

  Research on stream crossing and riparian management is underway at an ISU research farm and the work as received funding for on-farm research with southern Iowa beef cowherds. The Iowa Beef Center has held field days at the research farm and is helping to find willing participants for the on-farm research and will conduct educational field days at these farms.

  The Iowa Beef Center worked with Iowa Department of Natural Resources, NRCS, Iowa Cattlemens Association, and Iowa Department of Agriculture and Land Stewardship to develop and hold four feedlot workshops on environmental management, regulations, and resources attended by 410 people. The Iowa Beef Center also partnered with these organizations and the Iowa Renewable Fuels Association to hold train-the-trainer programs on feed and nutrient management when using DGS in the diet. The impact of these efforts is that beef producers are more aware of what regulations apply to their operation and where to find resources (advice, cost share, service) to help them in planning and implementation. Many producers are in the permitting and/or construction process to make improvements to protect water quality.

- *Feeder Cattle Marketing Opportunities*: A significant number of Iowa beef producers sell their calves at or shortly after weaning. The price they receive depends in part on management practices that the producer controls, such as vaccination, weaning, nutrition, genetics and appearance of the cattle. Price differences for those practices have increased in recent years as feedlots have learned the value of cattle that stay health in the feedlots. The center conducted research at Iowa auction markets during the peak calf marketing season, October 2005 – February 2006, and analyzed data from more than 20,000 lots of cattle sold. In addition to market conditions and cattle characteristics, buyers paid higher prices for vaccination and weaning practices and the premium for those practices were nearly doubled if the practice was third-party certified. These finding were reported in an IBC fact sheet and the media to alert producers of the value of third-party certification of management practices.

c. Source of Funding—Smith-Lever

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

Program 108: Iowa Pork Industry Center

a. Description of activity

The Iowa Pork Industry Center (IPIC) focuses on programs that are integral and complementary to work by ISU Extension and the Iowa Agriculture and Home Economics Experiment Station. Extensive use of traditional and emerging technologies from private and public partners enhances the organization and access to all Iowans.

More than 20 extension field specialists in swine and other livestock, farm management, and agricultural engineering areas, as well as county extension education directors (CEEDs) from all 100 Iowa county offices work with the IPIC.

IPIC sponsors educational programs designed to assist all segments of the pork industry. It demonstrates a commitment to providing timely, accurate and unbiased information to producers through several avenues including in-person producer meetings; research projects; cooperative educational offerings via electronic and telephone delivery; and print, electronic and Internet resources.

In cooperation with ISU Extension field specialists, IPIC has aided in development and/or funding of several demonstration projects, applied research projects and educational opportunities. Projects include updating and creating several software programs for various production types and stages; coordinating a National Research Initiative grant that integrates research, education, and extension in addressing production challenges faced by farmers raising hogs for niche markets; an examination of pelleting DDGS as a method of improving flow ability of the product; and field-based integrated crop and livestock demonstration projects.

b. Impact/accomplishment

IPIC played a major role in the success of the 2006 Iowa Pork Congress, a Midwest Pork Symposium. The more than 5,400 people who attended represented 90% of Iowa pork producers, including 75% of all sow production and 85% of all pig production in the state. This production equates to $2 billion in direct cash sales in Iowa. A conservative estimate is that more than half the congress attendees also attended at least one of the 20 educational seminars. IPIC designed a completely new look for the trade show's Pork Campus section, including an Internet café and National Animal ID registration area, ventilation trailer used for basic and advanced training sessions, ISU College of Agriculture student recruitment table and representatives, access to university and extension swine-related specialists, and educational posters and materials offerings.

Hundreds of producers attended one of eight locations in the sixth annual Iowa Pork Regional Conference series held in February. Co-sponsored by IPIC, Iowa Pork Producers Association and Extension, this year's attendees represented annual marketing of more than 1.6 million finisher pigs; 234,000 weaned pigs; 97,000 feeder pigs; and 27,000 sows and boars. More than 99% of program survey respondents rated the program "good" or "excellent."

The use of BLUP breeding value estimation procedures assists producers with internal replacement operations in maintaining the same rate of genetic progress as purchasing replacement females. Extension personnel developed a computerized interface between the two technologies of BLUP genetic estimation programs and on-farm reproductive data management programs. Several commercial pork producers who attended educational presentations on these programs requested that ISU Extension install the systems on their home computers. The net effect of implementing this program at the farm level has been to reduce genetic cost of production by $1-2 per head. If a typical 2400-head sow farm markets approximately 48,000 pigs per year, the savings in genetic costs will be from $48,000 to $96,000 per year. Recent research shows that avoiding a reproductive disease break saves another $75 per litter produced, with a total estimated annual savings of approximately $432,000.

IPIC continues to update existing software programs and create new applications to assist producers in gaining operation efficiencies. The Sow Longevity Spreadsheet (first available in 2004) has been provided to producers, consultants, university, industry and financial representatives in more than half the United States and 35 other countries, representing more than 28 million sows. IPIC also has released swine budget and cash flow software, Group Tracker ™ updates, and a manure nutrient value calculator. Additional software for sow reproductive management for herds with individual sow id's (Sow Tracker) and for herd sows in group systems and no individual id (Sow Group Tracker) is being developed and will be released this spring.

IPIC coordinates the NRI grant, "Enhancing Small Farm Prosperity: An Integrated Research, Education and Extension Program for Niche Pork Production." This two-year, $400,000 grant targets two areas in niche pork production: herd health issues and the economic and biological performance of those systems.

c. Source of Federal Funding—Smith-Lever

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

Program 109: Strengthening Iowa's Dairy Industry

a. Description of activity

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. Increasing the dairy industry is also of vital importance. 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.

b. Impact/accomplishment

- Dairy producers received language and technical assistance with their hispanic milkers. One dairy producer reported cutting his SCC by 150,000 which at 340 cows, a 25,000 pound herd average and in premium increase of $0.30 per hundredweight, equates to an annual added profit of $25,500 for his herd. This is not counting his increased labor efficiency or increase in milk production with the lower cell count. Reducing cell counts in half usually means 400 additional pounds of milk per cow which at $13 per cwt would translate into another $17,680 or a probable impact of $43,180 for this one herd annually.

- ISU Extension collaborated with others to conduct a by-lingual calf care workshop. Twenty herdspersons, (thirteen were Hispanic) Ten weeks post-workshop, the dairy owners whose herdspersons attended the September workshop were interviewed to assess the impact of the training. The dairy owners reported positive changes in their herdspersons' attitudes or job performances.

- ISUE assisted seven dairy farm families to make a decision of how to do a financial analysis of their dairy operation. Those producers report the analysis saving them over $1,000 each year fine-tuning their income over expenses and assessing capital purchases for over a $7,000 impact in total.

- ISUE assisted eight dairy producers as they performed a Dairy TRANS financial and benchmark analysis of their dairy operations to review and set financial goals for their operations. Two producers reported a minimum of $5,000 improvements each year in their operation as a result of this analysis. One producer, who has done the analysis for 5 years, credits increased profits of over $40,000 since initially performing the analysis.

- Six dairy producers constructed low cost parlors after receiving design assistance from ISUE, saving an average of $20,000 per parlor compared to more traditional systems. Total savings exceeded $120,000 in equipment costs.

- Eighteen dairy producers implemented changes in dairy facility design as a result of ISUE suggestions. They equated these changes to increased cow comfort and increased milk production by $30 per cow. These herds averaged 70 cows for a total increased income of $37,800.

- Dairy records: A series of 8 workshops, including a multi-state shortcourse, were developed by ISUE to train producers and industry consultants on how to use the information in dairy production records to make informed management decisions. All participants stated they had better understanding of how to use records to make informed decisions and increase profits.

- Through ISU Extension's collaboration with the dairy industry, dairy cow numbers in Iowa grew by 5,000 cows. The impact of this growth to Iowa at $15,000 of economic generation per cow annually is $75,000,000.

- Several dairy farm advisory meetings have been conducted. Topics included milk quality, reproduction, nutrition and PC-DART cow records systems for determining level of concern and progress, and protocols for addressing milk quality. Sample results: somatic cell count (SCC) decreased from 634,000 to 480,000. Standardized milk production increased from 66.1 to 68 pounds per milking cow. Rolling herd average increased 2,278 pounds in the eight months from the first team meeting. The percent of non-infected cows increased from 54% to 59%. Total economic impact of these changes is approximately $86,485 for a 139 cow herd for the 8 months since inception of the Team Meetings, with further progress possible on milk quality and reproduction.

- Heifer mastitis: Research shows > 50% of heifers calving with mammary infection or mastitis. A field study was conducted evaluating treatment of heifers prior to calving. Results showed a significant reduction in mastitis in heifers at calving and resulted in ~ 600 # more milk production in 1st lactation or $15,600 (200 heifers @ 600# milk @ .13/# milk).

- About 50 percent of all mastitis occurs in the dry or non-lactating period and shortly after calving. ISU extension received two more patents on an external teat sealant (non-antibiotic) for prevention of mastitis during this period. Current estimates show 16% of herds in North America using an external sealant and 22% using an internal sealant (40% combined). Research indicates a 20% decrease in overall mastitis (40% of dry period mastitis) resulting in reducing mastitis losses by $216 million in herds implementing this technology.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Adding Value to New and Old Agricultural Products

Program 121: Value-Added Agriculture

a. Description of activity

Value-added agricultural programming at ISU focuses on working with producer groups and entrepreneurs to build long-term economic, environmental and socially sustainable capacities. Emphasis this year has been with working with bio-fuels groups in development of plants and the utilization of co-products, development of value chains and working to develop local food supply and usage.

Additional programming has included:

- *Capacity building and training*: Created for producer 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.

- *Educational programming*: Provides hands-on workshops to the wine industry and to organic producers.

- *Development of niche value markets*: Targeted to producers and partnered with pork marketing groups, niche market opportunities are identified.

- *Resources for Web-base use*: Creating enhanced development of Web-based resources for U.S. farmers. Analytical tools, such as break even analysis, are available for download as is streaming video programming.

b. Impact/accomplishment

- *Bio-fuels Industry in Iowa*. The bio-fuels movement has moved to the forefront of Iowa's economic activity efforts. Numerous individuals and groups are seeking information about the potential for building bio-diesel and ethanol plants. This past year, staff has assisted with in-depth studies of the bio-diesel feasibility analysis.

  Staff has provided awareness and educational ethanol updates to service groups, producer associations and others who have an interest in understanding the impact that the bio-economy will have on their farms, families and communities.

  In addition to public awareness meetings, several state-wide information meetings have been held. A meeting held to explore the opportunities for expansion of the beef industry to utilize the distiller's co-products coming from the ethanol industry attracted many participants. The annual bio-fuels conference sponsored in conjunction with the Office of Bio-renewables at Iowa State attracted so many participants that several people had to be turned away due to space limitations.

  Presently, there are 95 operating ethanol and/or bio-diesel plants with another 325 plants planned or proposed. Fifty additional plants are presently under construction. Most of those plants are ethanol but bio-diesel plant construction is increasing. Both ethanol and

bio-diesel are now active in the fuel additive market, ethanol replacing MTBE and bio-diesel replacing sulfur.

- *Pork Niche Groups*. There are several companies in Iowa that Extension has organized to help producers collectively sell specific genetic lines, breeds or labels, such as "natural" or produced by family farms. It has worked with several of the groups to create a business structure to meet short- and long-term goals of the core group's values, principles and goals. The Extension team strives to use a process that is transparent, inclusive and robust to develop a structure that builds and maintains working capital without heavy borrowing and to develop a structure to foster producer ownership.

  These pork niche groups are bringing back between $8 and $12 per cwt above the spot market for the producers' hogs. Additionally, the ability for producers to participate in the equity growth of the company and brand is extremely important to individual wealth creation. The ability for producers to market through this company knowing that the working capital is there to support their business through low markets is important to success.

- *Value-Added Niche Enterprises*. Many producers are looking for small niches that they can develop to profitably serve specialty needs. These include organics, locally grown foods and products targeted toward the needs of the growing Hispanic population in Iowa. ISU Extension has worked with these producers on budgeting, market development and the specifics on growing and storing these products.

  Additionally, there is a growing interest among producers to grow vegetables and fruit for local and sustainable markets sold directly to wholesaler outlets. A series of meetings called "Bridging the Gap" were held in the spring of 2006 for producers to learn more about this market potential, how to sell in this marketplace, what types of produce are needed, how to price product, etc..

- *Value Chain with Low Linolenic Acid Soybeans*. Expanding the seed supply of the new varieties of low-linolenic acid soybeans developed by Walt Fehr, a professor at Iowa State University is a new focus for Extension. 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. Iowa State is the first out with these new healthy soybeans but it lacked the resources and connections to move them into the major markets for soybean oil. As Monsanto and Pioneer developed similar healthy bean varieties, their financial muscle and infrastructure surged the adoption of the soybeans. Progress has been slow but recent developments by large food chains and a number of cities and states have thrust the healthy soybeans into the limelight again. 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 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 also have

moved up the value chain further by making marketing agreements with oil distributors and the soy oil food ingredient market to expand the use of the product. The group is ISO certified and maintains a traceable trail from seed to end user. Extension helped the group obtain the ISO certification. The group sells a branded oil product and operates as a LLC. Another local Iowa producer group also is expanding the seed supply and working on developing processing and marketing partners up the value chain

Impacts for the State of Iowa have included better health alternatives (foods without or with less trans-fat). Farmers are receiving a $.75 to $1.00/bu. premium for growing the beans and processors are getting business and marketing profits are going back to Iowa investors.

- *Ag Marketing Resource Center*. ISU has established a strong foundation of case studies, feasibilities, outreach, training and experience in valued-added ag. Extension, along with partners from the University of California and Kansas State University, have received more than $11 million from USDA Rural Development to create an electronic center for farmers on value-added ag. The Web site, www.AgMRC.org, receives more than three million hits per month. It has more than 8,000 links and features more than 250 detailed profiles on various products and commodities, links to all the relevant state laws for value-added ag, has in-depth features on business development and information on markets and industries. The site generated more than 24 million hits in the past year and the site averages more than 1,000 daily downloads.

- *Flax Production — A New Crop for Iowa*. A new Iowa-based company, BIOWA Neutraceuticals, has recently formed to provide processing for specialty oilseed crops. The firm has partnered with a California-based company to process and package flaxseed oil for the health food and neutraceutical markets. The California firm is contracted with Iowa growers to produce organic flax on 1,000 acres in 2006 and plans to expand their product line to include a non-organic product in the future.

- *Development of the Wine Industry*. As a diversification strategy as, many producers and new agriculturists are planting vineyards in the state. It is estimated there are more than 340 commercial wine grape vineyards in Iowa encompassing more than 700 acres of grapes in the state There are currently 70 Iowa-bonded wineries in Iowa with another 20 or so new wineries in the early planning and construction stages. Iowa's wineries produced approximately 133,000 gallons of wine in 2005, which represented approximately 5.5 percent of Iowa's market share. The 2006 numbers are 246.000 gallons of wine representing 7.6 percent of Iowa's market share. A series of DVDs have been developed that address key business and marketing aspects to help ensure a profitable winery business. The 40 minutes of programming is available both on DVD and on several Web sites. The number of people viewing the videos and downloading the Excel tools has been growing with 3,986 viewings during the last 12 months. There have been 5,286 copies of the Excel tools distributed on the Web and 150 copies distributed to industry leaders, educators, business owners and people planning to build vineyards and wineries.

In addition to the video presentation of key questions, a typical feasibility study of a 20,000 gallon winery has been developed, as well as interactive spread sheets to determine profitability.

Workshops on How to Conduct a Wine Festival and several other agri-tourism training workshops also have been delivered in Iowa.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Home Lawn and Gardening

Program 146: Consumer Horticulture

a. Description of activity

Gardening is a popular leisure activity with close to 80% of the U.S. population participating in one or more types of garden activities in 2005. Gardening consumers spent $38.4 million in retail sales for lawn and garden products in 2003 or an average of $465 per household. The ISU Extension Consumer Horticulture and Forestry programs provide research-based education and information about plants and their care in the home lawn, landscape, garden and woodland. As a result, horticulture consumers are better able to make wise decisions in plant selection, maintenance and pest management.

b. Impact/accomplishment

- *The Iowa Master Gardener Program*. This is an educational and volunteer service program. University faculty and staff work to provide research-based horticultural information to Iowans through the volunteer efforts of trained Master Gardeners. This year, 600 adults were trained to become Master Gardeners. In 2006, Master Gardeners in 81 counties reported more than 74,900 hours of volunteer educational services to their communities. Assuming a value of $11.46 per hour for volunteer time, the Iowa Master Gardener program provided approximately $859,000 of education and service to local communities.

  One of the innovative training techniques used in the Iowa Master Gardener program is our day-long Class-on-Campus. Participants travel to Ames to receive highly-valued, hands-on training in the areas of botany, soils, plant pathology and entomology.

  In 2005, the Iowa Master Gardener program began to use Macromedia Breeze, a Web-based videoconferencing tool to broadcast seven of the 11 training sessions to local training sites. Master Gardener was one of the first Extension program to use Breeze.

- *Plant Disease Clinic*. Response to plant health problems without a systematic diagnosis can lead to the use of products that will not improve the situation and may even contribute to the development of additional problems. The ISU Plant Disease Clinic provides timely, unbiased information to commercial growers and home gardeners. In

many cases, chemical control measures are not warranted to manage plant health problems, especially those caused by abiotic (nonliving) stress factors.

The clinic also has a Plant Disease Clinic Update in most issues of the Home Horticulture and Pest Newsletter (HHPN) published online weekly or biweekly during the growing season. Each Update includes a list of plant diseases seen in the clinic since the last update, as well as links to relevant information about symptoms and disease management. Dissemination of this information has helped county staff more effectively respond to plant health questions. Diagnoses are provided, based on the information and sample submitted. In recent years, an increasing number of digital images have been submitted for problem diagnoses.

- *Gardening in the Zone*. Television provides access to a large potential audience. In 2004, ISU Extension began a collaborative project with Iowa Gardening Magazine called "Gardening in the Zone." The goal is to reach the consumer horticulture audience by producing and disseminating timely two-minute, educational videos on gardening for distribution to television stations throughout Iowa.

  In 2006, 36 two-minute video segments on gardening were developed. The video segments aired weekly from March to October on several Iowa stations. In addition, a weekly newspaper column highlighting each television segment was published by about 20 newspapers in Iowa. "Gardening in the Zone" was expanded significantly in 2005 and video clips were made available via pod-casting. Video clips also are available for viewing on the "Gardening in the Zone" Web page of the Extension Web site. Additionally, there are links to the newspaper columns.

  Television coverage has increased from 90% of Iowa in 2004 to 100% of the state in 2006 and includes viewers in southwestern Wisconsin, northwest Illinois, eastern Nebraska, and northern Missouri. The "Gardening in the Zone" segments reached about 153,000 viewers each week, or 5,355,000 gross impressions during the 36-week season. The innovative use of pod-casting was highlighted in seminars at The Ohio State University and the University of Minnesota as an excellent example of Extension programming at the 2006 American Society for Horticultural Science national meeting.

- *The Iowa Community Tree Steward program*. This work trains volunteers to assist county extension offices in delivering practical tree care information to Iowans. Volunteers are trained in both classroom and field settings (hands-on) where they learn: tree identification, species selection, tree planting, tree care and maintenance, pest management, value assessment, inventory techniques, program planning, funding and implementation. Each program graduate is expected to contribute 24-hours of volunteer hours back to the community. The Iowa Community Tree Workshop offered a variety of refresher courses (i.e. tree identification and pest management) and introduced new ideas (i.e. protecting trees through numerical guidelines and new cultivar selection) to keep the trained volunteers up-to-date.

  Many stewards have become community leaders and a source of knowledge about proper tree management. Several have developed and served on community tree boards and

helped to form tree ordinances. Others have volunteered at grade schools to educate Iowa youth on the importance of trees and tree care or held public education days. The Iowa Department of Natural Resources is using these volunteers to help with gypsy moth trap placement and monitoring and monitors for potential Emerald Ash borers. Also, the USDA Forest Service is looking at providing regional funds for equipment and educational material for the volunteers. There are 640 graduates from the Iowa Community Tree Steward Program that have turned in 21,820 hours of volunteer service.

The training workshop increased the number of volunteer hours and interest in the program. The 2006 workshop had 129 attendees for the full-day training. The evaluations of the program showed that 99% of the participants would attend future training, 78% want to contribute more than the required 24-hours of volunteer service, and 95% reported that this event is very valuable to them.

c. Source of Federal Funds—Smith-Lever

d. 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

FOOD SAFETY

- 5,095 individuals, volunteers, and childcare providers were trained in safe food handling.
- 31 food processors received information about food safety/HACCP.
- 40 grocery store managers received food safety training in the SuperSafeMark® program.
- 760 foodservice managers and employees were trained in the ServSafe® Program.
- 75 foodservice employees were trained in the DineSafe® Program.
- 3,087 school foodservice personnel received Food Safety Plan/HACCP training.
- 406 school foodservice personnel received Emergency Management/Preparedness training.
- 454 school foodservice managers and lead employees of Child Nutrition Programs attended Extension-sponsored short courses. Those managers are responsible for an estimated 250,000 meals/day.
- 3 Food Safety web sites were supported and updated daily or weekly. Those are the Food Safety Project, www.iowafoodsafety.org; the Iowa HACCP Information Center,

www.iowahaccp.iastate.edu; and the Food Safety Consortium, www.foodsafety.iastate.edu.

NUTRITION

- 82,468 individuals participated in nutrition education, including youth and adults.
- 1,173 individuals received nutrition and health education through individual consultation.
- 33,183 adults and 10,023 youth in Iowa participated in Lighten Up Iowa and Go the Distance.
- 173 uninsured/underinsured women aged 40-64 participated in the WiseWoman cardiovascular risk reduction program, a series of 12 healthy lifestyle sessions (208 sessions offered) for a total of 731 total session contacts.
- 1,662 school staff (administrators, teachers, school food service personnel and school nurses), participated in Iowa Communication Network (ICN) sessions regarding the local school wellness policy federal mandate.
- The Food and Nutrition website is maintained and updated weekly.
- Current Issues in Nutrition was provided to 44 out-of-state sites and 258 participants in-state.

EFNEP and FOOD STAMP NUTRITION EDUCATION

- Number of enrolled program families for FY06 = 2,543 (38% minority).
- Number of youth in a series of nutrition classes = 16,931 (34% minority).

b./c. Outcomes

FOOD SAFETY

- 100% of those responding to follow up surveys indicated that they had adopted one or more safe food handling practices (119 surveyed, 95 responded).
- 31 food processors received HACCP/food safety information and changed protocols to reflect new training.
- 88% of those taking ServSafe® certification exams passed (46 ServSafe® programs with 760 participants).
- 96% of those taking the SuperSafeMark certification exam passed.
- The Iowa Food Safety website had more than six million hits, an average of 2,000 visits each month, with an average of 12 minutes per visit.
- On-line Food Safety Lessons had more than two million hits.

NUTRITION

- Of 193 respondents (n = 247 response rate 78%) in face-to-face nutrition education programs, 93% reported adopting one or more nutrition and health behaviors.
- Of adult teams reporting weight in Lighten Up Iowa, 138,872 pounds were lost.
- Of adult teams reporting physical activity in Lighten Up Iowa, 76,842,495 minutes (approximately 5,122,833 miles) of activity were logged.
- Of teams reporting physical activity in Go the Distance, 30,437,205 minutes (approximately 2,029,147 miles) were logged.

EFNEP and FOOD STAMP NUTRITION EDUCATION

- The percentage of 1,492 EFNEP/FNP program graduates who reported diets that contained half or more of the recommended servings from all five food groups increased from 15% at the beginning of the program to 47% at the end of the program. A positive change in at least one food group was noted in 95% of the participants graduating from the program.

- Results from the food behavior checklist of 1492 adult graduates showed that:
  - 84% of participants showed improvement in one or more nutrition practices.
  - 88% of participants showed improvement in one or more food resource management practices.
  - 62% of participants showed improvement in one or more food safety practices.

- 37% of 5,122 youth from 246 groups increased nutrition knowledge and 31% of 5,360 from 255 groups improved practices in food preparation and safety.

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

e. State and Federal funds $1,600,610

FTEs 20.37

Key Theme – Food Accessibility and Affordability

a. Description of activity

Forty-eight EFNEP and FNP paraprofessionals enrolled 2,543 low-income adults and 16,931 youth in a series of nutrition classes in small group settings, schools or homes. One-time nutrition education was delivered to an additional 1,546 individuals participating in 84 groups in 22 counties. Partnerships with Head Start, Promise Jobs, empowerment boards and others resulted in increased funding, more effective audience recruitment and enhanced program delivery. ISUE continued efforts to meet with staff at local food assistance (Food Stamp) offices to share education strategies and offer to provide newsletters, referral cards and/or displays as needed. Response to those efforts was positive.

b. Impact/accomplishments—Refer to Overview.

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 delivered more than 125 food safety educational programs to 9,359 food safety program participants including those that work with at-risk groups such as seniors and children. Several hundred participants were trained in safe food handling for volunteer food

delivery projects including fair concession stands, the Annual Great Bike Ride Across Iowa and others. Extension field and campus specialists partnered with the Iowa Departments of Homeland Security, Inspections and Appeals, Education Bureau of Nutrition Programs, Agriculture and Land Stewardship, the Iowa Restaurant Association, 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 to provide education programs. 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, food-borne pathogen information and HACCP resources are provided at the Iowa Food Safety web site (www.iowafoodsafety.org or www.extension.iastate.edu/foodsafety) and are maintained by the campus specialists who support food safety. Thirty-one food processors received information and training in HACCP, recall/traceability and food safety. More than 3,000 foodservice personnel received training about HACCP implementation in schools, either through the Iowa Communications Network or live. 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. Successful completion of this training may result in employment. A second and third level of training have been implemented as employees end three months of employment and then again at the end of the year. In 46 ServSafe® training sessions, field specialists trained 760 restaurant and foodservice personnel in safe food handling with a passing rate of 88% on the certification exam. More than six million hits were made to the ISU Food Safety Web site last year and about 200,000 people investigated the on-line food safety lessons each month.

b. Impact/accomplishment – refer to overview.

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

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, now located at www.extension.iastate.edu/foodsafety.

Key Theme – Human Nutrition

a. Description of activity

Nutrition and health programs were offered in 197 communities in 92 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, ICN sessions, 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. This was a core theme of the ICN sessions, which highlighted the requirements of the federal mandate for school wellness policies; 1,662 school personnel attended. 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 31,183 adult participants and Go the Distance had 10,023 youth participants in 2006. 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 173 women were enrolled in the program and attendance at the 12 lifestyle sessions resulted in a total of 731 total session contacts. Data is currently in progress for this research study. Extension staff actively participated in 54 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.

b. Impact/accomplishments—Refer to Overview.

c. Source of Federal Funds—Smith-Lever 3b & c; WISEWOMAN (CDC grant), Team Nutrition (USDA).

Scope of Impact—State Specific, Nutrition Concerns program is multi-state, EFENP and FNP material shared regionally.

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

Overview

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

- 17 Refereed Publications, Research Papers, Manuscripts
- 119 Non-refereed Publications, Reports, Technical Papers
- 46 Proceedings, Published Abstracts
- 60 Extension Publications
- 249 Invited Presentation
- 826 Education Programs, Field Days, Tours (39,194 participants)
- 28,403 individual consultations
- 760 Volunteers trained
- 38,903 Web pages supported
- 3 book/chapter completed
- 1 patent
- 3 theses, MS, PhD completed
- 229 radio taps, 20 TV performances, 21 powerpoint presentations, 43 presentations and posters; 635 soybean cyst nematode soil samples handled, 205 plant disease clinic samples, 60 herbicide injury samples; 20 podcasts and compact disc compilations produced.

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 plant diseases continue to threaten Iowa's crops, particularly field corn, soybean and alfalfa. Every crop acre in Iowa is subject to yield reduction resulting from one or more of those pests. Both advancements in crop biotechnology and changing external market forces are driving producers toward changes in crop varieties and related management practices. Maintaining economic viability on farms requires producers to constantly adjust management practices. Change is driven by global market forces, the advent of new tools – including those from both biotechnology and traditional crop breeding methods – and from the emergence of new pests. Finally, the adoption of Integrated Pest/Integrated Crop Management practices results in more efficient use of resources and enhanced environmental stewardship.

b. Impact/accomplishment

- Enhanced education of crop advisors who serve producers is an effective method for aiding producers. Ag Chemical Dealer Updates is one method used to provide that education. They are attended by many ag professionals, including ag fertilizer and chemical dealers, seed research and sales personnel and Certified Crop Advisers. Extension field and state specialists provide education on pest management, soil fertility, soil and water conservation and crop management. Participant surveys indicate that the average clients' specialists consult with farm a total of 50,000 acres. Additionally, those clients will likely increase their profits by $9 per acre from content of the conferences. That translates into a value added average of more than $9 million.

- Several counties in Iowa suffered severe drought conditions in 2005. Drought-stressed corn is susceptible to infection from the fungus Aspergillus flavus, which is known to produce the carcinogenic mycotoxin aflatoxin. Not only were many corn growers unaware of the possible problem, they were unaware of marketing and feeding problems associated with aflatoxin infected corn. Grain buyers were confused on how to evaluate corn coming into their elevators. Insurance companies were not clear on how producers should verify aflatoxin problem fields or how growers were covered under RMA policies. In 2006, Extension began its effort to increase producer's awareness of the impending problem. E-mails to targeted producers, newspaper articles and radio and television

announcements encouraged corn growers to examine their fields for evidence of Aspergillus flavus. With reports of infected corn, Extension organized several county aflatoxin management meetings in Iowa. Corn growers, livestock producers, grain elevator operators and crop insurance agents attended. There, they learned:

- How to identify Aspergillus flavus in the field.
- That any grain testing more than 20 ppb would be rejected at local elevators.
- Rules on how to handle and store grain to prevent an increase in aflatoxin during storage.
- Alternative markets for infected grain.
- Aflatoxin concentrations that could safely be fed to various livestock. Dairy producers were encouraged to feed only aflatoxin free corn to stock.
- Information on switching to more quantitative ELISA-type tests.
- That field check strips were needed for insurance agents to ensure coverage.

Ninety-two percent of participants said that the information was excellent and beneficial. The estimated savings for corn growers and livestock producers in Iowa was more than $1 million in reduced harvest and feeding losses.

- A "Crop Update" newsletter began publishing in 1998. "Crop Update" is now primarily distributed by e-mail and fax to Iowa producers and agribusiness personnel. It is sent weekly during the crop growing season and monthly in winter. The newsletter covers existing problems and forecasts likely agronomic problems. Web links to current university newsletter articles are included as part of the e-mailed newsletter.

  A survey to measure impacts of this information was included as a part of the first issue of 2006. Many readers said that they make better agronomic or pest management decisions because of the newsletter.

  Both producers and crop advisers said newsletter information created an average of $15 per acre difference, with the crop producers indicating it was used on an average of 495 acres, and crop advisors reporting the information was used on an average of more than 12,500 acres per advisor. The financial impact, from both savings from reducing input costs by not-treating or increased yield because of management changes, was $85,000 for a total $1,705,500 economic impact.

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

a. 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. ISU Extension is

mandated by the state to develop and deliver training programs for commercial and private pesticide applicators.

Commercial pesticide applicator program development and delivery occurred throughout the year. Applicators in 23 certification categories and subcategories had opportunities to complete re-certification requirements in 33 different programs. Many of those programs were delivered via satellite and Web casts throughout Iowa.

In addition, initial training for commercial pesticide applicator certification was provided to ISU students through a course, ENT 283. The course includes a core background on pesticide application and specialization in agriculture, forestry and horticulture pesticide application.

Private pesticide applicator program development occurred from August to November and program delivery occurred from December to April. During the training season, 247 programs were completed in all 99 counties throughout the state.

b. Impact/accomplishment

The private pesticide applicator training program conducted 247 meetings from December 2005 to April 2006. Total attendance at those meetings was 17,793. A post-training evaluation indicated that 96% of the respondents said the program was excellent or good. In addition, 96% of the respondents strongly agreed or agreed that the information presented at the meeting is useful.

The evaluation examined specific areas to assess behavior changes toward safe pesticide use practices. The evaluation showed that 61% of the participants said they would make sure copies of Section 18 and Section 3 labels were in their possession at the time of application. In addition, applicators stated that they planned to implement several key IPM practices. Some of these IPM practices included: Conduct scouting before spraying (n = 154), calibrate sprayer (n = 113) and keep better records (n = 50).

In addition, 86% of the participants said that they now review the label of all chemicals for precautions to be observed when handling or mixing treated seed. This indicates applicators have adopted new pesticide safety procedures.

The commercial pesticide applicator training program conducted 33 meetings throughout the year. Post-training evaluation results from the Commercial Roadside, Forest and Aquatic Re-certification Program indicated that participants had increased their level of knowledge concerning the proper use of pesticide formulations. Prior to the program, 32% of participants ranked their knowledge as a high (4 or 5 on a scale of 1 to 5; with 1 being a low level and 5 being a high level). At the end of the program, 73% participants ranked their knowledge of pesticide formulations as high.

In addition, the evaluation showed that 73% of participants said that they now use personal protective equipment listed on the label when applying pesticides. This also indicates applicators have adopted safe pesticide use practices.

At the Pest Control Operators Re-certification Program, participants were asked "what practices have you adopted that have benefited the health and safety of you, other employees or your customers?" Participants had adopted the following health practices: (1) use more baits (n = 257), (2) integrated pest management (n = 248), (3) use less chemical (n = 247), and (4) use personal protective equipment (n = 242). Participants were also asked what practices they had adopted that have benefited the environment. Participants had adopted the following environmental practices: (1) use integrated pest management practices (n = 255), (2) use more baits (n = 241), and (3) use less chemical (n = 238).

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Sustainable Agriculture

Program 147: Sustainable Agriculture

a. Description of activity

Sustainable agriculture is a priority for producers and consumers. As noted last year, a majority of farmers (60 percent) believe than farming today is too heavily dependent on agricultural chemicals. Through the continuing study and fine-tuning of sustainable ag practices and policies, the industry now enjoys greater profitability, improved methods focused on environmentally-friendly farming and enhanced quality of life for the entire ag economy, including consumers.

b. Impact/accomplishment

- *High Tunnel Workshop*. A high tunnel workshop and field day was June 21, 2006, at the ISU Armstrong Research and Demonstration Farm near Lewis. Participants learned about the maintenance and management of high-value horticultural crops growing in the field compared to the same crops inside a high tunnel. Participants toured the newly constructed high tunnel planted with tomatoes, blackberries, red raspberries and other crops.

  Several area ag industry professionals participated in the field day. The follow-up evaluation showed that base-line knowledge of participants was low (avg. 2.9) ranging from 1-9 (on a 1-10 scale; 1 = little knowledge to 10 = very knowledgeable). The Knowledge gained from the information presented was assessed at 6.0 (avg.) and ranged from 3 - 10. The most frequently reported score for initial knowledge was 1.0 (mode) while the change in behavior expressed as knowledge gained was 6.0 (mode). This data suggests that participants' behavior was modified dramatically by the information presented. Forty percent of the participants indicated that they are considering commercial horticulture production. Economic benefit was estimated based on attendees' response to questions about technology adoption and on predicted net income from high tunnel enterprises. The multiplier effect of products, supplies and services purchased and sold locally was not included in this computation. The estimated economic benefit of this workshop and field day is $95,000.

- *The Conservation Security Program (CSP) Training*. Producers in the Blue Earth River Watershed (2004) and the Upper Wapsipinicon/ Turkey River Watersheds (2005) have had the opportunity to apply for CSP payments. Research shows that producers need to be aware of the CSP and its requirements and begin to prepare early to qualify.

  Several producer meetings had a combined attendance of several hundred attendees. Those attendees included bankers, crop consultants, company agronomists and farm managers. R, C and D and NRCS staff have received requests for copies of the program and materials to use in their watersheds. This demonstrates success with behavioral change. Changes in practices have been verified by both producers and educators. These meetings also have generated increased office contacts relating to CSP topics. This meeting series also provided the opportunity for R, C and D, NRCS and Extension staff to work cooperatively to share experiences related to problems from previous sign-ups. These stakeholders also shared information on current watershed and on-farm demonstration efforts in the eight counties and identified areas where extension recommendations and agency guidelines may be incompatible or in conflict. The conflicting issues identified have been shared on campus and with agency staff in Des Moines to encourage debate and resolution.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Program 150: Environmental Stewardship

a. Description of activity

- Several agencies are working on water quality issues. At times, those groups do not coordinate efforts well in putting changes into place in the landscape. More natural resources can be maintained or improved when the link from agencies to landowners can be more seamless. Sediment and nutrient movement are at the core of this concern.

- The impact of livestock production on air and water quality, from livestock manure management to air quality is an issue of concern. Several groups have shown a need for education on air quality, including understanding of the problems and mitigation strategies. Movement of manure nutrients to locations where negative impact can occur is an on-going concern. With livestock populations that are more concentrated and rendering industries are declining, concerns regarding environmental impacts of routine and emergency carcass disposal have mounted.

- Wildlife habitat needs to be better understood. There are not enough wildlife professionals to properly track Iowa's wildlife populations, particularly since nearly all of Iowa's land is in private ownership. Keeping common species common and preventing wild species from becoming endangered is a goal.

b. Impact/accomplishment

- The Heartland Water Quality Conference attracted many participants from four states and several agencies focusing on building regional capacity in local watershed management decision-making. Research from this group focusing on two small watersheds has been presented at the Rural Sociological Society conference and at the Heartland Conference. The Iowa Learning Farm project partnership with IDALS, DNR and NRCS has developed fact sheets for field days, produced the Iowa Learning Farm newsletter, distributed 45 "Conservation Minute" segments for radio stations throughout Iowa, and held field days with about many farmers and ag professionals in attendance. A rainfall simulator was used to demonstrate the effect of conservation practices on soil erosion and water quality.

- Technical Service Provider training offering 23-hours of training and interaction was provided for 93 individuals. These TSPs are trained to provide nutrient management planning services for livestock producers. A three-year study of emergency cattle mortality composting was completed and made available to peer researchers and producers, summarizing results of composting performance, environmental impacts and virus survival. Outreach materials were prepared and information has been shared a conferences throughout North America. Two pilot workshops focusing on livestock air quality attracting several participants was held, discussing case studies and mitigation techniques. Basic air quality science was a part of the program, too.

- More than 1,000 have participated in the Level 1, six-hour workshop training Iowans to properly collect accurate data on locations and vertebrate species and submit these records to an on-line database. More than 53,000 records of 358 Iowa wildlife species have been reported. Improving CRP land for wildlife habitat test plots, field days and meetings were held. Providing training for producers and landowners with CRP contracts and also for conservation professionals. In addition, a Quail Habitat workshop was held with Quail Unlimited to address different habitat needs of quail vs. other grass land birds.

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
330 – 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	3,519
Number of farm workers that received farm safety training	315
Number of youth participating in youth safety activities coordination by extension	3,204
Number of individual consultations	45
Number of youth that received hazardous occupation certification	40
Refereed publications, research papers, and manuscripts	3
Non-refereed publications, reports, and technical papers	1
Proceedings and published abstracts	4
Number of Thesis (MS/PhD programs competed)	2
Extension publications	4
Books and chapters	2
Videos	1
Number of Web pages supported	4
Media release and popular press articles	5
Radio interviews	56
Participation on state, national, and professional societies safety committees	25

This overview covers work done for Iowa's Plans of Work, 200.

a. Output/Impact

- Four comprehensive land use plans adopted
- One county business plan was developed and adopted
- Two planned urban development initiatives were developed
- 226 business entrepreneurs trained
- 265 jobs created
- 26 businesses expanded
- 31 business plans completed
- 51 businesses started

This overview covers work done for Iowa's Plans of Work, 300, 310, 330 and 340.

a. Output/Impact

- 1,021 Iowans participated in ISUE learning opportunities related to family decisions and relationships in mid and later life.
- 2,874 child care programs across Iowa received education and technical assistance through Iowa State University Extension.

- 898 providers received training through the Child Care that Works self-study program.
- Iowa State University Extension is actively involved in two early childhood national research studies – Midwest Child Care Research Consortium and QUINCE.
- 968 Iowans attended Better Kid Care satellite programs.
- Iowa State University hosts and manages the National Network for Child Care web site. NNCC received an average of 150,202 visits by unique users per month for a total of 1,802,424 per year.
- In partnership with Iowa Workforce Development and the Iowa Department of Human Services, ISU Extension to Families created a 30-hour curriculum for families with children who are participating in the Iowa Temporary Assistance for Needy Families program.
- 685 individuals increased their understanding of public issues by participating in poverty simulations, community issue forums on quality child care, workshops on quality and affordable environments for young children or related activities.
- 6,814 Iowans participated in parenting education programs.
- More than 14,294 Iowans participated in family resource management programs.
- 713 professionals and volunteers received in-depth training to deliver sequenced parenting education programs.

b./c. Outcome/Impact

- Eleven adults were certified as *Powerful Tools for Caregivers* class leaders.
- Ninety-four percent of child care providers completing follow-up evaluations adopted recommended practices to improve early childhood program quality.
- 118 new child care centers, early childhood and family home child care programs were started as a result of direct Extension involvement. Those programs serve 1,620 children.
- 144 individuals were employed as a result of new or expanded programs or businesses.
- Evaluations from the Iowa Workforce Development training sessions, using a curriculum developed by Extension, reflect that the 900 participants to date have learned the specific skills intended.
- 82% of participants in consumer credit workshops took steps to reduce debt.
- 74% of workshop participants gained greater control of their current spending, saving and financial security.
- 90% (n = 176) 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 50% (n = 97) before participating in SFP 10-14.
- 82% (n = 128) 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 35% (n = 55) before participating in SFP 10-14.

Overview – 4-H Youth Development Programs

This overview covers work done for 410-460.

a. Output/Impact

- 127,967 youth participated 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.
- 12,247 youth and adult volunteers contributed their time, energy and expertise to helping youth learn life skills.
- $96,090 dollars of scholarships were awarded by the Iowa 4-H Foundation and its partners to 108 4-H youth.
- 825 high school youth and 100 adults attended the State 4-H Youth Conference and participated in educational seminars and community service opportunities.
- More than 2,170 educators, school teachers, school administrators and parents participated or were trained in science-related extension 4-H sponsored youth curriculum.
- 2,523 youth, 3,699 adult volunteers and 344 other adults were trained in leadership, parenting and other topics.
- 2,558 adults and youth contributed 15,595 volunteer hours to improve their communities through the Governor's AmeriCorps After-School Initiative, State 4-H Youth Conference service projects, Iowa's Promise Youth grants and Pioneer Community Improvement grants.

b./c. Outcome/Impact

- As a result of participation in tutoring services and 4-H educational enrichment sponsored by the Governor's AmeriCorps After-School Initiative, students' average quarterly G.P.A.s increased .37 points, attendance increased by 13% by the last programming quarter and students' problem-based school referrals decreased 58% by the last programming quarter.

- After-school, club and residential camps targeting military family youth have reached more than 200 families across the state. Programs are designed and implemented to support families and to educate the public about issues facing children, youth and families of deployed family members.

- E-SET curriculum presentations were made at SEEC, AEA and LEA Teacher workshops, and area leader trainings. 19,651 youth and adults were reached through E-SET programming through these and other efforts.

- 6,000 volunteers who have direct, long-term contact with 4-H members received a statewide 4-H Volunteer Newsletter two times this past year. 100 counties have a newsletter or communication link with their local volunteer

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

e. State and Federal funds $3,107,067

FTEs 39.6

Key Theme – Aging

a. Description of activity

In FY06, 1,021 Iowans participated in ISUE learning opportunities related to family decisions and relationships in mid- and later-life. An additional 1,852 individuals in mid- and later-life learned ways to incorporate universal design and accessibility features in their home environments.

Fifty-seven Iowa family caregivers participated in the six-week, 15-hour *Powerful Tools for Caregivers* curriculum. Eleven adults were certified as *Powerful Tools for Caregivers* class leaders when they completed 20 hours of training provided by ISUE *Powerful Tools for Caregivers* master trainers. Nine-hundred fifty-three people attended additional aging-related informational presentations and workshops including *Adult Children and Aging Parents: Conversations between Generations, Who Gets Grandma's Yellow Pie Plate: Transferring Non-Titled Property*, and a series of workshops on memory and aging.

ISUE managed a growing *Iowa Powerful Tools for Caregivers* program providing resources for 45 trained class leaders from extension and community agencies, coordinating training opportunities for new leaders and supporting class leaders in their work with caregivers.

ISUE participated in development of a multi-state eXtension family care-giving community of practice that is working to coordinate and create web-based resources for family caregivers across the country.

b. Impact/accomplishment

- Powerful Tools for Caregivers class leaders implemented the educational series for family caregivers in seven communities. 31 family caregiver participants from five of those communities have responded to questions about the impact of the classes. Respondents believe they are more confident caregivers as a result of the classes. Ninety-four percent believe that the classes provided them with helpful information about community resources. All would recommend the curriculum to another caregiver.

- Eighty participants in *Adult Children and Aging Parents* classes completed end-of-class surveys about the benefits of the classes. Eighty-eight percent (70 participants) reported being much better prepared to participate in family decision-making for later life as a result of the classes.

- The national eXtension Family Caregiving Community of Practice was funded to begin work on its resources to benefit family caregivers with educational resources.

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

d. Scope of Impact— Statewide, regionally and nationally

Key Theme – Child Care

a. Description of activity

In the past year, 2,874 child care programs across Iowa received education and technical assistance through Iowa State University Extension. Ninety-four percent of child care providers completing follow-up evaluations had adopted recommended practices to improve early childhood program quality.

898 providers received training through the Child Care that Works self-study program reaching individuals in 46 counties. Providers participated 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.16,106 self-study video kits have been checked out to providers since the program's inception in 1997. 968 Iowans attended Better Kid Care satellite programs conducted in collaboration with Penn State University. Iowa State University Extension is actively involved in two early childhood national research studies – Midwest Child Care Research Consortium and QUINCE. During the 2005-2006 program year, Extension staff conducted 276 assessments of child care centers and programs for this study. In addition, ISU Extension staff conducted 100 assessments evaluating quality child care programs serving children with disabilities. ISU Extension instructors provided 5,856 hours of intensive, series-based training on improving child care quality for 732 child care professionals.

Iowa State University hosts and manages the National Network for Child Care Web Site.

During the 2005–2006 program year, NNCC received an average of 150,202 visits by unique users per month for a total of 1,802,424 per year. International visits represent 12% of all visits, visits from the US average 68% and visits from unknown origins represent 20%.

Currently, there are 2,421 peer-reviewed resources on nncc.org that represents information from universities in all 50 states. Iowa State University Extension also provides oversight and management of the Early Childhood section of the CYFERnet web site for the Children, Youth and Families Education Research Network (CSREES).

b. Impact/accomplishment

- 2,598 existing childhood programs and businesses were strengthened with Extension involvement.
- 9,608 hours of instruction on quality child care was provided to child care professionals.
- 158 playgrounds were improved with technical assistance or consultation from ISUE.
- 118 new child care centers, early childhood and family home child care programs were started as a result of direct Extension involvement. Those programs serve 1,620 children.
- 144 individuals were employed as a result of new or expanded programs or businesses.
- 376 early childhood education programs (family and center based) were evaluated for child care quality with the ITERS, FDCRS or ECERS rating scales.
- 33 communities actively participated in the Child Care Lasts A Lifetime Public Awareness Campaign

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

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

Key Theme – Children, Youth and Families at Risk

a. 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, to improve the well-being of children, youth and families, and build community capacity to support these families. Iowa's New Community Project (NCP) integrated and expanded CYFAR programming into ISU Extension and continues to strengthen local, state and national collaborations. The ISU Extension CYFAR Web site averages more than 11,814 visits per month from an average of 1,196 unique visitors: http://www.extension.iastate.edu/cyfar/

The ROWEL Poverty Simulation proves effective in increasing participants' awareness of poverty issues to those living in poverty. From October 2005 through September 2006, ISU Extension staff conducted 24 simulations for 1,593 participants.

Through CYFAR funding, Iowa's New Community Project (NCP) was built upon lessons learned and the sustained success of the previous State Strengthening project. The three community projects, Davenport's LeClaire Heights, Perry, and Sioux City's West Side Neighborhood, are unique in structure and programming. However, all continue to respond to the needs of at-risk children, youth and families past the federal funding. Project work includes educational programming in parenting and family relations, English language, computer technology, literacy, health, child safety, nutrition, gardening, leadership, conflict resolution and 4-H life skills. At risk children, youth, and families are reached through health and dental screenings, after-school and summer youth programs, parent education, mentoring and tutoring, reference and referrals, focus groups, computer labs, community engagement, and home visitations. ISU Extension Families and 4-H Youth staff provide continuous support for the three community projects. Project work is documented on the Web site through the development of eportfolios at: http://www.extension.iastate.edu/cyfar/eport/

In partnership with the Iowa Workforce Development and the Iowa Department of Human Services, ISU Extension to Families created a 30-hour curriculum for families (with children) who are participating in the Iowa Temporary Assistance for Needy Families program. The curriculum is designed to prepare individuals for training and work by helping them understand, learn and practice soft skills important for the workplace. Soft skills include self-assessment/learning styles, critical thinking, decision making, problem solving, communication, handling emotions, understanding the culture of work, etc.

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.).

- Preliminary evaluations from the training sessions through Iowa Workforce Development reflect that the 900 participants to date are learning the specific skills intended. There was positive change for every objective (31) within five learning units, ranging from 11% change to 54% change.

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

a. Description of activity

Sixteen individuals were certified as family development specialists who practice a strengths-based approach to help limited resource families set goals and access resources they need to become interdependent and self-reliant.

685 individuals increased their understanding of public issues by participating in poverty simulations, community issue forums on quality child care, workshops on quality and affordable environments for young children or related activities. Eighty-seven percent (144 of 165) of those completing evaluations reported taking follow up actions.

b. Impact/accomplishment

325 participants from 12 communities participating in community forums about quality child care reported the following examples of follow up action:

- Used the results of the child care community study to create a strategic plan for a system of quality child care.

- Completed two Provider Conversation meetings with child care centers and home providers in the county to offer trainings and information that they can use towards becoming “Quality Child Care.”

- Distributed parent education materials to local child care providers.

- Spearheaded “The Mayor’s Committee on Child Care,” a diverse coalition that formulated a plan to include a day care in one elementary school starting in 2007.

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

d. Scope of Impact—State specific.

Key Theme – Community Development

a. Description of activity

Community development programming in Iowa is organized around building and sustaining community capital (human, social, physical, environmental and fiscal). Prerequisites for strong communities include community visioning, planning and organizational capacity building. Individual projects that have addressed multiple community capital as a central feature include:

- Community Visioning Program – changed the landscape and physical entryways to an additional 12 communities in 2005–06, and 125 communities rural Iowa communities have participated in the program since its inception in 1996.

- Coordinating the efforts of College of Design off campus studios with Iowa State University Extension field specialists resulted in the development of three community comprehensive plans, one county comprehensive plan updated, two urban neighborhood plans, and two economic development plans for rural communities.

- Three communities are working with ISU Extension to develop 3-D, interactive inventories of their downtown areas to promote better community planning and economic development.

- Land Use Planning and Geographical Information Systems – assistance provided to three communities and six counties, and GIS training provided to 53 local officials and leaders statewide.

- Economic Development Programming – ISU Extension in conjunction with the ISU Experiment Station maintains a community economic and demographic data base system entitled Social and Economic Trends Analysis (SETA). Added to this site was the capacity for any community in the United States to download an economic base study including shift-share analysis and location quotient. The site records over two million hits a year.

- E-commerce training – five workshops on e-commerce were held for local main street merchants.

b. Impact/accomplishment

Evaluation of the past five years of the Community Visioning program found that of the communities that have participated, 95% used design elements derived from changes in their physical built environment (streetscapes, entrance ways, signage, etc.). The Community Visioning Program was recognized by the Iowa Chapter of the American Planning Association with the 2005 Outstanding Planning Award for a Project, Program or Tool in October 2005. On April 25, 2006, the program earned this honor at the national level from the American Planning Association and was featured in the APA awards issue of Planning, the APA magazine. In May 2006, the program was recognized by the American Society of

Landscape Architects (ASLA) at the first Annual Central States ASLA Conference. The program earned an honor award in the planning category, awarded for activities that promote quality planning and design that is functional and environmentally responsible while also improving public heath and safety.

To support further interaction between College of Design student outreach and Extension community development programming, design facilities are scheduled to be constructed next year in the downtowns of Perry and Sioux City. The Perry facility involves a significant gift to the Iowa State University College of Design and Iowa State University Extension. The focus of the Perry facility will be to generate and test new ideas and concepts for small town and neighborhood development. The Sioux City Design Studio involved the use of state funds through the Great Places Program. As one of three designees in this program, Sioux City received a block grant of $1,000,000. The city is investing over 60% of its grant to redevelop an older building in the Historic Fourth area to be used by the College of Design and Iowa State University Extension as outreach center for urban design, historic preservation and community development.

Thirty-eight Southwest Iowa businesses have taken advantage of the services offered by the Rural Development Resource Center (RDRC) since it opened in June 2006. Some of the benefits to these clients include one small business start-up, two small business expansions, two loan referrals, and the location investigation of more than 40 sites for an out-of-state, biofuels plant siting. RDRC is a communication hub that brings together resources and service providers for businesses in southwest Iowa. Services available through the center include:

- Business plans and business plan development workshops
- Feasibility studies
- Capitalization support
- Market plans and marketing analysis
- Annual business evaluations
- Business training
- E-commerce support
- Product-to-market and cooperative advertising mechanisms
- Producer/grower technical assistance

The primary partners that developed and secured funding for the center are Iowa State University Extension Community and Economic Development, the Southwest Iowa Coalition, the Grow Iowa Foundation, and the Wallace Foundation for Rural Research and Development. The U.S. Department of Agriculture Rural Development Agency awarded a $300,000 technical assistance grant to RDRC in late March 2006. That grant, coupled with other awards received earlier, provided the center a startup budget of $646,000. The center is the home to Iowa's only rural business accelerator for small businesses, funded by the Iowa Department of Economic Development.

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

d. Scope of Impact—State specific.

Key Theme – Family Resource Management

a. Description of activity

The family resource management programs 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. More than 14,294 Iowans learned about family resource management by participating in a wide range of learning activities. 10,232 Iowans participated in ISU Extension financial management workshops 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 4,755 of those learners participated in workshops on financial security in later life and 347 received a PowerPay debt reduction computer analysis. 1,621 consumers participated in individual consultations about their finances, including many who participated in Volunteer Income Tax Assistance programs supported by Extension. 11,235 Iowa high school students in 214 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 1,318 in face-to-face EIC workshops and 776 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.

b. Impact/accomplishment – The following outcome data are reported from surveys of program participants:
   - More than 14,294 Iowans participated in family resource management programs.
   - 82% of participants in consumer credit workshops took steps to reduce debt.
   - 74% of workshop participants gained greater control of their current spending, saving and financial security.

   A 2003-2004 survey of a national sample of high school students who completed the High School Financial Planning curriculum documented:
   - 60% increased knowledge about credit, auto insurance and investing.
   - 60% changed their savings patterns.
   - 59% changed their spending patterns.
   - 40% began to write goals for managing money, saving money, and tracking expenses.
   - 41% increased confidence in making financial decisions.

c. 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

a. Description of activity

The Iowa farm fatality summary 10-year average for 1988 to 1997 was 48 deaths per year. The farm fatality summary continues to show a decrease in the number of fatalities. The number of deaths recorded for 1998 to 2005 were 42, 49, 38, 22, 26, 38, 4 and 40, respectively. A target group identified in Iowa is farm youth. Farm safety days, safety educational programs and other activities are conducted to reduce the number of injuries and fatalities.

The most effective method to reach farm youth in Iowa has been farm safety day camps or safety day. Iowa State University Extension staff hosted several safety events and educated more than 3,000 youths aged 7- to 13-years-old. Extension participated with external partners to sponsor or participate in additional events. A partnership was continued with a national sponsor, Progressive Agriculture Foundation. Extension provides supporting materials of publications and demonstrations at these events. The 24-hour certification training program for youths requires the operation of tractors and other machinery that meet federal guidelines.

Safe Farm is an ISU Extension program that uses a combination of a media campaign and various educational efforts to promote farm safety. The media campaign includes weekly radio interviews. The radio interviews provide more than 62 minutes of programming yearly. 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 Internet (www.abe.iastate.edu/safety.html) contribute to the media campaign by providing timely information. Web resources include farm safety day materials, tractor and machinery certification classes, links to printable versions of all Safe Farm fact sheets, farm safety displays and links to other farm safety organizations.

A new safety training, instruction and research (STIR) effort also was initiated to address adult safety issues. The main activities for STIR are adult outreach and education and improved workplace safety. STIR provides resource information to educate employers and employees about the values, practices and benefits of an injury free workplace and lifestyle.

b. Impact/accomplishment

- Forty youth ages 14 to 16 years of age received federal required certification for being legally eligible for agricultural work opportunities off their parents' or legal guardians' farm. These youth can now enter the agricultural workforce and reduce the potential occurrence of agricultural-related injuries to this age group.

- 3,204 youth ages 8 to 14 years of age received one day of farm safety education from participation in farm safety day camps hosted throughout the state. These events offer a variety of farm safety messages tailored by local community and stakeholders. These events focus on awareness of farm hazards, develop an understanding of safe and unsafe behaviors, create a positive life-long acceptance of safety responsibilities and s decrease in the incidence of farm youth injuries and fatalities.

FY 06 SUCCESS STORIES
Title: Safe Farm Public Awareness Campaign
Supports POW#: 145 – Farm Safety

Situation: The Safe Farm radio program produced and distributed 52 weeks of one-minute messages to Iowa radio stations in 2005. This public awareness program is in the fourteenth year of production. It started in 1992 as a four-minute program and changed to the one-minute format in 2002. The Safe Farm media campaign increases awareness with the intent of encouraging farmers to adopt safe farming practices.

Objective: Determine the usage of ISUE Weekly Audio program and refine future programming efforts

Activities/Outputs: An Iowa State University Extension's Weekly Audio CD survey was developed and distributed to Iowa radio station managers or directors.

Impact/Outcomes: Participants indicated that nearly half of the radio stations broadcasted the Safe Farm minute form one to more than three times per week. Sixty percent of the radio stations indicated using at least one of the ISUE programs (Garden Calendar Minute, A minute in Urban Agriculture, It's Time to..., Safe Farm minute, Garden Column, and Interview with Doug Cooper) weekly. The percent of participants that indicated they "strongly agreed" or "agreed" that the ISUE programs were timely and newsworthy, appropriate in length, diverse in program content, diverse in topics and a match to their audience with 86%, 89%, 86 %, 86% 86%, respectively. Over half of the radio stations have an audience of both urban and rural residents. The remaining majority of other radio station identified their primary listening audience as rural.

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 eight 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 2006 these included:

- Developing Dynamic Leaders and other local leadership development programming provided training for almost 900 local leaders in the area of community leadership development.

- Nonprofit Management Institutes, a seven-session (two days each) certificate program targeting special concerns of nonprofit organizations such as governance by volunteer boards, legal and regulatory concerns, and developing diversified revenue sources was provided to over 600 participants. These programs were often held jointly with the Nonprofit Resource Center at the University of Iowa.

- 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.

- Over 100 Planning and Zoning officials participated in workshops related to local land use planning.

- Utilizing HAVA (Help America Vote Act) funds, the Iowa Secretary of State's Office contracted with Iowa State University to provide training to 600 of the state's local election officials before the mid-term elections. (Although occurring during FY 2007, ultimately 1,800 officials were trained under this contract prior to the election.)

b. Impact/accomplishment

Extension leadership training and development was available in each of Iowa's 100 Extension districts and specific programs were held in six counties and five communities. The results create an invigorated local and civic government benefiting from leadership, planning, legal and community participation programming.

During the year,
- 367 organizations were assisted/strengthened.
- 899 community leaders and 407 local government officials received training.
- 727 service providers and 1,098 youth were trained.
- 15 service providers were certified.
- 430 government officials and 28 Extension staff and county auditors statewide received training in election administration.
- 96 organizations were created.

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

d. Scope of Impact—State specific.

Key Theme – Parenting

a. Description of activity

Iowa State University Extension (ISUE) continued to train professionals and volunteers to implement sequenced parenting education, as well as provided training directly to parents through individual consultations and workshops on various parenting topics. Together, ISUE parenting education programming efforts reached 6,814 Iowans.

713 individuals were trained to deliver sequenced parenting education programs. Sequenced programs individuals were trained in include: The Strengthening Families Program for Parents and Youth 10-14; Girl Talk/Guy Talk (for parents and teens); Celebrate Families (for parents and their school-age children); Great Beginnings for Families (for parents of children 0-5 years); and The Incredible Years (for parents of children 2-7 years). In addition, 109

family and youth professionals participated in Partnering with Parents, a training series designed to strengthen the core competencies of parenting educators. Work at 136 sites in 21 states reached approximately 1,352 professionals in their state through the two-part satellite series The Impact of Couple and Marital Relationships on Parenting and Child Outcomes. Iowa State University, in collaboration with Pennsylvania State University, has funding to implement the research/extension project PROSPER (Promoting School Community and University Partnerships to Enhance Resiliency) for a sixth year. This project (funded at $21 million from the National Institute of Drug Abuse) involves 28 schools, community stakeholders, and more than 11,000 families in sustainable science-based programs to build resiliency among youth and reduce substance abuse.

b. Impact/accomplishment

- 6,814 Iowans participated in parenting education programs.
- 713 professionals and volunteers received in-depth training to deliver sequenced parenting education programs.
- 2,703 individuals received parenting education through individual consultations.
- 99% (n = 881) of individuals who reported adopted one or more recommended parenting practices.
- 90% (n = 176) 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 50% (n = 97) before participating in SFP 10-14.
- 82% (n = 128) 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 35% (n = 55) before participating in SFP.
- Preliminary research results for PROSPER show that students in PROSPER intervention communities, compared with students in the comparison communities, were more likely to report that their parents used consistent discipline and less harsh discipline and that their families were more cohesive. Overall, families in PROSPER communities appear to be functioning more positively than families in comparison communities. Youth participating in PROSPER programs are less likely to be engaging in risky behaviors such as substance use and violence than youth in comparison communities. These findings are consistent with findings in other research projects that use the same or similar evidence-based programs.

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 parenting educators in twelve states; The Impact of Couple and Marital Relationship on Parenting and Child Outcomes satellite series reached individuals in 21 states.

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

Iowa 4-H Youth Development programming seeks to empower youth to reach their full potential working and learning in partnership with caring adults. To do this, 4-H leaders must have an understanding of the research basis of positive youth development.

b. Impact/accomplishment

- 60 Extension staff received training in the 4-H Youth Development Program communication curriculum to train volunteer leaders.
- 825 youth from Iowa were trained in the youth/adult partnership concept at the 4-H Youth Development State Conference.
- 72 youth and adults were trained in the youth/adult partnership concept at a special workshop for state 4-H council members and adult mentors.
- Working with adult mentors, 20 4-H clubs partnered with another community organization to secure grants and complete community projects through the Iowa Promise Grant program.
- In a partnership with a school system, the school reported that youth involved in a mentoring program have enhanced their leadership skills and teachers have reported significant impact on students' self-esteem and improved social interaction.
- In a partnership developed with a local bank that has involved 100 youth, all of the students have gone on to post-high school education.
- The Quad Cities Youth Development Academy was developed as a nine-day comprehensive training program for adults who work with youth in out-of -school settings. Thirty area youth workers attended the academy during 2005-2006. All participants reported increased knowledge and efficacy in the youth development areas addressed in the 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

This program seeks to create safe, structured and progressive educational learning opportunities for young people (K-12) during out-of-school time. Positive life skills development is stressed.

4-H staffs are engaged in providing progressive learning experiences for and with Iowa's young people. Youth development learning opportunities are provided via 4-H clubs, Clover

Kids programs, day camps, summer programs and residential camps, no-school day programs, weekend programs and after-school programs. Those programs use 4-H research-based curricula and educator preparation materials to teach leadership, citizenship, communications, personal life management and special interest knowledge area life skills. Examples include 4-H Challenge (leadership, communications, team building, etc.), Boomerang! (character education, leadership, service learning, etc.), nutrition, health, science (science, engineering, technology, agriculture and environment), and other specialized subject matter curricula. To provide readily accessible, quality out-of-school time programming, staff works with a variety of secular and faith-based community partners at the state and local levels. Examples include individual citizens/volunteers; citizen associations (Kiwanis, Optimists, etc.) and local businesses, agencies and organizations.

b. Impact/accomplishment –

Participation in Iowa 4-H positive youth development programs help young people become competent, caring, contributing, confident, connected, and capable through a series of progressive learning experiences with caring adults. Through out-of-school time programming, 65,560 Iowa youth have participated in clubs, camping, afterschool, special interest, and school-aged child care education programs. Via participation in the 4-H out-of-school time programs, youth have been connected to caring adults and have strengthened their skills and knowledge in the areas of leadership, citizenship, communications, personal life management, and special interest knowledge areas.

- All 100 Iowa Extension counties report youth involvement in out-of-school time programming.
- 65,560 youth participated in one or more of the out-of- school time delivery modes.
- 1,613 4-H Clubs were lead by adult leaders and reached 30,681 youth.
- ISU Extension 4-H managed the Governor's AmeriCorps After-School Initiative in seven school districts for at-risk middle school youth year-round. This program received $1.8 million in federal, state and local funding for six years.
- ISU Extension 4-H has managed the Iowa AmeriCorps State of Promise Program (out-of-school time programming focus) in 12 communities for at-risk elementary and middle school students. This program received $650,000 in federal, state and local funding for two years.
- Afterschool, club and residential camps targeting military family youth have reached more than 200 Iowa families; these programs support families and educate the public about issues facing those with deployed family members.
- A new afterschool Filipino 4-H club was initiated in Floyd County.

Extension provides programming to meet the needs of youth locally. Polk County initiated after-school programs in response to a need to serve young women and strengthen their abilities to make positive choices and become more connected to the community. Ninety five percent of participants report positive, supportive relationship with program leaders and 75% of participants reported "doing better in school."

Governor's AmeriCorps After-School Initiative managed year round after-school programs in seven school districts for at-risk middle school youth.

- AmeriCorps members and community volunteers provided 192 middle school students tutoring assistance.
- As a result, students' average quarterly G.P.A.s increased .37 points, attendance increased by 13% by the last programming quarter, and students' problem-based school referrals decreased 58% by the last programming quarter.
- 462 middle school students participated in a total of 2,623 service learning hours.
- 431 different community partnerships were developed or strengthened. Those partnerships benefited youth by providing direct programs, media coverage, funding for program supplies, provision of curricula resources and youth job shadowing experiences.
- 482 volunteers were recruited to assist with tutoring and the organization of enrichment activities. The volunteers provided 3,395 hours of service.

Iowa 4-H's Operation: Military Kids (OMK) project is an outreach program for the children of Guard and Reserve soldiers deployed to fight the Global War on Terrorism. OMK provided direct programming to 276 military kids and educated more than 1,400 youth and adults about the impact of deployment on military kids and families.

- OMK interns, 4-H camp staff and community volunteers planned and staffed a week-long residential camp for 44 military kids.
- 4-H club members in central Iowa developed communication and leadership skills by planning and staffing two day camps for 22 military kids.
- 4-H program staff taught 38 military kids communication and team building skills during the annual National Guard Family Readiness Conference.
- State and county 4-H staff and 4-H members and volunteers provided programming to 97 military kids during Family Readiness Group meetings and community-based support group meetings.
- Community volunteers partnered with ISU Extension to provide activities for 75 military kids at an After Hours event at the National Mississippi Museum, Dubuque.
- The Speak Out for Military Kids team, comprised of high school-aged 4-H members and military kids, learned communication, citizenship and leadership skills at two retreats and practiced those skills as they educated more than 1,400 youth and adults about the issues facing military kids and families.

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 work focuses on improving science and technology literacy of American students through experiential activities within and outside the school classroom. Performance goals include marketing the ISUE E-SET program to Iowa Educators; helping K-12 youth understand the relationship between science and technology; providing K-8 youth with non-formal, experiential science activities that will develop science life skills; and delivering

technical assistance, curricula, kits, volunteer training, and professional development workshops to Iowa formal and non-formal educators. E-SET also works with the USDA/Army Project to provide curriculum and training.

b. Impact/accomplishment

The State Science and Technology Fair of Iowa has become a program within E-SET. The fair provides science, engineering and technology learning opportunities for Iowa youth and awarded more than $50,000 in awards and scholarships in 2006.

E-SET marketing has increased its partnership opportunities. AEAs, on-campus academic programs, community clubs/groups and other extension groups are groups that E-SET has partnered with this year. E-SET serves as the science education consultant on several state and federal grants by providing training to teachers.

E-SET also works with the USDA/Army 4-H Youth Project to serve the Northwest Region of the U.S. as a technology specialist. In 2004, an E-SET staff member began working with a joint project between Cooperative Extension and the Army Youth Development Program. Those trainings were conducted on United States Army Bases in Kansas, Missouri, Georgia, Alabama, Wisconsin, Washington, Illinois and Utah. The focus of the workshops is bringing more technology into the Child Youth Services program of the Army. This is done by providing and installing computers, scanners, printers, digital cameras and age appropriate software for youth.

- E-SET curriculum presentations were made at SEEC, AEA and LEA teacher workshops and area leader trainings. 19,651 youth and adults were reached through E-SET programming through these and other efforts.
- 13,100 youth were reached through E-SET Educational Programs.
- Youths enrolled in science and technology project areas: Sci/tech, 1100; Computer, 986; Aerospace, 577; Science and Technology, 3663.
- 442 youths participated in State Science and Technology Fair of Iowa.
- E-SET partnered with AEA 10, ISU College of Engineering, ISU Office of Biotechnology, ISU Space Education Initiatives, Iowa Conservationists, ISU College of Human Sciences, ISU's Plant Sciences Institute, SSTFI and others.
- 1907 youth and 539 adults participated in the USDA/Army Partnership. .

The Food, Fiber, Environmental Science Program is referred to as Connecting Learning and Living and includes six in-school and out-of-school curricula: Growing in the Garden (Grades K-3); Growing in the Garden: Outdoor Classrooms for Young Gardeners, Leader's Guide and Garden Journal; Where We Live (Grades 4-6 series): History of the Land, Weaving Food Webs, Living with the Land; and Food, Land and People (Pre-K –12). Program leaders train educators to use the curricula to enhance youth knowledge about agriculture, natural resources, food, and people. The program also develops thinking, communication, citizenship, and leadership skills. All lessons align with national standards and benchmarks and Iowa Test of Basic Skills in science, language arts, math, and social studies; Experiential Learning, 5E Learning Cycle, and Targeting Life Skills Models; and

Howard Gardner's Seven Intelligences and have built in student assessment tools so that they can meet No Child Left Behind guidelines.

- 18,733 youth participated in at least six hours of lessons (reported by ISU Extension, teachers, county naturalists, Farm Bureau Ag-in-the-Classroom staff).
- 1,478 youth participated in hour-long lessons presented by state staff through IPTV K-12 Classroom Connections satellite programs and special events.
- 321 pre-service teachers (student teachers) trained through educational methods classes at five Iowa universities/colleges.
- 214 adults (teachers, youth program leaders, naturalists, Ag in the Classroom educators, Extension staff, etc.) trained through five- to 16-hour trainings.
- 20 partners provide financial and in-kind support and expertise.

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. Two goals for this year included the development materials and a system to train 4-H volunteers on positive youth development and risk management skills consistently throughout the state. This is the first time a consistent training system has been developed that includes required training for all organizational/general volunteers and for project volunteers (high impact volunteers). The roles of volunteers vary and training needs to be developed that is relevant to the volunteers as well as for the agency. Staff researched volunteer systems, best practices and developed materials and curriculum to pilot and start a new Iowa 4-H volunteer training system in the fall 2007. Training includes:

- On-going communication activities. This includes a statewide newsletter published two times per year and recommendations that each county include volunteer information in their local newsletters and on a statewide Web site.

- On-going State offerings. This work includes The State 4-H Volunteer Leader Forum, specific project workshops (livestock, sewing, food and nutrition, camping, fishing, etc.).

- Two one hour volunteer trainings. These include youth development concepts, risk management information and specific project knowledge. This will be required beginning fall 2007.

- 18-hour shooting sports training conducted by State Staff/YFS and certified National Leaders.

b. Impact/accomplishment

- 10,510 adults and 1,498 youth volunteered for Iowa 4-H programs during this reporting year. Their roles include 4-H club volunteers, youth committee members, event and activity organization, chaperones, mentors, etc.

- A new volunteer type was included in Iowa. This mentor category will provide education to independent members.

- 6,000 volunteers who have direct, long-term contact with 4-H members received a statewide 4-H Volunteer Newsletter two times this past year. Printing was donated by the Iowa Farm Bureau and the Iowa 4-H Foundation. All 100 counties have a newsletter or other communication link with their local volunteer.

- 74 % of volunteers indicated a statewide newsletter would be important to them to help ensure information about statewide 4-H activities is communicated to them. 59.8% of volunteers indicated the state 4-H volunteer Web site was a valuable resource.

- 100 volunteers attended the State 4-H Volunteer Leader Forum that is organized by volunteers. Volunteers who take on planning and administrative posts are role models for others and free paid staff for programming and educating.

- $5,775 was granted by the Iowa Commission on Volunteer Service to ISU Extension 4-H to administer this program to encourage local youth groups to partner with another community group to plan and carry out a community service project. Twenty-four grants were funded. The original $5,775 grant resulted in projects totaling $38,282 aided by 17,861 youth volunteers and 152 adult volunteers working together for 3,042 volunteer hours.

- Ninety-one people were recognized for outstanding contribution to the 4-H program by their induction into the 2006 Iowa 4-H Hall of Fame. More than 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.

- Extension's fastest growing 4-H program is Safety and Education in Shooting Sports (SESS). Certified volunteers lead shooting programs in more than half of Iowa's counties. About 181 volunteers participated in Safety and Education in Shooting Sports training. Only one discipline certification may be achieved at a single state-sponsored training and certification workshop. A participant must attend all of the training sessions at a state 4-H sponsored workshop that includes 12-hours of discipline instruction and an additional six-hours on topics of SESS philosophy, youth development, risk management, planning county programs and additional topics identified by the State 4-H SESS Committee.

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, 40.4% 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

- 44,907 youth participated in 4-H Youth programs in the seven urban counties. This represents 21.7% of school age youth reached through ISUE programming in the seven urban counties.

- Programming involving partnerships and collaborations continues to increase resulting in targeted programs for specific community needs. Examples include 21st Century Community Learning Centers; BASICS nutrition education programs; AmeriCorp programs, Tobacco Prevention projects; Growing in the Garden programs, Adventure Learning Center, and Positive Behavioral Supports programs.

- Programs specific to science and math activities are conducted in the urban counties. Those 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 four urban centers – Des Moines (Polk County), Dubuque (Dubuque County), Sioux City (Woodbury County) and Waterloo (Black Hawk County). An additional PBS site is in an urban suburb – Central City (Linn County). Extension specialists work with PBS school staff to engage youth and community partners in the implementation of PBS strategies throughout the community.

- 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.

- Dubuque County ISU Extension, in partnership with several community organizations, created “E-Cubed”, a program targeted toward sixth-grade students that would focus on providing education around the topics of Energy Management, Ecology, Environmental

issues, and Education in Solid Waste Management. The program reached a total of 921 people, consisting of 859 students and 62 staff members from Roosevelt, Jefferson, and Washington middle schools in Dubuque. Participating students indicated they would do the following activities "more than before":

- 65.6% would "make more responsible choices concerning my environment."
- 68.7% "will turn off the lights, TV, computer and other electrical devices when I am not using them."
- 62.3% will "try to build or maintain good habitats for wildlife."

- Through a PEP grant, Polk County Extension developed "Local Motion," a program to help youth develop healthy choice in physical exercise and nutrition. Partnering with county schools, 16,000 youth and 75 physical education teachers are participants.
  - 85% of students made progress towards meeting state physical education standards.
  - 80% of physical education teachers reported proficiency in all aspects of Iowa Curriculum Guidelines for PE.

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].

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

1862 Research:

- **Program 1.** The Iowa Fruit and Vegetable Growers Association requested and funded sweet corn cultivar and weed control research during 2006. Cultivar evaluations identified Revelation, Temptation, Montauk and BC 0805 as having superior merit. BC 0805 is an insect-protected (bt) cultivar that will eliminate the need for three to four insecticide sprays

- **Program 5.** A team researcher was contacted by the Iowa subsidiary of a chemical seed treatment company to research unusual seed quality changes of insecticide-treated corn seed. The researcher initiated a study to investigate that request. A mechanism was found to modify existing seed testing protocols to permit assessment of seed quality. This research saved the chemical company and the seed industry millions of dollars in otherwise un-saleable carryover seed by providing means for assessing its quality and thus, the seed's true commercial value.

- **Program 7.** At various extension field days/workshops/conferences, attention was drawn by the stakeholders (green industry professionals) and researchers to the emerald ash borer (EAB), an introduced insect that continues to infest and kill native ash species in the upper Midwest (Michigan, Ohio, Indiana and Illinois). Because the emerald ash borer poses a serious threat to trees in landscapes, a significant portion of the 2007 ISU Shade Tree Short Course will be devoted to discussing how EAB has negatively affected our neighbors to the east.

- **Program 10.** Meetings with the National Pork Board and the Iowa Pork Producers Association were held and the role and value of sequencing the swine genome was explained, which helped development of future research planning and support. Faculty met with individual producers and breeding companies to help plan research efforts for the future. Requests from swine breeding stock industry leaders led to development of software to predict intramuscular fat and to develop training and education programs. Close collaboration with several integrated production systems in Iowa is used to give direction to research and genetic programs. Industry changes resulting from the bio-fuel industry are used to direct research on feed efficiency. In poultry directed accomplishments, we worked closely with geneticists of two poultry breeding companies to design and conduct cooperative research studies to meet industry needs in poultry genetics and breeding.

- **Program 11.**
  - A group including USDA (Iowa)-NRCS, Iowa-DNR, Iowa Renewable Fuels, Iowa Corn Growers, Iowa Cattlemen, ethanol producers and ISU scientists planned and held three meetings to address the issue of overfeeding phosphorus to livestock fed distillers co-products.
  - The Rathbun Land and Water Alliance; composed of local Soil and Water Conservation Districts, county governments, and the Rathbun Regional Water Association; cooperating landowners; Iowa Farm Bureau; Southern Iowa Development and Conservation Authority; Iowa Department of Agriculture and Land Stewardship Division of Soil Conservation; Iowa Department of Natural Resources; Iowa State University Extension; Army Corps of Engineers; US-EPA; USDA-Farm Service Agency; and the USDA-Natural Resources Conservation Service have worked together to develop and implement a project to manage non-point source of pollution of pasture streams in the Rathbun Lake watershed.
  - Farmers using alternative production systems to produce pork for niche markets, representatives from Practical Farmers of Iowa, local research organizations and the Pork Niche Market Working Group of the Iowa State University Leopold Center for Sustainable Agriculture are consulted to identify areas of research and educational outreach programs.
  - Input from alternative swine and beef cattle producers is actively sought to keep the alternative livestock production project relevant and applicable.

- **Program 13.**
  - Niche pork producers and organization management teams were relied upon heavily as the project on niche pork markets was developed and recommendations were made.
  - The research on the internal organization of cooperatives was mostly based on interviews of members and top managers of cooperatives. Cooperative managers also expressed

interest in the research as it helped them to sort out what really matters in their organization. As a result of this work and the potential for important extensions, one major Iowa cooperative has agreed to provide ISU researchers with confidential production contracts to help develop a better understanding of the cooperative-member relationship.
  - Iowa State University has been heavily involved in the four producer surveys in the swine industry over the past two decades and has developed a good working relationship with pork production industry personnel.

- **Program 14.** Iowa Farm Bureau is an important collaborator on the Livestock Gross Margin Insurance expansion. The Iowa Farm Bureau Federation and the National Grain and Feed Association provide valuable input into the price basis analysis and provide a rich test group in their members for real world evaluation.

- **Program 16.** Stakeholders that represent pork producers and processors have contributed to development of experiments designed to define specifications for processes to produce high quality pork.

- **Program 22.**
  - Stakeholders requested research on virus disease because of loss and reduction in grain quality. Working with the Iowa Soybean Association, research programs have been designed and implemented to develop disease control strategies.
  - The bean leaf beetle/Bean pod mottle virus research was a result of soybean farmer concerns about losses in yield quantity and quality resulting from these two pests.
  - Western bean cutworm research was initiated based upon corn grower and agribusiness concerns about the expanding range of this insect through the Midwest and its damage potential to both traditional corn hybrids and some transgenic corn hybrids.
  - The soybean production research is planned in consultation with the Iowa Soybean Association to help the growers in Iowa. Studies on hail injuries were designed and conducted after consultation with the National Hail Insurance Company and will be distributed to Iowa farmers and hail adjusters to help assess hail injuries on soybean.
  - A consortium of seed corn companies was formed to support IPM research concerning Stewart's disease of corn. This group resulted 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, researchers have conducted and completed work that provides pre-plant information concerning the seasonal and field-level (site-specific) risks for Stewart's disease of corn..

- **Program 24.** Working with the Iowa Department of Natural Resources on production goals – such as for channel catfish – and sampling methods for evaluating the relationship between fish populations and water quality will result in protocols and methods that are more accepted by field staff.

- Program 25. Stakeholders have recommended new sites and display routines that have been included in the Iowa Environmental Mesonet. We welcome stakeholder input and concerns through a wide variety of media such as email, instant messages and K-12 teacher in-service days.

- **Program 26.** The team has very close collaborations with the Iowa Department of Natural Resources, USDA Natural Resource Conservation Service and Farm Service Agency and the USDI Fish and Wildlife Service.

- **Program 27.**
  - The Southeast Iowa Targeted Industry Assessment research depended greatly on stakeholder input. From a basic outline of intended activities, participants described their needs, expectations and ideas. Those concerns and wishes were then incorporated into the research report and educational process.
  - In the goat browsing feasibility study, interviews and group listening sessions were conducted with a variety of stakeholders about barriers to a goat browsing business. The results of this data gathering entered into the business decision of Agren, Inc.
  - In the goat meat project the brokering relationship was in direct response to the need of Muslim stakeholders for a source of local (fresh) Halal goat meat. Producer marketing strategies were altered based on increased knowledge of the local market and through the personal interaction and crossing of cultural barriers facilitated by the research project.
  - The work with the Hopis involved participatory research, where wide-spread conversations with the various stakeholders determined the sampling frame, the interview schedule and the presentation of the data.

- **Program 29.**
  The project to alter soybean oil characteristics for use in industrial products was initiated after direct conversation with the Soyawax Co. The company has long been experiencing the less-than-optimal quality of soy wax materials and the resulting poor quality candles. This interaction led to co-funding of the research by the company and ISU-IPRT. The research on chemical modification has produced materials with significantly improved physical properties.

  Dynea North America has formed a partnership with Iowa State and West Central, a soy processing company in Ralston, Iowa, to evaluate the soy protein hydrolysate produced after a scale-up process in large-scale adhesive batch formulations for the purpose of testing the commercial feasibility of producing the soy protein-based adhesive. Dynea North America, a division of Dynea Oy of Finland, is a world leader in the manufacture of high performance adhesives and surface solutions. The company has more than 50 production units in 26 countries, employs 3,000 people, and has sales of $1.3 billion. Dynea customers manufacture plywood, oriented strand board, particleboard, fiberboard and molded wood products. ISU provides Dynea with lab-scale samples of hydrolysate to find the optimum formulations for their adhesives. Success will be measured by the development of a soy-based wood adhesive using the hydrolysate produced.

  Basic research has been done for Van Beek Natural Science LLC, Orange City, Iowa, leading to the development of methods for enhancing the antimicrobial activities of essential oils. The work has resulted in the initiation of additional research projects that may ultimately feed directly into and improve Van Beek's product lines for veterinary medicine and companion animal care.

- **Program 30.**

- The Iowa Department of Human Services and the Iowa Department of Management have supported the development and implementation of the Iowa Child Care Quality Rating System, implementing State of Iowa legislation that was influenced by the program's Four-State Child Care Quality study.
- The Iowa Department of Public Health requested and supported the development of the Iowa county poverty, food insecurity profiles and Web site dissemination.
- The Iowa Department of Elder Affairs provided input and financial support for the Web site on quality-of-life indicators for rural aging, and Elder Affairs staff participated in the development of the rural aging conference at the University of Iowa College of Public Health.

Extension:

- **Program 104.** All Extension farm management specialists as a group provide hundreds of consultations with land owners and tenants about farm leasing practices, rates and terms every year. Their questions determine the content of group meetings, publications and mass media releases and interviews.

- **Program 106.** All the programming in Program 106 is at least in part derived from conversations and surveys from current and potential clients.
  - The diversity gardens are a collaboration of the FFA, Farm Bureau, Ag Connect, the Soil and Water Conservation District, NRCS, Southern Iowa RC&D, County Conservation Board, and the Lions Club.
  - This year's ISU Shade Tree Short Course program was largely influenced by our partners at IDALS who requested that we devote substantial amount of time to discussing the emerald ash borer at STSC 2007.A fall 2005 survey of INLA members regarding their education needs was completed.

- **Program 107.** In 2005 Iowa cattle producers were surveyed to identify their opportunity, challenges, and research and education needs. Each year an advisory council of producers and industry representatives are gathered to evaluate and plan programs. This information has directed Iowa Beef Center program priorities and delivery methods. Their priorities included: financial and marketing management, environmental protection and regulations, and ethanol coproducts. These topics are programs delivered by the Iowa Beef Center. Producers also ranked meetings and correspondence course as their preferred methods to receive educational information. The Risk Management for Beef Cow-Calf Producers addressed production, financial, and market management and was delivered by a series of two-day workshops and a correspondence course.

- **Program 108.**
  - Stakeholders have an organized and active role in developing the work plans of IPIC. The Advisory Committee for IPIC is comprised primarily of representatives from the different stakeholder or client groups served. These include the swine production sector (farrow to finish, farrow to wean and finishing), veterinary services sector, allied industry, community colleges and commodity groups associated with pigs (Iowa Farm Bureau Federation, Iowa Pork Producers Association). In addition, the director of IPIC serves as an ad hoc member of the Iowa Pork Producers Association Board of Directors. The

National Pork Board and the Iowa Pork Producers Association are active supporters of IPIC.

- With the increasing demand for animal welfare, swine producers are encouraged to participate and become certified through the National Pork Board's Swine Welfare Assurance Program(sm). This certification is a requirement for selling hogs to the Triumph Packing Plant in St. Joseph, Mo., and is highly encouraged by other harvesting plants. To help meet this need, IPIC offered training for all ISU Extension swine field specialists to become SWAP-certified assessors and created and distributed brochures on the availability of SWAP assessments for producers. The service was widely used. More than 40 of these sites were for finishing sites under contract to Triumph. The others were independent producers, including two farrow to finish farms with approximately 400 sow units. In addition to meeting packer requirements, these SWAP assessments also helped producers be proactive in implementing and maintaining appropriate animal welfare standards on their farms.
- In cooperation ISU, the University of Nebraska, ISU Practical Farmers of Iowa, Iowa Farm Business Association, and several niche pork companies, IPIC leads the effort toward enrolling 80 farms in the herd health profiling part; and to enroll 80 farms in one of two record-keeping programs for the economic and production cost portion of the project.
- Constituent groups include producers, youth, consumers, veterinarians, packers and processors, scientists, international audiences, allied industry professionals, and students.

- **Program 121.** Extension staff partnered with the Iowa Alcoholic Beverage Division (Iowa ABD) and the federal Trade & Tax Bureau (TTB) in Iowa to work with wineries.

- **Program 142.**
  - The Iowa State University Corn and Soybean Initiative continued growth in its second full year. The initiative is a formal partnership between ISU and private-sector agribusinesses. It has expanded the dialog between retailers of agricultural products and services and the university.
  - In 2006, the second annual ISU Corn and Soybean Research Roundtable was held in Ames with several private sector partners attending. Discussion was on then expression of agronomic research needs by agricultural industry. The discussion produced a ranked list of topics in soybean and corn production to be reviewed.

- **Program 143.** Stakeholder input is important for the development of topics presented at the commercial and private pesticide applicator meetings. Each year, the state staff elicits topic ideas from producers and state field crop specialists. In addition, emerging pest concerns are addressed through the development of new learning modules. Some traditional agriculture modules include: Asian soybean rust update, corn rootworm variant update (i.e., northern corn rootworm extended diapause and western variant corn rootworm), and western bean cutworm update. One important non-agricultural module includes educational materials on emerald ash borer. These programs emphasize proper identification of the pest, accurate scouting techniques to determine pest populations, use of economic thresholds to make sound management decisions and implementation of safe and effective pest management practices.

- **Program 145.** Iowa State University has developed and maintains cooperative relationships with the Iowa Center for Agricultural Safety and Health (I-CASH) at the University of Iowa, the National Education Center for Agricultural Safety (NECAS) at Northeast Iowa Community College and other farm safety focused organizations. Partnerships with Iowa community colleges and selected not-for-profit educational organizations also were developed. 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 serves as a transfer mechanism to distribute safety information through their organizations.

- **Program 147.** The ISU Extension Sustainable Ag Program contacted Iowa stakeholders in June of 2006 for program assessment and opportunities. This input directly allowed for the development of the approved SA work plan for ISUE for 2007.

C. Program Review Process:

There has been no change in the review process.

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

1) 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.

2) 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 11.** The alternative swine program is designed to provide technology and information for small diversified farmers interested in pig production, allowing them to participate in growing niche pork markets. The grass-based beef and dairy work is 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. The niche pork production project has involved a number of small-herd pork producers.

- **Program 27.**

- *The Hispanic Business Network*: The group was started in Ottumwa and directly impacts minorities in Iowa. Hispanic business owners in Ottumwa now have a regular breakfast business meeting, purchase materials and supplies from each other, pool their buying power with suppliers and interact with local police and civic officials to increase mutual understanding. Alternative agricultural producers in the Grow Your Small Market Farm Network exchange business information in their newsletter, such as understanding the paperwork involved in hiring employees and government regulations about safe food processing. This information exchange helps them be profitable and stay in business.
- *Siouxland Goat Farming Project*: Part of the goat research program is specifically directed to minority and traditionally under-served populations. Research focused on immigrants from Southeast Asia; Muslims from Africa, India and Pakistan; and Latinos primarily from Mexico and Central America. Most of those groups are limited resource clients. Goat farmers are an under-served clientele. Research showed the ability of Siouxland producers to capitalize on area positive market signals to help recent Latino/a, Asian and Muslim immigrants raise, slaughter and market goat meat. Demand-supply mismatches currently provide an economic opportunity for goat producers. Case studies showed how Iowa meat goat farmers have succeeded with distinct marketing strategies, increasing interest in meat goats by all consumers and the potential of using goats as browsers. These producers facilitated a buying club arrangement that benefited Muslim consumers by assuring a supply of fresh Halal goat meat and using a mosque as a distribution point.
- *Hopi Project*: The work with the Hopis involved participatory research, where wide-spread conversations with the various stakeholders determined the sampling frame, the interview schedule and the presentation of the data.

- **Program 30.**
  - The child care quality rating system and child care consultant training for 146 child care programs focused in-depth on serving children with disabilities and special needs, such as English as Second Language difficulties. The training also supports Hispanic and African-American families with children in the Head Start programs.
  - Very old and severely disabled Iowans benefit from the Powerful Tools for CareGiving training. The program's work on food insecurity and poverty includes intensive interviews with several Latino families in Iowa counties for comparisons with samples of immigrant families obtained in Oregon and California.
  - Investigation of the impact of welfare reform on adolescents is based on a three-city study of minority families. Related investigations have been based on the African-American Communities and Health study of families in Iowa and Georgia.

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

- **Program 104.** More than half of the farm landowners attending the leasing meetings were female.

- **Program 106.**

- Several Hispanic workers have been identified within the Iowa golf course industry. As a result, safety training programs have been expanded and modified to meet the specific demographic needs of these Hispanic employees.
- To help meet the needs of Hispanics, ISU Extension continues to work with Community Diversity Gardens in Clarke County. This garden has doubled in size and number of participants during the last two years. Other participants in this garden include Euro-Americans, senior citizens, high school students, a church and families. In 2006, the total yield for the Community Diversity Gardens in southwest Iowa was estimated to be nearly 5,000 pounds of fresh produce.
- The Amish/Mennonite communities had recently started produce auction houses in three areas of Iowa (Riceville area between Howard and Mitchell County, Frytown area located north of Kalona in Johnson County, and Bloomfield area of Davis County) in 2003. 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. Produce quality, yields and price were improved when compared to 2005. At one of the three sites, total income went from approximately $85,000 in 2005 to about $100,000 in 2006.

- **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.**
  - An Amish dairy goat producer received assistance in financial planning for his 100 head goat operation that reportedly help fine tune his goat business well enough to keep him in business allowing him to support his family.
  - Two dairy producers have been assisted with employment of five hispanic milkers. Both managers expressed gratitude of the progress made in labor efficiency and also reducing the communication barrier. Four of the Hispanic milkers were surveyed as to the helpfulness of the service and all four responded very positively to the point that both the managers and milkers expressed willingness and interest for this field specialist to come out monthly to visit with them. One dairy producer reported cutting his SCC by 150,000 which at 340 cows, a 25,000 herd average and in premium increase of $0.30 per hundredweight, equates to an annual added profit of $25,500 for his herd. This is not counting his increased labor efficiency or increase in milk production with the lower cell count. Reducing cell counts in half usually means 400 additional pounds of milk per cow which at $13 per cwt would translate into another $17,680 or a probable impact of $43,180 for this one herd annually.

- **Program 121.** Programming this year has included hands-on workshops to the wine industry and for organic producers, and the development of niche value markets for producers.

- **Program 145.** The award-winning "The Mystery Club" series of six publications was translated to Spanish. The purpose of the translated "El Club Misterio" series is to provide the Spanish youth audience a reinforcement of key messages received from farm safety camps and to engage this audience with age appropriate information presented in a variety of ways.

- **Program 146.**
  - The Iowa Master Gardener Program trains from 500 to 700 adults per year to become Master Gardeners. Training is provided to accommodate adult learners with physical limitations. Closed captioning and hearing assistance devices for hearing impaired learners have been utilized. This year, the Resource Guide (training manual) was reformatted to a larger font to assist an intern with limited vision. Accommodation allowed the volunteer to successfully complete the course and to serve the 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. Construction has been accomplished using professional and volunteer labor. The garden will provide opportunities for people of all ages and abilities to share the beauty of nature and the joy of gardening when completed. The enabling garden will feature level and firm pathways, raised beds, vertical gardening and barrier free gardening with containers.

- **Program 147.** To provide detailed information about the market for goat meat among recent Latino/a, Asian and Muslim immigrants to the Sioux City area, several educational sessions were held. The sessions identified barriers to raising and marketing meat goats and provided ISU extension the opportunity to host several listening sessions. Case studies of goat meat producers (with distinctive marketing strategies) were also developed along with several focus group opportunities (combined with sampling of goat meat dishes). Surveys also were held at farmers markets and ethnic celebrations and field day events featuring goat browsing were hosted. Also, project advisory committees bringing together goat meat producers and consumers were organized and six poster presentations were presented at academic conferences.

  Program highlights include:
  - Completed subcontract for USDA SBIR project (feasibility phase) with Agren, Inc., Carroll, Iowa, focused on the economic feasibility of a goat browsing business.
  - Completed data collection in investigation of the market potential for goat meat among recent immigrants in the Sioux City area.
  - Brokered a direct-marketing relationship between goat farmers and Muslim consumers.
  - Began a new project, Weed Control in Perennial Wetland Pastures using Goat Browsing, partnering with a new and established goat farmers, ISU faculty and students and conservation agency professionals.

These activities include:

- Documented a highly segmented consumer market, in which preferences for goat meat (as to age, cut, slaughter practices, etc.) vary by national origin, ethnic and religious background and demographics, including income and rural/urban roots.
- Identified barriers to the production and marketing of goat meat: meat processing infrastructure and regulations; production/technical system unknowns (ranging from fencing and watering to parasite control); and the cultural stigma against goats as livestock and/or meat among most Iowans.
- Increased interest in meat goats and the potential of goats as browsers (as evidenced by phone and e-mail contacts from producers and by invitations to assist with new projects).
- Enhanced cross-cultural communication in the Sioux City area of Iowa.

- **Program 410.** A new after school Filipino 4-H club was initiated in Floyd County.

- **Hispanic Child Care Providers Receive Training in Spanish in NW Iowa.** In Woodbury County, 10 Hispanic immigrants received Child Care Providers training in Spanish, assisting them in becoming Registered Child Development Home Providers. One obtained her license, one renewed her license, and eight are completing next steps, i.e., CPR, First Aid and Mandatory Child Abuse Training. They now have emergency phone numbers posted, maintain information on daycare children, practice hand washing, and know more about ages and stages of children.

- **Summer Food Program Started in NW Iowa.** 100-150 youth under age 18 experienced new foods and learned to choose vegetables and fresh fruits each day through a summer food program where free nutritious breakfasts and lunches were distributed to youth left in self care, in the West Sioux Community School District. More than 50% were eligible for free or reduced lunch. Prior to the program, students were making poor food choices during the summer or not eating at all. Extension staff provided curriculum for use in the classroom.

- **Strengthening Families Programs for Parents and Youth 10-14 Reaches African Americans and Spanish Speaking Families in NE Iowa.** In spring 2005, two Strengthening Families Programs for Parents and Youth 10-14 were held in Waterloo, one to Spanish-speaking families and the other, African American families; the two groups comprise 10% of the county and had expressed the need for help in raising their children and strengthening family relations. The programs were co-sponsored by ISU Extension and Pathways Behavioral Center with funding supplied by the local Empowerment Board and a state methamphetamine grant. Eight Hispanic and six African American families,16 parents and 19 youth participated in the programming. Follow-up evaluations show positive behavioral changes and improved family relations.

- **Farm Women Learn about Family Money Issues in SW Iowa.** ISU Extension presented family financial information to 75 women in three Annie's Project series targeted to farm women in Harlan, Red Oak and Shenandoah. Evaluations showed participants planned to share financial information with families, track spending,

document inventory, encourage children to start saving early, get a copies credit reports, stop credit card offers and set up college savings accounts.

- **Enhancing Community Capacity in Perry, Iowa.** ISU Extension, continuing efforts began with CYFAR funding, is working with Perry's Hispanic residents and community groups to bring people together to create more understanding of different cultures. 40% of school children in Perry are Latino. A travel seminar, March 2006, was designed as a way to learn about Michoacan, Mexico, home to many of Perry's high school students. Extension helped develop the educational materials and Mexico itinerary, the outcome assessment tools and a multimedia presentation to further involve community members. Twenty-two participants participated in the tour. Outcomes to date: The local newspaper printed a series on Michoacan; the Tyson manager wrote letters to Iowa Senators concerning immigration policy; a youth involved other youth at an immigration rally at the state capital; the aftercare program director surveyed her immigrant parents to be more responsive to their needs and better understand their past; four participants are working on a summer youth "culture" camp; the local guitar store received a shipment of Michoacan guitars to sell. A multimedia presentation was developed to share information and insights with community partners.

- **Cultural Appreciation Day Camp - SW Iowa.** In Chariton, Iowa, Ukranian immigrants and Anglo mothers in the Nest program were not interacting. Extension educators held a day camp to introduce Ukrainian and non-Ukrainian mothers and children to each other in a fun environment. The children explored African, Australian and Mexican cultures. The mothers learned more about each other's cultures and Lucas County Extension. Nine families with 16 children, Ukrainian and Anglo, participated and reported positive experiences. This success has lead the way for recruitment of Ukrainian youth for day camps and 4-H club membership, and implementation of Project R.E.A.D. for mothers and children.

- **Money Talks: A Financial Guide for Women - Central Iowa.** Two Money Talk programs were taught by ISU Extension to 33 participants in Jasper and Madison Counties Spring, 2006. Women learned to: track expenses and debts; use credit wisely and be aware of identify theft; set goals for savings, investing, and retirement; and prepare estates and wills.

- **African American Health Awareness Weekend in SE Iowa.** ISU Extension served on the NAACP Health Committee to plan a two-day African American Health Awareness weekend which focused on diabetes, cancer and cardiovascular disease prevention. 60 people attended and received information on blood pressure, obesity, stroke, breast cancer, tobacco, blood screens, foods and nutrition and massage.

- **Powerful Tools for Caregivers – Central and SW Iowa.** Extension staff facilitated Powerful Tools for Caregivers (PTC) for 19 caregivers from Wayne, Polk, Boone and Story Counties. They learned 25 tools needed to take care of themselves as they care for an older adult including how to: reduce stress; improve self-confidence; better communicate feelings; balance their lives; increase ability to make tough decisions; and locate helpful resources. Participants felt they had learned skills to become confident

caregivers. One nurse who works with elderly has been sharing self-care tools taught in the program with her clients. Another woman illustrated her change in attitude by writing poems as a way to encourage herself. A gentleman was told by his physician that his physical care had improved markedly since his last checkup and this was attributed to the "Powerful Tools for Caregivers" program. Some participants are willing to help market more offerings and 2 are interested in becoming trainers. Agency partners believe the program makes a difference with their families and are committed to offering the program again.

- **Young Mothers Classes in Spanish in SE Iowa.** Extension began offering young mother classes in Spanish in southeast Iowa. Classes have been offered on topics related to maternal and infant nutrition and food safety as well as financial management and parenting. 10 mothers and 4 support persons have actively participated in weekly classes for the past six months. The mothers are very enthusiastic, and very happy that these classes are offered in Spanish. Positive behavior change has been self reported by participants.

- **Dubuque Multicultural Family Center – NE Iowa.** The Dubuque County Multi-Cultural Family Center is a place that minority families call their own; they can visit, celebrate, and socialize in a non-threatening atmosphere; and learn and access community services to facilitate full participation in Dubuque. The Center serves as a meeting location for the NAACP, Immigrant Rights Network, and a mentoring program for young African-American males involved in the criminal justice system. The center offers ESL classes; access to internet and computers, family and youth activities, and citizenship opportunities. Dubuque County Extension developed an AmeriCorps/VISTA position to support programming at the Center. This resulted in over 170 personal contacts and led to an award of $43,371 from the City of Dubuque Community Partnership Program. An additional $5,000 of in-kind donations was received including computers, office equipment and furniture.

- **Tax Credit Education Helps Families in 20 Iowa Counties.** A way to improve the long term financial stability and well being of lower income working families is to increase income by ensuring they claim the Earned Income Tax Credit (EITC) and Child Tax Credit. These credits make a substantial impact on the economics of local communities as EITC recipients circulate their refunds through the local economy, creating a ripple effect many times the size of the original refund. This money strengthens neighborhoods, assists small businesses, and spurs local economic development. ISU Extension works with community partners to recruit and train individuals to be IRS Volunteer Income Tax Assistance (VITA) workers. These volunteers provide free tax services to low-income families. In 2006, VITA workers helped low-income citizens complete 1,995 income tax returns, of which 564 qualified for the Earned Income Tax Credit (EITC) totaling $754,434 in the 20 counties that participated in the Extension-community partnerships to expand VITA programs to rural Iowa.

- **A Statewide Curriculum for Soft Skills Improves Employability.** Through a collaborative effort of Iowa Workforce Development, Department of Human Services, and Iowa State University Extension to Families, a 30-hour job readiness curriculum was

developed to train individuals receiving temporary public assistance. The curriculum goals are to prepare individuals for training and work by learning and practicing soft skills for the workplace. Training modules include: assessing learning style/setting goals, recognizing and handling emotions, making informed decisions, communicating well with others, understanding culture of work/balancing work and family. Approximately 3,500-4,000 individuals will be reached in the coming year through this training.

- **Modular Cabinet Designs Support Changing Needs.** ISU researchers and Extension staff are collaborating with Bertch Cabinet Manufacturing, Waterloo, to produce cabinets with universal design features that can accommodate a variety of users. A modular approach is being used, allowing cabinet components to be quickly changed with simple tools. The cabinets have the potential to revolutionize accessibility requirements in multifamily housing. Instead of installing accessible cabinets in the "handicapped" units and "standard" cabinets in the rest, the same modular cabinets could be installed in all units and easily changed--as needed--when new residents of various sizes and abilities come and go. The Iowa Finance Authority has expressed interest in installing the cabinets in apartment units they finance. The project is a collaborative effort of ISU Extension from Human Development and Family Studies, CIRAS, and Industrial and Manufacturing Systems Engineering, funded by a grant from the US Administration on Aging.

- **The Exito en el Norte ("Success in the North") is a 10-part, Latino acclimation and assimilation outreach video series.** Sales of the video began in July 2006. More than 230 sets of the videos have been sold in 29 states, including Iowa. The primary purchasers have been libraries, immigrant education centers, health and human service agencies, Hispanic outreach centers, community colleges, businesses and other state agencies. Land Grant institutions in Florida, Alabama, Georgia, Illinois and Missouri have purchased/reviewed these videos and are currently working to incorporate them into their Latino outreach programming. In the Fall 2006, the Northwest Area Foundation agreed to underwrite a small portion of the outreach and marketing cost for the video series by assisting in conferences, brochures, display pieces, Web sites, etc. to increase the visibility of this product within their eight state service area (Washington, Oregon, Montana, Idaho, North Dakota, South Dakota, Minnesota and Iowa). This group sees this video series as an educational empowerment tool to help reduce poverty. The primary partners in the production and distribution of this video series are Iowa State University Extension to Communities and Economic Development, Experience Education, Inc. and the Southwest Iowa Latino Resource Center

- **Amish Farm Safety Day Camp**. The Amish population in Buchanan County presents a challenge as an underserved audience because of their unique culture and religious practices. The Buchanan County Youth Farm Safety Team developed a multiphase plan to be conducted during an eight month period. The plan consisted of training all team members on the basics of the Amish culture and beliefs, meeting with teachers within the Amish school system and introducing the training to them, and then meeting with the elders and parents representing the Amish schools to generate trust and elder buy-in by putting the program content decisions in the hands of the Amish elders. The meetings with the Amish elders resulted in farm safety program educational stations on water

safety, pedestrian highway safety with stranger danger, large animal safety, grain bin and grain wagon safety, sun safety, disability awareness and hand tool safety. The Amish Elders want to continue and expand the program, and the Amish teachers are excited about the idea of other Extension programming in the schools.

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 occur throughout the five-year period and beyond. Under each Goal, specific progress towards the outcomes and impacts are documented.

4) 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:

1. NASULGC (e-Xtension)/NELD/NCCEA

The National Association of State Universities and Land-Grant Colleges (NASULGC) assessed fees to promote national initiatives. During FY 2006, Iowa State University Extension paid fees totaling $66,954 to support e-Extension.

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. Total costs associated with NELD for 2006 came to $10,815. The North Central Cooperative Extension Association (NCCEA) provides a forum for state extension directors and administrators on matters of regional, national, and international concern. The NCCEA plans, develops, and monitors cooperative efforts among the north central states. Assessments to NCCEA amounted to $5,733 during FY 2006. In total, $16,548 was assessed for NELD and NCCEA work.

2. 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 2006.

3. Agriculture and Natural Resources Extension Programs

Dr. DeWitt spent time on multi-state and national programs and activities in FY2006 that included: Regional SARE Administrative Council membership, Regional SARE PDP proposal review committee, Served as chair of NCR 201 Committee, served as representative to NC IPM coordinators group, served as Iowa representative to NC SARE PDP coordinators group, served as NC regional representative to National SARE 2006 Conference planning committee. This represents approximately 9 % of Dr. DeWitt's time or equivalent to approximately $10,249 of salary support.

The Dean of the College of Agriculture participated in many multistate activities related to Extension. The Dean provided leadership for the establishment of the U.S. Pork Centers of Excellence which is a multistate project involving over 20 land grant universities. In addition, the Dean chaired the establishment of the Midwest Dairy Consortium, a project involving cooperation for extension, research and teaching programs at seven land grant universities. The Dean served as the administrative advisor for NCERA201 – Integrated Pest Management – a multistate project that involves extension and research faculty. The Dean also served on the Steering Committee for the North Center Integrated Pest Management Center that coordinates extension and research programs in the North Central region. The Dean of the College of Agriculture spent at least 5% of her time on multistate projects, totaling $10,641 in salary alone in FFY 2006.

The Associate Dean for Extension Programs and Outreach allocated time during FY06 on national and regional activities. These activities included serving as the administrative advisor for 3 multi-state committees: 1) NCERA-3, Soil Survey, 2) NCERA-59, Soil Organic Matter: Formation, Function and Management, and 3) NCCC-9, Midwest Plan Service. Other activities include serving as a member of the Board of Directors for: 1) the Animal and Poultry Waste Management Center at North Carolina State University, and 2) the North Central Regional Aquaculture Center. In addition, represent the 4-state Heartland region to the USDA CSREES National Water Program and participated in the North Central Region Agriculture and Natural Resources program leader activities. These activities represent about 5% of the Associate Dean for Extension Programs and Outreach time, which is equal to $7,456 in salary during FY06.

4. Families Extension Program Director

During the federal fiscal year 2006, the Families program director spent more than 8% of her time on activities associated with multi-state programming. She continued as a tri-chair of the national USDA/CSREES and NASULGC task force on youth and young adult obesity. In this capacity, she worked on two major sub-committees: 1) eXtension Community of Practice on preventing obesity and 2) assisted with issues related to obesity on land grant campuses. In addition, she has been an active participant in discussions related to multi-state efforts associated with the development of the new plan of work. She has been engaged regionally in developing programs and shared evaluations associated with parenting, aging

and financial management. The ISU Extension Strengthening Families Program for Parents and Youth 10-14 was recognized as a National Program of Distinction, allowing several opportunities to share materials across the nation. Total spent on Families program director during federal fiscal year 2006 was $10,375.

5. 4-H Youth Extension Program Director

   The State Director for Extension 4-H Youth programs in Iowa spent time during FY 2006 on national and regional programs/activities. The Director served on the National 4-H Cooperative Curriculum System Board of Directors focusing on personnel issues and developing a new strategic direction for the organization. He was also as a member of the North Central 4-H Administrators Council and serves as their vice-chair. This past year discussions have been focused on developing a new federal plan of work related to the three national mission mandates of science and technology, healthy lifestyles and youth in civic engagement. Other activities by the Director included national and regional meetings with ongoing efforts in the areas of staff development, volunteer development, and curriculum development. Time spent on these multistate activities represented approximately 10% of effort or $10,368.

6. Iowa Cooperative Extension Director

   The Director of Extension for the state of Iowa is involved with many committees dealing with regional and national Extension activities. During FY 2006, participation and presentations at regional and national meetings included the Council on Extension Continuing Education and Public Service in Baltimore, Maryland; the North Central Land Grant Meeting in Fargo, North Dakota; Future of Agriculture Conference in Sacramento, California; and National Association of State Universities and Land-Grant Colleges (NASULGC) meetings. During FY 2006, salary paid for multistate extension activities totaled $2,683.

7. Iowa Cooperative Associate Extension Director

   In addition, the Associate Director for Extension also participated in regional and national Extension activities. Meetings and duties included the following: the Water Quality Challenges conference; the North Central Cooperative Extension Association meeting; Food Systems Leadership Institute (FSLI) meetings; the National Extension Directors and Administrators meeting; the Food and Society Networking conference with the W.K. Kellogg Foundation; as well as the National Association of State Universities and Land-Grant Colleges (NASULGC) meetings. During FY 2006, salary paid for multistate extension activities came to approximately 5% equaling $8,038.

F. Integrated Research and Extension Activities:

Hatch Act Funds:

Almost all of our integrated activities are based on faculty with split (research/extension) appointments, and is divided roughly equally between regular Hatch and Hatch Multistate. Multistate affiliations are so noted. Occasional adjustments are made in faculty appointments,

and occasionally the Iowa representation on and participation in multistate activities changes. Thus, some unplanned movements in resources have and do occur. While the overall expenditure of resources for integrated activities meets our planned commitment, there is some shifting among the various programs and activities.

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

Food Crops:
Dr. Paul Domoto – NC140 – See below under Smith-Lever Act Funds, Research Program 1: Food Crops / Extension Program 106. Commercial Greens Industry.

Crop Production and Management and Soil Resources Management:
Mahdi Al-Kaisi – NC1012 and NC1017 – Extension activities include programs related to soil management and the environment, participating in field day and training workshops statewide, developing best management practices and conducting extension field demonstration plots. My research program focuses on the interaction of tillage systems, cropping systems, and nutrient management on soil and water quality, water and nitrogen use efficiency, and soil carbon dynamics as affected by long and short-term tillage and nitrogen management. Examples of research include how long-term tillage practices impact on yield, agronomic relations and soil quality indicators. The idea is to establish several sites of different tillage systems for corn-soybean and a corn-corn-soybean rotation. No-tillage, strip-tillage, chisel plow, deep tillage and moldboard plow are being utilized at each location. The work seeks to: 1) evaluate the impact of five tillage systems (no-till, chisel plow, strip-tillage, moldboard plow, and deep rip) on the yield of corn and soybean, 2) study the long-term impact of these five tillage systems on soil quality indicators (i.e., soil carbon dynamics, soil physical properties, and soil chemical properties), and 3) evaluate the economic returns of different tillage systems.

Also, improving sub-soil carbon is critical in making a disturbed site more productive. This study utilizes 1) deep tillage and ridge tillage, 2) corn-soybean rotation and switch grass rotations 3) 0, six-inch, and 12-inch top soil placement depths 4) two subsurface drainage locations to evaluate soil physical, chemical, and biological properties and crop responses. The topsoil on this site was removed due to road construction to a depth of 15 feet and has been rehabilitated by placing three different topsoil depths (0, 6, and 12 inches) using laser-grading technology. This look will serve to: 1) evaluate the effects of different cropping systems on soil carbon dynamics, soil quality, and water quality, 2) investigate the impacts of top soil placement depths on yield potential and plant nutrient uptake, and 3) estimate the effects of cropping systems on nutrient availability and movement in the zone under disturbed conditions. In addition, a network of livestock producers, commercial manure applicators and crop producers are utilized to conduct replicated trials on cooperator farms in conjunction with a research study conducted at the Northeast Research Farm (NERF). The Northeast Research farm will serve as the “Hub” where tillage systems, manure rates and commercial fertilizers are evaluated. On-farm demonstrations serve as the “spokes” for comparing different manure rates over existing tillage systems in the 20 counties in NE Iowa. Through collaboration of researchers and producers best management practices in manure, nutrient and tillage management and educational programs are implemented to address economic and environmental issues producers are facing. Another research vein is the study of how nitrogen management and tillage system history can have a direct impact on soil carbon pools. Nitrogen availability in the soil environment plays a significant role in determining

soil carbon status by affecting the quantity and quality of plant residue as a source of soil carbon. Tillage is introduces oxygen to the soil environment and in turn increases the rate of organic matter decay and microbial activity. These carbon pools will be affected by microbial activities, which depend on nitrogen availability, crop residue, soil moisture, temperature, and organic matter content. In order to understand the impact of tillage and nitrogen management on soil carbon storage, we need to understand the long-term impact of various tillage and nitrogen management systems on soil carbon status.

Animal Genetics:

Thomas Baas, John Mabry, and Kenneth Stalder – NC1004 – Major research emphasis has been in the development and implementation of across herd and within herd genetic evaluation programs, along with development of cost-effective genetic systems for the swine industry. They work closely with major seedstock suppliers and commercial swine producers in Iowa, the U.S. and around the world on the development and implementation of data management systems and genetic evaluation programs in swine for growth, reproduction and meat quality. They have developed computer software for collection, processing and genetic evaluation from reproductive and performance test data. Individually, they have participated in cooperative research, technology transfer or consulting programs in more than 30 countries internationally. An example of their research work includes niche pork -- the kind raised with potential value-added attributes – that has become a staple on many restaurant menus. But Iowa farmers who have entered new markets for organic meat or meat from animals farrowed outdoors face the challenge of documenting production costs to support higher prices for their products (expected to be more than $5 per animal according to one Iowa State University study). And they find little integrated technical and research support for production or herd health issues. Research that pairs ISU researchers, veterinarians and extension field specialists with niche pork producers to help them better understand and manage their herds. As part of a two-year project, 80 swine producers will keep extensive records of their feed, facility and labor costs. And the ISU Veterinary Diagnostic Laboratory will analyze pigs from 40 antibiotic-free farms and sick pigs from 100 other antibiotic-free farms. In addition, alternative swine enterprises hold great promise for beginning farmers because of their lower start-up costs. Researchers think that what we learn from this project will enhance the business expertise and potentially improve the long-term prosperity of small and midsize farms. Other partners include the Leopold Center for Sustainable Agriculture, Practical Farmers of Iowa, ISU Hoop Group, ISU Extension, University of Nebraska Department of Animal Science, Iowa Farm Business Association and companies that sell niche pork products, including Eden Natural, Niman Ranch and Organic Valley. In addition, the two scientists offer advanced swine reproductive management seminars. The one-day programs includes sessions on how to avoid the summer slump in conception rates, boar fertility, financial and production impacts of new reproductive technology, artificial insemination to make genetic progress and a review of emerging reproductive technologies. ISU Extension livestock field specialists coordinate the programs and present information during the seminars.

Daryl Strohbehn – Dr. Strohbehn is an extension beef specialist associated with the Iowa Beef Center, which supports the growth and vitality of Iowa's beef cattle industry, and serves as the central access point for Iowa State University and ISU Extension programs and research related to the beef industry. His areas of research are applied beef cattle nutrition and management; field data analysis; and computer applications in beef cattle enterprise management.

Agricultural Risk Management:
Robert Jolly – NC1014 – Troubleshooting a farm business requires an orderly approach, good data and occasional intuitive leaps of faith. The procedure outlined in this publication helps the analyst go from symptoms to cause to cure. The difficulty, however, is that poor financial performance can be caused by several interacting factors. And the resolution of the problems will, in most cases, reflect the unique situation of a given farm business. This suggests that effective troubleshooting involves more than rules of thumb or simple financial guidelines. Appropriate financial analysis can only come from careful attention to the resources and needs of the individual farm family. An example of current application of research work in farm management and profitability is the 2007 Agricultural Credit School 62nd Annual. The purpose of the credit school is to strengthen the professional skills of agricultural lenders and other credit managers.

Attending the school is an important step in the career development of agricultural lenders. Since its establishment in 1945, the Ag Credit School has had more than 3,000 lenders and regulators enrolled. The Department of Economics in the College of Agriculture at Iowa State University, in cooperation with the Iowa Bankers Association, conducts the Agricultural Credit School on the Iowa State campus each June. The Ag Credit School is a complete learning experience that combines coursework, case studies, computer applications, and in-depth personal attention from instructors. It Increases participant's skill and effectiveness in agricultural credit management; attract and finance new credits; gain an in-depth understanding of farm financial and risk management; learn strategies to increase profitability, security, and competitiveness of agricultural lending. In addition, Jolly has been focusing on the increasing role that ethanol is playing in the farm economy of Iowa and the Midwest region. He is studying the impact on all segments of the agricultural industry as the surge in ethanol production is putting pricing and production strains and nuances on the marketplace. The results are beneficial to all stakeholders by suggesting the financial and real world impacts on the economy from livestock producers who will pay rising costs for grain to potential new uses for byproducts from ethanol production. The result is an increased understanding of how this growing ag market segment will have long-term impact of farming and industry profits, production and distribution. Area producers can access this information from several Web sites including Ag Decision Maker and from area Extension offices.

Roger McEowen – Dr. McEowen provides law and policy expertise to the citizens of Iowa and the nation. A few of the topics that are addressed in his extensive Extension programs include: charitable tax planning, farm lease law, contract hog production and anti-corporate farming law, estate planning, civil liabilities, water and environmental law, private property rights, and farm estate and business planning. He is widely published in scholarly journals and agricultural law reviews.

Green Industry:
Jeff Iles – See below under Smith-Lever Act Funds, Extension Program 106. Commercial Greens Industry.

David Minner – Dr. Minner's turfgrass research includes; (1) producing safe, durable and attractive athletic fields, (2) improving the winter survival of golf course grass systems, and (3) developing strategies that maximize turfgrass performance and minimize environmental impact.

As extension specialist Dr. Minner implements demonstration and educational programs to assist the commercial turfgrass industry of Iowa including; golf courses, parks, lawn service companies, athletic fields, and roadways. He is the liaison between Iowa State University and the Iowa Turfgrass Association, Iowa Golf Course Superintendents Association, Iowa Sports Turf Managers Association, and Iowa Professional Lawn Care Assoc.

Integrated Pest Management:
Mark Gleason –See below under Smith-Lever Act Funds, Extension Program 142. Integrated Pest and Crop Management.

Stephen Barnhart – See below under Smith-Lever Act Funds, Extension Program 142. Integrated Pest and Crop Management.

Robert Hartzler – See below under Smith-Lever Act Funds, Extension Program 142. Integrated Pest and Crop Management

Marlin Rice – NC205 – See below under Smith-Lever Act Funds, Extension Program 142. Integrated Pest and Crop Management

Animal Waste Management:
Wendy Powers-Schilling – S1000, S291, NC1119 – Dr. Powers' research areas are odor characterization and quantification, dietary manipulation of manure nutrients and odor, and influence of management system on manure nutrients. Her extension activities provide technical support and information to policymakers, producers, and the public that promote environmentally sound agriculture. Specific topics include whole farm nutrient management strategies, current and pending regulations, and air quality issues.

Rural Development:
North Central Regional Center for Rural Development (NCRCRD) – Cornelia Flora – NC1100 – The mission of NCRCRD is to strengthen the ability of the land-grant system and its partners to help build rural community capacity, create vibrant and sustainable economies, and cultivate inclusive approaches to governance to enhance regional well-being. The NCRCRD also provides leadership in rural development regionally and nationally by identifying, developing and supporting programs on the vanguard of emerging issues. Five goals of NCRCRD are 1) To increase the capacity of communities to cope with change and implement strategies that address the triple bottom line. 2) To increase the land-grant universities' ability to reach out to under-served and new populations. 3) To convene research groups around issues central to the work of land-grant universities in community and economic development in order to foster the development of effective, science-based educational materials and outreach programs. 4) To encourage better use of evaluation tools within the land-grant university system by applying the community capitals framework and the indicators of public good to a regional system. 5) To create an organization that can effectively advocate for and support the land-grant university's role in community and economic development by: analyzing key issues, creating bridging opportunities, innovation, collaboration, convening and communications.

Lorna Butler and Lois Morton – NC1001 – This program advocates for the public engagement and participation in analyzing and resolving social and cultural issues impacting the future of

agriculture. Particular research and teaching interests include rural-urban interdependency, urban agriculture, entrepreneurial agricultural alliances and relationships between agriculture, agro-ecosystems and community viability. Work has focused on agriculture on the urban edge, urban agriculture, cover crops as an avenue to sustainability and participatory research as a tool for identifying agricultural system innovations and mechanisms for bridging rural and urban communities. Research work has included food security surveys held in Minnesota and Iowa that interviewed individuals in Minnesota's urban areas in a number of sites in order to capture ethnic diversity and various levels of income (n = 396). In 2003, 400 rural Minnesotan were measured and surveyed. Attitudes, beliefs and prevalence of dumpster diving as a means to obtain food by Midwestern, low-income, urban dwellers were reviewed. In Iowa, 720 random sample surveys were mailed to residents in two high poverty rural counties and 528 purposeful surveys were given to low-income individuals utilizing safety net services (food pantries, senior meal sites, WIC, Head Start) in two high poverty, low-income neighborhoods and two high poverty rural counties. Findings include transportation and food access. It found that households in two rural Iowa counties regularly shop two grocery stores weekly and travel about 18 minutes each way. While most residents of these counties use their own vehicle to obtain food, older persons and those with limited incomes are more likely to be dependent on family, friends, neighbors and others. Sixteen percent of open country compared to 11 percent of rural town residents regularly shop for food out-of-county at supercenters, discount and wholesale food stores. An increasingly rural aging population suggests lower mobility, isolation and future access to food store concerns as retail food consolidation continues. Policy makers need to examine rural transportation systems and develop an infrastructure that links elderly and low-income individuals to retail food sources on a regular basis. Random sample surveys of residents living in two high poverty rural Iowa counties with two local grocery stores in each county reveals that perceptions of living in a high civic structure rural area significantly decreases the odds of being food insecure. While a great deal of food giving (74 percent give to family and 68 percent to friends) and receiving (30 percent received food from family and friends) is reported, these personal connections do not decrease the odds of being food insecure. Lower incomes and being younger increase the odds of being food insecure. The findings suggest that investments in strengthening the social structure of rural communities in concert with strategies that increase incomes can help households solve the problem of food insecurity. Partnerships among public health, community groups and university researchers in several states (North Dakota, Minnesota, and Iowa) have increased awareness and begun intervention projects that link the community environment and food access research to food insecurity and hunger interventions. The Iowa Department of Public Health has acknowledged the importance of linking the local food environment to food security over the last three years by providing more than $160,000 to extend research to local applications. Newly developed educational materials and a hunger Web site (www.extension.iastate.edu/hunger) in Iowa based on research findings are used by staff and volunteers in the four food banks covering the state and their local food pantry partners to assess food insecurity in their communities and have public dialogues about how to solve local food issues.

Daniel Otto – NE1011 – Dr. Otto's interests are in economic development, rural development, program and policy analysis, applied input output analysis, fiscal import analysis. The NE1011 project was designed to engage in outreach to the scientific community, the policy community and local citizens and decision makers, with investigators extending research results and seeking professional input into their research at professional meetings and through associated journals. As a project investigator with an extension appointment, this allows for direct input from and

feedback to economic development stakeholders, with significant research and policy results being shared with stakeholders via publications, reports, meetings, web sites, clientele training and policy and technical briefs.

Quality of Life:
Jan Flora – Dr. Flora specializes in the areas of community, agricultural, and rural change in the United States and in developing countries. He is a community extension specialist, assisting Hispanics and other immigrant groups to become more involved in their Iowa communities. Current research includes the role of social capital in rural U.S. communities, the impact of Confinement Animal Feeding Operations on natural, human, social, cultural, and financial capitals, and research on self sufficiency wages and the working poor in rural Iowa.

Beverlyn Allen – Dr. Allen's areas of interest include community studies and development, social organization and social inequality. Her research emphasis is on race, class and gender inequality with a particular interest in housing, female networks, and social capital in the community development process. She is currently focusing her research on homeownership among non-married women, housing and new immigrants in rural communities, and housing and social capital. She has been able to weave her extension program that focuses on community enhancement of leadership, group relations and organizational activities with her research inquiry into social injustice. She serves as the team co-leader for the Extension-to-Communities Leadership Program, and is a co-PI on The Horizons Community Leadership Program to Reduce Poverty, which helps communities build stronger leaders to address economic issues and find ways to implement change.

Grain Quality:
Charles Hurburgh – NC213 – The rapid expansion of the ethanol industry has changed corn marketing to include more local processing than in the past. However, as more corn is used locally for renewable fuel production, less is available for export, livestock feedstuffs and other processing. Currently, ethanol will consume about 44 percent of Iowa corn, which will grow to about 75 percent when all the projects under construction are completed, which makes the ethanol industry the major force in Iowa grain marketing. The consequences of increased local processing have affected grain transportation, on-farm grain storage and the structure of local elevators. This study collected data to indicate the scope of current and future impacts of ethanol production on Iowa agricultural logistics. Data is being combined with this study of Iowa's ethanol and co-product production capacities and storage capacities to create an overall picture of the impact of ethanol processing on Iowa agriculture. Processing and storage capacity, corn quality and consumption, and distribution of distillers grains were the main points of interest, but interview data also included plant managers' opinions about future industry needs in market development, transportation and logistics, and worker training. Related issues included securing adequate rail service for regular shipments of both ethanol and distillers grains and the potential for increased environmental regulations. The need for ongoing training for current and future ethanol plant workers was stressed by managers.

For additional information and to read the full study online, visit the Iowa Grain Quality Initiative Web site at www.extension.iastate.edu/grain or www.iowagrain.org.

Roger Ginder – NC213 – The transgenic crop, also known as genetically modified organism (GMO), debate has created many new issues for production agriculture. Most are not unique to transgenic crops; they are just the beginning of differentiated markets based on a wide range of new traits. Checklists have been developed to help producers with planting and financing decisions. Information is made available to stakeholders – both producers and industry professionals – via the Internet, Extension publications and training. The information includes discussions on premium payments for certified non-GMO grains, availability of marketing GMO grains nationally and internationally without a discount and the suitability of GMO grains for storage at grain elevator companies. Examples of other research topics available via the project include discussions of grain storage options, including an examination of various methods of contract storage with elevator companies. Work also looks into the financial aspects of the most secure options for farmers if an elevator company defaults on agreements or debts. Internet-based reference materials include research reports, fact sheets, bulletins, manuals, handbooks and slide presentations at local, regional and national organizations. Management approaches to meet customer needs for the identity preservation, certification and tracking of cereals and oilseeds in the evolving global market place of differentiated products also are provided under this work. Systems have been developed that provide critical information to grain processors that allows then to institute component pricing systems resulting in increase sales of U.S. grains. Work has shown that development of a system that tracks the origin and shipping history of bulk grains and how these systems allow producers and handlers to realize higher prices. Examples of work may be identified on Web sites, such as ISU's Ag Decision Makers, http://www.extension.iastate.edu/agdm/homepage.html.

Seed Science:
Manjit Misra – W1168 – Research is conducted on developing new technologies to assess seed germination, genetic purity and seed health. Studies are also conducted to optimize operations to improve quality, preserve identity and traceability. The research provides insight to causal agents and practical solutions to the problem. These research based solutions are then shared with the clientele annually through extension workshops, demonstrations, invited presentations, newsletters and through problem solving assistance in Iowa and the nation.

Sustainable/Organic Agriculture:
Kathleen Delate – See below under Smith-Lever Act Funds, Extension Program 147. Sustainable Agriculture.

Agricultural Economics:
Mark Edelman – Dr. Edelman is director of the Iowa Community Vitality Center (CVC), whose mission is to serve as a catalyst for innovative projects and initiatives designed to improve the vitality of Iowa communities. The CVC facilitates networking among small and medium size rural communities, sponsors policy analyses, engages communities in dialogue, and fosters discussion among rural and urban interests. Specifically, the CVC identifies policy topics of concern to rural communities; commissions research to analyze the priority policy topics and differential impacts of public policy on rural communities and rural areas; assesses best practices, lessons learned and performance of alternative strategies to improve rural vitality; and fosters collaborative public-private partnerships to engage rural communities and diverse rural and urban interests in dialogue. The Community Vitality Center is an independent policy analysis center established as a joint collaboration between Iowa State University and rural

community leaders representing diverse public and private sector interests from across the state of Iowa. Iowa State University Extension provides administrative support and serves as the fiscal agent for the Community Vitality Center and its projects.

William Edwards – His interests are in farm management, agricultural finance, and international agricultural development He specializes in teaching and outreach activities in farm business management, and has been active in small farmer development programs in Latin America and Eastern Europe.

Robert Wisner – His interests are in grain and oilseed market analysis, price forecasting, marketing, international trade in grains and oilseeds, agricultural policy, and risk management.

Iowa Beef Center:
Daniel Loy – See below under Smith-Lever Act Funds, Program 107. Iowa Beef Center.

Daniel Morrical – See below under Smith-Lever Act Funds, Program 107. Iowa Beef Center.

Farm Safety:
Charles Schwab – Dr. Schwab conducts research projects concerning agricultural safety and health issues. His research includes efforts in the area of granular mechanics safety, injury and fatality identification and analysis, and safety education and intervention methods. Current projects include reviewing the effectiveness of web-based delivery of tractor certification educational programming, paraprofessionals' perceptions of agricultural risks, and the magnitudes and characteristics of grain coefficient of friction on denim. As the extension safety specialist for the state of Iowa, Dr. Schwab provides leadership for Safe Farm, Iowa State University (ISU) Extension's program helping to make Iowa farms a safer place to work and live. The activities of the ISU Extension Safe Farm program are directed toward the following four major objectives: (1) Increasing farm safety awareness to encourage farmers to adopt safe farming practices, (2) Reducing the number of farm-related injuries and fatalities, (3) Enhancing the efficiency of ISU Extension to provide farm safety programming, and (4) Providing leadership and expertise for the development of farm safety programs. Dr. Schwab also cooperates with the Progressive Farmer's farm safety day camp program providing educational activities to over 50,000 youth and is the ISU Extension's lead coordinator for emergency preparedness.

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.
- 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.
- Distance learning programs and courses such as the Agricultural Management e-School(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.
2. Examining the impact of biofuel expansion on farmers' choice of cropping systems, investment portfolios and income.
3. Examining factors that influence entrepreneurial activities and firm growth within the agricultural sector.
4. Analyzing the process of opportunity recognition and assessment with an emphasis on agricultural and rural firms.
5. Examining the emergence and impact of contract farming in China and its implications for the transformation and competitiveness of Chinese agriculture.

Specific projects for FY06 include:

1. 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. Information from this project was incorporated into a series of financial and risk management educational programs offered by Iowa Women in Agriculture (IWIA), a new organization for women involved in managing agricultural enterprises. Directors of the IWIA participate in the design and implementation of these educational programs as well as the collection and analysis of farm management data. IWIA was established with assistance from ISU Extension and the USDA's Risk Management Agency.
2. 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.
3. A research project, undertaken initially at the request of the Iowa Soybean Association, examined the impact of the expansion of ethanol production in Iowa on cropping decisions and farm profitability. Results from this project indicated that a significant shift in acreage is possible as a result of the ethanol expansion. Soybean acreage could drop by a third -- a shift that would have significant impacts on the soybean industry's infrastructure and profitably. With the pace of current expansion, ethanol plants will be required to bid corn away from export, feeding and other uses. Information from this analysis was presented to soybean industry leaders. Presentations were also made at 2006 USDA Outlook Conference in

Washington DC, the annual meetings of the American Agricultural Economics Association as well as several national and state level conferences on biofuel expansion.

4. Four new research projects were initiated in FY06. All focus on the underlying process and impact of entrepreneurship and business creation within the agricultural sector. These projects are guided and informed by agricultural entrepreneurs, pubic officials and university administrators. One project examines the role of human capital, work experience and higher education on the incidence and success of agricultural entrepreneurship. Two projects, using case study research methods, will examine how and why individuals recognize distinct opportunities in response to common external economic shocks. These projects involve extension field staff in design, data collection and analysis. A fourth project looks at firm creation, growth, in- and out-migration in response to economic conditions and industry specific factors. This project has been undertaken, in part, because of concern voiced by the private sector on Iowa's business climate. It is expected that all of the research projects will produce data and results that will support Dr. Jolly's extension and teaching programs.

Dr. Jolly's research projects are driven by the needs of his outreach and teaching programs and, in most cases, involve direct interaction with stakeholders. In turn, the research results are directly disseminated through training and informational programs.

Program 103: Crop Nutrient Management

Antonio P. Mallarino (faculty member in Agronomy) activities focus on soil fertility and nutrient management issues with primary dedication to applied research and extension and a minor dedication to teaching and service (approximately 60% research and 30% extension, and 10% teaching and service). He has maintained an integrated research and extension program that addresses the plant availability of nutrients in soils, soil and tissue testing that improve assessments of nutrient availability in production agriculture, and nutrient management practices that improve the sustainability and environmental stewardship of Iowa cropping systems. Mallarino shares responsibility for establishing nutrient management guidelines, with specific responsibility for agronomic and environmental issues related to phosphorus, potassium, and support for the Iowa Phosphorus Index. He also develops policies of the Iowa State University Soil and Plant Analysis Laboratory and provides expertise to state and federal agencies (such as IDNR and NRCS) in charge of developing nutrient management guidelines and regulations. The activity integrates conventional research at research and demonstrations farms, an extensive on-farm research and demonstration program, and support to several Extension programs (such as the Crop Diagnostic Clinics of the Field Extension Education Laboratory, AgChem Dealer Updates, Crop Advantage Series, the Integrated Crop Management Conference, short courses, and CCA exam training). During this period, Mallarino established 30 conventional field trials at research farms and developed three on-farm research/demonstration projects involving 20 farmers' fields in cooperation with producers and agribusiness. The on-farm projects were (1) use of precision agriculture tools for improving potassium fertilizer management, (2) demonstration of phosphorus loss with runoff when using various manure and fertilizer sources, (3) poultry manure nutrients management. During this period, he gave 39 presentations to groups of farmers, consultants, or field extension specialists; authored or co-authored 5 extension articles or publications; published 7 journal or position papers; and published 14 technical reports or abstracts. There was significant collaboration with specialists from other states to arrive at improved regional agronomic and environmental nutrient recommendations. Mallarino

represented the Experiment Station at the regional committees of the Cooperative States Research, Education, and Extension Service (CSREES) North-Central Regional Committee for Soil Testing and Plant Analysis (NCERA-13) and Minimizing Phosphorus Losses from Agriculture / Information Exchange group (SERA-17).

Program 106. Commercial Greens Industry

Jeff Iles: Research projects led to improved methods of landscape plant installation, enhanced awareness of adapted landscape plant species, varieties, and cultivars, and the discovery of efficient and cost-effective management strategies that sustain landscape plants and reduce their dependence on fertilizers and pesticides. Integration between research and extension activities was achieved by rapidly disseminating this information to green industry professionals at Iowa Nursery & Landscape Association functions, the Iowa Turfgrass Field Day, Iowa Turfgrass Conference, ISU Shade Tree Short Course, Iowa Arborist Field Day, and the Iowa Community Tree Steward Conference. At each of these events, attention was drawn to the emerald ash borer (EAB), an introduced insect that continues to infest and kill native ash species in the upper Midwest (Michigan, Ohio, Indiana, and Illinois). The opinion held by most educators, researchers, and regulatory agency personnel is that it is time to discontinue the use of native ash (green, white, and black in particular) in our managed landscapes, and therefore, at each of the aforementioned training sessions, alternative tree species (to ash) were discussed. Because the emerald ash borer poses such a serious threat to trees in natural and managed landscapes, a significant portion of the 2007 ISU Shade Tree Short Course will be devoted to discussing the emerald ash borer, how it has negatively affected our neighbors to the east, and what our game plan will be if/when this insect is discovered in Iowa. An end-of-meeting questionnaire and follow-up survey (to be conducted during summer, 2007) will help us evaluate the effectiveness and quality of our programming.

Mark Gleason: During 2006, Gleason's lab (PhD student Zhihan Xu) monitored overwinter survival of sclerotia of the soilborne fungi Sclerotium rolfsii and S. rolfsii var. delphinii, causal agent of petiole rot disease of hosta, at sites in Iowa, North Dakota, North Carolina, and Georgia. Results showed clearly that S. rolfsii does not survive winters in the northern U.S., unlike S. rolfsii var. delphinii, and that both species of fungi survive winters in the southern U.S. This finding provides the first biological explanation for the apparent exclusion of S. rolfsii, an important pathogen of hundreds of crop and ornamental plants, from northern latitudes. The practical value of this research is that it suggests that growers in the Upper Midwest, including Iowa, do not need to worry that infestations of S. rolfsii originating from plant shipments from the southern U.S. will overwinter and infect crops in subsequent years, since the fungus is highly to die out before it can attack crops in late spring or early summer. Turfgrass research of Gleason's program consisted of fungicide trials on golf course greens and roughs. Diseases targeted in these field trials in summer 2005 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 2006. Finally, we obtained a second year of data in 2006 on performance of elm cultivars and species that are highly resistant to Dutch elm disease, as part of the National Elm Trial being held in 19 locations around the U.S. Results of this 10-year trial will be shared annually through the National Elm Trial's website.

Research Program 1. Food Crops

Extension Program 106. Commercial Greens Industry

Paul Domoto: Commercial fruit growers have gained information to remain competitive through the selection regionally appropriate cultivars and rootstocks and the adoption of techniques that encourage and reward early production, improved quality and sustainability. Information was distributed at events such as the Iowa Fruit and Vegetable Growers Association conference, Iowa Grape Growers Association conference and at regional extension seminars and workshops. Research plots are an important part of field days and shows growers how cultivars perform under local conditions and with improved facilities and techniques. Progress reports are prepared and published for the ISU Research and Demonstration Farms on and are made available on the Internet. A success of the program has been the timely dissemination of information to the growing grape industry now well more than 700 acres. The ISU Viticulture Home Page (http://viticulture.hort.iastate.edu/home.html) has been a major tool in that effort. With input from established grower/winemakers, two grape cultivars trials were created. A grant from the Leopold Center for Sustainable Agriculture for a grape cultivar management system trial was established at two sites with different soil and climatic conditions. That trial included 10 wine cultivars and five seedless table cultivars that are grown under three levels of pest management (calendar-based, IPM, organic approved). Also, a cultivar trial sponsored by a grant from the Iowa Grape Growers Association was created 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. These trials are now being funded through state wine tax dollars administered by an industry wine and grape commission. Results from these trials have reported at in-state and out-of-state grape conferences. The information also has been published in annual progress reports, posted on the ISU Viticulture Home Page and on the ISU Research and Demonstration Farms Web site (http://www.ag.iastate.edu/farms/). The plantings have served as examples for pictorial essays demonstrating planting a vineyard and installing a vineyard trellis that are posted on the Web, for developing videos demonstrations and for documenting several pest and cultural practices. The plantings serve as a valuable resource for individual growers to visit to observe the various cultivars, cultural practices, and to learn cultivar characteristics related to wine quality. In 2006, grapes from one site were made into wine by a commercial winemaker following standard procedures to evaluate the varietal characteristics and winemaking potential. The plantings also have served as a model for developing three interactive vineyard feasibility workbooks for estimating the cost to establish a vineyard under different training systems. These down-loadable workbooks are on the ISU Agricultural Marketing Recourse Center Web site (http://www.agmrc.org/agmrc/commodity/fruits/wine/wineryfeasibility.htm).

Program 107. Iowa Beef Center

Dan Morrical: Iowa Beef Center efforts in the grazing area in FY 2006 focused efforts to educate producers on improving their grazing management. I conducted a series of Grazing Days with state NRCS staff around the state. The targeted audience was producers who had received EQUIP grazing contracts. These meetings incorporated hands on pasture walks along with a large three ring notebook of reference materials. I serve as the Animal Science representative for Iowa Forage and Grassland Council and the Iowa Grasslands Initiative. I communicate producer problems in the grazing area to research faculty and assist them in developing projects to address those concerns. I also assisted with developing materials for a risk management workshops that involved the impact of increased grazing costs with competition for land in the bio-economy.

In response to the growing ethanol industry, a project was repeated to evaluate the use of self fed distillers to stocker cattle in a continuous grazing system. The objectives of this work were to demonstrate use of dried distillers grains in grazing systems and producing grass based finished cattle for a niche market. Evaluations of fatty acid composition of the cattle self fed distillers and grazing cool season pastures were performed. Cattle marketed from this system graded 64% choice. A private ultra sound technician evaluated the live animals for tenderness pre-slaughter. Tenderness estimates were compared to Warner Bratzler shear force. There was no correlation which is drastically different than information presented by the marketing firm. This data is being used to assist beef producers in making more informed decisions in regards to genetics for niche/grass based beef production.

Dan Loy: The ethanol industry is currently in the process of doubling. Approximately 30% of the capacity for ethanol production nationally is in the State of Iowa. 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 plants under construction and planning. A Spring 2005 Iowa Beef Center survey of Iowa beef producers identified this area as an important need for both research and education. This survey identified storage and delivery issues as primary limitations to the adoption of feeding corn co products in the diets of cattle fed in small to medium sized operations. Grants from the Leopold Center for Sustainable Agriculture and the Iowa Energy Center were secured to develop and expand an integrated research-demonstration-education program revolving around these issues.

Program 108. Iowa Pork Industry Center

Tom Baas: Intramuscular fat is an important quality determinant of pork. 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. As a result, research has been conducted at Iowa State University to overcome these problems by developing procedures to estimate intramuscular fat in live pigs using real-time ultrasound. Pigs at the ISU Swine Breeding Farm were used to develop the original model. Additional pigs from two different projects were used to test and validate the model for accuracy of prediction. Procedures used were described in a paper published in the Journal of Animal Science and details of the prediction model were published in the ISU Animal Industry Report. A private company, Biotronics, Inc., has utilized the prediction model to develop software and make it available to the swine industry. Three training programs for technicians have been conducted jointly by Biotronics, Inc. and Iowa State University. The two leading seedstock companies in the U.S. are using the software and it is also being used in three foreign countries. In addition, the software is being used in an ongoing selection project at ISU. 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 feed costs rise and profit margins become very thin. In order for a commodity pork producer to survive, they must address all avenues possible to reduce their cost of production while maintaining throughput. Two such areas that have not been addressed are: a) from a genetic

standpoint in reducing non-productive sow days (NPSD) through genetic selection; and b) from a technology standpoint, an affordable sow reproductive data management system is essential. Non-productive sow days occur when a sow is in the herd, but is not in a stage of production of product. Examples of NPSD are the interval from weaning to estrus, the interval from entry to service, days open due to an unsuccessful mating. The sows incur feed costs, fixed costs and labor costs, but are not producing any product to pay for these costs. Reduction in NPSD will lower the cost of production and therefore increase profit. This reduction can come from a genetic origin or from a management origin.

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. Recently, the cost of these reproductive data management software packages has risen dramatically, resulting in many producers dropping the software packages. Dr. Mabry has worked with contracted programmers to develop an affordable, sow reproductive data management software, Sow Tracker, that will insure producers have an affordable data management option to manage the sow herd, and to extract data for genetic improvement.

The next step was to utilize mixed model technology to estimate the genetic variances and covariance 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 0.10 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. This phase of the project has now extended to pork producers in SE Iowa, Central Iowa, and NC Iowa.

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. Recently, Dr. Mabry was asked for access to the BLUP genetic evaluation programs by programmers of several popular swine reproductive data management systems. Their goal is to include the BLUP Sow Indexing as a module within their software systems. He is now working with them so the technology will have easier access by the commodity pork industry.

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

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

Robert Hartzler: The interactions between preemergence herbicides and the timing of postemergence herbicide application timing on early-season weed competition and weed control in soybean were investigated across Iowa. The introduction of herbicide resistant crops has led to an increased 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. In 2005 experiments were conducted at three ISU Research Farms, whereas in 2006 on-farm field experiments were conducted in cooperation with four agricultural chemical dealers. Cooperating agronomists located fields for the trials and selected the preemergence product to be used in the individual experiments. Results from the small plot and on-farm studies were consistent, demonstrating that under many conditions (6 out of 7 experiments) soybean can tolerate early-season competition until the V6 stage of development without suffering yield losses. However, an inability to predict the developmental stage when yields begin to impact yields creates risks for farmers relying on total postemergence programs since yield losses can accumulate quickly once the competition begins. Several benefits of preemergence herbicides were identified, including reduction in early-season growth of weeds, thus reducing the risk of early-season competition prior to postemergence application. Preemergence herbicides were also effective at the selection pressure placed on weed communities by glyphosate, reducing the number of weeks controlled by glyphosate by 40 to 95%, depending upon the species sensitivity to the preemergence herbicide applied.

The primary delivery of research results for Dr. Hartzler 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.

Stephen Barnhart: Dr. Barnhart is a Forage Production and Management Specialist. Forages are integral to crop, livestock and conservation enterprises in Iowa. During FY 2006 he contributed forage species and management recommendations and experimental treatment suggestions in several on-going, cooperative research projects with Iowa State University colleagues and with private producers. He also served as Principal Investigator on applied research projects. Extension clientele are included in: research planning discussions, the selection of study treatments, and, they serve an important role in advising during the development of educational

materials and Extension outreach programs. One example of stakeholder involvement is an ongoing 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. The prairie enthusiast's 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 amount of forage that can be harvested while prairie species are establishing. Dr. Barnhart, members of the Iowa Prairie Network , and cooperating ISU Research Farm staff and cooperating private farmers completed the second seasons on this project in 2006. Only limited data have been collected to-date. It has been found that in an effort to determine the feasibility of the opposite scenario, establishing an alfalfa or red clover stands in an existing prairie planting, some of the prairie species are quite productive in the spring. It is possible that the correct proportions of native species included in the 'prairie mixture may also provide a cropping system that can produce a harvested forage crop while maintaining the soil, water and wildlife conservation benefits of a diverse prairie. 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 project. The findings will be of interest to a wide array of private and public organizations and agencies with an interest in prairie restoration in the Midwest U.S.

Mark Hanna: Iowa and Midwestern soybean growers have expressed serious concerns about application techniques if and when Asian Soybean Rust arrives from the U.S. Delta region. Statistical analysis was completed on first year results and field measurements continued for a second year on foliar fungicide application to soybeans. Plots were established and six different treatments were applied at Boone and Chariton. First year results were shared with stakeholders and presented in an invited paper at the international American Society of Agricultural and Biological Engineers meeting. Discussions were held with representatives of the Jacto Company who donated an air-assisted sprayer for use in the trials. I attended a national meeting of the EPA Drift Reduction Task Force on testing of application technology.

Information from foliar fungicide application trials was presented to 196 growers and agricultural professionals at a northwest Iowa field day. Application techniques were shared at field ag engineers' in-service training. Two visits by colleague Dr. Erdal Ozkan at Ohio State were coordinated to share additional information with Iowa applicators. National consultants from both government and industry solicited advice on application equipment use. Press material was supplied to a national magazine (Progressive Farmer), regional newspaper in Sioux Falls, SD, and via the Integrated Crop Management newsletter.

A major portion of pesticide application work is done as a part of Extension's Pesticide Management and the Environment (PME) group. Major emphasis is given to application equipment techniques including drift reduction and calibration. Commercial applicators are strongly targeted as multipliers of appropriate practices over large acreages. Commercial training was coordinated for both aerial applicators (responsible for large areas, about 100,000 acres each) and seed treatment (a rapidly growing audience of 677 applicators). Video was shot for future seed treatment training and continuing instruction in seed treatment was coordinated for four summer workshops at the Seed Science Center. Equipment leadership responsibilities in

other categories of commercial application resulted in training 781 applicators in agricultural, roadside, weed, forestry, aquatic, and turf areas. I led discussion on private applicator training with field crop specialists and participated in a statewide review of the program and day-long PME staff retreat.

Marlin Rice: Extension efforts were integrated with applied research during 2005-2006 using a broad array of delivery techniques.

1. Approximately 30 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/. Additionally, I have served as the Executive Editor (or similar capacity) of this Extension publication for 18 years.
2. Results from current research and field observations on pest populations were presented on three different topics at the Integrated Crop Management Conference. These included 1) biology and management of western bean cutworm in corn, 2) performance of neonicotinoid insecticides, and 3) corn rootworm biology. 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.
3. A total of 33 Extension clinics or workshops were conducted which presented applied research information. Most of these meetings were under one of two Extension banners: Crop Advantage Series or Ag-Chem Dealer Meetings. Here corn and soybean producers and agri-business professionals were presented crop management information and given opportunities for interaction and discussion.
4. Educational information was delivered in 5 extension publications. These focused on 1) soybean aphids in Iowa, 2) controlling corn insect pests with Bt corn technology, 3) field scouting manual, 4) western bean cutworms, and 5) neonicotinoid insecticides. 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.
5. There were 3 contributions to the popular farm press and 26 presentations on radio relating to insect pest management in Iowa.
6. Fourteen presentations of a novel new series “BugCast with Marlin Rice” were delivered via the World Wide Web and available free through Extension Communications and iTunes in the iPod format. These are the first insect related or integrated pest management podcasts to be developed and delivered in the United States.
7. Research with an Extension focus was conducted on the bean leaf beetle/Bean pod mottle virus pest complex problem. Research was initiated as a result of soybean farmer concerns about losses in yield quantity and quality resulting from these two pests. Research was partially funded by a grant from Pioneer Hi-Bred to address management strategies to improve seed quality, particularly in seed beans.

   Research on western bean cutworm research was initiated based upon corn grower and agribusiness concerns about the expanding range of this insect through the Midwest and its

damage potential to both traditional corn hybrids and some transgenic corn hybrids. Research was partially funded by grants from Syngenta.

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 2006 included three “Transitioning to Organic” field days and a 15-session “Iowa Organic Conference” reaching 525 farmers and ag. professionals total. Partners in these activities included Extension, USDA-Natural Resources Conservation Service (NRCS), Risk Management Agency (RMA), and the Iowa Department of Agriculture and Land Stewardship. Four meetings with organic advisory committee and producer stakeholder groups helped focus research and extension plans in FY 06. 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 such as the Organic No-Till System from the Rodale Institute. A total of 18 presentations at Extension/research meetings and field days reached an additional 1,333 agricultural professionals in all sustainable agriculture programs in FY06. Impacts of these integrated research and Extension activities included adoption of organic practices, leading to increases in soil quality, including soil organic matter and aggregation increase, and an increase in farm income from premium prices for certified organic crops.

The ISU Organic Ag webpage: http://extension.agron.iastate.edu/organicag/ continues to be an excellent venue for dissemination of sustainable/organic agriculture information. The USDA Organic Ag. Consortium website, OrganicAgInfo: http://www.organicaginfo.org/ also contains research and Extension information from the ISU Organic Ag. Program.

Integrated activities for Dr. Delate, such as those described above, represented about 70% of her total time and accounted for a salary expense of $44,100 during FY2006.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)
Fiscal Year: 2006

Select One: ☐ **Interim** ☒ **Final**
Institution: Iowa State University
State: Iowa

	Integrated Activities (Hatch)		Multistate Extension Activities (Smith-Lever)		Integrated Activities (Smith-Lever)	
Established Target%	7.86	%	0.75	%	5.00	%
This FY Allocation (from 1088)	$5,831,582		$9,061,653		$9,061,653	
This FY Target Amount	$ 458,362		$ 67,962		$ 453,083	
Title of Planned Program Activity						
Food Crops	$ 27,093		0		0	
Crop Production and Management	4,909		0		0	
Animal Physiology	13,295		0		0	
Animal Genetics	62,227		0		0	
Agricultural Risk Management	47,146		0		0	
Soil Resources Management	4,057		0		0	
Animal Waste Management	3,102		0		0	
Rural Development	77,198		0		0	
Quality of Life	38,460		0		0	
Grain Quality: Marketing & Delivery	72,431		0		0	
Seed Science	13,732		0		0	
Beginning Farmer Center	65,572		0		0	
Farm Safety	11,116		0		0	
e-Xtension	0		66,954		0	

	Integrated Activities (Hatch)	Multistate Extension Activities (Smith-Lever)	Integrated Activities (Smith-Lever)
NASULGC/NELD	0	$ 16,548	0
North Central Regional Center for Rural Devel.	0	2,553	0
Directors (national & regional responsibilities)	0	0	0
Agriculture & Natural Resources Extension Prog.	0	28,346	0
Families Extension Program Director	0	10,375	0
4-H Youth Extension Program Director	0	10,368	0
Directors of Extension	0	10,721	0
Programs 101/104: Strategic Advantage/Ag Financial Management	0	0	$ 22,679
Program 103: Crop Nutrient Management	0	0	5,659
Programs 7 & 104: Commercial Greens Industry	13,694	0	96,643
Program 107: Iowa Beef Center	29,290	0	121,019
Program 108: Iowa Pork Industry Center	0	0	85,565
Programs 22& 142: Integrated Pest and Crop Management	28,427	0	184,945
Programs 20 & 147: Sustainable Agriculture	4,204	0	31,913
	0	0	0
Total	$ 515,953	$ 145,865	$ 548,423
Carryover			

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

Director **Date**

Form CSREES-REPT (Revised 09/04)