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 2001
(October 1–September 30)

Table of Contents

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:

- 237 Refereed Publications, Research Papers, Manuscripts
- 235 Non-refereed Publications, Reports, Technical Papers
- 345 Proceedings, Published Abstracts
- 153 Extension Publications
- 276 Invited Presentations
- 525 Education Programs, Field Days, Tours
- 55 Books & Chapters
- 10 Patents
- 38 Theses, MS/Ph.D Programs Completed

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

The ethylene inhibitor 1-Methylcyclopropene was found to delay the ripening of pink and light red stage tomatoes by one to four days, but when less mature tomatoes were treated, the effect was irreversible and the tomatoes would not ripen. Controlling the ripening of tomatoes would extend their postharvest shelf life, and thereby allow producers and handlers of tomatoes to reduce the postharvest loss from about 10 to 30% to a more reasonable 5 to 10%. Such a reduction would allow more food to get to the consumer, keep fresh market tomatoes affordable, and contribute to better nutrition for society members.

Two genes that control potato tuber formation have been identified, partly characterized, and shown to interact with one another. When overexpressed in transformed plants, both genes enhanced tuber production. The biological significance of these genes and their interaction in controlling potato tuber growth may potentially lead to enhanced yields, and could shorten the time necessary for field cultivation of potatoes.

Food and non-food value-added products using soy protein were developed. In the non-food area, these investigations have led to the development of soy-protein-based adhesive technology that has been patented and is currently being commercialized. In the food area, the functionality of low-fat, soy-protein flour manufactured using extruder-expeller technology, and the applications of the flour in a cake doughnut formulation and as a textured soy protein replacement for ground beef in hamburger were determined.

A natural and low-cost refining method for mechanically pressed soybean oil was developed. This technique can be adopted by local processors to produce value-added and gourmet soybean oils.

Hydrogenated soybean oil was proven to be a suitable alternative to petroleum paraffin in decorative and aroma-therapy candle applications. The research demonstrated that the soy wax candles are cleaner burning and that the physical properties of soy wax can easily be modified by composition modification. This allows further entry into various niche markets for a participating Iowa company.

A study identified a new antioxidant that is about ten times more effective in stopping the oxidation of vegetable oils than traditional phenolic antioxidants. Its structure was established. It can be produced very inexpensively and should facilitate the use of vegetable oils in industrial uses.

Eleven soybean specialty varieties were released to seed producers: five have large seed, one has large seed and high protein, and five lack the lipoxygenase enzymes responsible for the beany flavor of soybean seed and protein products. These 11 soybean varieties were developed by traditional breeding methods to serve the food industry and for where genetically engineered traits are not acceptable.

Establishing warm-season grasses in pastures improves the efficiency of forage growth for livestock. Addition of legumes to grass pastures improves forage quality and reduces use of nitrogen fertilizer.

A system was developed to study Two-Stage anaerobic digestion of corn stover to methane. Studies of anaerobic digestion of corn stover to ethanol, acetic acid, glycerol, and lactic acid were continued using various inhibitors of sugar metabolism. A system was developed to ferment raw sugar beets for ethanol. The process yielded the equivalent of about 8000 L/ha of ethanol. More efficient methods of producing chemicals from agricultural biomass will increase the value of farm products.

A comprehensive problem-solving and decision-support system has been developed to improve analyses, simulation and visualization of field-scale impacts of precision agriculture practices on environmental quality and crop productivity. The decision support system includes an economic modeling component that can be used for risk-based assessment of effects of variable rate application on productivity and profitability of the farm operations.

Turf injury may be avoided by selecting the proper tarp color. Tarp manufacturers will respond by developing new and improved tarps to meet this market demand.

Traits of Acer nigrum we identified will serve as the basis for selecting superior genotypes for use in managed landscapes. Protocols we established for the propagation of Rhamnus caroliniana will permit growers of this U.S.-native species to develop clones with desirable traits.

Developed, patented, licensed and commercialized a synthetic skin targeted to reduce mastitis during the dry period. Field trials have shown a > 60% reduction in major mastitis infections at calving. This synthetic skin has also been shown to be as effective as prophylactic antibiotics in preventing early dry period infections.

Feeding 25-hydroxyvitamine D3 prior to slaughter improves tenderness of beef. Feeding vitamin D3 or its metabolite may be a strategy the beef industry uses to reduce the variability of tenderness of beef at the meat counter.

Real-time ultrasound technology, which allows evaluation of the live animal, can be used 1) to scan beef herd progeny for body composition information used to quantify the genetic attributes of compositional traits, and 2) to scan pigs and, using a model to predict intramuscular fat, allow breeders to select on this important trait.

Programs developed for swine are currently used as the basis for national genetic evaluation. This directly impacts 40,000 purebred animals that have the potential to control the genetic improvement for 1 million sows and 16% of the market pigs in the US, at an annual income of over $2 billion/year and a multiplier effect on rural communities.

Organic rotations, which included corn-soybean-oats-alfalfa, produced equivalent yields to conventional corn/soybean rotations. Longer crop rotations, which included small grains and legumes, provide yield stability, improved plant protection, enhanced soil health and economic benefits, compared to conventional systems with shorter corn/soybean rotations and greater off-farm inputs.

Research found switchgrass has significant potential as a bio-energy product as compared to alfalfa, reed canary grass, and big bluestem. It has similar biomass potential with sweet and forage sorghums but is less stressful on the environment. Bio-mass is marginally competitive with fossil fuels at the current time, but has some potential for special or niche markets.

Members of the department have developed an Advanced Grain Marketing Course that is delivered over the WEB. The course utilizes the results of recent research on appropriate risk management strategies. The course has modules teaching the essentials and also more advanced topics related to the marketing of grain products through cash, forward, futures and options markets. The course provides interactive discussion as well as asynchronous delivery. Well over 100 producers have participated in the course to date.

Assessment of accomplishments as measured against POW:

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

- reduced crop and postharvest product losses, ①
- more efficient use of agricultural chemicals, ⑧⑩❼
- yield gains through genetic improvements, ②⑦❺❻
- new products and applications, ③④⑤⑥⑨❸❽
- improved quality and consistency of products, and ❶❷❹❺
- a better understanding and adoption of appropriate risk management practices. ⑩❾

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 $ 11,479,817

FTEs 79.0

Key Theme – Adding Value to New and Old Agricultural Products

Program 1: Food Crops

a. Description of activity

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

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

b. Impact/accomplishment –

Short-term:

- Cultivar trials and field-based cultural studies have resulted in better recommendations that have allowed the Iowa fruit and vegetable industry to remain competitive.

    - Cultivar trials were conducted for bush beans, broccoli, and bicolor sweet corn in 2001. Trials continue in the evaluation of asparagus, scab-immune apple, strawberry, and blueberry cultivars, and cooperation in the national potato germplasm evaluation. These trials have identified cultivars that are productive and well adapted to Iowa growing conditions. The field plots offered growers the opportunity to observe cultivars under local conditions at field days and other visits. Results are reported on at grower meetings, made available through annual progress reports, and serve as the basis for state and multi-state recommended cultivar lists.

    - As consumers become more safety conscious and environmentally aware, and apple growers look to cut production costs, scab-immune apple cultivars offer the potential for satisfying everyone's concerns. However, little is known about the adaptability, productivity, and consumer acceptance of these new cultivars and advanced selections. A trial was established to evaluate 13 new cultivars and selections, after nine growing seasons, Gold Rush, Liberty, Freedom, Redfree, and Jonafree have been the most productive, while 'Coop28', 'Coop 27', 'Coop 29' and CLT13T40 have been the least productive.

- To meet a sudden demand for information on grape growing, a major outreach effort was initiated in 2001. This included an intensive workshop with out-of-state speakers, a series of regional meetings addressing seasonal cultural practices, and the development of a web site. These efforts directly reached over 300 potential growers, and the web site was accessed over 28,000 times. Approximately 105 vineyards were established or expanded in 2001, and at a startup cost of over $4,500 per acre, these outreach efforts probably saved each grower at least $2,000 in startup costs through the avoidance of common mistakes.

- Because of the lack of an abundant water source, many Iowa vegetable growers are utilizing micro-irrigation (drip/trickle) to supplement water needs during dry periods. However, few guidelines were available for scheduling irrigations needs in a semi-arid environment. A study evaluating several scheduling methods showed that soil tensiometers were effective in determining irrigation needs, and were most likely to be accepted by growers. Through the use of tensiometers, growers using micro-irrigation can sustain crop quality and minimize water use.

- The use of the ethylene inhibitor 1-Methylcyclopropene was found to delay the ripening of pink and light red stage tomatoes by one to four days, but when less mature tomatoes were treated, the effect was irreversible and the tomatoes would not ripen. Controlling the ripening of tomatoes would extend their postharvest shelf life, and thereby allow producers and handlers of tomatoes to reduce the postharvest loss from about 10 to 30% to a more reasonable 5 to 10%. Such a reduction would allow more food to get to the consumer, keep fresh market tomatoes affordable, and contribute to better nutrition for society members.

Long-term:

- Two genes that control potato tuber formation have been identified, partly characterized, and shown to interact with one another. When overexpressed in transformed plants, both genes enhanced tuber production. The biological significance of these genes and their interaction in controlling potato tuber growth may potentially lead to enhanced yields, and could shorten the time necessary for field cultivation of potatoes.

a. Source of Federal Funds—Hatch

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

Program 29: Value Added Agriculture

a. Description of activity

This program has the following goals: 1) developing food and industrial value-added products from agricultural materials, including low-value commodities and waste streams; 2) improving the quality, safety, and efficiency of production of these commodity and processed products to improve their value in the marketplace; and 3) conducting technology transfer

activities that, ultimately, increase rural development, employment, and the profitability of growers.

b. Impact/accomplishment -

Short-term:

- The functionality of soy protein from different seed varieties (both value-enhanced and genetically modified) manufactured using both traditional and nontraditional processing methods was evaluated. Food and non-food value-added products using the protein were developed. In the non-food area, these investigations have led to the development of soy-protein-based adhesive technology that has been patented and is currently being commercialized. In the food area, the functionality of low-fat, soy-protein flour manufactured using extruder-expeller technology, and the applications of the flour in a cake doughnut formulation and as a textured soy protein replacement for ground beef in hamburger were determined.

- Contamination of minimally processed fresh produce with human pathogens is a major food safety problem. Using a sanitizing agent of sodium hydroxide/sodium bicarbonate solution significantly reduced numbers of *Salmonella* bacteria on the surface of the outer rind of cantaloupe.

- A natural and low-cost refining method for mechanically pressed soybean oil was developed. This technique can be adopted by local processors to produce value-added and gourmet soybean oils.

- Hydrogenated soybean oil was proven to be a suitable alternative to petroleum paraffin in decorative and aroma-therapy candle applications. The research demonstrated that the soy wax candles are cleaner burning and that the physical properties of soy wax can easily be modified by composition modification. This allows further entry into various niche markets for a participating Iowa company.

Long-term:

- Soybean farmers are interested in increasing the industrial use of soybean oil in inks, lubricants, fuels, etc. The chief barrier to the use of soybean oil as a lubricant and industrial fluid is that it oxidizes readily and increases in viscosity. Antioxidants, usually phenolic compounds, are often added to oils to decrease their rate of oxidation. A study identified a new antioxidant that is about ten times more effective in stopping the oxidation of vegetable oils than traditional phenolic antioxidants. Its structure was established. It can be produced very inexpensively and should facilitate the use of vegetable oils in industrial uses.

- The innovative use of composting as a “biological drying technology” is progressing as a way for researchers and industry experts to develop systems for the value-added conversion of high-moisture wastes into building materials and other dry products.

- Continued development of biodegradable plastics from soy protein, having good performance characteristics and a competitive price, progressed on to blends incorporating poultry feather waste and synthetic biodegradable polymers.

- Microbial contamination of locally produced apples and apple cider is being surveyed to reveal baseline data on the number and types of organisms present in the products, and dictates what processing conditions are needed to increase the safety of these products.

a. Source of Federal Funds—Hatch

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

Key Theme – Plant Genomics

Program 3: Fundamental Plant Sciences

a. Description of activity

This program continued towards its overall goal of determining the fundamental biochemical processes of crop plants that contribute to their utility as foods and industrial raw materials. The two major thrusts of the program during the current reporting period were: 1) exploiting gene discoveries to learn more about the chemical mechanisms that control pathways of metabolism in plants and 2) developing a novel technical infrastructure that will allow new types of insights into plant metabolic pathways.

b. Impact/accomplishment –

As a fundamental research project, we envision that basic information obtained in the program will supply a larger information base that in the long run will be used for the design of plants with particular production capacities. An example is the goal of engineering corn plants so that the starch they produce has particular structural features that would improve desirable traits, for example, digestibility or reduced cost of conversion to fuel ethanol. The accomplishments of this project provide clear knowledge that one means of altering starch structure is to alter the activity of particular starch debranching enzymes. It is not within the scope of this project to try to design particular starches, because additional issues such as yield, production methods, and associated agronomic traits all must be considered in the overall application. Our accomplishments, however, provide a specific knowledge, and materials, such as cloned genetic elements, that could be used in the future by a design team charged with developing novel crop varieties to meet specific needs. The same series of analogies can be applied to the focus of the project on lipid production, with the overall agronomic goal in large-scale crop design programs being increased yield from oil seed crops. Thus, the outcomes of the project are best described as an increased knowledge base from which future crop design programs can draw fundamental required information.

Short-term:

- One success story from the project is the ability to use genetic modification of crops to alter the structure of starch. Our previous work has found that starch debranching

enzymes affect the structure of the storage compound. Even though we do not yet know the chemical mechanism that explains this effect, we have tried to exploit the observation by altering expression of the enzyme in transgenic plants. We have constructed a series of transgenic maize lines that display spectrum in the debranching enzyme gene expression, from a very low percentage of the normal activity to approximately double the activity found in wild type plants. Using the metabolism analysis facility (described below), we have found that the transgenic plants display altered starch structures, some of which have not been seen previously in naturally occurring maize variants. Thus we have used fundamental plant science information to provide potential new products of agronomic application. Much work remains to be done to determine whether these new variants are of particular use in the starch industry. Regardless of whether this is true, however, the establishment of the principle that starch debranching enzymes can be used to alter starch structure should be viewed as a success.

Long-term:

- One of the major fundamental plant science questions addressed is how the architecture of starch molecules is determined. The structure of starch is critical for its agronomic applications as a food and as a renewable source of industrial raw material. In the past year the project has focused on learning how the products of those genes function at the chemical and molecular level in starch metabolism. Among the facts that were determined is that a certain starch debranching enzymes functions both in the degradation of starch, as would be expected, and also in the biosynthesis of starch, which is a result that was not obvious prior to these experiments. Although this research has provided new insights into some of the mechanisms that control starch architecture, the complexity of the problem has become more evident.

- Work in the previous reporting period focused on isolation of genes involved in production of acteyl-CoA, which is the precursor of the lipids that make up plant oils. One unanswered question is the site of synthesis of acetyl-CoA within plant cells. This question is significant because acetyl-CoA synthesis is the rate-limiting step in oil production, and so future manipulation of plants to increase oil yields will require understanding of the cellular mechanisms that are used in this metabolic pathway. Work in this project determined that the enzyme pyruvate dehydrogenase is responsible for production of acetyl-CoA in the chloroplasts. This pool of acetyl-CoA was determined to be responsible for production of lipids and oils. The project also learned that the enzyme ATP-citrate lyase is responsible for production of acetyl-CoA in the cytoplasm. This alternative pool of acetyl-CoA fuels the metabolic pathways that lead to production of many important secondary metabolites in plants. The fact that separate pathways form to these two distinct pools of metabolic precursors is a new contribution to our understanding of plant metabolism.

- Significant accomplishments were made in the establishment of an analytical facility focused on new methods of characterizing plant metabolism. A multi-user instrumentation facility was established and during the reporting period it began to acquire instrumentation and apply the new methods. One instrument is a capillary electrophoresis device designed for the determination of the distribution of the lengths of

glucan chains in starch molecules. This analysis has been of wide use in the starch industry, however, the new facility allows its application to a much larger number of samples than was previously possible. The quantity of starch required is also much reduced. Thus, the amount of structural data that can now be obtained in the project has increased greatly. Now we can turn our aims towards combining this technical capacity with the previous work on gene cloning and biochemical analysis, so that refined modifications of specifically designed starches can be considered as a future targeted outcome of the project in Fundamental Plant Sciences.

a. Source of Federal Funds—Hatch

b. Scope of Impact—State Specific

Key Theme – Plant Germplasm

Program 4: Plant Germplasm

a. Description of activity

This program focuses on germplasm, the basic resource for plant improvement. Major objectives are to: 1) increase the genetic diversity available for basic and applied plant science research, 2) increase the germplasm base of the major U.S. crop species to reduce the chances of devastating crop losses due to either biotic or abiotic stresses, 3) develop and enhance elite germplasm resources to provide private and public breeding programs a greater array of elite germplasm for cultivar development, 4) improve germplasm to ensure systematic genetic advances of newly developed cultivars, 5) enhance specific plant and seed traits to permit alternative uses of the major crop species, and 6) provide unbiased data of corn hybrids available to Iowa producers.

b. Impact/accomplishment -

Short-term:

- Eleven soybean specialty varieties were released to seed producers: five have large seed, one has large seed and high protein, and five lack the lipoxygenase enzymes responsible for the beany flavor of soybean seed and protein products. These 11 soybean varieties were developed by traditional breeding methods to serve the food industry and for where genetically engineered traits are not acceptable.

- B115 was released for use in corn breeding programs because of resistance to foliar leaf diseases and feeding by the European corn borer.

- 2001 was the 82nd consecutive year ISU and the Iowa Crop Improvement Association provided data to growers for 564 corn hybrids from 64 brands grown in 7 districts. Data are on the web at http://www.agron.iastate.edu/icia/.

Long-term:

- The North Central Regional Plant Introduction Station conserves more than 47,000 unique plant populations (accessions). In 2001,

  - 300 new accessions were acquired and 1859 were cultivated for regeneration.

  - A tall-biomass, non-shattering Amaranth line and two non-shattering grain amaranth hybrid populations were released.

  - A project was completed which integrated isozyme profiles with molecular and morphological data to classify New World popcorn races.

  - A pathogen (Pythium sp.) causing amaranth stem canker and lodging in Midwest production areas was identified, and resistance screening methods are being developed.

  - Research on quantitative ELISA determinations of Stewart's wilt infection of maize seeds was completed.

  - A three-year effort to collect descriptor data for Echinacea was completed.

  The characterization, evaluation, enhancement, and conservation of plant genetic resources contribute to increased varietal diversity and performance for growers. By discovering and developing natural sources of pest resistance, and of new food, feed, nutriceutical, medicinal and industrial products, we contribute to a more diversified agriculture and an increasingly biobased economy. Improvement of phytosanitary detection procedures aids in the validation of seed-health testing protocols and development of statistically valid sampling procedures. Development of analytical tools and methods to assess potential invasiveness of species assists in preservation of native flora while identifying new, useful germplasm for agricultural and horticultural varietal development. Research on alternative pollinator insects for use in germplasm regeneration increases the array of insect biodiversity we can effectively use to conserve and manage plant germplasm, while better managing our financial resources. Development of characterization and evaluation information, when transferred via public databases and publications, increases the value of the germplasm collections provided to researchers and enables them to better target their endeavors, increasing their probability of success. By increasing the quantity and quality of diverse plant genetic resources and associated information publicly available to researchers and educators, we enhance the opportunities to derive social and economic benefits.

a. Source of Federal Funds—Hatch

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

Key Theme – Agricultural Profitability

Program 5: Crop Production and Management Strategies for Iowa

a. Description of activity

- *Identify genetic material or biochemical pathways that help crops maintain dry matter production or limit loses when growing under stressful environmental conditions.* Gene expression in response to frost stress was compared in healthy seedlings and in seedlings germinated from frost-stressed seed. Nearly 100 gene fragments were expressed differently in seedlings from frost-stressed seed. A study of seedling abnormalities associated germination from low seed moisture contents (imbibitional injury) showed that germination percentage increased with increased seed moisture content.

- *Conduct field experimentation of basic production research using modern varieties or cultivars growing in different environments and soils.* Application of seed fungicides improved yields of soybeans planted in March and April. Field studies showed that kernel number per plant is determined by plant growth rate during the flowering period in corn.

- *Alter seed chemical composition to increase marketability.* Sampling of seeds from genetic lines varying in seed protein content is complete. RNA has been extracted in preparation for gene expression (microarray) analysis. Amplification soybean EST clones from the public EST database has begun. Replicated experiments testing the response of seed composition (protein, oil, and starch) to temperature during seed filling are completed. A preliminary metabolic flux model was developed to examine interactions between genotype and temperature, which influence accumulation of seed components. Soybean transformation to alter seed protein accumulation continues on schedule. New software algorithms were developed for analyzing gene expression profiles.

- *Identify and characterize factors that limit the nutritive value of forage grasses and legumes.* A system was developed to study Two-Stage anaerobic digestion of corn stover to methane. Studies of anaerobic digestion of corn stover to ethanol, acetic acid, glycerol, and lactic acid were continued using various inhibitors of sugar metabolism. A system was developed to ferment raw sugar beets for ethanol. The process yielded the equivalent of about 8000 L/ha of ethanol.

- *Develop systems and strategies for improving the seasonal distribution and utilization of forages.* Enzyme-enhanced ensilage of corn stover holds promise for biomass storage and pretreatment to shift biomass hydrolysis to the storage phase. Remote sensing tools were tested as a way to identify field variability and reduce sampling needed to depict the variability observed with remote sensing tools. Precision agriculture technologies were used to characterize spatial variability in species composition across four cool season grass-legume pastures.

- *Understand the basic biology, biochemistry and molecular biology of seed dormancy.* Polyamine profiles of maize seedlings were characterized to determine the relationships between profiles and various stresses that affected seedling development. Studies are underway to develop screening protocols for cold tolerance, investigate the role of stress and genotype on the respiratory transition during seedling growth, and assess gene expression during cold acclimation.

- *Understand the influence of the seed production environment on seed quality and dormancy in a range of crop and forage species important to Iowa.* Fourteen maize

accessions native to the arid and semiarid U.S. Southwest and one check population were grown for morphological, phenological, and disease susceptibility ratings and seed increase. A protocol was developed to evaluate the capacity of these cultivars to emerge from extraordinary soil depths under controlled conditions.

a. Impact/accomplishment –

Short-term:

- Earlier planting of soybean increases producer options for managing spring planting. Knowledge of plant factors limiting yield provides greater accuracy of early season yield-predictions models.

- Establishing warm-season grasses in pastures improves the efficiency of forage growth for livestock. Addition of legumes to grass pastures improves forage quality and reduces use of nitrogen fertilizer.

Long-term:

- Knowledge of gene expression will lead to improved management of frost injury in commercial seed corn. Awareness that media used for testing the germination of the seed can influence the germination test results can help seed producers deal with problems caused by low-moisture seed by using the most accurate test.

- Understanding the basis for effects of low temperature stress on maize stand establishment forms the basis for ameliorating these problems, and future studies aimed at plant signaling mechanisms and signal cascades.

- Identifying genes controlling seed composition will speed the development of soybean genotypes with valuable seed components. Such genotypes are essential as soybean markets shift to trait-based pricing.

- More efficient methods of producing chemicals from agricultural biomass will increase the value of farm products.

- Documenting characteristics of stress-adapted maize germplasm will expand the utility of these genetic resources and contribute to yield stability of new commercial germplasm. Capacity to emerge may enable producers to plant earlier and/or in no-till systems with reduced risk of stand reductions.

a. Source of Federal Funds—Hatch

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

Key Theme – Precision Agriculture

Program 6: Precision Agriculture

a. Description of activity

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

This project has been addressing these critical needs through the development of sensor technologies for the measurement of spatially and temporally varying crop production factors so that variability can be effectively quantified in crop fields. Significant progress has been made in the development of new analysis techniques to further understanding on the effects of in-field variability on crop yield variability and the effects of production practices on the environment. As the causes of variability are better understood, this understanding will lead to advances in farming management systems to protect the environment while increasing production efficiency.

b. Impact/accomplishment -

Short-term:

- Crop modeling and Decision Support Systems

    - Crop models have been used to identify spatial yield loss due to interacting factors and evaluate the consequences of different spatial management strategies, including the forecasting of spatial yields during the season. The models have been successfully used to identify the relative effect of water stress, weed pressure and soybean cyst nematodes stress on soybean yield variability. Similar modeling techniques for corn have been developed that have shown corn population and water stress account for a significant amount of the spatial yield variability. These crop models have also been used to evaluate the consequences of different management decisions and the potential economic return from implementing these strategies.

    - A comprehensive problem-solving and decision-support system has been developed to improve analyses, simulation and visualization of field-scale impacts of precision agriculture practices on environmental quality and crop productivity. The system incorporates biophysical models, statistical analysis and plant growth models with Geographical Information Systems (GIS). Components of the system have been validated and evaluated using data from several farmers' fields, and are made interoperable with standard commercial precision farming software. The decision support system includes an economic modeling component that can be used for risk-

based assessment of effects of variable rate application on productivity and profitability of the farm operations.

Long-term:

- Sensor technology.
    - The development a real-time soil nutrient analysis system, based on ion-selective field-effect transistors (ISFETs) and micro-electro-mechanical systems (MEMS) technology is continuing. There is potential for reduction in fertilizer inputs with negligible reductions in yields, while reducing the potential for environmental degradation due to excess nitrate in the environment.
    - A machine vision-based system to sense early season plant population has been developed and has shown significant promise. This early season population sensor system is being developed to complement the combine mounted corn population sensors already developed. These systems will allow the mapping of plant populations from germination through to harvest and the effect of population on yield. This work has shown the importance of population on the yield potential and interpretation of yield limiting parameters within fields
    - A research program on the effect of electro hydraulic multi-modal four-wheel steering on sprayer performance has been completed. The study identified the potential benefits and problems associated with the different steering control systems, and the subsequent effects on the accuracy of chemical application.

a. Source of Federal Funds—Hatch

b. Scope of Impact—State Specific

Key Theme – Ornamental/Green Agriculture

Program 7: Green Industry

a. Description of activity

Propagation protocols, genetic analysis, and landscape suitability of promising, but rarely used, species of trees and shrubs were examined. The relative stability of various traits related to drought resistance of Acer nigrum seedlings was determined, and differences in resistance to drought and flooding between nine taxa of Betula and Alnus were shown.

The regeneration ability of explants was determined from germinating seedlings of Poa pratensis. Regeneration improved by including, rather than excluding, the shoot apical meristem.

Root and shoot growth were used to predict transplant success of tree species. Trees that are very well adapted to this region are often not used because they have been reported to not

survive transplanting. Contrary to long-held opinions, we found American hornbeam can be successfully transplanted in the fall.

Turfgrass covers are often used to protect sport and golf areas from rain, cold temperatures, and traffic. Tarp color had a profound effect on turf cover when grass was covered during the winter and spring. Grass was better under tarps that were red, orange, and yellow compared to tarps that were gray, black, green, or blue.

b. Impact/accomplishment -

Short-term:

- Turf injury may be avoided by selecting the proper tarp color. Tarp manufacturers will respond by developing new and improved tarps to meet this market demand.

Long-term:

- Traits of Acer nigrum we identified will serve as the basis for selecting superior genotypes for use in managed landscapes. Protocols we established for the propagation of Rhamnus caroliniana will permit growers of this U.S.-native species to develop clones with desirable traits.

- The enhanced ability to regenerate explants will assist in making genetic improvements to existing Kentucky bluegrass cultivars.

- Knowing that the more desirable American hornbeam tree can be successfully transplanted will increase its nursery production and successful use in the landscape.

a. Source of Federal Funds—Hatch

b. 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 –

Short-term:

- A technique was developed to calculate the volume of blood retained in the placenta using an algorithm based on hemoglobin content of the fetal blood and hemoglobin content and weight of the placental cotyledons. This will be used to assess the response to various delivery techniques at parturition. In addition, to assess the effects of cloning on umbilical responsiveness at birth, a technique is being developed to assess umbilical tissue contractile response to various bradykinin agonists. A neonatal calf model has also been developed to determine the mechanism regulating the anaphylactic-type reactions induced by rapid administration of intravenous immunoglobulin preparations. These projects have helped determine management techniques that improve neonatal survivability.

- Fifty percent of all mastitis occurs during the dry period with > 90 % in the first and last week. We developed polymer that dries to form a protective persistent (4-7 day) synthetic skin. Our research has shown > 60% reduction in major pathogen mastitis infections at calving. Our work has also shown this technology to be equal to antibiotic therapy for preventing early dry period mastitis, but with 80% less cost and significantly reduced risks for antibiotic contamination of milk. This work has led to 5 patents, licensure, commercialization, and sales of this product in 17 countries.

- Developed and implemented a teat biopsy technique to evaluate winter changes on teat end tissue. This led to proof that winter changes were due to rapid tissue hydration issues and not of viral origin. We have proved this with long-term intense observational studies. As a result, industries have developed 6 new product technologies to address this.

Long-term:

- Using atomic force microscopy we identified new cellular structures at the cell plasma membrane called ‘pits’ and ‘depressions’, where membrane-bound secretory vesicles dock and fuse to release vesicular contents. Similar structures were identified at the plasma membrane of porcine growth hormone (GH)-secreting cells of the pituitary and implicate their involvement in hormone release. Following stimulation of secretion, the size of depression enlarged and gold-tagged GH antibody were found to bind to the pit structures in the stimulated GH cells. This study documents for the first time the presence of these structures and their involvement in secretions in a neuroendocrine cell.

- High resolution immunogold antibody localization was used to show that smooth muscle cells do not contain separate intracellular contractile and cytoskeletal domains; instead, these two functional classes are intermixed. This has direct implications for our understanding of how contractile and cytoskeletal elements interact and how these elements are anchored inside the cell.

a. Source of Federal Funds—Hatch

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

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

a. Description of activity

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

b. Impact/accomplishment -

Short-term:

- Demonstrated that 1) fall-calving cows grazing corn crop residues and stockpiled grass-legume pastures during the winter required 2,745 less hay per cow than spring-calving cows maintained in a drylot during the winter, and 2) grazing corn crop residues during the winter did not affect subsequent soybean production from fields planted with no tillage or by disking. Adoption of this practice can increase producer profitability.

- A forage budgeting computer program was developed to assist cattle producers utilize forage resources more efficiently and to help develop year-round grazing systems to reduce cost of wintering cattle.

- Developed a spreadsheet matrix for estimating the value as cattle feed for wet corn processing byproducts in comparison with prices of corn and soybean meal. Farmer-owned cooperatives producing fuel ethanol from corn were able to use computer spreadsheet programs developed to estimate the value of wet byproducts relative to cost of corn and soybean meal.

- Programmed feeding of protein resulted in 4.3 pounds less dietary nitrogen input per steer without affecting performance of growing and finishing calves. Using grazing management and programming protein intake of feedlot cattle will allow livestock producers to develop management plans to minimize nutrient losses from livestock production systems.

- Feeding 125 mg of 25-hydroxy vitamin D3 four days prior to harvest of beef steers increased tenderness of sirloin and top round steaks and resulted in significantly less accumulation of vitamin D3 and 25-hydroxy vitamin D3 in skeletal muscle compared with feeding five million IU of vitamin D3 for nine days before harvest. Feeding vitamin D3 or its metabolite may be a strategy the beef industry uses to reduce the variability of tenderness of beef at the meat counter.

Long-term:

- Dietary Eubacterium coprostanoligenes exerted a hypocholesterolemic response in cynamologus monkeys suggesting a hypocholesterolemic food supplement for people may be possible.

a. Source of Federal Funds—Hatch

b. Scope of Impact—State Specific

Key Theme – Animal Genomics

Program 10: Genetic Enhancement of Agriculturally Important Animals

a. Description of activity

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

b. Impact/accomplishment -

Short-term:

- The beef herd progeny are serially scanned for body composition information used to quantify the genetic attributes of compositional traits. Research results document that yearling age measurements are much more repeatable than measures taken on younger animals. This means breeders can combine ultrasound scans with other measures collected at yearling time. Research also shows a zero genetic correlation between sexual maturation (measured by scrotal circumference) and the amount of intramuscular fat in the longissimus dorsi muscle.

- More effective selection for meat quality is possible with real-time ultrasound technology, which allows evaluation of the live animal. A model to predict intramuscular fat on this basis has been developed for pigs, which allows breeders to select on this important trait.

- It was found that an electronic feeding system (used in selection programs to evaluate feed consumption of individual animals), which is quite different from commercial conditions, does not affect performance of growing pigs and, therefore, does not jeopardize accuracy of selection for performance traits. In addition, editing methods have been developed to allow breeders to make more effective use of data from electronic feeders and are now used by several stakeholders.

- Programs developed for swine are currently used as the basis for national genetic evaluation. This directly impacts 40,000 purebred animals that have the potential to control the genetic improvement for 1 million sows and 16% of the market pigs in the US, at an annual income of over $2 billion/year and a multiplier effect on rural communities.

Long-term:

- Genomic tools have been developed for the porcine genome in collaboration with the Universities of Iowa, Missouri, and Nebraska, and the NCGR. This includes the sequencing of 15,000 expressed sequence tags (EST's). These are used to develop comparative data with the human, which allows the wealth of human genome information to be used for gene discovery in the pig. To date, 1,000 matching EST's have been found, of which 100 have been mapped. All findings are deposited in public databases, which allow their use by other researchers.

- Data from national projects were used to estimate genetic parameters of meat quality traits in the pig and used to educate producers and other stakeholders on the growing importance of meat quality. Several complementary approaches were used to find such genes that affect meat quality. The initial phase of a genome-wide scan located over 100 regions with effects on quality traits in a cross between commercial breeds of swine. Follow-up study of candidate genes in selected regions has to date found three genes with important effects. One affects pH by 0.1 and can impact the US industry by over $20 million/yr. A candidate gene that increases litter size by 0.22/pigs /litter was identified also.

- In beef cattle, 31 genes were identified that are differentially expressed in double muscle cattle. This enables the discovery of genes that control quality of beef, which will allow breeders to select for heavier muscled cattle with better quality.

- In poultry, candidate gene approaches have found new sequence variations in a total of eight genes and identified their effects on important traits, including growth, body composition, skeletal integrity, circulating metabolic factors, and response to Salmonella enteriditis. The use of these genes in selection can enhance production efficiency, animal health, and food safety. In addition, phenotypic measures of unique experimental populations were used to estimate the number of genes that control growth and body composition traits.

- Improved statistical methods for analysis of molecular data have been developed that enable the detection of genes in complex livestock pedigrees. Methods for the integration of molecular and phenotypic data in selection programs have been further developed and extended to crossbreeding programs. These are necessary to make optimal use of molecular data in selection.

- Premature culling of cows and perinatal mortality of calves are large cost components to dairy farms. Models for genetic prediction of perinatal mortality were examined and genetic parameters were estimated from field data. Genetic analysis of twinning

rate showed that ample opportunity exists to reduce the incidence of twins in Holstein cattle, which results in increased birth problems. Results will help dairy producers and breeders with selection decisions and with strategies to prevent or treat health problems based on risk factors.

a. Source of Federal Funds—Hatch

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

Key Theme – Diversified/Alternative Agriculture

Program 12: Potential of Alternative Livestock for Iowa's Economic Enhancement

a. Description of activity

This program has focused on alternative types of animal production in Iowa. Aquaculture has been the fastest growing sector of American agriculture for the past two decades. "Game farming" is an equally rapidly growing industry, which today includes native animals such as bison, elk, quail, and waterfowl, plus exotic species such as llama, ostrich, fallow deer, and pheasant. A growing number of Iowans are engaged in aquaculture (fish farming) and game ranching as a primary or supplemental income source. Commodity organizations exist in Iowa for the fish, bison, elk, and ratite production industries, and there are cottage industries that use the bones, hides, feathers, and egg shells of such animals. This program provides basic information on cultural and husbandry principles and techniques, pertinent regulations, and marketing that producers require, as well as new research-based knowledge to maximize production efficiency, enhance profits, and ensure that operations comply with environmental and health (animal and human) standards. State and federal agencies with responsibilities in these areas are also stakeholders in the program.

b. Impact/accomplishment -

Short-term:

- The biennial survey of Iowa aquaculturists was completed and sent to producers and relevant state agency personnel. As in the 1999 survey, it showed continuing concerns about regulatory pressures and marketing. We continued to support the Iowa Aquaculture Association, assisting it in developing a membership directory, producing newsletters and conducting an annual meeting.

- In an earlier ISU study, it was determined that nutrient ratios are important to walleye culture in earthen ponds. A similar study is now being performed in plastic-lined culture ponds. Information garnered thus far indicates the importance of organic fertilizers to the establishment of invertebrate organisms that serve as food for the young walleye and provides guidelines for fish stocking densities. This information is being used by the Iowa Department of Natural Resources to improve its hatchery walleye production program.

Long-term:

- A commonly used fish culture production technique is cage-culture, in which fish are grown in a cage or pen that is suspended in a pond or lake. We recently investigated the use of cages for maintaining and growing bluegill broodstock, with mixed results. If fish of larger size can be produced by this method, greater overwinter survival and greater production of offspring may occur.

- While a relatively small number of Iowa farmers in a 2001 survey sample (n = 3049) are producing alternative livestock, if it is representative of the larger farm community, far greater numbers of farmers are interested in raising such animals. For example 21% of non-producing farmers have interest in raising fish, and 25% are interested in raising pheasants or quail. Other species currently being raised by Iowa producers include buffalo, elk, emu, fallow deer, fox and mink, llamas, goats, ostriches, rheas, and snapping turtles. While it is unlikely that any of these animals will rise to the importance of Iowa's traditional livestock industries, they may provide niche markets that will help people stay in farming and on the land. This survey information is useful for long-term ISU Extension program development for the alternative livestock industry.

a. Source of Federal Funds—Hatch

b. 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 policy questions related to the production and distribution of agricultural products. Models of individual firms and models with various levels of aggregation were created and utilized to investigate a large number of current economic questions.

b. Impact/accomplishment -

Short-term:

- Models developed by the Food and Agricultural Policy Research Institute (FAPRI) were used for preliminary analysis of the 2002 Farm Bill including the impacts of an alternative and competing policies on farm income and exports. Analysis was also conducted on the potential benefits of "green" payments to farmers as an alternative to the welfare type payments in the proposed bill. Commodity groups and environmentalists alike used these estimates in making arguments for changes to the legislation.

- Researchers are developing a database documenting the cropping practices of Iowa farmers. This database is then useful for analysis of alternative production systems and policies. The database is an essential input in many other research studies. Recent work on the production and marketing of Bt corn and Round-up Ready soybeans used data

from this database. This data was also used on studies of carbon sequestration and green payments for conservation practices.

- Research found switchgrass has significant potential as a bio-energy product as compared to alfalfa, reed canary grass, and big bluestem. It has similar biomass potential with sweet and forage sorghums but is less stressful on the environment. Bio-mass is marginally competitive with fossil fuels at the current time, but has some potential for special or niche markets.

- A conceptual model necessary for an assessment of biotechnology's economic benefits and costs was developed. The model emphasized the need to account for the proprietary nature of biotechnology innovations. The model was applied to Roundup Ready soybeans. The estimated value of this innovation is sizeable, with consumers and innovators claiming the largest shares of net benefits.

Long-term:

- Models were developed to forecast export flows of corn, wheat and soybeans through locks on the Mississippi River. These models showed significantly lower projected flows than those utilized by the Army Corps of Engineers in justifying construction or upgrading of locks on the rivers. Research also showed the fundamentally flawed nature of the forecasts used by the Army Corps and thereby argued against unnecessary government construction expenditures. Current work is extending this analysis to the flow of grain between farms and elevators in the Midwest.

- Analysis was performed documenting state-level agricultural policies towards value-added agriculture, incentives given for establishing businesses in rural areas, and developing businesses that utilize locally produced agricultural products. It was found that support for new or existing small businesses was more likely to be effective in promoting rural development than programs encouraging the location of large firms in rural areas. Large businesses were more likely to locate and be successful in more urban areas, with the benefits to rural areas coming through employment of commuting rural residents.

- Data from beef and pork packers documented the rapid movement of procurement from the cash market to formal vertical linkages. A survey of these packers shows that quality concerns are the driving force in the adoption of marketing contracts or own production. The pork industry has moved more quickly to value based or gird marketing. The development of branded products has lead to these changes and will encourage similar changes in the future. The impact of thinly traded cash markets on the accuracy of price reporting and market power is not yet known.

a. Source of Federal Funds—Hatch

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

Key Theme – Risk Management

Program 14: Agricultural Risk Management

a. Description of activity

Researchers developed models to analyze economic questions related to risk and uncertainty in agricultural production and agricultural markets. The models developed considered with decision problems of individual producers and also the market implications of risk.

b. Impact/accomplishment -

Short-term:

- Many agricultural producers have limited knowledge of contingent markets such as options and futures markets. Based on interaction with them members of the department have developed an Advanced Grain Marketing Course which is delivered over the WEB. The course utilizes the results of recent research on appropriate risk management strategies. The course has modules teaching the essentials and also more advanced topics related to the marketing of grain products through cash, forward, futures and options markets. The course provides interactive discussion as well as asynchronous delivery. Well over 100 producers have participated in the course to date. Members of the department have nearly completed a similar course on financial management.

Long-term:

- In the 1990s many farmers were induced to enter long-term hedge-to-arrive contracts to secure high prices for their crops several years ahead. However, such contracts failed to meet the intended objective, resulting in widespread losses for farmers and grain merchandisers alike. Supply and demand analysis was used to demonstrate that long-term hedge-to-arrive contracts are unsound, in the sense that one cannot expect them to secure high prices for crops to be harvested several years ahead. The analysis was supported with over 100 years of corn-price data, showing over such a long period there were other times when markets displayed similar behavior to that observed during the market events that led to the hedge-to-arrive debacle. This work raised awareness about the importance of performing a sound economic analysis when designing and marketing contracts aimed at managing risks. The analysis should help avoid pitfalls like the ones associated with the hedge-to-arrive contracts from occurring in the future.

- One of the difficulties in estimating the response of agricultural producers to changes in returns and the riskiness of those returns is that crop and livestock yields are uncertain, therefore the output observed by researchers ex post may not equal the output planned ex ante by the producer. Unless the analyst conducts interviews with individual producers about intended versus actual output, it is difficult to ascertain how producers might respond to changes in prices or crop insurance or other guarantee payments. Researchers developed improved ways to measure intended responses using readily available data and sophisticated econometric techniques. Using such methods other researchers will be

better able to predict the response of crop producers to changes in government programs and the resulting changes in market prices and incomes.

- In many situations involving the use of new products or the implementation of new governmental regulations there is little if any historical data on which to base estimates of economic impact. In such situations expert opinions are often used in place of statistical estimates. These expert assessments are often subject to a great deal on uncertainty in and of themselves and so add uncertainty to the entire impact analysis. A method was developed to elicit probability distributions as compared to point estimates from experts. These methods were then used to obtain opinion distributions about the potential impact of new pesticide regulations on the production and marketing practices in the apple industry. This data was used to develop estimates of the distribution of welfare gains and losses from these regulations. Nonparametric methods of ranking alternative distributions were then used to provide information to policymakers about the relative merits of different regulation policies. Results showed that if consumer willingness to pay for pesticide (organo-phosphate) free apples increases by 2.5%, the benefits of banning all organo-phosphates versus only the most dangerous one outweigh the increased cost of producing apples without these pesticides.

- There has been increased interest in counter-cyclical agricultural polices, polices that would make larger payments in periods of low prices or yields. Such policies may be more World Trade Organization (WTO) compliant than the current price support system. Producers also prefer selling commodity programs as risk insurance as compared to the current price support or welfare type programs. Analysis by researchers in the department shows that proposed counter cyclical programs are generally duplicative of existing programs based on support payments and crop insurance but may find support because they raise market prices above the long run market equilibrium.

- Development and adoption of new technologies was responsible for much of the economic growth of the last century. An important question is the rate at which firms will adopt new technology and how their perception of adoption costs affects this adoption rate. In order to understand better the impact of information and uncertainty on adoption, a theoretical model was developed. Each firm in the model has private information about his own adoption cost and also some public information, released by early adopters, about the technology's efficiency. More efficient communication about the technology slows down the early adoption process as firms wait to glean information from early adopters, but speeds up the diffusion in later periods. This communication may raise the long-run adoption rate of a relatively good technology, but reduce that of a mediocre technology.

a. Source of Federal Funds—Hatch

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

Key Theme – Organic Agriculture

Program 20: Sustainable/Organic Agriculture

a. Description of activity

Organic agriculture has become an $8 billion in the U.S., growing at a rate of 20% annually, with Iowa's organic acreage increasing to over 120,000 acres in 2000. Sustainable agricultural practices, including organic agriculture, continue to increase in Iowa. This program investigates new sustainable production and postharvest practices, which include grain, vegetable, fruit, turfgrass, and greenhouse crops. The program has focused on four major issues: (1) development of sustainable/organic horticultural and agronomic systems, (2) development of improved nutrient management and soil building systems, (3) development of value-added industry products through improved sustainable/organic production and postharvest techniques, and (4) development of research-based information in sustainable/organic systems for public training and advancement.

b. Impact/accomplishment -

Short-term:

Research projects have identified soil amendments that yield similar results as conventional fertilizers and promote soil health parameters, including organic carbon pools and microbial biomass. In fifteen grain, vegetable, fruit, and turfgrass research projects across Iowa, results included the following:

- Compost applications provided equivalent organic and conventional corn, soybean and pepper yields, particularly under low moisture conditions when cover crops failed.

- Organic rotations, which included corn-soybean-oats-alfalfa, produced equivalent yields to conventional corn/soybean rotations. Longer crop rotations, which included small grains and legumes, provide yield stability, improved plant protection, enhanced soil health and economic benefits, compared to conventional systems with shorter corn/soybean rotations and greater off-farm inputs.

- In an evaluation of the effect of plowing on soil quality in organic systems, soil quality (in terms of organic matter carbon) returned to pre-plowing levels three weeks post-plowing.

- Economic analysis determined a greater return with organic crops that utilize less off-farm inputs.

- Sustainable fruit and vegetable production systems for Iowa that utilize corn gluten meal for weed control and scab-resistant apple cultivars have been developed.

- High-quality organic day-neutral strawberries were produced using compost and corn gluten meal.

- In conditions of low disease pressure, effects from applications of biological disease control treatments (Bacillus subtilis and Trichoderma harzianum) were not significant.

- Kaolin clay products were effective in controlling plum curculio and codling moth in organic apples, and organic squash, destined for the organic baby food market, produced greater yields when organic pest management strategies were employed.

- Nutritional quality and microbial load were not different in conventional and organic apple cider.

- Results demonstrated that the use of soil amendments, such as zeolite clinoptilolite with fertilizer, might enhance turf quality.

Efforts have resulted in a significant increase in agronomic and horticultural operations farmed or maintained without potentially polluting levels of nitrates and synthetic pesticides. Premium prices for certified organic crops, averaging 200% above conventional prices, have increased the economic base of Iowa's farm families.

a. Source of Federal Funds—Hatch

b. Scope of Impact—State Specific

Goal 2: A safe and secure food and fiber system.

Overview

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

- 13 Refereed Publications, Research Papers, Manuscripts
- 9 Non-refereed Publications, Reports, Technical Papers
- 23 Proceedings, Published Abstracts
- 26 Extension Publications
- 11 Invited Presentations
- 15 Education Programs, Field Days, Tours
- 1 Book/Chapter
- 3 Theses, MS/Ph.D. Programs Completed

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

The use of irradiation, processing ingredients (lactate, diacetate, pediocin) and packaging (carbon monoxide) are all being adopted or under consideration by the meat industry as means of ensuring product safety. As a result, ready-to-eat meat products are significantly safer for consumers now than in the recent past.

Assessment of accomplishments as measured against POW:

A more safe and secure food and fiber system due through the development and dissemination of information on new or improved methods, practices, and products that will result in

- improved quality of fresh and processed meat products,①
- greater public understanding of the principles of food safety and quality, and
- greater understanding of chemical, physical, and biological hazards to food safety.①

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

State and Hatch Funds $ 1,215,080

FTEs 5.2

Key Themes – Food Safety and Food Quality

Program 16: Improving the Quality and Safety of Muscle Foods

Program 17: Reduction of Physical, Chemical, and Biological Hazards Introduced into Foods

a. Description of activity

The focus of this program is improving quality of muscle foods by studying the fundamentals of animal growth and protein deposition. Protein properties are being investigated to determine how to best improve meat quality factors such as tenderness and moisture retention during subsequent processing. Processing technologies are being studied to determine effects on quality and for effective means to achieve safety for consumers following storage and distribution of muscle food products.

b. Impact/accomplishment -

Short-term:

- Carbon monoxide packaging (0.5% CO) was found to be very effective for extending the color life of fresh ground beef and ground pork. Control of microbial growth by increased carbon dioxide in conjunction with carbon monoxide means that fresh meat shelf life is improved in terms of both color and microbial quality with this packaging system.

- Our program continues to work with technology transfer in the pork industry. This year we specifically targeted the export market in an attempt to increase high quality exports to the Japanese market. Working with a group of Japanese importers and a major Iowa packing facility, we developed and implemented pH selection of product to better fit Japanese quality standards. Currently, the packing company is pH testing about 11,000 samples per day and selecting product within a pH range for specific Japanese customers. Adding a pH selection to quality workmanship guarantees a place for Iowa pork products in the Japanese market.

Long-term:

- Studies of muscle cytoskeletal proteins have shown that the proteins desmin, synemin, talin and vinculin are important for linking together muscle myofibrils (contractile threads) in muscle cells and linking the myofibrils to the outer cell membrane. It has been determined that postmortem degradation of these proteins is not only important to tenderness in beef but also that degradation of a subset of these proteins is important to moisture retention and water-holding capacity in pork. It has also been found that while postmortem aging of pork increases protein degradation and improves moisture retention, aging does not offer a significant advantage for injected, moisture-enhanced fresh pork cuts. This is because it was determined that the variability between animals for protein degradation was greater than the effect of aging within a given muscle. Thus, while determination of ways to increase the extent and uniformity of the protein degradation processes could enhance the quality of pork, genetics probably offers greater potential for improving the moisture retention affected by protein degradation in pork muscle.

- Control of Listeria monocytogenes on ready-to-eat meat products (frankfurters, bologna, ham and roast beef) by use of irradiation was demonstrated for improved safety. Doses of 2.0 kGy prevented growth at 4º C for five weeks while 4.0 kGy resulted in no growth of the organism for as long as 12 weeks at 4º C.

- Use of pediocin (a natural antimicrobial) was found to have a synergistic effect on Listeria monocytogenes inactivation when combined with low-dose irradiation for frankfurters. Addition of pediocin dramatically increased the effectiveness of irradiation and prevented growth of the pathogen on frankfurters for at least 12 weeks at 4º C.

The use of irradiation, processing ingredients (lactate, diacetate, pediocin) and packaging (carbon monoxide) are all being adopted or under consideration by the meat industry as means of ensuring product safety. As a result, ready-to-eat meat products are significantly safer for consumers now than in the recent past.

a. Source of Federal Funds—Hatch

b. 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:

- 22 Refereed Publications, Research Papers, Manuscripts
- 7 Non-refereed Publications, Reports, Technical Papers
- 30 Proceedings, Published Abstracts

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

Research on this project determined the impact of plant chemicals and nutrients on food quality and health promoting effects of food. Research directed at understanding the interactions between dietary constituents will influence dietary recommendations directed at maintaining optimum health and preventing disease. Moreover, it will aid in the development of new food products and therapeutic dietary strategies. The outcomes of this research will benefit all people by improving dietary selections and health benefits of food.

Assessment of accomplishments as measured against POW:

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

- increase in the availability of health promoting foods for consumers, ①
- increase in risk-taking by food companies in developing improved foods, and ①
- increase in the public's awareness of health promoting dietary and feeding behaviors. ①

New contributions to the understanding of the hazards to a safe food supply and the applications of scientific advances promote an improved nutritional status of the general population of Iowa, the United States, and the world.

State and Hatch Funds $ 598,057

FTEs 5.8

Key Theme – Human Nutrition

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

a. Description of activity

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

b. Impact/accomplishment –

Research on this project determined the impact of plant chemicals and nutrients on food quality and health promoting effects of food. Research directed at understanding the interactions between dietary constituents will influence dietary recommendations directed at maintaining optimum health and preventing disease. Moreover, it will aid in the development of new food products and therapeutic dietary strategies. The outcomes of this research will benefit all people by improving dietary selections and health benefits of food.

Short-term:

- The effect of vitamin A and carotenoids on iron bioavailabilty varied and was not related to their electronegativity differences. Creating vitamin A deficiency in the cells increased iron uptake in the presence of some analogs. The results of this study suggest that in populations where iron and vitamin A deficiencies are common, vitamin A supplementation alone may be effective in reducing iron deficiency anemia especially when iron bioavailability is the problem.

- Research directed at understanding the interaction between retinoids and folate function will influence dietary recommendations directed at preventing adverse liver function, including liver disease and cancer. Moreover, it will aid in the evaluation of new therapeutic retinoids important in skin disorders and cancer treatment.

Long-term:

- Sensory evaluation of bitterness of soy isoflavones and saponins was demonstrated in soy food products. Minimum detectable or threshold bitterness was estimated and was greatest in soy germ compared to soy flour and isolate and was greater in water-dispersed soy compared to soy milks.

- Additional data were gathered in support of the observation that isoflavone disappearance phenotype, as estimated by in vitro fecal isoflavone degradation, influenced isoflavone bioavailability. Low isoflavone degraders showed significantly greater apparent isoflavone absorption when fed isoflavones daily for 7 days. This work suggests a crucial role for gut microorganisms in human health by either enhancing or inhibiting absorption of potentially beneficial food components.

- Strategies are being developed for cancer prevention by transgenic crops that provide elevated intakes of specific phytochemicals. Feeding transgenic alfalfa with a bound form of the phytoalexin, resveratrol, was not effective in cancer prevention in mice but feeding this alfalfa with enzymes to free the resveratrol or with free resveratrol were effective in cancer prevention research.

- Biosynthesis of the very important long chain polyunsaturated fatty acid, docosahexaenoic acid (DHA) from the dietary essential linolenic acid did not occur in the fetus but rapidly increased in the neonatal piglet. Implications are that DHA must be supplied to the fetus via the placenta and that maternal diet and stores of DHA may affect the outcome of pregnancy.

- Research has identified the molecular mechanism by which plants generate the carbon precursor (acetyl-CoA) that is used in the biosynthesis of oils. Over the last 30 years most researchers assumed that the enzyme acetyl-CoA synthetase generated this acetyl-CoA pool, however, our research indicates that this is in fact incorrect and that this acetyl-CoA pool is produced by the plastidic isozyme of pyruvate dehydrogenase.

- Conjugated linoleic acids (CLA) have been recognized for their potential health benefits. Dietary supplementation of dairy cattle with soy oil and CLA is effective in increasing the concentration of CLA in milk and yogurt processed from the milk. Traditional yogurt processing methods do not contribute to significant increases in CLA content of the yogurt and unique processing techniques must be considered to further effectively increase the CLA content of processed dairy products.

a. Source of Federal Funds—Hatch

b. 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:

- 94 Refereed Publications, Research Papers, Manuscripts
- 76 Non-refereed Publications, Reports, Technical Papers
- 104 Proceedings, Published Abstracts
- 71 Extension Publications
- 101 Invited Presentations
- 184 Education Programs, Field Days, Tours
- 10 Books & Chapters
- 3 Web Sites, Multi-Media
- 1 Patent
- 29 Theses, MS/Ph.D. Programs Completed

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

A study of corn response to application of zinc fertilizer was completed. The results suggest that application of Zn fertilizer placed below and to the side of seed at planting time has little likelihood of increasing grain yields. The study also shows that use of the current zinc soil test, DTPA-extractable zinc, was not a good predictor of yield responses. Reduced use of Zn and S fertilizers will increase profits for 25 to 30% of Iowa crop producers.

Nitrogen trials were conducted on 120 fields by using precision farming technologies (GPS, GIS, soil testing, remote sensing, yield monitors, tissue testing) to help corn producers evaluate and improve their nitrogen management practices. Considerable effort was directed toward developing the methodology needed to use the new technologies for this purpose. Results of these studies will be used to refine N fertilizer recommendations, which should increase producer profits on 25 million acres used for corn and soybean production.

Research work has indicated that runoff control from smaller feedlots can be treated to meet current performance levels through the use of alternative runoff disposal systems such as vegetated filter strips, infiltration basins and constructed wetlands. The economic impact of this research may end up saving a large segment of the smaller farmer feeder feedlots in the state.

Evaluations have been conducted on the impact of manure application on surface and groundwater quality and of earthen waste storage structures on the contamination of groundwater. A report was prepared on the health impacts of concentrated animal feeding operations, and a response to EPA's proposed feedlot regulations was submitted. All these will assist policy makers with development of regulatory rules concerning manure management and air and water quality.

A multidisciplinary team completed a two-year study of the Clear Lake, Iowa, watershed. The study resulted in a $15 million restoration program that will be undertaken by the state and the Clear Lake community.

A long-term ecological study of the Missouri River system was completed. The totality of our results should help state and federal fishery biologists make better informed decisions on options for managing the river and its exploited fish populations.

The goal of Integrated Pest Management is to make pest management more economical, efficient, and environmentally compatible. The goal can be achieved by avoiding control actions when they are not needed, using the lowest effective dose of insects when they are warranted, and timing the application of insecticidal treatments so that they will have maximum benefit with minimum environmental impact. For example, area-wide management and prediction of emergence and peak egg laying can reduce in toxicants applied, number of fields treated, and number of field scouting trips can significantly reduce the costs of controlling corn rootworm larval damage. Thrips are not the main cause for bronzed fruits in strawberry fields in Iowa; thus insecticidal treatments specifically for thrips can be reduced or eliminated. Bean leaf beetle has been shown to transmit Bean Pod Mottle Virus (BPMV), but treatment of one early plus a mid-season spray resulted in the highest yield and the lowest (or not significantly different compared to other treatments) percentage damaged and discolored seeds.

We have found evidence for the possibility of seasonal prediction of growing-season climate (including rainfall and soil moisture) over Iowa and adjacent states. We are exploring this prospect using regional climate models and will make the results available to the public using the World Wide Web. These relatively long-lead forecasts could be of significant value to agricultural producers, and possibly to other interests such as public safety.

Assessment of accomplishments as measured against POW:

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

- enhanced soil and water quality, ③④⑤

- increased utilization of integrated pest management, sustainable, and organic agricultural practices, ②⑦

- adoption of better manure management practices, ③④

- increased wetland restoration and improved riparian management on public and private lands, ③⑤

- greater societal recreational and economic benefits from surface water uses, and ⑤⑥

- Iowa's agriculture being highly productive, economically profitable, environmentally friendly, and socially responsible. ①②③④⑤⑥⑦⑧

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

State and Hatch Funds $ 3,647,796

FTEs 39.7

Key Theme – Forest Resource Management

Program 2: Forest Resource Enhancement

a. Description –

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

b. Impact/accomplishment –

Short-term:

- Rainfall simulation studies indicate higher phosphorus runoff to streams in continuously vs. intensively rotationally grazed pastures.

- Cool-season grass filter soils have 86% more large and 41% more small stable macroaggregates than cultivated soils leading to higher rainfall infiltration rates and higher denitrification rates.

- A new fast growing cottonwood clone ranked number 1 out of 90 clones in productivity in regional trials in Iowa and Wisconsin. This represents a 95% improvement over the best commercially available clones.

- Focus group interviews and a local task force have identified best management practices that can be used to preserve ecological integrity and amenities during the development of urban residential sites.

- Research results on fiber/plastic materials motivated three Iowa based companies to request assistance from the Iowa Companies Assistance Program (ICAP) project to investigate fiber/plastic materials for use in their manufacturing processes.

Long-term:

- Based on project results, an Iowa-based producer group is considering a new enterprise to supply and blend ag fiber and plastic.

a. Source of Federal Funds—McIntire-Stennis

b. Scope of Impact—State Specific

Key Theme – Soil Quality

Program 21: Sustainable and Environmentally Safe Management of Soil Resources

a. Description of activity

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

b. Impact/accomplishment -

Short-term:

- A study of corn response to application of zinc fertilizer was completed. The results suggest that application of Zn fertilizer placed below and to the side of seed at planting time has little likelihood of increasing grain yields. The study also shows that use of the current zinc soil test, DTPA-extractable zinc, was not a good predictor of yield responses. Reduced use of Zn and S fertilizers will increase profits for 25 to 30% of Iowa crop producers.

- The use of the green fluorescent protein as a bioreporter for the detection of bioavailable aromatic pollutants was reported, providing a new tool for assessing potential pollutant exposure and for bioremediation of polluted sites.

Long-term:

- Nitrogen trials were conducted on 120 fields by using precision farming technologies (GPS, GIS, soil testing, remote sensing, yield monitors, tissue testing) to help corn producers evaluate and improve their nitrogen management practices. Considerable effort was directed toward developing the methodology needed to use the new technologies for this purpose. Results of these studies will be used to refine N fertilizer recommendations, which should increase producer profits on 25 million acres used for corn and soybean production.

- A new device and methodology was developed for measuring soil thermal and electrical properties. We showed that the measurements can be used to determine soil water content and soil bulk density. This approach will lead to numerous opportunities for measuring near surface properties as a function of time.

- Results of research on subsurface banding of nutrients, precision agriculture technologies, and environmental aspects of phosphorus fertilization have changed nutrient management recommendations and led to development of the first Iowa Phosphorus Risk Index for use in agricultural fields.

a. Source of Federal Funds—Hatch

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

Key Theme – Integrated Pest Management (repeated under Extension program 142)

Program 22: Integrated Pest Management

a. Description of activity

The goal of Integrated Pest Management is to make pest management more economical, efficient, and environmentally compatible. The goal can be achieved by avoiding control actions when they are not needed, using the lowest effective dose of insects when they are warranted, and timing the application of insecticidal treatments so that they will have maximum benefit with minimum environmental impact. Research at Iowa State University has identified safer control options, more efficient utilization of pest management alternatives, and even the documentation that some actions that are not warranted. This information is shared with stakeholders through Extension programs.

Insects, weeds, plant-parasitic nematodes, and diseases are a continuing threat to Iowa's crop production. Every crop acre in Iowa is subject to yield reduction resulting from these pests. Additionally, costs are incurred that include practices for cultural and chemical control of these pests. Adoption of Integrated Pest Management and Integrated Crop Management principles result in more efficient use of resources, increased profitability, and enhanced

environmental stewardship. The IPM and ICM program in Iowa currently focuses on field corn, soybean and alfalfa with both conventional and organic agriculture. Seasonal monitoring and forecasting of crop pests (i.e., black cutworm monitoring, weed emergence monitoring and forecasts, degree-day accumulations) is conducted and delivered real time though radio, internet, and ICM Newsletter. IPM education is intertwined into the private and commercial pesticide applicator continuing instruction courses that reach more than 32,000 Iowa agriculturalists annually. The ISU Agribusiness Education Program, a comprehensive, interdisciplinary program of clinics and schools to improve the transfer of information to the farmer through agribusiness professionals, provides targeted in-depth education in classroom and field situations. Targeted pest management education programs are supported such as the soybean cyst nematode management education coalition and the soybean aphid regional work. Plant disease clinic, weed ID and herbicide diagnostic services, insect ID clinic, and remote diagnostic clinics provide grower and industry support.

Field educational activities in 2001 were 94 educational events, with 3,340 in attendance, for 314 contact hours of education in 37 counties.

b. Impact/accomplishment -

- Approximately ¾ of the acres of corn planted after corn have been treated with a pound of active insecticide per acre to prevent corn rootworm larval damage. By managing all the infested fields within a landscape, a further reduction in toxicants applied might be achieved using prescribed applications of insecticidal baits that contain $1/10^{th}$ the active ingredient. In this area-wide management project, a four-fold reduction in pest populations has been achieved, reducing the number of fields treated by half while maintaining an average level of root protection throughout the area that is comparable to the traditional, full-rate application of insecticides. A model was developed to predict the emergence of the corn rootworm adult, the target of the insecticidal bait. Previously fields had been scouted 8-10 times per season to time the bait applications. The model, developed over four years, was employed during 2001. The predicted emergence matched actual emergence nearly perfectly allowing the anticipation of emergence and peak egg laying. Based on the model, scouting was timed to coincide with these critical times, reducing scouting trips to the field and hence scouting costs by half.

- Strawberry growers have associated thrips with fruit damage and have been treating their plants with insecticides. In 2001, strawberry fruits from one strawberry farm were hand harvested for 5 days during peak strawberry production; less than 1% of damaged fruit was attributed to thrips damage. At this farm, mean numbers of thrips ranged from 0.1 to 48 per flower. A greenhouse study showed that flower and bud stages were damaged by infestations of > 5 thrips; however, relatively few berries showed a bronzed appearance, which is the typical damage from thrips feeding. Based upon our studies, thrips are not the main cause for bronzed fruits in strawberry fields in Iowa; thus insecticidal treatments specifically for thrips can be reduced or eliminated.

- Early-season insecticide treatment to reduce bean leaf beetle damage to soybeans has not provided economic value. Recently, however, the beetle has been shown to transmit Bean Pod Mottle Virus (BPMV). If the virus is transmitted during the early-season feeding by

the beetle, insecticidal applications to reduce first generation populations might provide value. Tests were conducted to determine if plants could be protected from BPMV by managing bean leaf beetles. The treatments were one early-season spray, two early-season sprays, and one early-season plus a mid-season spray. Yield was highest in the strips receiving one early plus a mid-season spray and the percentage of damaged and discolored seeds was lowest, or not significantly different from, the other treatments.

- Northwest Iowa experienced an extremely dry growing season in the crop year 2000. Producers expressed many concerns during the growing season of expected outcomes from such a year - and questions about handling drought-damaged crops were common. In cooperation with local County Extension Education Directors in Plymouth, Cherokee and Sioux counties, five "drought meetings" were held. A total of 476 people attended these meetings.

  An impact survey was sent to 86 of these participants from lists collected at the Cherokee county sites. 97% of the respondents indicated they were either satisfied or very satisfied with up-to-date, useful and timely information. Ten indicated that they made operation changes based on information received at the meeting, such as harvesting early to prevent losses from stalk rot, better marketing plan, putting up silage from this corn instead of green-chopping and feeding, segregate grain for quality differences, and collecting CRC payments properly. Eight indicated they would make changes in the future like better weed management, more beans if the spring is very dry, discontinue corn on corn, reduce fall tillage/less tillage (3 times), and better drought tolerance consideration on hybrid selection. Additional questions asked for the economic impact of the use of this information on their operation and how many of their acres were impacted by drought. Categories that could be marked included:

  - Less than $5/acre - marked by 11 producers who indicated this impacted 5,932 acres.
  - Between $6 and $10/acre - marked by 9 producers impacting 4517 acres.
  - Between $11 and $25/acre - marked by 4 producers impacting 722 acres.
  - Between $26 and $50/acre - marked by one producer with 35 drought impacted acres.

  If using a median value for all categories (and excluding the lowest category), an impact from this small segment of those who attended these meetings could be estimated at $50,462.

- Agricultural clients need access to crop and pest management information quickly and effectively throughout the year, and most importantly in the growing season. A quick, easy to use and read e-mail update was generated and sent directly to over 120 growers, retailers, consultants, agronomists, manufacturer reps, farm managers and media personnel in southwest Iowa.

  A survey was sent to the recipients of the e-mail version of the newsletter to evaluate its effectiveness. 63 clients responded, and 55 were "very satisfied" with the newsletter overall, with the balance (8) "satisfied". Clients indicated that they electronically forward the updates to over 350 customers, co-workers and neighbors. Of the clients who were inclined to put a dollar value to the impact of the updates, 21 reported $1 to $5 per acre

(serving approximately 280,000 acres), 5 clients reported between $6 and $10 per acre (serving around 110,000 acres), and 1 client reported income growth of approximately $12 per acre on the 5000 acres he manages.

- Many southwest Iowa ag retailers and growers have commonly applied "insurance applications" of insecticides for the prevention of black cutworm (BCW) in corn. Iowa State University research has shown that these preventative applications are unnecessary.

  In cooperation with local ag retailers, seed dealers and farm managers, the extension field crops specialist was able to present and train field day attendees in Iowa State University Integrated Pest Management recommendations for scouting and managing BCW as well as many other early season crop pests. The retailers, seed dealers and farm managers in attendance represented 37,000 acres of corn, and the growers in attendance represented 19,000 acres of corn. At a saving of $7 per acre when avoiding a preventative application, the economic benefit to clients was approximately $400,000.

- Severe damage by variegated cutworms to a 115-acre soybean field farmed in central Iowa required a replanting and insecticide spraying decision. The Farm Service Cooperative in Indianola asked the ISU Specialist to look at the field to determine the problem. Approximately 50 acres of the 115 acres field was severely damaged by variegated cutworms and needed to be replanted. After scouting the entire soybean field it was determined that the cutworms were either about to pupate or had just begun to pupate. The damage had been done. It was recommended that they replant the 50 acres immediately and not use an insecticide application on the 115 acres of soybeans. The decision not to spray an insecticide on the 115 acres saved the farmer approximately $11 per acre in insecticide and application costs, for a grand total of $1,265.

- An 80-acre cornfield sustained approximately 95 percent cutting from black cutworm. It was May 16, and the most recent ISU research indicates that corn planted at that time of year has a yield potential of only 1- percent less than earlier planted corn. But, as yield potential was beginning to drop rapidly, a replanting decision was needed rapidly. The producer was "ready to roll" but his dealer suggested he seek another opinion. ISU Extension was contacted for that opinion. The Extension Crops Specialist examined the field the same day and determined that nearly all the cutting had occurred above the growing point of the corn plants. Thus, the plants should recover without yield loss. There were still many small black cutworms present, so an insecticide treatment was recommended to prevent yield-robbing injury.

  Eighty acres of corn were not destroyed and replanted. The costs that were avoided, per acre, were:

  - Cost of destroying the existing stand. The existing stand was (to be) destroyed with a field finisher. According to FM 1698, the average cost is $8.40 per acre.
  - Cost of seed. According to FM 1712, the cost of seed is approximately $30 per acre.
  - Cost of planting. According to FM 1698, the average cost of planting is $9.55 per acre.

The total cost of replanting an acre would have been approximately $47.95 per acre. Applying that figure to 80 acres, the total savings that resulted from this consultation were approximately $3,836. However, an insecticide cost of approximately $960, including application, was incurred to save the existing crop, resulting in a net benefit of the consultation of $2,876.

- The county extension education director offered one-to-one consultations with farmers and their families. A random survey by the area extension education director was conducted with these farm operations to evaluate client satisfaction, change in farming practices and, if appropriate, economic impact.

  One farmer eliminated the use of starter fertilizer that has resulted in a savings of $2,450. One farmer was provided consultation on fall tillage versus spring and he estimated a savings of $3,135. Another farm operation is now making efforts to change to an intensive grazing management system and he estimates improving returns by $9,500 in his operation.

  An organic farmer consulted the local extension office on genetically engineered organism (GEO) issues and as a result, he created a buffer strip between his corn and the neighbors to avoid contamination issues from cross pollination. He estimated that this change alone added $5,200 to his operation. An agronomy salesman replied that he estimates that one farm call we assisted him with on a legume pest helped his customer save $1,230.

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

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

Key Theme – Agricultural Waste Management

Program 23: Animal Waste Management

a. Description of activity

Iowa has had an integrated scientific approach to address several issues surrounding animal waste management. Research work has been accomplished on widely differing subjects such as influence of diets on manure nutrients and odor, development of manure management systems to better methods to utilize manure and avoid nuisance problems for sustainable agricultural production, impact of open feedlots on water quality, impact of land application of manure on surface and groundwater quality, development of an odor model to assist with planning and zoning, and the public health effects of Concentrated Animal Feeding Operations (CAFOs). Results of this work are being used to assist producers, public agencies and other stakeholders with usable results to minimize problems with animal production and the environment. Much of the research is being disseminated through Extension activities such as Manure Applicators Certification Program, as well as many other public education and training events across the state.

b. Impact/accomplishment -

Short-term:

- EPA's Proposed Feedlot Regulations: The University prepared and submitted a response to the proposed regulations and has developed a literature review to assist with the evaluation of potential alternative runoff control systems to the standard storage basin and irrigation. Research work has indicated that runoff control from smaller feedlots can be treated to meet current performance levels through the use of alternative runoff disposal systems such as vegetated filter strips, infiltration basins and constructed wetlands. The economic impact of this research may end up saving a large segment of the smaller farmer feeder feedlots in the state.

- A report requested by the Governor and the Director of Iowa Department of Natural Resources on the health impacts of Concentrated Animal Feeding Operations (CAFOs) on the public in Iowa was cooperatively written with faculty from the University of Iowa. It will act as a guide to the state legislature as they debate any changes needed in regulations on the animal industry in early 2002. Regulations will address the discharge of hydrogen sulfide, ammonia and odors from animal feeding operations in the state.

Long-term:

- Research is being conducted at several sites around the state to determine the impact of land application of manure on surface and subsurface groundwater quality. Results to date indicate that surface water quality can be affected by runoff from land on which manure was applied. Phosphorus and bacteria can be detected at higher levels when manure is surface applied prior to a runoff event as compared to a check. However, with proper application techniques, there is little impact on surface water quality. There is also little evidence of bacterial contamination of shallow groundwater, i.e. subsurface drainage flow, when swine waste is applied at agronomically accepted levels. Results will be used by the Iowa Department of Natural Resources in the discussion of changes in regulatory rules.

- Evaluated the impact of earthen waste storage structures on the contamination of groundwater in the state. Research was conducted and reported on the hydrogeologic placement of these structures, the leakage rates determined, the sampling of soil and water around the outside of these structures, and the management impacts on water quality. The results of the various studies associated with this project will be used in the discussion of changes in regulatory rules on manure storage structures.

a. Source of Federal Funds—Hatch

b. 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

This program focuses on several issues of importance to understanding the interrelationship between water quality and agriculture: 1) describing the sources of water quality problems and the feasibility of remedial measures for lake and watershed restoration, 2) calculating economic and cultural benefits derived from societal uses of the water resources, 3) constructing models of critical habitat for endangered fish and freshwater mussels that allow water resource development but maintain biodiversity, and 4) contributing to environmental databases for improved state and federal water resource management programs. Program stakeholders include the public, which uses surface water resources, and government agencies that manage those resources.

b. Impact/accomplishment -

Short-term:

- A multidisciplinary team completed a two-year study of the Clear Lake, Iowa, watershed. The report covered the history of the lake and its watershed, the social value of preservation and improvements of water quality, human attitudes and perceptions regarding water quality and community, historical changes in the waterscape, general limnology and ecology, environmental microbiology, physical limnology and hydrology, hydrogeology, groundwater discharge, experimental analyses of fish manipulation and wetland remediation, GIS analyses of the watershed and its biogeochemistry, and an exploration of potential remedial measures to be applied to improvement of water quality. The study resulted in a $15 million restoration program that will be undertaken by the state and the Clear Lake community.

- In southwest Iowa, many low head dams have been constructed in streams in the vicinity of road bridges for the purpose of ameliorating erosion around bridge abutments. The dams have the unintended consequence of interfering with normal longitudinal migratory movements of stream fishes. A field study was conducted to determine if a modified dam design was adequate to permit such movements. Preliminary findings on marked channel catfish and flathead chubs indicated that both species can and do move over the modified dams.

- Refinements were made on a mathematical model that identifies potential habitat of a federally-listed endangered fish species in Iowa, the Topeka shiner. The model is based on landscape-level environmental features and can be used to evaluate the risk of harm to Topeka shiner habitat that would be posed by waterway modifications. It may also be useful for identifying areas that might be suitable for habitat restoration. The model is now being used by the U.S. Fish and Wildlife Service, the Iowa Department of Natural Resources, and a private conservation organization, The Nature Conservancy, for such purposes.

- A long-term study of the littoral fish community in Spirit Lake, Iowa, revealed that the number of native species has declined by approximately 25% over the last 70 years. We concluded that predator-prey interactions and resulting population dynamics might be quite different in Spirit Lake than in other systems dominated by walleye and yellow

perch. These findings are being applied by the Iowa Department of Natural Resources in its program for managing the recreational fishery of Spirit Lake.

Long-term:

- A long-term ecological study of the Missouri River system was completed:

    - Using a multivariate approach, a model was developed based on flow variability parameters that could be used to test hypotheses about the role of flow in determining aquatic community structure. Results synthesize, simplify, and interpret the complex changes in flow occurring in the system and provide an objective grouping for future tests of how these changes affect biological communities.

    - Growth rates were estimated for a number of key fish species to assess latitudinal trends at two life-stages. Results suggest that growth rates of fishes along the Missouri River system are complex and could have large impacts on the management and conservation of fish communities in this altered system.

    - Collapse of the European and Asian caviar industry has raised concern about the persistence of shovelnose sturgeon populations in the Missouri River. We assessed the influence of exploitation and harvest regulations on size structure and yield of shovelnose sturgeon. The results of this study suggest that shovelnose sturgeon are sensitive to low levels of exploitation and changes in natural mortality. We believe that a pro-active approach to their management is warranted due to their current status and possible threats in the future.

    The totality of our results should help state and federal fishery biologists make better informed decisions on options for managing the river and its exploited fish populations.

a. Source of Federal Funds—Hatch

b. 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

Climate variability is the major contributor to large year-to-year variations of crop yields in the Midwest. Over the short term, understanding (and, ultimately, prediction) of climate variations and how they affect production can aid producers in maximizing production efficiency and productivity. Over the longer term, natural or human-induced climate changes could profoundly affect crop production, with some projections even suggesting large-scale dislocations such as the inability to grow dryland corn in Iowa.

Our research focuses on understanding climate variations and their effects on production variation. While most research is focused on the central U.S., recognition of the global nature

of agricultural markets leads us to include efforts to understand other regions' climate variability and, hence, crop production. In conducting this research we use mathematical predictive tools (climate models) as well as analysis of very large climate data sets.

Research to date has focused mainly on growing-season rainfall over the central United States. We have found that springtime rainfall systems were affected by the strong El Nino of 1997-98. Additionally we have evaluated the skill of regional climate models for simulating precipitation and soil moisture. The models were able to capture year-to-year variations in growing-season rainfall although the magnitudes of the variations were somewhat damped in comparison with observed trends. The models were able to predict upper-level soil moisture quite well. There was a persistent low bias in deep soil moisture. Since soil moisture depends mainly on the difference between rainfall and evapotranspiration, a small error in either of these quantities can produce noticeable error in soil moisture. The errors in deep soil moisture were thus hypothesized to result from a negative bias in simulated precipitation.

We also have examined specific processes such as snow accumulation and snow melt that are related to the evolution of soil moisture and precipitation. We found that realistic simulation of snow melt requires that model computations be conducted on a much finer grid than currently used for most operational (and even research) numerical models.

Other research has examined weather and climate trends in agricultural competitor regions such as in South America. We found substantial variations in South American rainfall over interannual and even decadal time scales.

b. Impact/accomplishment -

Short-term:

- The Iowa Environmental Mesonet has brought together data from various agencies (ISU, Iowa Department of Transportation, and others) into a unified data base that can be readily accessed by the public. The Mesonet can be accessed online at <http://mesonet.agron.iastate.edu/>.

Long-term:

- We have found evidence for the possibility of seasonal prediction of growing-season climate (including rainfall and soil moisture) over Iowa and adjacent states. We are exploring this prospect using regional climate models and will make the results available to the public using the World Wide Web. These relatively long-lead forecasts could be of significant value to agricultural producers, and possibly to other interests such as public safety.

a. Source of Federal Funds—Hatch

b. Scope of Impact—State Specific

Key Theme – Natural Resources Management

Program 26: Improving Environmental Quality in a Changing Landscape

a. Description of activity

This program focuses on basic research on relationships between agricultural landscapes and land-uses on biological diversity. Several forms of wildlife habitat manipulations and restorations for restoring and maintaining biological diversity are also being studied. Information derived from the research will help policy makers and natural resources managers to better understand the implications of agricultural policy and land uses on wildlife populations. Stakeholders of this program include Iowans who utilize the state's natural areas and wildlife, and state and federal natural resources agencies.

b. Impact/accomplishment -

Short-term:

- We have established a clearinghouse for the most current information available on methods of reducing deer-vehicle accidents and providing continuously updated information on this issue. The clearinghouse is available to state and federal transportation agencies interested in diagnosing problems with current and future roadways.

- Researchers have developed methods that can be used to quantify the abundance and distribution of small predators in relation to agricultural landscape patterns. These techniques are used by wildlife managers to estimate predation rates, which influence abundance of game species like waterfowl and pheasants.

Long-term:

- Researchers have worked with the Iowa Department of Natural Resources and the U.S. Fish and Wildlife Service to evaluate wildlife response to habitat restoration in northern Iowa. Wetlands have been restored, along with nearby grassland cover, in eight distinct areas that were formerly in agriculture. Population densities that these areas could support were calculated for six bird species. Four of these species have been experiencing population declines in the Midwest, and one is an important game species. This kind of evaluation is useful to state and federal agencies seeking to document results of their restoration efforts.

a. Source of Federal Funds—Hatch

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

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:

- 154 Refereed Publications, Research Papers, Manuscripts
- 124 Non-refereed Publications, Reports, Technical Papers
- 51 Proceedings, Published Abstracts
- 72 Extension Publications
- 154 Invited Presentations
- 82 Education Programs, Field Days, Tours
- 42 Books & Chapters
- 15 Theses, MS/Ph.D. Programs Completed
- 2100 web-based reports from the 2000 census

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

Research conducted in 2001 found a positive relationship between older consumers' shopping activities and life satisfaction. Older female consumers who actively participated in leisure and formal activities were involved and interested in fashion and enjoyed apparel shopping. This work offers potential to improve customer service, selection, and satisfaction with apparel products and services for the rising numbers of rural elderly consumers.

Older consumers in rural Iowa can aid the small community marketplace. Approximately one in four Iowans is currently 55 years or older with a medium income of $41,560. This research provides information for better matching product and service offerings targeted toward the 55+ consumer. The impact of a 1 percent increase in local shopping for a community of 2,500 in population would generate an annual increase of $100,000 spent locally.

The reports on Empowerment Zones/Enterprise Communities to USDA provide policy guidance for reauthorizing legislation on rural development in persistently poor areas with respect to the importance of investments in community capacity on leveraging resources for other social infrastructure and non-economic development projects. The research papers and manuscripts will develop the importance of citizen participation and bridging social capital for rural development. The research reports on welfare reform will reshape lines of debate on theories of poverty and strategies to sustain the transition off welfare and reduce systemic poverty over the longer-term.

Mail survey data estimate the impact of outshopping—via Internet and other modes—on the tax base of rural and small town areas in 11 states. Communities in these areas can use the information to develop programs that counter leakage of tax dollars from their communities. Extension specialists in 11 states are being provided information that can be used to develop consumer education programs related to Internet product purchase and information search.

All observational data regarding home visiting with the Mid-Iowa Community Action Agency, Inc. Early Head Start program have been collected for more than 1,000 home visits conducted by Family Development Specialists and Infant-Toddler Development Specialists. In addition, data documenting overall amounts of services provided to participating families

have been obtained from MICA, and data to describe child and family outcomes will soon be available. Preliminary data have been shared with program staff at MICA EHS, and findings are being used to facilitate examination of their service delivery procedures, as well as their efforts aimed at training and technical assistance of staff people.

Assessment of accomplishments as measured against POW:

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

- increases in employment opportunities, educational attainment, per capita income, housing availability, continuing education, participation in local events, and elements of the environment such as water quality, ②
- communities supporting development projects; increased capacity of communities, families, and individuals to improve their own quality of life, ①⑤
- improved cooperation between the university, state and federal agencies, industries and communities to transfer technology that will lead to industrial growth and rural development, and ④
- enhanced education of decision-makers at local, regional, and state levels; those initiating development projects; and those setting policies. ③⑤

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 $ 2,251,178

FTEs 18.4

Key Theme – Information Technologies

Program 15: Agricultural Information Technologies

This has been discontinued as a separate program. This work is being carried out under programs 13 and 14, among others.

Key Theme – Impact of Change on Rural Communities

Program 27: Rural Development

a. Description of activity

This program examined how human systems affect and are affected by the structure of agriculture and life in rural communities to address five major issues: (1) enhancing economic opportunities and the quality of life in rural America, (2) building greater harmony between agriculture and the environment, (3) achieving sustained, long-term improvement in the competitive position of U.S. agriculture, (4) developing a safe and secure food system, and (5) encouraging a healthier, more well-nourished population.

b. Impact/accomplishment -

Short-term:

- CD-DIAL has provided data-mapping assistance to our survey clients. Information from mapped data is allowing local planning teams to better understand survey results, especially geographic variations that may be occurring in multiple county or statewide surveys. Modifications to the system are now being tested and will provide a more user-friendly system for reporting ISU Extension to Communities activities and outcomes in the future.

Long-term:

- The reports on Empowerment Zones/Enterprise Communities to USDA provide policy guidance for reauthorizing legislation on rural development in persistently poor areas with respect to the importance of investments in community capacity on leveraging resources for other social infrastructure and non-economic development projects. The research papers and manuscripts will develop the importance of citizen participation and bridging social capital for rural development. The research reports on welfare reform will reshape lines of debate on theories of poverty and strategies to sustain the transition off welfare and reduce systemic poverty over the longer-term.

a. Source of Federal Funds—Hatch

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

Key Theme – Other

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

a. Description of activity

This program has focused on the following three main issues: 1) improvement of protective quality and use of fiber-related products by addressing challenges posed by occupational safety and health issues; 2) enhancement of individuals, family, and community socio-economic development through expansion and advancement of information, products, and services related to textiles and clothing; and 3) facilitation of fiber-related product or industry process development to advance domestic and/or global market exchange.

b. Impact/accomplishment

Short-term:

- Occupational Safety and Health Through the Use of Protective Clothing: Survey findings point the direction to target educational messages for the public. Gender is an important variable, with men taking fewer sun-protective measures than women. Appearance has emerged as an important variable with regard to sun-tanning

behavior and headgear selection for both men and women. These data show that additional educational information is needed by the public concerning effects of sun exposure and means to prevent excess exposure. Educational resources for sun safety have been produced that can be obtained via the internet, giving world-wide access.

- Research conducted in 2001 found a positive relationship between older consumers' shopping activities and life satisfaction. Older female consumers who actively participated in leisure and formal activities were involved and interested in fashion and enjoyed apparel shopping. This work offers potential to improve customer service, selection, and satisfaction with apparel products and services for the rising numbers of rural elderly consumers.

- Older consumers in rural Iowa can aid the small community marketplace. Approximately one in four Iowans is currently 55 years or older with a medium income of $41,560. This research provides information for better matching product and service offerings targeted toward the 55+ consumer. The impact of a 1 percent increase in local shopping for a community of 2,500 in population would generate an annual increase of $100,000 spent locally.

Long-term:

- Planning, Problems, and Performance for U.S. Small Businesses: Current research offers a better understanding of marketing strategies used by successful small businesses enhancing startup success and venture capital investment; thus, providing collateral support to justify additional small business loans.

- Digital Printing for Mass Customization. Researchers have been working collaboratively to find ways to expose the potential applications of the new digital textile printing technology by focusing on creative design garments or art-to-wear, rather than developing a product for a specific target market. They intentionally strove to document the *process* of implementing the new technology, as well as the resulting *products.* These technologies offer opportunities to expand collaborative efforts among designers from diverse disciplines and open up a constantly expanding range of creative possibilities.

- Impact of Outshopping on Rural Areas and Small Towns: Mail survey data estimate the impact of outshopping—via Internet and other modes—on the tax base of rural and small town areas in 11 states. Communities in these areas can use the information to develop programs that counter leakage of tax dollars from their communities. Extension specialists in 11 states are being provided information that can be used to develop consumer education programs related to Internet product purchase and information search.

a. Source of Federal Funds—Hatch

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

Program 30: Quality of Life

a. Description

This program focuses on sustaining and enhancing rural life quality by investing in safe technology, community and social services support to families, and better management of natural resources to preserve and improve environmental amenities. These investments must be based on scientifically valid research that responds to a variety of challenges: population aging and employment needs, devolution of social service policy making to the community level, tensions between maximizing incomes and preserving resources, and health hazards from intensive livestock and crops production.

b. Impact/accomplishment

Short-term:

- All observational data regarding home visiting with the Mid-Iowa Community Action Agency, Inc. Early Head Start program have been collected for more than 1,000 home visits conducted by Family Development Specialists and Infant-Toddler Development Specialists. In addition, data documenting overall amounts of services provided to participating families have been obtained from MICA, and data to describe child and family outcomes will soon be available. Preliminary data have been shared with program staff at MICA EHS, and findings are being used to facilitate examination of their service delivery procedures, as well as their efforts aimed at training and technical assistance of staff people.

a. Source of Federal Funds—Hatch

b. 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:

- 21 Refereed Publications, Research Papers, Manuscripts
- 114 Non-refereed Publications, Reports, Technical Papers
- 39 Proceedings, Published Abstracts
- 164 Extension Publications
- 153 Invited Presentations
- 1,097 Education Programs, Field Days, Tours
- 2 Patents
- 4 Theses, MS/Ph.D. Programs Completed
- 71 meetings, workshops, conferences; 61 presentations

- 6 feasibility studies
- 42,327 attended meetings and conferences
- 65,187 one-on-one consultations

Commercial Applicators: 652 commercial applicators were trained in 81 statewide education meetings. The emphasis in the 2001 commercial applicator program was adopting emergency action plans or a plan in case you have an accident or emergency in terms of manure leaks, spills, etc. Of the 652 evaluations summarized for the 2001 program, 45 percent of commercial applicators say they have already developed an emergency action plan, another 44 percent say they plan to adopt an emergency action plan as a result of the training. Fifty four percent of the respondents say they already maintain manure application records, another 34 percent say they will start maintaining application records as part of the training.

The Master Woodland Manager's Program. The Master Woodland Manager's Program is an educational program designed to provide more and better assistance to woodland owners. Each year, a selected group of woodland owners are selected to receive 32 hours of intensive instruction in forestry and woodland management. These woodland ambassadors then have the responsibility to work to promote better management and stewardship of the woodland resource through educational and service contacts. They are tracked for two years to document their service to the resource. By fall 2001, as a result of 28 sessions, the 711 graduates of the program have contributed almost 18,000 hours of document service for the improvement of the woodland resource in Iowa. Types of service activities have included: Youth education and working in schools; working one to one with neighbor forest land owners; developing county and state fair exhibits; answering phone questions at county extension offices; working with county conservation boards as presenters for educational programming; and many more types of activities.

Participants learn where trees should and should not be used in the landscape, how to plant and provide appropriate post-plant care, how to manage mature trees, and finally, how to identify potentially dangerous trees in the landscape. While students are not charged a fee for participating, they are expected to "give back" 24 hours of service to their communities performing various tree care related tasks. Since the inception of the program in 1992, Tree Steward graduates have recorded over 13,000 volunteer hours. This small army of trained volunteers undoubtedly has made a positive impact on Iowa's urban and community forest.

Leadership, technical support, and analysis were provided to cattle marketing alliances, i.e., Chariton Valley Beef, Raccoon Valley Cow Calf Association, and IMBIO. These alliances improved market access through cooperative efforts and producers earned an additional $20-25 per head over conventional marketing programs by providing additional information and/or larger group sizes.

The Advanced Reproductive Management seminars were held at five sites in state with total attendance of approximately 250. This series was cosponsored with Iowa Pork Producers Association. In seminar evaluations, producers said they especially appreciated receiving current knowledge in the areas of boar fertility and using artificial insemination to make genetic progress. At one site alone, one-third of those completing evaluations said they estimated their annual income would increase at least $2,500 when they applied the

knowledge gained at the seminar. Because of the strong approval rating of this series and recommendations from producers that this type of programming be continued, plans were made to offer a series of finishing management seminars in March 2002.

In just 15 days in spring 2001, IPIC coordinated a program on foot and mouth disease and broadcast it to 35 sites on the state ICN network. Speakers told the approximately 180 attendees how to recognize FMD, steps to take if it was found on a farm, what was being done to keep the disease out of the U.S. and the economic impact if the disease entered the U.S. They also helped audience members distinguish between FMD and Bovine Spongiform Encephalopathy (BSE), as both diseases were in news reports almost daily. The biggest impact of this program was creating and maintaining awareness of practices that could impede or prevent disease infection at individual livestock sites, as evidenced by evaluation results. Forty-one percent of those who completed the program evaluation said they did not require “time away from livestock” for visitors entering their production facilities. Yet, nearly 70 percent said that, based on information they gained from this program, they would modify their visitor policies. This heightened awareness factor should pay dividends in terms of lower disease rates of all kinds at production facilities.

Over 75 individual farm milk quality trouble-shooting farm visits were conducted, leading to a field research/demonstration project on 3 farms. Utilizing an approach involving selective sampling of cows, management changes, and implementing new strategies, each of the farms experienced increased income from additional milk quality premiums: $16,000 for herd 1 (300 cows), $65,700 for herd 2 (1100 cows), and $30,660 for herd 3 (120 cows). Furthermore, additional profits were realized through increased milk sales, decreased treatment, milk discard, and culling costs.

Twenty-four producers are seeking to diversify their cropping systems, by planting dry edible beans and Adzuki beans. Having witnessed other alternative crop projects come and go, this group approached the process with a unique attitude of cooperation. The group determined cropping systems that would work for these crops, cooperatively harvested and marketed the beans. When prices are compared to traditional soybeans they are realizing profits of $100 more per acre.

Working with a new start-up firm, Iowa State University helped the company add value to part of the hog that previously sold for $ .09-.22/lb as low cost trimmings. A small tender muscle was processed differently so that it could be exported for a price averaging $ 2.60/lb.

Plant and Pest Diagnosis. Successful problem solving in the garden or landscape requires accurate identification and diagnosis. Identification and diagnosis is accomplished on campus through the Plant Disease Clinic, Insect Diagnostic Clinic, Hortline and Weed Science Unit and others. The combined total number of samples analyzed for homeowners, garden centers and local county extension offices was 2200. One major impact of correct identification and diagnosis is the avoidance of unnecessary pesticide application (or purchase of pesticide application service).

Assessment of accomplishments as measured against the POW:

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

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

FTEs: 122

Key Theme – Managing Change in Agriculture

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

a. Description of activity

Short-term farm financial performance and the reliance on farm program payments strongly influenced the demand for and approach taken toward business strategy and management development during this reporting period. The focus for this plan of work remained on adjusting the farm business to changing financial conditions, farm business organization, management information systems and competitiveness.

All of the reported program elements were designed and delivered in cooperation with representatives from leading farm organizations, the lending community and government agencies. The overall design of the strategic management program is multidisciplinary and addresses the needs of farm families drawing on the research and resources of economics and business, family and human development as well as technical agriculture.

b. Impact/accomplishment -

A 70-cow dairy herd, even if herd milk production is high, has great difficulty competing in today's milk industry. The costs of doing business have simply out-stripped any efficiencies one may have gained in milk production. The return on assets in the operation have shrunk to almost nothing. If the interest bill is large, then the difficulties of operating a dairy farm are even more severe. This "family" sized dairy farm must make a choice of either expanding cow numbers to a more competitive 240 head or de-emphasize the dairy in the form of some other income producing activity. Over the past year, I have worked closely with 3 different "family" dairy farms. Most of the work involved financial analysis, considerable of the work with third party lenders or other family member investors. Also, considerable work is required to convince operators that assets have to be maximized, i.e., cow freshening must occur consistently 5 times per week, minimizing the times that calf hutches, birthing stalls and heifer pens are over-crowded or unused. Also, some of my time was used to teach risk management in milk pricing and input pricing. One of the dairy farms expanded to 224 cows from 80 cows, the other 2 farms have not made a final decision about expanding. The expansion involved new cow stalls, new parlor, new feed storage, new manure handling, and 160 new bred heifers. The system is fully functioning, average daily tank weight is 74# when our projection required 64#, average unit cost of milk is lower than was projected. The debt of this young couple zoomed from zero to about $700,000, but their business profit and the prospects of a continuing dairy career and the amount of family disposal income are much

healthier. I think we can realistically expect this couple to earn $3,000 more each year than was possible under the old, small system.

A regional cooperative requested assistance from Iowa State University Extension in helping its technical field staff understand farm business competition and strategy. Senior management believes that although their staff was well trained in production technology, they lacked an understanding of how technology and business strategy influenced the competitive position of the farm business. ISUE organized and delivered a day-long workshop on farm business strategy for the Cooperative's technical staff. The work used Strategic Advantage materials and emphasized financial performance and business strategy.

c. Source of Federal Funds—Smith-Lever

d. Scope of impact—State Specific

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, such as manure. Doing so will help Iowa producers optimize systems for comprehensive farm planning and maintain long-term economic viability and environmental stewardship.

b. Impact/accomplishment -

- Manure Applicator Certification Program

  This program provides training that is required by state law.

  - Commercial Applicators: 652 commercial applicators were trained in 81 statewide education meetings. The emphasis in the 2001 commercial applicator program was adopting emergency action plans or a plan in case you have an accident or emergency in terms of manure leaks, spills, etc. Of the 652 evaluations summarized for the 2001 program, 45 percent of commercial applicators say they have already developed an emergency action plan, another 44 percent say they plan to adopt an emergency action plan as a result of the training. Fifty four percent of the respondents say they already maintain manure application records, another 34 percent say they will start maintaining application records as part of the training.

- Confinement Site Applicators: 968 confinement site applicators were trained in 77 statewide meetings. In the confinement site program 62 percent of evaluations stated that confinement site applicators were already sampling manure, and additional 29 percent reported they would adopt manure sampling as a result of the training they received. 36 percent of the respondents said that they had developed an emergency action plan prior to training and 52 percent of the confinement site applicators said they plan to develop emergency action plans because of the training that they had received at the meetings.

- Others: The Manure Applicator Certification program also trained 200 people outside of Iowa who apply manure in Iowa. It also serves as an educational tool to Wisconsin commercial applicators that do not need to be certified, but value it as an educational tool for their professions.

- Nitrogen Fertilizer Supply and Price Concern

  In the winter/spring of 2001 there were very high nitrogen fertilizer prices and a potential shortage of nitrogen fertilizer products available for corn production. Extension information and newsletters were disseminated that explained the issues involved, and emphasized nitrogen management practices that helped producers adjust nitrogen application rates, lower fertilizer use, and choose alternative products to deal with the critical nitrogen supply issue.

- Phosphorus and Water Quality

  Phosphorus in surface water systems has regained prominence in Iowa as a contributor to water quality degradation. A series of extension newsletter articles was developed that explained the issue, explored the governmental agency activities related to the phosphorus issue (such as the P-Index development), and provided management options for producers to improve phosphorus management and soil conservation. This information helped producers refine phosphorus applications for crop production and reduce the potential for phosphorus leaving farm fields and reaching surface water bodies.

- Odor and Nutrient Management Newsletter

  Four Manure Matters- Odor and Nutrient Management Newsletters were distributed. These four newsletters contained 11 articles directly related to nutrient management. Remaining articles were announcements, rule changes or related to odor control. The newsletter was distributed to over 6,500 producers, agency personnel, and agribusiness personnel.

- Swine Manure Nutrient Utilization Demonstration Project

  The goal of this project is to expand knowledge concerning liquid swine manure nitrogen and phosphorus availability for corn and soybean production in Iowa and to cause change in manure management practices by crop and livestock farmers through integration of the

project with Extension education programs. The strategy for this project is to conduct on-farm field demonstrations across Iowa with concurrent data collection to document liquid swine manure nitrogen and phosphorus availability to crops and compare crop yields with manure to crop yields with commercial fertilizer. In the first two years of the project twenty-three demonstration sites were established in nine Iowa counties. Swine manure was applied before corn and soybean crops, and at some sites second-year residual manure nutrient response was monitored. Preliminary results show that supplementing swine manure application with additional fertilizer nitrogen or phosphorus is not a requirement, and a consistent, economical yield response to additional fertilizer will occur only when the manure application does not supply sufficient nutrients to meet corn needs at responsive sites. First-year soybean yield data suggest that swine manure application increases yields on low phosphorus-testing soils. In 2001, 968 certified confinement site manure applicators learned about this on-going field demonstration project and the results at 77 certification meetings.

- IMMAG Web Site Hosts Information for Iowa Plan for Open Feedlots and EPA Proposed AFO/CAFO Rules.

  Two major programs had a major impact on Iowa Livestock producers in 2001. The Iowa Plan for Open Feedlots is a voluntary compliance plan to assist open feedlot producers in meeting state regulations. EPA's proposed AFO/CAFO rules have impact across all animal agriculture and are of particular importance in Iowa, a leading livestock producing state. The Iowa Manure Management Action Group responded to the need for information dissemination for both programs by showcasing each on the IMMAG web site and by assisting with development of educational materials related to both programs.

  - The Iowa Plan for Open Feedlots: As a result of this plan, by December 31, 2001, over 1,300 feedlots have registered with DNR. The Iowa Plan for Open Feedlots page on IMMAG was the most visited page on the site from its initial posting on March 21, 2001 through the last reporting period, December 31, 2001.

  - News Regarding EPA's Proposed AFO/CAFO Rules: A separate page was created on the IMMAG site to provide information on the EPA proposed rules. The page was posted on May 23, 2001. It contains quick links to EPA web pages containing the proposed rules, fact sheets and instruction on how to submit comments. In addition, the site contains a brief review of the proposed rules and possible impacts on Iowa producers developed by an issue team at ISU. As a result of this information being included on the IMMAG site, the use of the site doubled from March 1 to June 30, 2001 over the same period from one year ago.

    As a result of this effort, Iowa producers have more opportunities to be informed about environmental issues affecting them. This information is coordinated, collected and disseminated through a recognized electronic clearinghouse.

- Nutrient Management Education Project

This project was designed to increase awareness and understanding of nutrient pollution sources, impacts and potential management/regulation issues among all Iowa citizens and stakeholder groups, and to increase significant measures of long-term management change to reduce agricultural non-point pollution, including voluntary adoption of refined crop fertility management practices by producers and crop management service providers. During the second year of the project, an aggressive audio and print media, water quality-nutrient, public awareness campaign continued. Several methods were employed, including: 1) the Nitrogen and Phosphorus Knowledge web page, 2) public information news releases, ICM Newsletter articles, nitrogen posters and fact sheets, 3) Nutrient Management Minute radio programs, 4) a September 10, 2001 Fall Nitrogen Policy news conference, and 5) educational presentations, interviews and surveys.

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

This program focused on ways to address both the short and long-term financial problems facing Iowa farmers. These problems include source and level of net farm income and also the changing structure facing farmers.

One-to-one, individual contacts were the primary method used to deliver individual financial analysis. Group sessions were used to demonstrate the records necessary for complete financial analysis and how to use these records in a complete financial analysis.

Improving marketing of the existing commodities is one way to improve the financial performance of the farm. Meetings were held to illustrate the use of the futures market and other marketing tools. Home study courses were also used as a means of market education. Finally, facilitating development of marketing clubs was also a strategy that was employed. The marketing clubs enable farmers to learn from one another.

Farmers are changing in how they want information delivered. This year we developed and began delivering a web based course in advanced grain marketing. A home study course, on valuing land, using the more traditional delivery methods, was also updated.

The government program has provided over half of {the basis for all of} Iowa's net farm income in the 1990's. This program provided an analysis of the new farm bill debate and how farmers could be impacted. Additionally, the longer-term conservation reserve program was analyzed to illustrate the possible advantages of this program to some farmers.

Several programs were held to inform the public about the current tax regulations. It is possible to save considerable money and to use the tax provisions as a part of financial management; these meetings illustrate the potential for Iowa farmers.

Computers offer a remarkable tool for financial analysis, marketing, and purchasing. However, some farmers are still not computer literate. This program offered a course in basic computer literacy for farmers. Specific applications were covered and the ability to further use the computer in the farming operation was taught.

This program used a variety of delivery methods and worked with a variety of partners. Delivery methods included one-on-one, meetings, home study courses, and facilitating marketing clubs. Partners included the traditional farm groups, community colleges, mental health workers, and members of the faith community. This program also worked with other land grant institutions in the region.

b. Impact/accomplishment

- One-on-one education--Due to low prices, poor production, and a variety of other factors some agricultural producers find it difficult to procure operating capital to continue farming. Bankers sent letters to clients saying they where not going to have their credit lines renewed. ISU Extension met with 70 clients individually to examine their debt loads, profitability and efficiency. We were able to examine the impact if they restructured their debt, reduced expenses, increased income, and found new sources of capital. This included working with new lenders.

- Crop Pricing Strategies Program--The new farm bill encourages farmers to rely on the market for their income. Most producers do not use all the marketing tools available to them. In 2000 farmers did not aggressively forward price their crops in anticipation of a drought. The prices rallied and a drought did not materialize. As a result farmers missed out on pricing opportunities.

- Several meetings were held around the state trying to introduce farmers to the marketing tools available and how to use them. One series of meetings combined two extension areas and a grain marketing organization. There were two meetings held in the summer to try and increase attendance. Farmers attending were introduced to crop pricing strategies to help them increase profitability.

- Land Leasing Meetings--Land represents the single largest expense in crop production and over 50 percent of Iowa's farmland is leased. Over the past few years the structural changes in agriculture have changed the traditional tenant landlord relations. This means that farmers have to be very careful in determining what type of lease they are going to choose and how much rent they will pay.

- Extension provides numerous meetings, publications and one-to-one consultations to help people analyze their options and alternatives. Extension works with both the tenants and the landlords. In some cases the landlords are not even familiar with the basics of modern agriculture. From one set of meetings alone 43 percent will be changing their rental rates

and 14 percent will be changing the type of lease. Over 3000 publications on rents are distributed each year.

a. Source of Federal Funds—Smith-Lever

b. Scope of Impact—State Specific

Program 106: Commercial Greens Industry

a. Description of activity

The production, marketing, installation, and maintenance of horticultural crops create many jobs for Iowans. Commercial horticultural enterprises in Iowa include, fruit, nut, herb, flower, and vegetable producers, lawn care companies, golf courses, school and professional sport athletic fields, corporate grounds care, turfgrass sod producers, production wholesale nurseries, landscape design and installation firms, retail garden centers, landscape maintenance companies, arborists, greenhouse crop producers, retail florists, and Christmas tree growers. Other important clients include public utilities, and city, county, and state public lands. Program 106 has focused on three important issues: (1) increasing the quality and percentage of marketable crop per acre and increasing profitability of businesses without harming the environment; (2) improving and enhancing the quality of life for all Iowans through the use of horticultural crops; and (3) insuring the safety of commercial horticulture workers and all users of the cultivated and managed landscapes they design, build, and maintain.

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

b. Impact/accomplishment

- *Performance Goal 1*. (see http://www.extension.iastate.edu/Pages/planofwork/plan106.html for goals)

  - Fruit & Vegetable Growers Meetings: A significant challenge for Iowa's commercial fruit and vegetable producers is remaining competitive in our uncertain global economy. Thanks to the research efforts of ISU Extension specialists, our clients are planting Iowa tested; high quality, disease resistant, vegetable varieties on plastic mulch with trickle irrigation. Recommendations were based on campus based studies and results of vegetable research from the Horticulture (Gilbert), Muscatine Island (Fruitland), and Castana, IA, research farms. The recommendations were delivered via Extension winter educational programs and summer field day training programs in cooperation with the Iowa Fruit and Vegetable Growers Association. Cooperative meetings with Illinois, Nebraska, Missouri, and Kansas were also used to dispense this information to over 650 fruit and vegetable growers. These improved

management practices have resulted in reduced use of pesticides and irrigation water, higher quality produce, higher yields per acre, and overall increased profits for commercial producers.

- Shade Tree Short Course: The Iowa State University *Shade Tree Short Course*, sponsored by the Departments of Entomology, Forestry, Horticulture, and Plant Pathology, has evolved from its inception in the late 1950's to becoming the preeminent shade tree/landscape maintenance conference in the Midwestern United States. The two-day Short Course attracts arborists, landscape architects and designers, grounds maintenance workers, nursery professionals, educators, and community volunteers from Iowa and the surrounding states to hear internationally renowned authorities speak on a wide variety of plant and landscape related topics. The 45th Annual *Shade Tree Short Course*, held March 13-14, 2001, on the ISU campus, attracted over 650 participants. A blend of speakers from as far away as Pennsylvania and California created a networking and learning experience that is unrivaled in the green industry.

- Iowa State University Turfgrass Summer Field Day. The annual Iowa State University Turfgrass Summer Field Day sponsored by the ISU Departments of Horticulture, Plant Pathology, Entomology, and in cooperation with the Iowa Turfgrass Institute is one, if not the best-attended "field day" in the state of Iowa. Over 500 participants attended the Field Day last year (August 2, 2001) and were treated to a wide variety of topics and demonstrations including, recommended turfgrass varieties, summer turfgrass maintenance, disease, insect and weed identification and control, sports turf care, sand green management, and tree care. All participants receive the Iowa Turfgrass Research Report, which provides descriptions of, and results from, the various research projects taking place at the ISU Horticulture Research Station.

- The Master Woodland Manager's Program. The Master Woodland Manager's Program is an educational program designed to provide more and better assistance to woodland owners. Each year, a selected group of woodland owners are selected to receive 32 hours of intensive instruction in forestry and woodland management. These woodland ambassadors then have the responsibility to work to promote better management and stewardship of the woodland resource through educational and service contacts. They are tracked for two years to document their service to the resource. By fall 2001, as a result of 28 sessions, the 711 graduates of the program have contributed almost 18,000 hours of document service for the improvement of the woodland resource in Iowa. Types of service activities have included: Youth education and working in schools; working one to one with neighbor forest land owners; developing county and state fair exhibits; answering phone questions at county extension offices; working with county conservation boards as presenters for educational programming; and many more types of activities.

- In addition, the Commercial Greens Industry group is involved with three Woodland Stewardship Conferences, involving neighboring states. In November, we were in Nebraska City with attendance of 160 woodland owners from Iowa, Nebraska,

Missouri and Kansas. In March we provided training for about 130 woodland owners from Missouri, Illinois and Iowa in Quincy, Ill and for more than 600 woodland owners from Iowa, Illinois and Wisconsin in Sinsinawa, WI.

- *Performance Goal 2.*

  - Plant Evaluation. We are currently evaluating a broad selection of fruits, vegetables, turfgrass varieties, and woody and herbaceous ornamental plants for quality (both aesthetic and edible use), pest resistance, and tolerance to environmental conditions in the upper Midwest. Results and information derived from these plant trials aid green industry professionals as they decide which plants they will offer to their retail clients, or use in a commercial or residential landscape design setting.

  - The Iowa Community Tree Steward Program. The aesthetic, environmental, and functional benefits that come from using trees in urban and rural landscapes are well documented. But municipalities and individual homeowners alike frequently run into difficulties when selecting and planting trees, and maintaining this valuable community resource. Enter the Iowa State University Extension offering, The Iowa Community Tree Steward Program. Offered at two different geographic locations in Iowa each year (Iowa City/Washington and Fort Dodge in 2001), this popular program provides 24 hours of instruction to green industry professionals as well as to interested citizens who are without formal training in the plant sciences. Participants (30/site) learn where trees should and should not be used in the landscape, how to plant and provide appropriate post-plant care, how to manage mature trees, and finally, how to identify potentially dangerous trees in the landscape. While students are not charged a fee for participating, they are expected to "give back" 24 hours of service to their communities performing various tree care related tasks. Since the inception of the program in 1992, Tree Steward graduates have recorded over 13,000 volunteer hours. This small army of trained volunteers undoubtedly has made a positive impact on Iowa's urban and community forest.

- *Performance Goal 3.*

  - Pesticide Applicator Training. The Iowa Pesticide Act provides two renewal options for commercial and public pesticide applicator certification for the greens industry categories of Ornamental, Turfgrass, Greenhouse, Fruit and Vegetable, and Forestry. Commercial and public applicators may renew their certification by testing once every three years or attending approved instructional training each year (2 hours/year). The vast majority of applicators take the recertification route. Annually, special programs are offered by Iowa State University Extension and delivered in a variety of methods tailored to ensure all Iowans that need recertification credits will have the opportunity to obtain them. Delivery methods include: ICN (live interactive direct multi-site TV), satellite, videotape, live in person recertification meetings and inclusion in other 'Greens' programs such as Iowa Fruit and Vegetable Growers Association Annual Convention, Shade Tree Short Course, Iowa Nursery and Landscape Convention, Turfgrass Field Day and Iowa Turf Institute Annual Convention. This year Plant Pathology, and Horticulture delivered programs that

covered insect and disease identification and control topics specific for each category (e.g. greenhouse covered greenhouse pests). In addition all programs this year contained sections on commercial storage of pesticides, use of personal protection equipment and information on rules and regulations. In total, through the various delivery systems, 3657 Iowans received this recertification training (this is a sub total from Program 143: Pesticide Applicator Training). The tree fruit, small fruit, and vegetable production guides put out by ISU Extension have incorporated into their recommendations, organic, and other newer plant protection products that are safer for the applicator and the environment. Turfgrass varieties and management systems are being further evaluated for tolerance to traffic, and resistance to compaction. The purpose is to improve overall safety and reduce number and severity of injuries of athletic participants.

a. Source of funding: Smith-Lever

b. 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 is a central contact point for all things beef at Iowa State University. Its mission is to enhance the vitality, profitability, and growth of the Iowa beef industry through timely and relevant producer education, applied research, and improved access to information. A core group of campus and field extension specialists and applied researchers from five departments in two colleges work together on timely high priority projects. Core program areas were developed with significant input from producers, regulators, USDA agencies, and extension staff and delivered via state wide conferences, fiber-optics communication, a dynamic user-friendly website, work with the media, published materials, local meetings, and one-on-one advise. In addition to a formal advisory board that meets annually, the Iowa Beef Center conducted producer listening sessions at seven locations across Iowa to identify producer priority areas to help direct our program. The focus in 2001 was in three primary areas:

1. environmental management for open feedlots,
2. value-added and value-based marketing, and
3. improved production efficiency.

b. Impact/accomplishment

- The Iowa Plan for Open Feedlots was a cooperative effort between several industry and regulatory organizations facilitated by the Iowa Beef Center. Under the program, open beef and dairy feedlot operators were encouraged through mailings, educational programs, media efforts and other contact, to register their operations with DNR. More

than 1,500 open feedlots in Iowa registered under the plan between March and December. These producers will receive direct contact and specific recommendations as to how to better manage their operations to protect water quality. The intensity of the media and educational campaign raised the environmental awareness of nearly all Iowa cattle producers. The Beef Feedlot Systems Manual (PM 1867) and Feedlot Conference in November 2000 provided research based information on animal and environmental performance, investment cost, and profitability of alternative feedlot designs. The Center was also successful in acquiring grant funds to support environmental programming.

- The Iowa Beef Center continues to explore ways of adding and capturing value produced by Iowa cattlemen and women. The Iowa Progeny Tenderness Demonstration Project is a multi-year project to educate producers and identify Iowa sires ability to produce progeny with tender beef. Leadership, technical support, and analysis were provided to cattle marketing alliances, i.e., Chariton Valley Beef, Raccoon Valley Cow Calf Association, and IMBIO. These alliances improved market access through cooperative efforts and producers earned an additional $20-25 per head over conventional marketing programs by providing additional information and/or larger group sizes. The Iowa Beef Center led the development of the Iowa Certified Beef Female program and organized two special sales featuring these cattle. Consignors received premiums of $25, $50 and $100/hd. over similar cattle at the same location within a week. We served on the Iowa Quality Beef Supply Network grid committee and provided data support and analysis to the Network. The Center also developed the automated report for returning producers their carcass information and providing a meaningful format to benchmark their cattle to others. More cattle each day are marketed on a value-based grid. Basic and advanced grid marketing education programs provide producers tools to better evaluate their marketing options.

- A web-based estrus synchronization system planner for managing and comparing the economics of commercially available synchronization products was developed and has been widely used. Producers from across the US and as far away as Australia and South America have utilized the tool to refine their breeding management and chose the most effective product. A statewide ICN conference on cowherd reproductive and breeding management attracted over 180 producers. A newly developed five-day feedlot management short course provides producers hands on learning opportunities to experience research-based recommendations and participate in on-farm research. Enrollment was capped at 32 and there is a waiting list for next year. The CHIPS program provided on-farm education and service to producers in 60 counties. Forage analysis, diet formulation, performance analysis enables these producers to make more profitable decisions.

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 is a coordinated effort across the colleges of Agriculture and Veterinary Medicine, and 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 as well as emerging technologies from private and public partners enhances the organization and delivery of these programs and improves access to all Iowans.

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

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

For example, as part of Iowa's commitment to ridding the state of pseudorabies, IPIC is involved in research on the effectiveness of using meat juice tests in Iowa slaughter plants for PRV case finding and surveillance. The pilot project identified new cases of infected herds and confirmed the existence of known infected herds, and this success led to the expansion of the pilot project for a 12-month period. With the assistance of ISU Extension field specialists, county extension education directors, and district and state veterinarians, the IPIC presented informational meetings in face-to-face and Iowa Communication Network (ICN) formats on new state pseudorabies regulations and requirements to approximately 1,000 producers. This effort was expanded by developing a segment of the IPIC Web site to include PRV-related information, sources and resources, and questions and answers both in a general format and specifically for 4-H members. Viewers visited this portion of the Web site frequently—statistics show it among the top individual pages for several months, with average viewing times of more than five minutes common through much of the year.

Seminars on advanced reproductive management, financial and production standards, meat quality, were held in multiple locations throughout the state, and nearly 70 percent of those attending said they would be willing to travel more than 50 miles to attend similar seminars. Iowa Communications Network programs that focused on a different specific topic of producer interest per program drew nearly 900 people.

The IPIC demonstrated its commitment to providing timely, accurate and unbiased herd health and food safety information to producers through several avenues including producer meetings, research projects and Internet resources.

In cooperation with ISU Extension field specialists, the IPIC has developed a series of demonstration and applied research programs designed to answer producer questions about costs and benefits of various technologies and to provide information on the financial impacts. Examples include effectiveness of dietary phytase, animal composting, niche and

value-added market and product development, and the use of a biofilter for improving quality of air leaving a swine finishing building.

b. Impact/accomplishment

- The IPIC and Leopold Center for Sustainable Agriculture co-sponsored a conference on niche and value-added marketing. Approximately 130 people attended from 10 states. Of those who indicated on evaluations the most valuable thing they gained from the conference, 75 percent said the information on existing value-added groups and the experiences of those group members was most important. Twenty-five percent said the contacts they made during the conference were most important.

- As a follow-up to the niche and value-added conference, a pork niche marketing working group was formed to examine activities and options available to assist those interested in developing and sustaining new marketing groups. Membership includes producers, consultants, financial and government representatives, and university and extension educators. The IPIC will continue to play an active role in this working group.

- The Advanced Reproductive Management seminars were held at five sites in state with total attendance of approximately 250. This series was cosponsored with Iowa Pork Producers Association. In seminar evaluations, producers said they especially appreciated receiving current knowledge in the areas of boar fertility and using artificial insemination to make genetic progress. At one site alone, one-third of those completing evaluations said they estimated their annual income would increase at least $2,500 when they applied the knowledge gained at the seminar. Because of the strong approval rating of this series and recommendations from producers that this type of programming be continued, plans were made to offer a series of finishing management seminars in March 2002.

- In just 15 days in spring 2001, IPIC coordinated a program on foot and mouth disease and broadcast it to 35 sites on the state ICN network. Speakers told the approximately 180 attendees how to recognize FMD, steps to take if it was found on a farm, what was being done to keep the disease out of the U.S. and the economic impact if the disease entered the U.S. They also helped audience members distinguish between FMD and Bovine Spongiform Encephalopathy (BSE), as both diseases were in news reports almost daily. The biggest impact of this program was creating and maintaining awareness of practices that could impede or prevent disease infection at individual livestock sites, as evidenced by evaluation results. Forty-one percent of those who completed the program evaluation said they did not require “time away from livestock” for visitors entering their production facilities. Yet, nearly 70 percent said that, based on information they gained from this program, they would modify their visitor policies. This heightened awareness factor should pay dividends in terms of lower disease rates of all kinds at production facilities.

- An ICN program on a proposed hog revenue insurance program drew nearly 400 people at 36 sites across the state. The low hog market price period in 1998-99 showed producers the importance of risk management in all types of operations. Since then, producers have requested information on recognizing risk and learning risk management

strategies for their operations. In evaluations for this ICN program, producers, lenders and insurance agents expressed their appreciation to IPIC for publicizing the proposed insurance and making the information on the insurance easy to understand.

a. Source of Federal Funding: Smith-Lever

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

Program 109: Strengthening Iowa's Dairy Industry

a. Description of activity

- Issue 1. Human resource management: Increasing dairy management skills was a key presentation at the Four-State Applied Nutrition and Management Conference and at the North Central Dairy Calf and Heifer Workshop. These programs targeted over 750 dairy herd owners and nutrition professionals. In addition, "Management Strategies for Dairies" was the focus of a program in NW Iowa that involved 130 dairy producers and their employees. This program was preceded by an informal question and answer session with 40 participants.

- Issue 2. Risk management: Twelve Iowa counties were involved in the Dairy Options Pilot Program (DOPP), compared to 3 counties in 2000. A total of 31 producers in 8 counties exercised 126 trades compared with 3 producers and 31 trades in 2000. This represents 7% of the trades in the MN-WI-IA region and 4% of the trades nationally. Iowa producers received $144,440 in options subsidies.

- Issue 3. Business planning and arrangements: Tabulation of the mail-in survey conducted in NE Iowa to determine the business structure was completed and results were discussed at 10 Dairy Day meetings.

  Over 30 farm visits were conducted with producers looking at changing their business structure. Most dealt with changing the size of the operation, changing to a replacement heifer rearing operation, or bringing in additional family members.

  In addition, numerous producers were provided economic and cost analysis information on custom rearing heifers and 3 field days were held on this topic. A packet on custom heifer raising, which included information on cost analysis, types of inputs, wage returns depending on number of heifers raised and the return to labor, several sample contracts, and copies of heifer budgets has been developed and sent to about 25 producers seeking further information.

- Issue 4. Improving production practices: ISU hosted an international satellite symposium that coincided with the release of the National Research Council's Nutrient Requirement of Dairy Cattle, 7th revised edition. This program was down-linked by 30 sites across North America, one in South Africa, and one in Brazil. In addition, Spain, Peru, and Israel utilized the program via videotape.

Ten county based Dairy Days were conducted and two Four-State programs, one covering feeding and management practices for replacement heifers and the other dealing with nutrition related topics were held this past year. 120 individuals from 7 states and 2 foreign countries attended an upper mid-west grazing conference. Dairy Youth Classic, with 110 youth and their 238 animals, taught dairy youth methods of ranking animals based on productivity, growth, reproduction and genetics. Tri-State Ag and Dairy Expo attracted 450 youth with 7 educational presentations conducted.

- Issue 5. Environmental quality is being handled by Program 103.

- Issue 6. Food safety and quality: Improving milk quality was the focus of 3 barn meetings in NE Iowa and at a NW Iowa Milk Quality workshop. Over 100 dairy producers and agri-business personnel attended the NE milk quality barn meetings. The producers represented approximately 50 dairy farms, which based on the information presented had the potential to increase profits an average of $13,000 per farm ($650,000 total). This does not include the value of reduced culling or reduced drug use nor does it put a value on the reduced potential for antibiotic contamination of the farm's milk.

  Over 75 individual farm milk quality trouble-shooting farm visits were conducted, leading to a field research/demonstration project on 3 farms. Utilizing an approach involving selective sampling of cows, management changes, and implementing new strategies, each of the farms experienced increased income from additional milk quality premiums: $16,000 for herd 1 (300 cows), $65,700 for herd 2 (1100 cows), and $30,660 for herd 3 (120 cows). Furthermore, additional profits were realized through increased milk sales, decreased treatment, milk discard, and culling costs.

a. Impact/accomplishment -

- Iowa dairy producers received $144,440 in DOPP options subsidies

- Dairy producers increased income from milk quality premiums: $16,000 for herd 1 (300 cows), $65,700 for herd 2 (1100 cows), and $30,660 for herd 3 (120 cows)

- Dairy farmers with milk quality problems increased income per cow per year by approximately $280 when they adopted milk quality suggestions made by Extension

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

The ISU Value Added Ag program has worked with communities and individual entrepreneurs this past year to build long-term economic, environmental and socially

sustainable capacities. Emphasis this year has been with trying to develop alternative crops for producers, development of value chains, enhancing the efforts of local Community Supported Agricultural (CSAs) emphasis, and working to develop traceable and quality systems to ensure accountability and safety in the food system. Furthermore, efforts this year have focused on developing resources to provide producers information on line through the newly established Agricultural Marketing Resource Center.

Agricultural processors are beginning to request products with specific traits and attributes. ISU Extension worked with several projects encouraging Iowa farmers to develop supply chains. One project included facilitating the efforts of producers who are seeking up to 100,000 acres under cultivation for next year. Extension has also developed several first-in-the-nation pilot projects working to certify producer networks in ISO. Among the projects are Farnhamville Elevator and several livestock supply alliances.

ISU has been a leader in facilitating efforts among states. This past year several events were sponsored in which service providers from more than 18 states convened to discuss value added ag activities, explore ways for collaboration and facilitating efforts so the various groups could work or market collectively.

- Through consultation on feasibility, marketing and business plans, ISU staff work with groups starting a value added ag business. Extension conducted six in-depth feasibility studies for farmers this year starting value added ag businesses. They included two ethanol plants, a soy processing facility, ag machinery facility, a bio-mass company and an agri-tourism project.

This past year several in-depth feasibility studies and pilot projects have been conducted for community based groups. For example:

- Twenty-four producers are seeking to diversify their cropping systems, by planting dry edible beans and Adzuki beans. Having witnessed other alternative crop projects come and go, this group approached the process with a unique attitude of cooperation. The group determined cropping systems that would work for these crops, cooperatively harvested and marketed the beans. When prices are compared to traditional soybeans they are realizing profits of $100 more per acre.

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

- Working with a new start-up firm, Iowa State University helped the company add value to part of the hog that previously sold for $ .09-.22/lb as low cost trimmings. A small tender muscle was processed differently so that it could be exported for a price averaging $ 2.60/lb.

a. Impact/accomplishment –

The efforts of value added ag activities are making a significant economic impact on individual farmers and communities throughout Iowa. This year more than 35 community

and farmer-initiated groups were started or assisted by ISU Extension staff. This commitment ranged from facilitating a group during start-up to conducting in-depth feasibility studies for enterprises.

ISU is currently assisting several farmer groups who are considering the ethanol industry as a way to add value to their commodity corn. Currently more than $165 million dollars of investment is planned in these plants. If these proposed plants come to fruition this will represent more than 500 jobs with an economic multiplier in which every dollar in the local economy turns approximately 2.5 times.

This past year we have helped the ethanol groups work to cooperatively market their co-products, conducted several meetings to teach them more about the value of their co-products, develop a trade association to adequately address their legislative, educational and promotional needs. Additionally we have assisted the ethanol groups in writing grants. The groups have secured three USDA loan guarantees and were the recipients of four USDA grants for assisting producers.

Success Stories:

- The Iowa Crop Management Database provides producers a one-stop computer program to record all their agronomic and economic data. This program, designed at Penn State and modified to meet Iowa needs is being used increasingly by supply chain groups to aggregate and consolidate producer data as part of a new method to document and market specialty crops or special niches producer groups are trying to develop. At the end of the fiscal year, more than 749 copies of the database have been distributed.

- A group of organic farmers interested in adding value to and retaining value from their crops have been organizing and planning a farmer-owned cooperative called Iowa Farm Fresh Poultry. The group has incorporated and completed a marketing study as it relates to marketing their unique product. Their natural/organic, air chilled product is farmer-owned and source verified. The membership has grown to 14 members with many additional producers interested. The group is developing its membership criteria and has started the fund drive.

- CAFÉ Workshop: Iowa farmers are looking for ways to cope with transitions in agriculture. Integration and consolidation in agricultural suppliers, processors and retailers have left farmers with limited choices. In response, larger farmers prepare to supply global markets with cheap raw commodities through integrated supply chains while small farmers are turning to local, high value markets for their specialty products. The agencies and organizations that these small farms rely on for technical assistance must also prepare for this “new” agriculture.

  A collaborative of four agencies was formed to plan and hold five workshops around the state in spring 2001. Iowa State Extension, Practical Farmers of Iowa, Leopold Center for Sustainable Agriculture and USDA’s NRCS formed a working partnership to present the Iowa CAFÉ (Community, Agriculture and Food Enterprises) workshops. A total of 273 participants attended. The workshops were designed as an interactive, community-based,

systems approach to building local food systems. Each participant received a resource manual. The CAFÉ workshops brought together many individuals and groups that are in some stage of developing local markets for specialty farm products. Participants felt strongly that this workshop helped them network with new groups or people they hadn't traditionally worked with (4.16 on a 1-5 scale). Participants also felt that the workshops had helped them to think about Iowa agriculture and its future in new ways. Additional follow-up assessment will be conducted to determine if behaviors change as a result of the workshops.

- Ag Marketing Resource Center: Because of the previous work done in value added agriculture, ISU has established a strong foundation of case studies, feasibilities, outreach, training and experience. This year, ISU Extension applied for and received a federal USDA grant from Cooperative Development Services, a grant for $5 million over a three year period to develop an electronic center for farmers to get information about value added ag from the internet. The Center is coordinating those efforts with the University of California, and Kansas State University.

a. Source of Federal Funds—Smith-Lever

b. Scope of Impact—State Specific

Key Theme – Home Lawn and Gardening

Program 146: Consumer Horticulture

a. Description of activity

The Iowa State University Extension Consumer Horticulture program provides unbiased, research-based education and information about plants and their care in the home lawn and garden. As a result, horticulture consumers are better able to make wise decisions in plant selection and maintenance and pest management.

b. Impact/accomplishment -

- Individual Consultation with Consumers. Iowa State University Extension responds in a timely fashion to consumers seeks answers to their specific, individual home lawn, landscape and garden questions. Campus faculty and staff in horticulture, entomology, plant pathology, forestry, animal ecology and agronomy provide one-on-one consultation service via telephone, email, letter and office visits. Individualized outreach in consumer horticulture on campus is concentrated in the Hortline, Plant Disease Clinic and the Insect Diagnostic Clinic.

  County extension staff and Master Gardeners (volunteers providing service to their communities through the local extension office) also inform and educate the public about home horticulture.

  The estimated total number of individual responses to consumers through phone, email, letter and office visits was 31,900 for the year. The impact of this individualized attention

is highly variable. Some clients achieve increased quality of life through better choices in the selection and maintenance of fruits, vegetables, flowers and other ornamental plants. Others avoid costly mistakes such as purchase of plants not adapted to our northern climate.

- Plant and Pest Diagnosis. Successful problem solving in the garden or landscape requires accurate identification and diagnosis. The plant species or variety must be accurately identified to determine proper care requirements and likely potential problems. Accurate diagnosis of plant diseases, weeds, insect pests and other problems is necessary to determine the likely outcome and to choose from among several courses of action (including the option of doing nothing).

  Identification and diagnosis is accomplished on campus through the Plant Disease Clinic, Insect Diagnostic Clinic, Hortline and Weed Science Unit and others. The combined total number of samples analyzed for homeowners, garden centers and local county extension offices was 2200. One major impact of correct identification and diagnosis is the avoidance of unnecessary pesticide application (or purchase of pesticide application service).

- Master Gardener Program. The Iowa Master Gardener Program is an educational and volunteer service program of Iowa State University Extension and the College of Agriculture. University faculty and staff in the departments of entomology, horticulture, plant pathology, animal ecology and agronomy and Extension field specialists work with County Extension staff to provide unbiased, research-based horticultural information to the citizens of Iowa through the volunteer efforts of trained Master Gardeners. Through their participation in educational activities, Master Gardeners increase their own personal knowledge in horticulture. In return for their training, Master Gardeners volunteer in extension horticulture programs and projects to meet needs within their community.

  Master Gardener volunteer activities include answering phone and e-mail inquiries at extension offices, writing gardening-related articles for local and state distribution, judging at county and state fairs, assisting in training of others, operating “diagnosis clinics” during the growing season, planning, planting, and maintaining display and demonstration gardens for schools, retirement centers, and local communities.

  Again this year the Polk County Extension Master Gardeners planned, planted, and maintained the Discovery Garden at the Iowa State Fair. Over 150,000 people visited the garden during the two weeks of the fair.

  In Boone County, Local radio station KWBG broadcasts the Master Gardner Minute prepared by Master Gardeners in the county. The radio station reports that the Master Gardener Minute airs a total of approximately 64 times per month. The radio station does not charge Extension for these minutes. If they did the bill would be about $768.00 per month ($12 per minute).

a. Source of Federal Funds—Smith-Lever

b. Scope of Impact—State Specific

Goal 2: A safe and secure food and fiber system

Overview

Iowa's Extension Plan of Work, "330 – Nutrition: Choices for Health," speaks to the federal goal 2. Food safety education to Iowa's 99 counties is provided by Nutrition and Health field specialists and paraprofessionals in the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) with support from a campus team of food safety educators. The field and campus specialists partner with a variety of agencies at the state and local levels; The Iowa Department of Inspections and Appeals, the Iowa Hospitality Association, the Iowa Bureau of Food and Nutrition, local schools, hospitals, and community organizations, the Food Safety Consortium (Iowa, Kansas, Arkansas), WIC, food stamps, Head Start, Promise Jobs, and empowerment boards. ISUE partnered with Purdue University Extension to develop new educational materials about food safety for pregnant women and preschoolers. ISUE also partnered with the Iowa Department of Human Services to fund the Family Nutrition Program, which incorporates food safety programming in its series of meetings with families. Field and campus specialists use resources developed by USDA such as the FightBac materials, Partnership for Food Safety Education, and food safety web-sites, including the ISUE Food Safety and Quality web-site, FDA-CFSAN sites, Foodsafety.gov, and others. Resources in biotechnology, irradiation, and HACCP, are provided at a companion ISUE website. Food safety rules and regulations specifically for Iowa have been developed in partnership with the State of Iowa and made available to the public in an extension brochure and on an ISUE website.

a. Output/Impact -

- 44 food safety programs reached 4,035 consumers, including youth and adults
- 394 volunteers trained in food safety
- 2,285 individuals received food safety education through individual consultations
- 401 managers and lead employees of child nutrition programs attended 7 school foodservice Extension sponsored short courses. Managers report they are responsible for over 120,000 daily school food service meals.
- 4 food safety websites supported and updated daily/weekly:
  - Food Safety* http://www.extension.iastate.edu/foodsafety/
  - Kitchen Incubators http://www.extension.iastate.edu/pages/families/incubator.html
  - Iowa HACCP http://www.iowahaccp.iastate.edu
  - Consortium Food Safety http://www.foodsafety.iastate.edu

  *Consumers accessed 736,698 page views through the ISU food safety website home page or one of its links; 4,456,300 hits were recorded last year. Over 85,000 consumers have accessed and completed one of the four interactive food safety lessons (1997-2001).

b./c. Outcomes –

Over 80% of school food service managers and employees plan to use the information from the short-courses in their child nutrition programs.

2,192 teachers used the web-based food safety lessons in their classrooms. Municipalities, such as the City of Toronto, are using the lessons to educate employees.

30 foodservice managers completed sanitation certification courses. Managers planned to check temperatures more frequently, record cooling equipment temperatures, and test thermometers more often.

A study of the costs and benefits of Iowa EFNEP, published December 2000 and tailored after the Virginia Tech study, showed that for every $1 spent to deliver nutrition education in Iowa, $10.75 is saved in future health care costs. Part of these savings is due to better food handling practices, resulting in less foodborne illness.

Nine hundred six (86%) graduates of the EFNEP program demonstrated acceptable practices in food safety at graduation from the program, as compared to only 547 (52%) at enrollment.

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

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

SYs – 20.37.

Key Theme – Food Accessibility and Affordability

a. In the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), 65 paraprofessionals delivered nutrition education to 3.712 adults and 17,910 youth in either small group settings or individually in the home. Pregnant teens and women at risk of having low birthweight babies are special target audiences of EFNEP/FNP. EFNEP/FNP served 285 pregnant and/or breastfeeding women under the age of 20, or 8% of the total audience. Staff partnered with a variety of agencies at the local level, including WIC, food stamps, Head Start, Promise Jobs, empowerment boards, and others, which resulted in increased funding, more effective audience recruitment, and enhanced program delivery. At the state level, ISUE partnered with Purdue University Extension to develop new educational materials about food safety for pregnant women and preschoolers. In addition, ISUE has a Memorandum of Understanding between WIC and EFNEP to formalize and expand reciprocal referrals between the two programs. ISUE also partners with the Iowa Department of Human Services to fund the Family Nutrition Program and to provide local EFNEP/FNP units with a monthly list of referrals.

b. Impact/accomplishment -

- A study of the costs and benefits of Iowa EFNEP, published in December 2000, showed that for every $1 spent to deliver nutrition education in Iowa, $10.75 is saved in future health care costs. The $10.75 in health care savings occur because participants: learn safe food handling practices, thus have fewer food-borne illnesses; eat better during

pregnancy, resulting in fewer low birth weight babies; are more likely to breastfeed their babies, resulting in fewer childhood diseases; and improve their overall diets, resulting in delay or prevention of chronic diseases.

- Three hundred forty-two (32%) graduates of the EFNEP program demonstrated acceptable practices in all three categories of behaviors taught (nutrition, food safety, and food resource management) at graduation from the program, as compared to only 45 (4%) at enrollment.

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

d. Scope of Impact – State Specific

ISUE partnered with Kansas State University, North Carolina State University, University of California-Davis, USDA, Syracuse University, National Agricultural Library-Center for Food Safety and Applied Nutrition and others to design and maintain web-based food safety resources.

Goal 3: A healthy well-nourished population

Overview

Iowa's Extension Plan of Work, "330 – Nutrition: Choices for Health," speaks to federal goal 3. Nutrition education to Iowa's 99 counties is provided by Nutrition and Health field specialists and paraprofessionals in the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) with support from campus nutrition educators. The field and campus specialists partner with a variety of agencies at the state and local levels. Key collaborations formed include: Iowa Nutrition Education Network; Iowa Department of Public Health, Iowa Department of Education, Iowa WIC Program, Iowa Department of Human Services, Head Start, University of Iowa, local substance abuse programs, local food pantries, Leopold Center for Sustainable Agriculture, commodity groups, local empowerment boards, team nutrition schools, and the Iowa Hospitality Association.

a. Output/Impact -

- 55,251 individuals participated in nutrition education, including youth and adults
- 3,712 adults and 17,910 youth participated in EFNEP/FNP
- 1,062 EFNEP volunteers were recruited and contributed more than 7,904 hours

b./c. Outcomes –

Of 1,757 participants in face-to-face nutrition education programs who were surveyed, 1,397 returned the written questionnaires, for a response rate of 80%. Of those who responded, 95% planned to adopt at least one recommended nutrition behavior and 76% reported actually adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products.

A study of the costs and benefits of Iowa EFNEP published in December 2000 showed that for every $1 spent to deliver nutrition education in Iowa, $10.75 is saved in future health care costs.

Three hundred forty-two (32%) graduates of the EFNEP program demonstrated acceptable practices in nutrition—at graduation from the program—as compared to only 45 (4%) at enrollment in the program.

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

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

SYs, 20.37.

Key Theme – Human Nutrition

a. Description of activity

Nutrition and health programs were offered in 99 counties. Persons served included 4,321 in individual lessons or consultations and 50,930 in group sessions. Targeted audiences were adults, employees at worksites, older adults, child-care providers, elementary school teachers, and health professionals. The primary focus of nutrition education programs this year was the emerging food supply. Under the title of "What's To Eat In The 21st Century" audiences learned about functional foods, food labeling, farm-to-table food systems, dietary supplements, soy foods, and food regulations. The delivery methods included audiovisual presentations, bulletins, displays, and a national satellite videoconference for health professionals. A second major focus for nutrition education was "Pick A Better Snack," a social marketing campaign aimed at increasing the fruit and vegetable consumption of children and their adult care-givers. The Pick A Better Snack campaign was founded on research conducted by ISUE. Program materials included monthly fact sheets, monthly "bingo" cards, recipe cards, bookmarks, and two web sites. Extension staff actively participated in 86 community coalitions to address local health needs. A new program, under development this year, for implementation in the coming program year is "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. Both county and campus-based Extension staff wrote successful grant proposals to support key programs. Program collaborations were established with the Iowa Department of Public Health, Department of Education, Department of Elder Affairs, and the University of Iowa College of Public Health.

In the Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), 65 paraprofessionals delivered nutrition education to 3,712 adults and 17,910 youth in either small group settings or individually in the home. Pregnant teens and women at risk of having low birthweight infants were special target audiences of EFNEP/FNP. EFNEP/FNP served 285 pregnant and/or breastfeeding women under the age of 20, or 8% of the total audience. Staff partnered with a variety of agencies at the local level, including WIC, food stamps, Head Start, Promise Jobs, empowerment boards, and others, which resulted in increased funding, more effective audience recruitment, and enhanced

program delivery. ISUE has a Memorandum of Understanding between WIC and EFNEP to formalize and expand reciprocal referrals between the two programs. ISUE also partners with the Iowa Department of Human Services to fund the FNP and to provide local EFNEP/FNP units with a monthly list of referrals.

b. Impact/accomplishment –

- 95% of individuals receiving nutrition education this year planned to adopt at least one recommended nutrition behavior and 76% reported actually adopting the behavior change, such as increased consumption of fruits and vegetables or increased label reading on food products. (1,757 individuals received mailed surveys; 1,397 returned the written questionnaires, for a response rate of 80%.)

- A study of the costs and benefits of Iowa EFNEP published in December 2000 showed that for every $1 spent to deliver nutrition education in Iowa, $10.75 is saved in future health care costs. The health care savings occur because participants: learn safe food handling practices and thus have fewer food-borne illnesses; eat better during pregnancy, resulting in fewer low birthweight infants; are more likely to breastfeed their babies, resulting in fewer childhood diseases; and improve their overall diets, resulting in delay or prevention of chronic diseases.

- Four hundred seventy-one (45%) graduates of EFNEP demonstrated acceptable practices in nutrition at graduation from the program, as compared to only 113 (11%) at enrollment.

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

b. Scope of Impact – State Specific

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

Overview

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

- 18 Refereed Publications, Research Papers, Manuscripts
- 87 Non-refereed Publications, Reports, Technical Papers
- 28 Proceedings, Published Abstracts
- 71 Extension Publications
- 163 Invited Presentation
- 471 Education Programs, Field Days, Tours
- 1 Patent
- 8 Theses, MS/Ph.D. Programs Completed
- 5 Slide sets/scripts distributed
- 99 in-service videotapes distributed to counties
- 23,545 attended meetings and conferences

- 32,763 one-on-one consultations
- 307,341 Web sites hits; 28,779 web site user sessions

Northwest Iowa experienced an extremely dry growing season in the crop year 2000. Producers expressed many concerns during the growing season of expected outcomes from such a year - and questions about handling drought-damaged crops were common. In cooperation with local County Extension Education Directors in Plymouth, Cherokee and Sioux counties, five "drought meetings" were held. A total of 476 people attended these meetings.

An impact survey was sent to 86 of these participants from lists collected at the Cherokee county sites. 97% of the respondents indicated they were either satisfied or very satisfied with up-to-date, useful and timely information. Ten indicated that they made operation changes based on information received at the meeting, such as harvesting early to prevent losses from stalk rot, better marketing plan, putting up silage from this corn instead of green-chopping and feeding, segregate grain for quality differences, and collecting CRC payments properly. Eight indicated they would make changes in the future like better weed management, more beans if the spring is very dry, discontinue corn on corn, reduce fall tillage/less tillage (3 times), and better drought tolerance consideration on hybrid selection. Additional questions asked for the economic impact of the use of this information on their operation and how many of their acres were impacted by drought. Categories that could be marked included:

- Less than $5/acre - marked by 11 producers who indicated this impacted 5,932 acres.
- Between $6 and $10/acre - marked by 9 producers impacting 4517 acres.
- Between $11 and $25/acre - marked by 4 producers impacting 722 acres.
- Between $26 and $50/acre - marked by one producer with 35 drought impacted acres.

Severe damage by variegated cutworms to a 115-acre soybean field farmed in central Iowa required a replanting and insecticide spraying decision. The Farm Service Cooperative in Indianola asked the ISU Specialist to look at the field to determine the problem. Approximately 50 acres of the 115 acres field was severely damaged by variegated cutworms and needed to be replanted. After scouting the entire soybean field it was determined that the cutworms were either about to pupate or had just begun to pupate. The damage had been done. It was recommended that they replant the 50 acres immediately and not use an insecticide application on the 115 acres of soybeans. The decision not to spray an insecticide on the 115 acres saved the farmer approximately $11 per acre in insecticide and application costs, for a grand total of $1,265.

To determine if the private program had an impact on the participants, the evaluation examined specific areas to assess behavioral changes. One required area of emphasis for this program was pesticide storage and handling. As a result of the program, respondents indicated that they would have the following items available where pesticides are stored or loaded: 49% would have a spill kit (absorbent materials and leakproof containers), 45% would have emergency phone numbers posted, 42% would have clean copies of the labels and MSDS sheets, and 41% would have a spare set of clean personal protective. These items

are important elements that allow an applicator a higher level of safety when working with pesticides.

In addition, this post-training evaluation examined if participants had indeed successfully initiated new activities as a result of the previous year of private pesticide applicator training. According to the respondents, 60% calibrated their sprayer by checking actual output at each of the nozzles as a result of the previous year of training. These results indicate that this program is positively impacting the private pesticide applicator. The applicator is learning and implementing safe and effective use of pesticides.

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

The goal of Integrated Pest Management is to make pest management more economical, efficient, and environmentally compatible. The goal can be achieved by avoiding control actions when they are not needed, using the lowest effective dose of insects when they are warranted, and timing the application of insecticidal treatments so that they will have maximum benefit with minimum environmental impact. Research at Iowa State University has identified safer control options, more efficient utilization of pest management alternatives, and even the documentation that some actions that are not warranted.

Insects, weeds, plant-parasitic nematodes, and diseases are a continuing threat to Iowa's crop production. Every crop acre in Iowa is subject to yield reduction resulting from these pests. Additionally, costs are incurred that include practices for cultural and chemical control of these pests. Adoption of Integrated Pest Management and Integrated Crop Management principles result in more efficient use of resources, increased profitability, and enhanced environmental stewardship. The IPM and ICM program in Iowa currently focuses on field corn, soybean and alfalfa with both conventional and organic agriculture. Seasonal monitoring and forecasting of crop pests (i.e., black cutworm monitoring, weed emergence monitoring and forecasts, degree-day accumulations) is conducted and delivered real time though radio, internet, and ICM Newsletter. IPM education is intertwined into the private and commercial pesticide applicator continuing instruction courses that reach more than 32,000 Iowa agriculturalists annually. The ISU Agribusiness Education Program, a comprehensive, interdisciplinary program of clinics and schools to improve the transfer of information to the farmer through agribusiness professionals, provides targeted in-depth education in classroom and field situations. Targeted pest management education programs are supported such as the soybean cyst nematode management education coalition and the soybean aphid regional work. Plant disease clinic, weed ID and herbicide diagnostic services, insect ID clinic, and remote diagnostic clinics provide grower and industry support.

Field educational activities in 2001 were 94 educational events, with 3,340 in attendance, for 314 contact hours of education in 37 counties.

b. Impact/accomplishment -

- Approximately ¾ of the acres of corn planted after corn have been treated with a pound of active insecticide per acre to prevent corn rootworm larval damage. By managing all the infested fields within a landscape, a further reduction in toxicants applied might be achieved using prescribed applications of insecticidal baits that contain $1/10^{th}$ the active ingredient. In this area-wide management project, a four-fold reduction in pest populations has been achieved, reducing the number of fields treated by half while maintaining an average level of root protection throughout the area that is comparable to the traditional, full-rate application of insecticides. A model was developed to predict the emergence of the corn rootworm adult, the target of the insecticidal bait. Previously fields had been scouted 8-10 times per season to time the bait applications. The model, developed over four years, was employed during 2001. The predicted emergence matched actual emergence nearly perfectly allowing the anticipation of emergence and peak egg laying. Based on the model, scouting was timed to coincide with these critical times, reducing scouting trips to the field and hence scouting costs by half.

- Strawberry growers have associated thrips with fruit damage and have been treating their plants with insecticides. In 2001, strawberry fruits from one strawberry farm were hand harvested for 5 days during peak strawberry production; less than 1% of damaged fruit was attributed to thrips damage. At this farm, mean numbers of thrips ranged from 0.1 to 48 per flower. A greenhouse study showed that flower and bud stages were damaged by infestations of > 5 thrips; however, relatively few berries showed a bronzed appearance, which is the typical damage from thrips feeding. Based upon our studies, thrips are not the main cause for bronzed fruits in strawberry fields in Iowa; thus insecticidal treatments specifically for thrips can be reduced or eliminated.

- Early-season insecticide treatment to reduce bean leaf beetle damage to soybeans has not provided economic value. Recently, however, the beetle has been shown to transmit Bean Pod Mottle Virus (BPMV). If the virus is transmitted during the early-season feeding by the beetle, insecticidal applications to reduce first generation populations might provide value. Tests were conducted to determine if plants could be protected from BPMV by managing bean leaf beetles. The treatments were one early-season spray, two early-season sprays, and one early-season plus a mid-season spray. Yield was highest in the strips receiving one early plus a mid-season spray and the percentage damaged and discolored seeds was lowest, or not significantly different from, the other treatments.

- Northwest Iowa experienced an extremely dry growing season in the crop year 2000. Producers expressed many concerns during the growing season of expected outcomes from such a year - and questions about handling drought-damaged crops were common. In cooperation with local County Extension Education Directors in Plymouth, Cherokee and Sioux counties, five “drought meetings” were held. A total of 476 people attended these meetings.

An impact survey was sent to 86 of these participants from lists collected at the Cherokee county sites. 97% of the respondents indicated they were either satisfied or very satisfied with up-to-date, useful and timely information. Ten indicated that they made operation changes based on information received at the meeting, such as harvesting early to prevent losses from stalk rot, better marketing plan, putting up silage from this corn instead of green-chopping and feeding, segregate grain for quality differences, and collecting CRC payments properly. Eight indicated they would make changes in the future like better weed management, more beans if the spring is very dry, discontinue corn on corn, reduce fall tillage/less tillage (3 times), and better drought tolerance consideration on hybrid selection. Additional questions asked for the economic impact of the use of this information on their operation and how many of their acres were impacted by drought. Categories that could be marked included:

- Less than $5/acre - marked by 11 producers who indicated this impacted 5,932 acres.
- Between $6 and $10/acre - marked by 9 producers impacting 4517 acres.
- Between $11 and $25/acre - marked by 4 producers impacting 722 acres.
- Between $26 and $50/acre - marked by one producer with 35 drought impacted acres.

If using a median value for all categories (and excluding the lowest category), an impact from this small segment of those who attended these meetings could be estimated at $50,462.

- Agricultural clients need access to crop and pest management information quickly and effectively throughout the year, and most importantly in the growing season. A quick, easy to use and read e-mail update was generated and sent directly to over 120 growers, retailers, consultants, agronomists, manufacturer reps, farm managers and media personnel in southwest Iowa.

  A survey was sent to the recipients of the e-mail version of the newsletter to evaluate its effectiveness. 63 clients responded, and 55 were “very satisfied” with the newsletter overall, with the balance (8) “satisfied”. Clients indicated that they electronically forward the updates to over 350 customers, co-workers and neighbors. Of the clients who were inclined to put a dollar value to the impact of the updates, 21 reported $1 to $5 per acre (serving approximately 280,000 acres), 5 clients reported between $6 and $10 per acre (serving around 110,000 acres) and 1 client reported income growth of approximately $12 per acre on the 5000 acres he manages.

- Many southwest Iowa ag retailers and growers have commonly applied “insurance applications” of insecticides for the prevention of black cutworm (BCW) in corn. Iowa State University research has shown that these preventative applications are unnecessary.

  In cooperation with local ag retailers, seed dealers and farm managers, the extension field crops specialist was able to present and train field day attendees in Iowa State University Integrated Pest Management recommendations for scouting and managing BCW as well as many other early season crop pests. The retailers, seed dealers and farm managers in attendance represented 37,000 acres of corn, and the growers in attendance represented

19,000 acres of corn. At a saving of $7 per acre when avoiding a preventative application, the economic benefit to clients was approximately $400,000.

- Severe damage by variegated cutworms to a 115-acre soybean field farmed in central Iowa required a replanting and insecticide spraying decision. The Farm Service Cooperative in Indianola asked the ISU Specialist to look at the field to determine the problem. Approximately 50 acres of the 115 acres field was severely damaged by variegated cutworms and needed to be replanted. After scouting the entire soybean field it was determined that the cutworms were either about to pupate or had just begun to pupate. The damage had been done. It was recommended that they replant the 50 acres immediately and not use an insecticide application on the 115 acres of soybeans. The decision not to spray an insecticide on the 115 acres saved the farmer approximately $11 per acre in insecticide and application costs, for a grand total of $1,265.

- An 80-acre cornfield sustained approximately 95 percent cutting from black cutworm. It was May 16, and the most recent ISU research indicates that corn planted at that time of year has a yield potential of only 1- percent less than earlier planted corn. But, as yield potential was beginning to drop rapidly, a replanting decision was needed rapidly. The producer was "ready to roll" but his dealer suggested he seek another opinion. ISU Extension was contacted for that opinion. The Extension Crops Specialist examined the field the same day and determined that nearly all the cutting had occurred above the growing point of the corn plants. Thus, the plants should recover without yield loss. There were still many small black cutworms present, so an insecticide treatment was recommended to prevent yield-robbing injury.

  Eighty acres of corn were not destroyed and replanted. The costs that were avoided, per acre, were:

  - Cost of destroying the existing stand. The existing stand was (to be) destroyed with a field finisher. According to FM 1698, the average cost is $8.40 per acre.
  - Cost of seed. According to FM 1712, the cost of seed is approximately $30 per acre.
  - Cost of planting. According to FM 1698, the average cost of planting is $9.55 per acre.

  The total cost of replanting an acre would have been approximately $47.95 per acre. Applying that figure to 80 acres, the total savings that resulted from this consultation were approximately $3,836. However, an insecticide cost of approximately $960, including application, was incurred to save the existing crop, resulting in a net benefit of the consultation of $2,876.

- The county extension education director offered one-to-one consultations with farmers and their families. A random survey by the area extension education director was conducted with these farm operations to evaluate client satisfaction, change in farming practices and, if appropriate, economic impact.

  One farmer eliminated the use of starter fertilizer that has resulted in a savings of $2,450. One farmer was provided consultation on fall tillage versus spring and he estimated a

savings of $3,135. Another farm operation is now making efforts to change to an intensive grazing management system and he estimates improving returns by $9,500 in his operation.

An organic farmer consulted the local extension office on genetically engineered organism (GEO) issues and as a result, he created a buffer strip between his corn and the neighbors to avoid contamination issues from cross pollination. He estimated that this change alone added $5,200 to his operation. An agronomy salesman replied that he estimates that one farm call we assisted him with on a legume pest helped his customer save $1,230.

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

Iowa State University Extension is mandated by the state of Iowa to develop and deliver training programs for all commercial pesticide applicators and the private pesticide applicators that apply restricted use pesticides. The primary focus of program development and delivery for the commercial pesticide applicator training programs was January–March and October–December. During these months, 25 different programs were provided for commercial applicators in 21 certification categories and sub-categories. In addition to the continuing instruction, initial exam training was provided to 56 participants during 7 sessions.

The primary focus of program development and delivery for the private pesticide applicator training programs was January–March and October–December. During January–March, the training season for 2000–2001 was completed, while the new training season was developed and implemented in October–December. During the training season (December 2000–April 2001) for the private applicators, programs were conducted in all 99 counties in the state. In addition, initial training for the private exam was provided to 395 participants during 11 sessions.

b. Impact/accomplishment -

- The private pesticide applicator training program conducted 349 meetings with 22,118 participants from December 1, 2000–April 12, 2001. A post-training evaluation indicated that the program was successful. Overall, 95% of the respondents indicated that the program was excellent or good. In addition, 93% of the respondents strongly agreed or agreed that the information presented was useful for their farm operations.

- To determine if the private program had an impact on the participants, the evaluation examined specific areas to assess behavioral changes. One required area of emphasis for

this program was pesticide storage and handling. As a result of the program, respondents indicated that they would have the following items available where pesticides are stored or loaded: 49% would have a spill kit (absorbent materials and leakproof containers), 45% would have emergency phone numbers posted, 42% would have clean copies of the labels and MSDS sheets, and 41% would have a spare set of clean personal protective. These items are important elements that allow an applicator a higher level of safety when working with pesticides.

- In addition, this post-training evaluation examined if participants had indeed successfully initiated new activities as a result of the previous year of private pesticide applicator training. According to the respondents, 60% calibrated their sprayer by checking actual output at each of the nozzles as a result of the previous year of training. These results indicate that this program is positively impacting the private pesticide applicator. The applicator is learning and implementing safe and effective use of pesticides.

- The commercial pesticide applicator training program conducted 25 programs with 9,255 participants. Post-training evaluations indicate that these programs also were successful. Overall, 96% of the respondents in the Pest Control Operators and Ornamental and Turfgrass Applicators indicated that respective programs were excellent or good. In addition, 94% of the Pest Control Operators felt pesticide safety was a very important or important topic. Again, these programs focus on topics that advocate safe and effective pesticide applicators.

a. Source of Federal Funds—Smith-Lever

b. Scope of Impact—State Specific

Key Theme – Sustainable Agriculture

Program 147: Sustainable Agriculture

a. Description of activity

Interest in sustainable agriculture remained strong in Iowa and the region in 2001. Iowa now has its own state organic certification program, as well as a number of private certifiers serving a quickly growing population of organic farmers.

In addition, consumer and farmer commitment to local and sustainable food systems remained strong, as demonstrated by the demand at farmers markets, CSAs, and retail markets for locally produced foods, and by the more than 275 people who attended the Iowa Café Local Foods workshops.

Extension continued to provide training in sustainable agriculture principles to its own staff, as well as to Natural Resources Conservation Service employees and staff from the Farm Service Agency. Training highlights in 2001 include introductory in-service training to 35 agency staff; 5 workshops on local food systems offered in conjunction with NRCS, the Leopold Center for Sustainable Agriculture, and Practical Farmers of Iowa; a workshop on

sustainable weed management; and the first Iowa Organic Agriculture conference sponsored by Extension.

Many of these agricultural professionals are in turn providing outreach on sustainable agriculture practices and approaches, both in their regular programming and through special projects.

Projects are underway involving exploration of alternative crops for Iowa, integrated pest management including biological control of plant pests, development of alternative livestock production and marketing systems, non-target effects of transgenic crops, etc.

b. Impact/accomplishment -

General Sustainable Agriculture:

- Number of Community Supported Agriculture groups (CSAs) increased slightly from 50 to 52. There were 35 CSAs in 2000 and none before 1996.
- Virtually all Extension field staff hired before October 2001 have received introductory sustainable agriculture training. More than 200 agricultural professionals in USDA and state agencies in Iowa have received introductory sustainable agriculture training
- More than 15 farmers used as trainers for Extension sustainable agriculture events
- More than 2,000 hoop barns in use for pork production
- Iowa Farm Bureau and Iowa Pork Producers co-sponsoring sustainable agriculture events such as the Pork Niche and Value Added Conference in September, and including sustainable agriculture concepts in regular programming.

Organic Agriculture:

- Iowa State University Extension sponsored a one-day statewide Organic Agriculture conference. The workshop was attended by more than 200 Extension staff, farmers, and others from Iowa and surrounding states.
- Number of research/demonstration plots established to develop sustainable/organic systems: 13
- Due to budget cutbacks, the number of acres and farms in certified organic production in the state was not surveyed. The Iowa Department of Agriculture and Land Stewardship suspects organic acreage is growing more slowly than in the previous 5 years.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Goal 5: Enhanced economic opportunity and quality of life for Americans

Overview

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

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

This overview covers work done for 300-340.

a. Output/Impact-

- A total of 2,968 older Iowans, family members, and caregivers attended workshops to plan for their own futures, to assist family members or to assist clients.
- A total of 7,554 child care providers and community members participated in training to improve the availability and quality of child care.
- A total of 16,226 Iowans participated in Extension programs that addressed financial management skills.
- Extension staff worked with local schools to implement the High School Financial Planning Program, reaching 4,722 high school students in 121 schools.
- 912 youth and their parents have taken part in Strengthening Families Program for Parents and Youth 10-14 (SFP 10-14) across Iowa. 189 agency staff and community personnel have been trained in the SFP 10-14.

b./c. Outcome/Impact -

- 85% of participants who did not report using effective ways to communicate about later life issues prior to attending Adult Children and Aging Parent workshops reported using effective ways to talk about the topics after workshop participation.

- 66% of participants in Adult Children/Aging Parent workshops who did not discuss advance directives with their families prior to the workshops, reported discussing advance directives as a result of the workshops.

- 293 new and 2,285 existing child care businesses or programs were created and/or strengthened by Extension involvement.

- 65% of child care programming participants surveyed (n = 1,205) adopted one of more recommended child care practices.

- Iowa families participating in the Money 2000 program and responding to a follow-up survey increased personal savings by $1,784,577 and reduced their debts by $1,201,387.

- Based on parent surveys at the close of SPF 10-14, parents have reported a significant change in positive behaviors toward youth. For example, before the program, 95 (18%) parents said they wait to deal with problems until they have cooled down, compared to 392 (74%) after the program. Before the program, 208 (39%) parents said they help their youth understand what family rules are, compared to 471 (87%) after the program. Before the program, 263 (49%) parents say they listen to youth when he/she is upset, compared to 469 (87%) after the program.

- 532 youth completed surveys at the end of SFP 10-14. Examples of changes youth reported include: before the program, 204 (38%) said they know steps to take to reach one of the goals, compared to 452 (85%) after the program. Before the program, 161 (30%) said they do things to help them feel better when they are under stress, compared to 390 (73%) after the program. Before the program, 99 (19%) used peer pressure resistance steps when they were urged to do something wrong, compared to 323 (61%) after the program.

Overview – 4-H Youth Development Programs

This overview covers work done for 410-460.

a. Output/Impact-

- A total of 134,854 youth were involved in Extension 4-H Youth Development sponsored community clubs, special interest groups, school enrichment programs, overnight camping and other programs. One in four Iowa school age youth are participate in a 4-H Youth program.

- A total of 13,157 youth and adult volunteers contributed their time, energy and expertise to helping youth learn life skills.

- A total of $67,000 dollars of scholarships were given by the Iowa 4-H Foundation to 69 4-H'ers.

- A total of 1,050 high school youth attended State 4-H Youth Conference, held on the campus of Iowa State University and participated in educational seminars and community service opportunities.

- A total of 1740 educators, school teachers and school official participated or were trained in science related extension 4-H sponsored youth curriculum.

- A total of 2,147 youth, 3,675 adult volunteers, and 2,019 other adults were trained in leadership, parenting and other topics.

- All 100 counties report involvement in out-of-school time programming. 71,612 youth participated in one or more of the out-of- school time offerings.

b./c. Outcome/Impact -

- Youth completing life skill evaluation statements following participation in Extension 4-H Youth Development programs indicate the following:
  46% stated 4-H programs helped them set goals for their future.
  75% stated 4-H helped them consider how their actions affect others.
  62% stated 4-H helped them to volunteer their time for community service.
  59% stated 4-H help them value the contributions of others.
  57% stated 4-H helped them to be friends with people who are different from them.
  74% stated 4-H helped them to avoid risky behaviors.
  87% state 4-H helped them to feel comfortable saying "no" to things they did not want to do.

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

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

SYs, 39.6.

Key Theme – Aging

a. Description of activity

Adult Children and Aging Parents: Conversations Between Generations, a series of program components addressing family decisions and relationships in later life, reached 519 adults with 76 hours of sequenced programming. 90 additional participants attended one-topic workshops from the series and 802 participated in 57 contact hours of *"Transferring Non-Titled Property: Who Gets Grandma's Yellow Pieplate."* Three of four respondents to 3-month follow-up surveys attended the workshops to plan for their own futures. Two of five attended to know how to assist parents, and one of five to help clients. A pilot newsletter series, developed from the program materials and distributed in one county through worksites and specialized mailings, is now available for statewide use.

107 adults participated in the national Extension sponsored satellite, *"Grandparents Raising Grandchildren: Legal and Policy Issues,"* at 14 sites in Iowa. Intergenerational dialogues on

community issues included 413 people representing each of five generations in three communities and 101 people participated in educational programs encouraging intergenerational awareness. Field and campus specialists were part of 37 coalitions addressing aging issues. 936 adults participated in other aging related educational programs including caregiver communication, understanding aging, and grandparenting.

b. Impact/accomplishment –

- 84% of Iowa participants in the Grandparents Raising Grandchildren satellite program increased their awareness of state and local policies/programs that can be developed to assist grandparents raising grandchildren. Over one-third of the Iowa participants planned to explore how their organization/agency can help bring about needed changes in state laws and public policies impacting relatives as parents.

- Two of three Adult Children and Aging Parents participants responding to mailed three-month follow-up evaluations gained knowledge of community information sources for help with later life issues. 73% of participants who did not discuss later life legal issues with families prior to the workshops reported discussing these topics as a result of the workshops. Of 78 surveyed participants who did not use effective ways to discuss difficult later life decisions with families prior to the workshops, 85% reported a positive change in their ability to communicate about decisions as a result of the workshops.

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

d. Scope of Impact – State Specific

Key Theme – Child Care

a. Description of activity

A total of 7,554 individuals received child care training and education. A total of 2,107 providers received training through Child Care that Works Self Study program. The Child Care That Works self study program reached individuals living in 83 counties and two neighboring states (Kansas and Nebraska). Providers participating in their program received Iowa Department of Human Services credit for licensing and registration requirements. 51% of the self study kits were accessed by center-based programs; 40% were accessed by family child care programs. 10,059 self study video kits have been checked out since the program's inception in 1997; an additional 5,447 participants received training and educational through workshops, onsite training and consultation.

An estimated 1,882 (35%) of these individuals attended Better Kid Care Satellite programs conducted in collaboration with Penn State University. Playground safety training or consultation was conducted for 268 individuals. The National Network for Child Care website (NNCC.org) managed by Iowa State University, received over 4,000,000 hits annually with an average of 130,000 user sessions per month. The website is actively supported by 42 states and is accessed by over 128 countries. The NNCC KIDCARE listserve averages 360 providers nation-wide.

b. Impact/accomplishment –

- 268 outdoor environments/playgrounds were improved with technical assistance/consultation from ISUE.
- 11 new child care centers or early childhood programs were established with direct Extension involvement increasing child care availability for 634 children.
- 282 new family child care homes/businesses serving 1,401 children with established with direct Extension involvement.
- 571 existing child care or early childhood programs were strengthened with Extension involvement.

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

d. Scope of Impact – State Specific, however, NNCC is actively sponsored by 37 states and accessed by 137 countries.

Key Theme – Children, Youth and Families at Risk

a. Description of activity

Iowa's New Community Project (NCP) continues integration and expansion of Children, Youth, and Families at Risk (CYFAR) programming through organizational change and three new community projects: Davenport, Perry, and Sioux City. The CYFAR Coalition collaborates with other state and national organizations to advocate for children, youth, and families at risk. The CYFAR Coalition and previous State Strengthening project staff support the three community projects with implementing and evaluating their community-based programs and collaborative processes.

Twenty-eight ROWEL Poverty Simulations have been conducted for 1,334 participants. Jostens Inc. awarded the Union County Youth Plus program the Josten's "Our Town Award" and a two-year $50,000 grant. The local program was recognized for both its recent successes and its plans for the future. Union County, Iowa, was one of four communities nationally selected by Jostens for the award and grant. Union County Youth Plus was a State Strengthening Targeted Community Project that demonstrates sustainability and great success two years after the end of federal funding. The State Strengthening Targeted Community Project in Dubuque was chosen as an exemplary example of technology integration in Iowa's CYFAR efforts by CSREES-USDA. As such, Iowa is being included in the Community Connectivity Study and hosted a site visit with Dr. Faye Lee, University of California at Davis.

"Copin County USA: A Citizen Involvement Workshop" received the Outstanding Public Issues Education Program Award Sponsored by Farm Foundation and the National Public Policy Education Committee (NPPEC) Fall 2001. An interdisciplinary team of faculty was involved in its development.

Over 3,800 individuals in 53 communities/41 counties were part of educational efforts related to public issues, including informational satellite downlinks, interagency coalition planning meetings, sharing welfare reform research, etc. As a result of the Postville Diversity Committee's educational activities to bring about better understanding among cultures, a Jewish resident was elected to city council. Another community that had struggled for two years to create a four-county empowerment area realized, after a statewide educational conference sponsored by Extension and other state agencies, that they were more a network rather than a collaboration. They returned to their community with renewed optimism to recreate a successful four-county collaborative which is working to meet families' needs.

ISUE is a member of a statewide voluntary coalition, Partners in Learning, organized to promote public deliberation in Iowa. The collaborative sponsored five public issue forums around the state to help citizens experience a deliberative dialogue. This was followed by a two-day workshop (25 participants) which focused on teaching skills to help communities prepare for conversations about public issues: framing issues for public deliberation.

b. Impact/accomplishment –

- 1,765 individuals learned about Earned Income Credit
- 1,938 individuals learned about Iowa's Child Health Insurance Program for low-income children
- Poverty Simulation participants continue to show increased awareness and sensitivity to the needs of families - including reduced requests for monetary donations from students for field trips, offering fee waivers, collecting donated instruments, etc.
- Copin County USA was identified by a graduate class at ISU as the most helpful of all class activities to their understanding of how local government works.
- Individuals at 147 downlinks in 26 states heard Dr. James Garbarino share suggestions for making "A Safer Community for Children and Youth: Ten Things You Can Do."

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

d. Scope of Impact – State Specific

Key Theme – Community Development

a. Description of activity

Organized in-state around Building Social capital – Visioning, planning and organizational capacity building are prerequisites for strong communities. Six separate projects have social capital as a central feature. These include a) *Community Visioning,* changing the landscape and physical entryways to 15 communities; b) *ad hoc planning and visioning*, locally supported efforts to address one or more elements of community capital in 7 communities; c) *Resident-led watershed planning,* facilitation and organizational development support to citizen based planning in 4 watersheds; d) *Community Outreach Partnership Center (COPC),*

a multi-faceted community capital building project in the Des Moines Enterprise Community; e) *Community Voices,* a program for new Spanish speaking residents to the state; and f) *Land use planning,* fact sheets expert assistance provided to communities, municipalities and counties.

b. Impact/accomplishment –

- 89 interorganizational collaborations formed
- 124 leadership structures diversified
- 249 organizations assisted and strengthened
- 15 organizations created
- 1,609 individuals placed into organized networks
- 76 social networks established.

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

d. Scope of Impact – State Specific

Key Theme – Family Resource Management

a. Description of activity

A total of 16,226 Iowans participated in Extension programs that addressed financial management skills. In addition, Extension staff worked with local schools to implement the High School Financial Planning Program, reaching 4,722 high school students in 121 schools.

The Money 2000 campaign, conducted January 1998 – December 2000, resulted in 1,152 Iowans saving a total of $1,784,577 and reducing debt by a total of $1,201,387. Partnering with local communities and the Iowa-based Institute for Social and Economic Development (ISED), Extension staff taught financial literacy workshops for 229 low-income Iowans and refugees who are saving through Individual Development Accounts (IDAs). Nearly 1,800 low-income Iowans received information about the Earned Income Credit and more than 1,900 learned about the Healthy and Well Kids in Iowa (HAWK-I) program—Iowa's Child Health Insurance Program (CHIP) for uninsured low- and moderate-income children.

More than 3,855 Iowans participated in credit education programs and 3,551 developed basic budgeting and management skills. Credit education programs targeted young adults through high school classroom presentations, freshman orientation workshops at the University of Iowa and through worksite programs. Interest in consumer privacy issues led to 1,337 individuals participating in workshops and presentations based on a series of fact sheets prepared by Extension staff and reviewed by the Iowa Office of the Attorney General.

A major focus of Extension programs was launching a retirement planning program directed toward mid-life and younger consumers. Using displays and workshop presentations at

worksites and expositions, 975 Iowans received information to help them "Secure Your Dreams" for a financially stable retirement.

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

- Iowa families participating in the Money 2000 program and responding to a follow-up survey increased personal savings by $1,784,577 and reduced their debt by $1,201,387.
- 90% of resource management program respondents made specific retirement plans (41% response rate).
- 63% of resource management program respondents improved their financial preparedness for retirement (39% response rate).
- 2,508 parents of entering college students learned about the pitfalls of credit abuse among college students and shared management tips with their children.

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

b. Scope of Impact – State Specific, however, new "Secure Your Dreams" retirement materials have been shared with the national initiative on retirement planning.

Key Theme – Farm Safety

a. Description of activity

The Iowa farm fatality summary for 1988 to 2000 continues to show a decrease in the number of farm fatalities during those years. The number of deaths recorded for 1988 to 2000 were 63, 63, 60, 33, 53, 34, 57, 34, 31, 49, 42, 49, and 38 respectively. A target group identified in Iowa is farm youth. The number of children (under 19 yr.) who died during 2000 represents 16 percent of these total deaths. Farm safety day camps, in-school educational programs and other activities are conducted to reduce the number of injuries and fatalities.

The most effective method of reaching the target audience of youth in Iowa has been the farm safety day camps. Iowa State University Extension staff hosted 34 farm safety day camps and educated nearly 6,500 youth between 4 to 13 years old. The average attendance for these camps is about 190 youth per camp. Extension participated with external partners to help sponsor or participate in additional camps. A partnership was developed with a national sponsor, Progressive Farmer. Iowa State University Extension program provides supporting materials of publications and demonstrations to these camps.

Iowa State University Extension delivered education to public schools with our in-school programs. Extension staff in 21 counties presented in-school farm safety programs that reached about 3,500 students. These in-school programs combined with the tractor and machinery certification programs are structure learning experiences. The Certification program fulfills the youth requirements to operate tractors and machinery that meets the

federal guidelines and include 24 hours of training. Twelve counties in Iowa sponsored the program with 161 students.

Full-time farmers are most receptive to publications, demonstrations, and mass media events. Safe Farm is an Iowa State University Extension program helping to make Iowa farms a safer place to work and live by the combination of a media campaign and various educational efforts. A structured farm safety media campaign included weekly scheduled radio interviews. The radio interviews provided over 226 minutes of quality radio programming. During National Farm Safety Week, Iowa State University Extension coordinated a multi-organizational promotion to increase awareness. The Safe Farm agricultural health and safety pages on the World Wide Web contribute to the media campaign by providing current and timely information to both the county extension offices and Iowans. The address of the page is <www.abe.iastate.edu/safety.htm>. Items found on these pages include: listing of farm safety day camps, location, date, contact person, listing of tractor and machinery certification classes, county, contact person, links to camera ready printable version of all Safe Farm fact sheets, listing of information about available farm safety displays, and links to other farm safety organizations and their efforts.

Descriptions of Output Performance Measures	**Outputs**
Number of people that received farm safety training	11,644
Number of farm workers that received farm safety training	1,424
Number of youth participating in youth farm safety activity taught by extension	6,475
Number of youth participating in youth safety activities coordination by extension	3,584
Number of youth that received hazardous occupation certification	161
Refereed publications, research papers, and manuscripts	0
Non-refereed publications, reports, and technical papers	3
Proceedings and published abstracts	1
Extension publications	6
Books and chapters	3
Videos	2
radio interviews	64
Media release and popular press articles	12
Safety expert on state, national, CES, and professional societies committees	24

b. Impact/accomplishment –

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

- 6,475 youth ages 8 to 14 years of age received one day of farm safety education from participating in farm safety day camps hosted throughout the state. These camps offer a variety of farm safety messages tailored by local community and stakeholders. These camps create awareness of farm hazards; develop an understanding of safe and unsafe behaviors; create a positive life-long acceptance of safety responsibilities; and decrease the incidence of farm youth injuries and fatalities.

- Safe Farm E-News, an electronic monthly newsletter for extension educators has gain success. Subscriptions requests have increased since 2000 and extension staff from other states are taking advantage of this timely delivery of agricultural safety information at no cost. Recipients from Texas, Nebraska, and Minnesota have commented about the usefulness of this informative newsletter.

c. Source of Federal Funds—Smith-Lever

d. Scope of Impact—State Specific

Key Theme – Impact of Change on Rural Communities

a. Description of activity

Organized around Data for Decisions – Communities and organizations are supported with objective statistical social and economic data as input to informed decisions. The support is in the form of archived on-line and print data (Midwest PROfiles, Iowa Census Services), custom designed and localized fact sheets and graphic media (Iowa Census Services), analysis and interpretation in reports and presentations to audiences. Additionally, support is provided to organizations and communities to generate custom designed data by providing technical services for applied sample surveys and focus groups (CD-DIAL, Iowa Farm and Rural Life Poll). The data based activities are augmented with group process facilitation to assist local officials in decision making activities.

b. Impact/accomplishment – assessment of need for 25 organizations/communities, 12 focus groups for 5 organizations, county specific fact sheets on three separate issues, 500+ media contacts, 3,000+ daily visits to internet site with average exploration of 8 pages of data per visit, 1 bond issue passed, 3 comprehensive plans completed, 25 landscapes changed, 7 watershed plans developed.

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

d. Scope of Impact – State specific; geographical contiguous states (Midwest PROfiles)

Key Theme – Leadership Training and Development

a. Description of activity

Organized in-state around Building Human Capital. Iowa citizens were taught leadership skills from a portfolio of six programs. The development of human and social capital is central to the ability of communities to solve their problems. In FY2000, these included a) *Developing Dynamic Leaders*, a six-session skill-building program in group formation, goal setting, group dynamics, decision-making, and assessing community needs and direction; b) *Governing Cities: A Leadership Toolbox*, a six-session program for elected city officials offered in partnership with Iowa League of Cities on communication and building public trust, c) *Citizen Initiated Performance Assessment*, a collaborative project with Iowa League of Cities at the Sloan Foundation that involves citizens in an iterative process that identifies goals and benchmarks for local government services; d) *Nonprofit Management Institutes*, a

13 session (2 days each session) certificate program targeting the special concerns of nonprofit organizations such as governance by volunteer boards, legal and regulatory concerns, and developing diversified revenue sources; e) *Tomorrow's Leaders Today*, a cooperative program on targeting potential leaders from Des Moines' Enterprise Community and focusing on skill building, community projects, and local issues, and f) *Municipal Clerk's Institute*, a 3-year tiered program with a curriculum build around budget and finance, communications, city records, ordinance development, community development, intergovernmental relations and technology updates. Emerging leaders were offered training in basic skills and seasoned leaders participated in advanced training in building civic communities and in developing and maintaining community coalitions.

b. Impact/accomplishment – Ten communities have instituted benchmarks for municipal services, 1,569 government officials trained, 305 business entrepreneurs trained, 2,176 community leaders trained, 524 service providers trained, 65 service provider certified, 992 youth trained. Using self-assessment tools, increased skill and aspiration, i.e. human capital, increased among 85+ percent of participants, aspirations for taking on new leadership roles is 90+ percent of participants.

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

d. Scope of Impact: State specific

Key Theme – Parenting

a. Description of activity

Extension staff have greatly increased their support of sequenced programming designed to strengthen parenting skills. Research funded at over 22 million federal dollars and carried out by Project Family at the Institute for Social and Behavioral Research at ISU has informed widespread dissemination of the 7-week Strengthening Families Program for Parents and Youth 10-14 (SFP 10-14). SFP 10-14 has been scientifically tested and proven to reduce substance abuse in youth, build parenting skills, and strengthen the family unit. From fall 2000 through fall 2001, 912 youth and their parents have taken part in SFP 10-14 across Iowa. 189 agency staff and community personnel have been trained in SFP 10-14.

Of the 3,780 people who participated in parenting education, 2,786 were surveyed regarding the impact of their participation. 2,372 people (n=2,786) adopted one or more recommended parenting practices.

Celebrate Families Program, an 8-week program for parents and school-age children reached 952 individuals. Kindermusik®, a program to promote parent/child interaction and child socialization reached 313 children. Girl Talk/Guy Talk and Wise Guys programs, designed to increase positive communication about sexuality issues between youth and parents over 4 sessions reached 763 individuals. The Iowa Department of Human Services granted Extension money to hire five paraprofessionals to provide parenting education through intensive home visitation, reaching a total of 247 families. Other approaches included an

interactive website for fathers, averaging 687 visits per month; Stepping Stones for Stepfamilies, a home-study program; parent classes at Head Start and family resource centers, sending children's books and interactive activities home with Head Start and other preschool-age children to promote literacy and positive parent/child interaction; and an Academy of Parent Education, designed to strengthen parent educators' knowledge and skills in interacting with parents in group settings. The Academy reached 30 parent educators via 18 hours of structured group learning sessions.

b. Impact/accomplishment –

- 189 facilitators throughout Iowa have been trained to teach the SFP 10-14.

- Before the program 95 (18%) parents said they wait to deal with problems until they have cooled down, compared to 392 (73%) after the program. Before the program, 208 (39%) parents said they help their youth understand what family rules are, compared to 471 (87%) after the program. Before the program, 263 (49%) parents say they listen to youth when he/she is upset, compared to 469 (87%) after the program.

- 532 youth completed surveys at the end of SFP 10-14. Examples of changes youth reported include: before the program, 204 (38%) said they know steps to take to reach one of their goals, compared to 452 (85%) after the program. Before the program, 161 (30%) said they do things to help them feel better when they are under stress, compared to 390 (73%) after the program. Before the program, 99 (19%) use peer pressure resistance steps when they are urged to do something wrong, compared to 323 (61%) after the program.

- A total of 3,780 people participated in parenting education. 2,372 people adopted one or more recommended parenting practices.

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

d. Scope of Impact – State Specific

Key Theme – Workforce Preparation – Youth

a. Description of activity

Seventy-one 10^{th} and 11^{th} grade youth from ten counties participated in Career Trek. Career Trek provides career education opportunities for youth, parents, educators and staff using hands-on experiences that link math, science, and technology skills to future careers in agriculture, engineering and family consumer sciences. Youth participate in a local orientation workshop, seven hours of career exploration experiences as a part of a campus trip, and a follow-up session to share their learning experiences locally.

Twenty-nine Glidden-Ralston school district youth completed the Youth Marketplace curriculum, designed to teach basic entrepreneurship skills plus, an all-day seminar on entrepreneurship. The students each created a business or service, established goals for their

business, developed a business plan, and marketed their business during a special event held in conjunction with parent-teacher conferences.

b. Impact/accomplishment –

- Sixty-one of the participants in Career Trek submitted evaluations of the program. As a result of their participation:
  88% now understand how high school classes prepare them for the future.
  96% are more aware of choices available for employment or education following high school
  78% better understand how technology, environment, social and /or political changes create new career options.
  80% have an increased understanding of education and career option that fit their interests.
  80% improved their skills and abilities to seek out career and education options.
  98% improved their ability to contribute as a member of a team.
  93% improved their ability to accept responsibility for doing a job.
  100% said this 4-H experience helped them prepare for the future.

- Evaluation results from eighty-eight of the 90 participants in the West Pottawattamie County Careers workshop included:
  100% learned communication skills to plan, organize and make a presentation.
  100% learned to listen more carefully to what other say.
  100% learned to clearly state their thoughts, feelings and ideas to others.
  96% learned to settle arguments in ways that are not hurtful.
  94 % learned ways to have more control over the events in their life.
  100% learned to feel comfortable saying 'no' to things they don't want to do.
  100% said 4-H encourages good ethical behavior.
  100% said their 4-H experiences have helped them feel good about themselves.

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

d. Scope of Impact – State Specific

Key Theme – Youth Development/4-H

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

Key Theme – Understanding Youth Needs

a. Description of activity

The mission of Iowa's 4-H Youth Development Program is to create supportive environments for culturally diverse youth and adults to reach their potential. The Youth Development Approach enables youth to develop skills, interact with other young people from various backgrounds and in different stages of maturation. This Plan of Work 1) gathers and conducts youth development research to help adults understand youth needs, 2) builds awareness and knowledge of youth development research and needs among family members,

policy makers, practitioners, and community members, and 3) applies research-based youth development concepts to families, youth programs and policies to maximize the effectiveness of community resources and to help youth reach their potential.

b. Impact/accomplishment –

- Team teachers learned "I have a positive attitude towards things and try to be more friendly." "I think we really helped the kids become better people. They stop and think and act nicer towards their peers and others."

- A federal grant of $32,000 was secured to fund a summer youth project.

- A $732,241 21st Century Community Center Learning Grant, one of several in the state, was secured to address the youth development needs of the community.

- The Iowa Law Enforcement Academy, the sate agency responsible for training law enforcement officers, added several hours of diversity training to the curriculum.

- The State of Iowa Criminal and Juvenile Justice Planning Division established an advisory council to address issues of disproportionate minority confinement in the state.

- The Iowa Collaboration for Youth Development has created a statewide Youth Action Committee which consists of 23 Iowa teens 15-18 years old who will interact with state policy makers and state agency staff to discuss the impact of state policies upon Iowa's youth.

- The Iowa Collaboration for Youth Development has sponsored a series of youth development training workshops for both youth and adults.

- The Iowa Collaboration for Youth Development has created a web site on youth development for persons interested in learning about positive youth development.

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

d. Scope of Impact – State Specific

Key Theme – Out-of-School Time

a. Description of activity

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

Development, being identified as a key resource for communities, is indicated with the following examples: The County Extension Council identified programming in out-of-school time as a priority and financed these community programs; community collaborative efforts continue with the County Extension Education Director providing coordination of these groups; due to the efforts of the County Extension staff the community youth and families task force.

b. Impact/accomplishment – Iowa State University Extension 4-H manages the Governor's AmeriCorps After-School Initiative in 13 school districts for at-risk middle school youth year-round:

- AmeriCops members developed and/or strengthened community partnerships with an average of 84 community entities.

- An average of 393 middle school youth received tutoring assistance from the initiative's members and community volunteer tutors. On average, students' homework completion rates increased per quarter by 38%. On average, students' grade point averages increased per quarter by .33 points. On average, school attendance rates increased per quarter by 27%. Of those students who were working through behavioral issues, problem behavior school referrals decreased, on average, per quarter by 42%.

- An average of 360 middle school students participated in a total of 9,552 hours of community service learning events. On average, the students provided 1,194 service hours per quarter.

- 48 mentors provided 291 mentor-mentee hours. Middle school students indicated that they were able to complete their homework assignments in a timely manner and that enrichment activities were more enjoyable when done with a mentor. The mentees also stated that they wanted to do better in school because of their mentors and that they felt important because someone was taking a special interest in their lives and personal interests. Youth further indicated that the mentor-mentee relationships assisted them in learning how to interact with and trust people from different backgrounds.

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

d. Scope of Impact – State Specific

Key Theme – Science and Technology Literacy

a. Description of activity

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

LEA's. Educators have commented on the quality of the resources, the responsiveness of the staff, and the breadth and depth of training.

b. Impact/accomplishment – 23,055 youth were reached through E-SET educational programs including:

- 8911, aerospace and aeronautics
- 5774, biotechnology education
- 2845, Engineering and Technology
- 2484, physical science
- 1511, life sciences
- 1530, general sciences

A total of $166,00 of external funding was received to design and execute youth science education.

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

d. Scope of Impact – State Specific

Key Theme – Strengthening Volunteer Development

a. Description of activity

Enhancing and expanding the roles of volunteers to initiate a comprehensive volunteer management system in their counties is the focus of this plan of work. Selected activities include: 1) A club survey designed to strengthen youth as partners programming in Iowa 4-H community clubs was completed by 50 clubs, 956 4-H'ers and 363 adult leaders and parents; 2) 130 4-H youth and adult leaders attended the East Central Area 4-H Leader's Conference; 3) 45 high school age youth from across Iowa serve on the state 4-H council; 4) 59 adults attended the State 4-H Leader's Retreat; 5) 155 4-H Horse Project Leaders participated in a two-night ICN training designed to share new educational resources and to strengthen local horse project meetings and workshops; and 6) ICN training for 4-H Youth Development Specialists and County Youth Coordinators around revised volunteer job descriptions for 4-H organizational club leaders, project leaders and mentoring volunteers and a volunteer development training plan including a potential training calendar with suggested resources was conducted.

b. Impact/accomplishment –

- $5,000 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-two grants funded. The original $5,000 grant resulted in projects totaling $16,438 aided by 652 volunteers working 2,343 volunteer hours.

- Adults who attended the State 4-H Leader's Retreat had this to say about their experience: "…knowledge learned will be very beneficial to our club and hopefully others in our county;" "gathering with other leaders and getting ideas from them on how to solve problems we have;" and "I'm new to 4-H and there's a lot of things I don't know and I'm learning a lot and did learn a lot here."

- After serving on the state 4-H council youth believe: "My state council experience gave me the courage to take the initiative and start and complete projects that I saw as beneficial. It also taught me that leadership does not always mean taking the brunt of responsibility; it means working well with others to form a functional and successful team." "I am more confident in my leadership abilities. I found that leading a group of people I don't know is a vastly different experience than leading a group that I do know." "I had to learn how to adapt my leadership skills to fit each different group. I couldn't take the same leadership stance that I hold with my local club with a bunch of high school students from around the state."

- A special 100 years of 4-H in Page County celebration was planned by local volunteers with Extension staff partners. The Celebration attracted more than 1,100 participants came from eight states. The weekend included rich and exciting tales of 4-H and the people who had an impact on the lives of 4-H members in the last century. One 4-H alumnus stated, "I would say all of who I am comes from 4-H and my mother. 4-H has much to offer the child of today. If you start early and stay with it through high school, there is no end to what you can learn."

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 the Iowa Department of Education statistics, 38% of the school age youth live in the seven designated urban counties. Urban is considered a setting rather than a program or way of delivering programs. This Plan of Work 1) works to help create a positive environment where youth (grades K-12) will develop life skills while having a positive relationship with a trained adult volunteer, 2) develops a county wide marketing and recruitment plan that will reach the urban audience for all delivery methods, and 3) provides youth grades 4-8 with out-of-school time science/math activities that will better prepare them for the workplace of the future.

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

- 100% of the participants learned the importance of protecting the natural environment
- 89% of the participants learned how to follow instructions
- 91% of the participants learned to listen when others are talking

- 100 % of the participants learned to think about possible alternatives before making a decision
- 86% of the participants learned to consider how their actions affect others
- 63% of the participants are better able to handle conflict than before participating in the group

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

d. Scope of Impact – State Specific

B. Stakeholder Input Process:

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

1862 Research:

- Program 1. Food Crops: Vegetable growers indicated at winter meetings and summer field days the need to evaluate variety influence on earliness practices for tomatoes and peppers. Accordingly, the research program was modified to include colored plastic mulch effect on early production of fresh market tomatoes. An observational trial was initiated with eight pepper varieties and three planting dates to evaluate uniformity of production throughout the growing season.

- Program 2. Forest Resource Enhancement: Stakeholder input continues to drive the work being conducted. The numerous variations in our buffer system model are the direct result of farmer inputs. Local stakeholders have determined the landscape-level issues the urban forestry activities will address, the types of assessments that will occur, and the development management practices that will be evaluated. Our research program on fiber/plastic composites was initiated as a direct result of farmer-producer group input and has been guided subsequently by feedback from producers and industry.

- Program 5. Crop Production and Management Strategies:

    - Published journal articles on flooding and temperature effects on soybean germination resulted from soybean producer questions on how soybean germination responds to wet spring soil conditions. We were able to provide information on the influence of soil temperature, hours of flooding, and their interaction on soybean germination at different seed growth stages. This information is useful in helping producers and crop consultants

in predicting and assessing potential soybean stand loss during periods of heavy rainfall on recently planted soils in spring conditions.

- Have been conducting research on the production of alternative summer forage crops for a group of stakeholders interested in sustainable farming systems. These producers are taking 'ownership' in helping identify research conducted at the Iowa State University Research and Demonstration farm in their community. A committee of the stakeholder group contributes to the development of research priorities with university faculty and staff. A series of studies at the Neely-Kinyon Research and Demonstration farm has been addressing annual summer forages with newly released soybean varieties showing greater potential for forage value. Because mixed species are being investigated and there is a need for practical production systems employing these varieties and species, the practical input from the stakeholder group has been a very important factor in this research effort.

- Information generated by project investigating impacts of Composted Swine Manure on Weed Seed Survival, Seedling Emergence, Growth, and Competitive Ability will be applicable directly to small- and mid-scale hog producers. Project activities were driven by requests from the membership of Practical Farmers of Iowa for information about the best use and impacts of composted swine manure.

- Studies conducted to determine how interactive stresses from soybean cyst nematode, post-emergence herbicides, brown stem rot, and water stress were designed and conducted after consultation with the Iowa Soybean Promotion Board and Illinois Soybean Production Committee. Outcomes from these studies were distributed to Iowa farmers throughout Iowa and Illinois in a special publication by the ISPB.

- Program 7. Green Industry: The turf research evaluating tarp color was proposed and co-authored by the Baltimore Ravens Sports Turf Manager (stakeholder). It basically answered their question of why tarp color effects turf performance. Tarp manufactures (stakeholders) supply tarps based on this discovery and sports turf managers (stakeholders) use this information when purchasing and using tarps for turf cover.

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

  - A state 4-H equine stakeholder committee works to enhance the youth horse program. The committee was directly involved in development of leader training programs, youth activities and written materials.

  - Input from stakeholders (corn producers and, separately a seed company) has led to the development of a program to develop independent tests for genetically modified corn and soybeans.

  - Fifty percent of all mastitis occurs during the dry period with > 90 % in the first and last week. Producers and the industry were interested in novel prevention approaches. In response, we developed a polymer that dries to form a protective persistent (4-7 day) synthetic skin. Our research has shown > 60% reduction in major pathogen mastitis

infections at calving. Our work has also shown this technology to be equal to antibiotic therapy for preventing early dry period mastitis, but with 80% less cost and significantly reduced risks for antibiotic contamination of milk. This work has led to 5 patents, licensure, commercialization, and sales of this product in 17 countries.

  - Based on industry input and frustration with winter conditions and mastitis, we developed a technique to elucidate that the cause of winter tissue changes was tissue hydration rather than viral. We have proved this with long term intense observational studies. As a result, industries have developed 6 new product technologies to address this.

  - Results from our water quality study are important for helping dairy producers to evaluate different water sources for dairy usage. This study was initiated directly to respond to client inquiries about possible economic benefits to dairies for improved water quality.

- Program 10. Genetic Enhancement of Agriculturally Important Animals: This program addresses stated priorities of stakeholder organizations, which are regularly consulted for input. For example, meetings with swine breeders are held twice a year and have resulted in increased emphasis on meat quality, and interactions with the Berkshire breed association resulted in further gene discovery research. Input from scientists in stakeholder industries was received and used to modify the experimental design of studies in poultry. Stakeholder input came primarily from the poultry breeding companies, which would be the facet of agribusiness to implement the major findings of the research, and from popular consumer preferences to move towards animal production systems that provide safe foods without heavy reliance on chronic antibiotic use. The inputs from these stakeholders helped to shape the goals of the specific research projects and the materials used in the research. Studies were conducted to identify specific DNA markers that could be used to improve animal health and pre-harvest food safety.

- Program 11. Develop and Integrate Nutritional Knowledge to Enhance Animal Production: Stakeholder input was primarily in the forms of advice and counsel from state agribusiness scientists, and of popular consumer preferences expressed for natural products, for foods with enhanced qualities, and for systems of environmentally sustainable animal agriculture. This input influenced choices of specific research questions addressed in research. Various diet formulations, feed additives and bio-active compounds were examined for their effects on metabolic pathways and on functions of cells and tissues. The impact of specific natural compounds on enhanced characteristics of animal-derived food products (“functional foods”) was studied.

  - An Iowa cattle producer pointed out the lack of knowledge on the relationship between grazing management and phosphorus loss from pastures. A team including ISU scientists, Iowa DNR personnel, and staff from Iowa Cattlemen’s Association participated in planning for an EPA 319 grant that was funded.

  - A group of Northeast Iowa and Southwest Wisconsin farmers developing organic and direct marketing of dairy and beef products from grazing cattle had interest in enhancing the conjugated linoleic acid content of milk and beef. Cooperative efforts by farmer

representatives, ISU scientists, staff from an organic cooperative, and the local RC&D Coordinator developed a USDA SARE proposal that was funded.

- A prominent Midwestern Cooperative had interest in developing butter with improved spreadability. Results of a joint research project by scientists from the cooperative and the university indicate genetic variation in fatty acid content of milk fat from individual cows.

- Two groups of Northwest Iowa farmers formed cooperatives to build fuel-ethanol plants. Working with local cooperative grain and feed elevators to develop a marketing plan for wet byproduct feeds, there was a need for information and tools to show the value of the byproducts as feeds for cattle. Using results of university research, spreadsheets were developed to show the comparative economic value in relation to prices of corn and soybean meal.

- Six cattle producers, three agency personnel, and three area livestock extension specialists have been instrumental in providing input for the design and implementation of the grazing studies. A question raised by three of the producers ("Grazing in July is easy, tell me what to graze in February?") provided the stimulus for the development of the winter grazing studies. Another producer question relative to development of replacement heifers in these programs pointed out a deficiency in our knowledge base.

- Studies on the effects of cattle grazing corn stalks on soil properties and subsequent crop production were designed and conducted as a result of two farmers pointing out that lack of this knowledge was a major factor limiting the grazing of crop residues.

- Program 12. Potential of Alternative Livestock: Our support services for the Iowa Aquaculture Association are made at the request of the organization. Extension aquaculture publications and programs are done at the request of, and in cooperation with, the USDA North Central Regional Aquaculture Center. The project on walleye culture pond fertilization was requested and funded by the Iowa Department of Natural Resources.

- Program 13. International Economic Competitiveness:

  - The major commodity groups in Iowa as well as members of the Iowa Congressional Delegation requested and received significant levels of analysis in conjunction with development of the 2002 Farm Bill. The estimates of benefits and costs have major implications on the bills ultimately debated.

  - Many small and medium size producers have requested research on alternative production systems consistent with their investment ability and environmental concerns. The hoops project was developed in response to these concerns.

- Program 16. Improving the Quality and Safety of Muscle Foods: Our program was directly influenced by stakeholders' input from the Iowa Pork Producers Association and Johnsonville Foods Company. Both of these stakeholders encouraged us to investigate the quality/safety problem of broken hypodermic needle residues with associated muscle damage

in pork carcasses. As a result, a current study is underway, funded by the National Pork Board, of a transdermal injection device (needle-free) for delivery of swine vaccines.

- Program 18. Improving Human Foods: Functionality, Selection and Nutrition. Scientists from The Procter & Gamble Nutrition Science Institute (Cincinnati, OH) sought a rapid screening method to measure effects of dietary factors such as added fat on the absorption of carotenoids from fresh vegetables in humans. In collaboration with scientists at The Ohio State University (Columbus, OH), ISU investigators applied the enhanced sensitivity of electrochemical detection to measure the effects of fat-modified salad dressings on the absorption of beta-carotene and other carotenoids from fresh vegetable salads. Results demonstrated that the use of fat-free or reduced-fat salad dressings rather than full-fat dressing limits the absorption of health-protective carotenoid.

- Program 20. Sustainable/Organic Agriculture. On 22 June 2001, an Organic Advisory Committee meeting was held with organic farmers, industry and Extension stakeholders to obtain input on research and extension needs in Iowa. A discussion on research to date was followed by input about the organic business climate, concerns, and future research needs. Stakeholders requested that certified organic pest management treatments should be researched and changed the design of several experiments as a result. Based on stakeholder demand, an Organic Conference was organized for November 2001, which would address key issues of marketing and production. Stakeholder involvement has increased the applicability of research, including the development of an evaluation instrument for 2002.

- Program 21. Sustainable and Environmentally Safe Management of Soil Resources. Stakeholders have been directly involved in several research projects of this program. Stakeholders include business corporations (Agribusiness Association of Iowa, Cenex/Land O Lakes, Agrium, Inc.,) public agencies (Iowa Department of Natural Resources, Chariton Valley Resource Conservation and Development District), and over 100 farmers on whose farms research trials were conducted. Projects with such direct stakeholder participation included studies of nitrogen application and efficiency of uptake, precision farming technologies (GPS, GIS, soil testing, remote sensing, yield monitors, tissue testing), response of corn to zinc fertilizer applications, and relationships between soil organic carbon content and land use, soil type, and landscape positions. In many cases, producers helped to identify practices that need to be compared and selected treatment comparisons for their farms. State agency stakeholders as well as agribusiness stakeholders were involved in developing the Iowa Phosphorus Risk Index for use in agricultural fields.

- Program 23. Animal Waste Management: Much of the new work initiated this year was at the request of stakeholders.

    - Early in the year, state commodity organizations asked the University to help with the response to EPA's Proposed Feedlot Regulations. Further work has been initiated to evaluate alternative feedlot runoff disposal alternatives such as vegetated filter strips, infiltration basins and constructed wetlands.

    - Iowa's Department of Natural Resources has asked the University to evaluate the impact of manure application on surface and groundwater quality from water emanating from the

land. Research is being conducted at several sites around the state to determine the impact of land application of manure on surface and subsurface groundwater quality.

- IDNR also asked for an evaluation of the impact of earthen waste storage structures on the contamination of groundwater in the state. Research was conducted and reported on the hydrogeologic placement of these structures, the leakage rates determined, the sampling of soil and water around the outside of these structures, and the management impacts on water quality.

- The Governor and the Director of Iowa Department of Natural Resources asked for a report on the health impacts of Concentrated Animal Feeding Operations (CAFOs) on the public in Iowa. This report was cooperatively written with faculty from the University of Iowa. It will act as a guide to the state legislature as they debate any changes needed in regulations on the animal industry in early 2002.

- Program 24. Improving Water Resources Management in an Agroecosystem: Research on lake water quality involved participation by landowners, aquatic recreationists, community organizations and state and federal natural resources management agencies. The Iowa Department of Natural Resources, acting on behalf of the interests of a USDA NRCS Resource Conservation and Development program, requested and funded the low head dam research. The IDNR requested and funded the Spirit Lake research. The U.S. Fish and Wildlife Service and the IDNR requested and funded the Missouri River research and the Topeka shiner research.

- Program 26. Improving Environmental Quality in a Changing Landscape: Some research needs were identified by the Iowa Department of Natural Resources and the U.S. Fish and Wildlife Service. These agencies provided funding support, which led to initiation of research on effects of habitat restoration on wildlife populations. A project concerning wildlife use of riparian buffer strips along agricultural fields was requested by the U.S. Natural Resources Conservation Service Wildlife Habitat Institute as a means for developing alternative plantings in Conservation Reserve and Enhancement Program (CREP) areas. It is being done in cooperation with a farmer who wishes to make native ecotype plantings in buffer strips but cannot qualify for CREP funding because such plantings are not NRCS-approved. The deer-vehicle project was requested by the Iowa Department of Transportation and representatives of the insurance industry.

- Program 27. Rural Development.

  - Citizens-as-stakeholders influence the decisions of the 33 rural Empowerment Zones and Enterprise Communities investigations.

  - In deciding what research methodology to use in studies of e-commerce and Native American business owners, we put together a council of stakeholders that included tribal and governmental representatives. Their input changed our methodology from surveys and focus groups to learning circles.

- The biotechnology consortium relies heavily upon input from Native American stakeholders in developing social science research on consumer opinions of biotechnology.

- Stakeholders for the Farm and Rural Life Poll data are the seed industry, particularly the biotechnology companies that have invested heavily in transgenic processes, media and policy makers. Working with seed industry representatives, concerned environmentalists, and policy makers, the questionnaire was designed to make an initial assessment of producer use of transgenic crops, and marketing problems.

- Program 29. Value-added Agriculture.

  - Poultry feather waste was investigated as a component of biodegradable plastics in response to a request by that industry.

  - A USDA-IFAFS grant to survey apple cider production was written with the full support and cooperation of the Iowa Fruit and Vegetable Growers Association and five cooperating grower/producers.

  - Research was conducted on the digestibility of starch for glucose and alcohol production in response to a request by Iowa corn producers to increase profits and reduce production costs.

  - Development of an ensilage technology for biomass storage was in direct response to a request from B/MAP, a value-chain cooperative in southwest Iowa. The cooperative has fully implemented this technology.

  - Compost utilization studies were requested by farmer-members of Practical Farmers of Iowa, a group that became a cooperating organization on a research proposal that funded this work. Practical Farmers members are now hosting on-farm trials and on-station research on compost as a value-added product.

  - A compost drying technology was developed at the request of Bluestem Solid Waste Agency, Cedar Rapids, Iowa, to solve a process control problem associated with the production of a high-moisture feedstock. They have incorporated several changes suggested by the research into their full-scale production system.

  - An Iowa Corn Promotion Board grant which funded bio-film fermentation production of succinic acid was terminated after one year, due to industry perception that succinic acid is no longer a viable platform for biodegradable polymers.

  - A soy-cheese project was subjected to outside reviews by NASA, and received a favorable and supportive evaluation.

  - Iowa Soy Specialties of Vinton, Iowa, has adopted technology developed to produce soy protein isolates and to refunctionalize soy protein from extruder-expeller meals.

Extension:

- To meet a sudden demand for information on grape growing, a major outreach effort was initiated in 2001. This included an intensive workshop with out-of-state speakers, a series of regional meetings addressing seasonal cultural practices, and the development of a web site. These efforts directly reached over 300 potential growers, and the web site was accessed over 28,000 times. Approximately 105 vineyards were established or expanded in 2001, and at a startup cost of over $4,500 per acre, these outreach efforts probably saved each grower at least $2,000 in startup costs through the avoidance of common mistakes.

- Program 101. Strategic Advantage: Management Development for Iowa's Farm Businesses: All of the reported program elements were designed and delivered in cooperation with representatives from leading farm organizations, the lending community and government agencies.

- Program 103. Crop Nutrient Management. Environmental Phosphorus Risk Assessment – Iowa P-Index Developed. Movement of phosphorus from farm fields to surface waters can elevate phosphorus in water systems above critical levels for aquatic plant growth and thus enhance nutrient enrichment and seasonal deficient oxygen, a process called eutrophication. Due to a heightened focus on this environmental issue, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in each state was required to revise their state Nutrient Management standard (590) in accordance with guidance on phosphorus risk assessment provided by national policy and the national 590 standard – the code used to assist producers with nutrient management in voluntary programs. Because phosphorus risk assessment is a new concept, and an appropriate assessment method was not established in Iowa, NRCS approached Iowa State University Extension for assistance in development of a method appropriate for Iowa conditions. A team of Iowa State University extension and research specialists, Iowa State University and USDA soil scientists, and NRCS employees addressed the request from NRCS. This team successfully evaluated the scientific literature on the subject of phosphorus movement and losses, evaluated various tools to assist in estimating losses, and built a practical phosphorus risk assessment tool – the Iowa Phosphorus Index. Additionally, a series of educational meetings and newsletter articles were developed to raise awareness among public, agency, agbusiness, and commodity groups on the environmental issue of phosphorus management and the Iowa phosphorus index. The Iowa phosphorus index is an integrated system, and thus useful for understanding the important factors causing a high phosphorus loss risk and identification of management practices to lower that risk. And that is the goal, to reduce risk of phosphorus loss, help water quality, and provide producers options for phosphorus management on their farms. The Iowa phosphorus index will greatly improve the ability of producers to understand and voluntarily manage phosphorus losses from fields, which will positively impact surface water quality in Iowa and in waters downstream.

- Program 106. Commercial Greens Industry.

    - Growing Grapes Commercially. The number of commercial grape growers in Iowa has risen from 17 in 1999 to more than 100 in 2001. The majority of these growers have planted 1-3 acres of grapes each with the hopes of selling the grapes to a local winery.

These growers have invested between $3,000 and $5,000 per acre to get started in these enterprises. Unfortunately, most of these growers have little knowledge or experience in grape production. Many of the new and prospective growers have asked for technical assistance in wine-grape production, as have the two largest existing wineries that use locally grown grapes. Extension Field Specialists, County Directors, and State Specialists working with the developing Iowa grape industry leaders and other government entities organized a series of monthly grape and wine technical information meetings from March through September of 2001 in both the east and central part of the state. These meetings were held at Indianola, Cedar Rapids, Muscatine, Baldwin and Maquoketa. Seven technical meetings were held in Central Iowa and six in Eastern Iowa, including a comprehensive full day workshop in cooperation with the Iowa Fruit & Vegetable Growers Association. Average participation in theses meetings ranged from 30 - 150. A return mail survey was sent out to 109 different individuals who attended one or more of these meetings. Results of this survey indicated that these participants felt these meetings were good to very good and positively impacted their grape growing management decisions. They overwhelmingly wanted these meetings to continue during the 2002-growing season.

- Acreage Answers Comes to the Country. Many people in Iowa are moving from the suburbs onto acreages in the country and are experiencing many new challenges county living offers. Extension offices are being used as a focal point by this ‘new’ rural population to find answers to their perplexing questions. To address this need in 1998 a project was piloted that was named Acreage Answers. In cooperation with two agriculture cooperatives and a public library in Waukee, programs were offered to give information and answer questions. Agriculture field specialists covered topics from trees and lawns to septic systems and pasture maintenance. The sessions were modified and offered in multiple counties in Central Iowa the following year. A sample of participants were contacted by phone and asked if they had found the information useful and how they wanted to continue receiving information. The responses were positive and requested information via newsletter and the Iowa Communication Network (ICN) so that travel would be minimized. The first issue of the Acreage Answers newsletter was distributed in February of 2000. Articles and topics are chosen based upon evaluations of the newsletter and the ICN programs. The three programs that have been offered via ICN are Ponds and Wetlands, Trees, Shrubs and Prairies, and one focused totally on Prairie Establishment and Maintenance. Issues of the newsletter are posted on the one county website. Other counties link their web page to this site. Individuals can then access current and past issues electronically. The newsletter is distributed to more than 1,500 acreage owners in more than 20 counties.

- Program 107. Iowa Beef Center. The Iowa Feedlot Plan and environmental education program are the direct result of input from both cattle feedlot operators and environmental regulators. The federal EPA was concerned that open feedlots in Iowa were not in compliance with federal regulations and made surprise inspections of feedlots. EPA applied pressure to Iowa regulators (DNR) to get more feedlots into compliance. Iowa feedlots after many years of regulation largely on a complaint basis wanted to be accurately evaluated to determine what changes were necessary and wanted a reasonable amount of time to make the necessary changes. The Iowa Beef Center brought the two groups together to forge a

cooperative program under which feedlots would voluntarily register to be inspected by regulators and would be given a reasonable amount of time to make necessary changes in their operation. The Iowa Beef Center provided technical information to the parties involved in the discussion, participated in the development of off-site assessment tools, and provided education and information to producers about the program. The result is that this systematic program to bring more Iowa producers into compliance signed up over 1500 feedlots and generated wide spread interest in environmental management by cattle producers.

- Program 108. Iowa Pork Industry Center. The PRV program is directly influenced by stakeholder needs. Surveys of the production segment of the industry in Iowa have suggested reproductive management and finishing management as priority educational opportunities; therefore, the IPIC has directed its programming to resolve that need.

- Program 109. Strengthening Iowa's Dairy Industry. Numerous cooperators and stakeholders have been engaged, including Dordt College, Northeast Iowa Community College, The Iowa Institute of Coops, Iowa Farm Bureau, The Western Iowa Alliance, and the NE Iowa Dairy Foundation in added-value ventures. Two producer-agribusiness-state university relationships were formed, both are involved in expanding dairy educational opportunities as well as post secondary and applied research initiatives. Work continued with the Iowa Veterinary Medical Association, the Iowa State Dairy Association, and the Iowa Dairy Products Association in educational endeavors of benefit to their memberships.

- Program 143: Pesticide Applicator Training: Stakeholder input is important for the development of the optional topics presented at the private pesticide applicator training meetings. Each year the state staff elicit topic ideas from producers and state field crop specialists. The programs are directly related to current concerns and emerging issues throughout the state. Last year the topics included: corn rootworm management update and herbicide persistence/carryover concerns. The corn rootworm management topic addressed the development and use of biotechnology for management of this corn pest. The herbicide persistence and carryover concerns addressed pertinent state issues.

- Program 145: Farm Safety:

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

    - During the instructional training of volunteers to coordinate farm safety day camps, a concern was raised about the available resources targeted for youth attending farm safety

day programs. These coordinators indicated that materials with adult safety messages were used because of limited materials appropriated for youth 8 to 14 years of age. This stakeholder input was used to generate a successful extension publication series the "Mystery Club" that reinforces key messages from farm safety day camps about specific hazards and engage the youth audience with age appropriate information presented in a variety of ways. Several of the first publications in this series were reprinted after 4 months because of stakeholders' demand.

- Goals 2, 3, and 5: Programmatic efforts were modified in focus groups and as part of the normal feedback and programming. Specific examples include building on a retirement effort for older Iowans, working in the area of obesity in young children, and growth within our Hispanic programming area. Efforts on food safety were redirected as a result of discussions with food consortium members, which include consumers, producers, and business and industry folks.

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 2: Focus group interviews conducted in support of urban forestry activities, as well as task force participants included women and minorities, and representative developers, realtors, citizen activists, urban-rural fringe residents, contractors, planners, and natural resource professionals. All efforts and project sites associated with work related to conservation buffers has been located on small, privately-owned family farms and models being developed are focused on addressing the needs and concerns of society in general while improving the quality of life for the farmer who lives on the farm. Likewise, efforts to develop new bioproducts and niche markets are highly focused on local entrepreneurs and co-ops interested in developing alternative sources of income for farmers as well as creating local employment opportunities.

- Program 9: Presented a Shortcourse in Endocrinology at Cheyney University of Pennsylvania in the Department of Science and Allied Health, April 11-13, 2001. This mentoring program for minority students is sponsored by The Endocrine Society. The majority of individuals who are involved in the equine industry are females. At two different pasture management programs, clientele consisted of small farm owners. Participants were ~80% women and 20% men. At the annual Horse Fair a young jamboree is held where the youth can participate in a variety of contests. Over 350 youth participated last year. Approximately 75% were girls and 25% were boys. Member of Referees Panel for Sponsored Research, United Arab Emirates University, Kuwait.

- Program 10: The genetic evaluation methods that have been implemented on a national basis enable small/medium size producers to participate in and benefit from genetic improvement, as they evaluate their position in a changing livestock industry. Information on meat quality traits is used to help small/medium size pork producers to develop and implement breeding programs that meet the requirements of niche markets that emphasize pork with superior quality.

- Program 13: The Beginning Farmer Center works with small, disadvantaged, and beginning farmers. Analyzing data compiled from the Iowa Farm Business Association factors of success for small and beginning farmers were identified and then used for preparation of educational materials and developing policy recommendations for small and under served farmers.

- Program 18:

    - Research on infant feeding has identified how breastfeeding after one year of age is beneficial for the toddler yet can have detrimental effects on the next lactation period if there is an overlap with a new pregnancy. This research is focused on poor women and children and/or minorities. The studies have included on U.S. Hispanics, poor women and infants from Alabama (primarily African-American), US adolescents (primarily African-American young women), and Peruvians and Ghanaian women and children.

    - A multistate research project has developed and validated tools to quantify fruit and vegetable intake and determine stage of readiness of change using the Stages of Change Transtheoretical Model. Focus groups with young adults in five states (including IA) found newsletters to be more acceptable than a proposed web-based option for this age group. More focus groups are ongoing in more states to confirm this preliminary finding as interventions are designed. The intervention phase of this research will be implemented with low-income young adults including African American and Hispanic subjects. Recruiting and working with subjects will be done by Extension paraprofessionals with participants in EFNEP, WIC, and FSNP.

- Program 20: Two minority student interns from California and Missouri participated in the Organic Research and Education Program at ISU in the summer of 2001. Benefits derived included interaction with organic farmers and Extension staff in disseminating information on methods of sustainable agriculture. Research on organic pest management

methods for control of chrysomelid beetles in squash and soybean production identified the practicality of cultural controls, such as floating row covers over kaolin clay products. Other activities with minority agriculturists included a new Organic Weed Management grant program with scientists at Tuskegee University. This program involves minority farmers and staff in developing non-toxic weed management strategies in order to sell crops under a certified organic label.

- Program 27:

  - Research on populations on the margin of the rural economy, either as members of minority groups or as persons underserved.

  - Work on e-commerce and broad band access both specially involves Native American populations. Spanish-speaking populations are the focus of the extension tools inventory and planning process we have put into place through a region-wide workshop in Chicago.

  - Worked with various programs (e.g., MANRRS) that provide opportunities for minority students to enhance their educational experience.

  - Member of the LAS EXCELLE mentoring program, now under the direction of the provost. While EXCELLE no longer exists, we continue to informally mentor several African-American students.

  - Community Voices (CV) program implemented. Although rapid immigration challenges Iowa to engage newcomers in community and leadership development, programs for Latino/as are scarce. CV, translated into Spanish and adapted for Latino/a audiences, incorporates classic community development principles: involving participants in defining their own needs, setting priorities, and developing action steps for meeting priority needs and solving priority issues.

- Program 29: Working with the Iowa apple growers to increase the safety of their products and ensure the continuation of these small-scale rural businesses.

- Program 30: The research programs on Early Head Start home visits, the study of adolescent health care transitions, and the research on optimal aging all include sub-populations that have physical or mental disabilities. Also, the Early Head Start home visits project is focused entirely on individuals with limited resources.

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

- To meet a sudden demand for information on grape growing, a major outreach effort was initiated in 2001. This included an intensive workshop with out-of-state speakers, a series of regional meetings addressing seasonal cultural practices, and the development of a web site. These efforts directly reached over 300 potential growers, and the web site was

accessed over 28,000 times. Approximately 105 vineyards were established or expanded in 2001, and at a startup cost of over $4,500 per acre, these outreach efforts probably saved each grower at least $2,000 in startup costs through the avoidance of common mistakes.

- Program 103. The Manure Applicator Certification program was delivered in Spanish to eight confinement site applicators. Also a Spanish videotape and transcript was developed to serve the Spanish-speaking clientele in Iowa.

- Program 106. Storm Lake's Diversity Gardens project began in 2000 as a pilot program within the Hispanic community to determine the feasibility of growing specific crops and the marketability of the produce as alternative crops for northwest Iowa. After extensive media coverage during the first year, an additional goal this year is to find new ways to continue to externally market the project. Extension specialists worked to make several important personal contacts with program producers at the Iowa Public Television station (IPTV). Because of these efforts, IPTV joined the Diversity Gardens committee and gardeners to film and conduct interview sessions on numerous occasions. The diversity efforts of Iowa State University and cooperating agencies will receive statewide attention when the program airs. The production work which has been under way has also, it appears, strengthened IPTV's possible extended coverage of Hispanics in northwest Iowa communities.

- Program 107. Many Iowa Beef Center activities are with limited resource clients, farm couples, and female producers. Chariton Valley Beef, Raccoon Valley Cow Calf Association, and IMBIO programs specifically target smaller cattle operations to help producers effectively combine their animals into large group sizes (e.g., truckload lots) before selling and/or assure greater market access.

- Program 109.

    - Three groups of dairy clients have the potential to be under served. Last year, assistance was provided to help a Jewish dairy farmer develop the ability to have his dairy's milk processed into Kosher cheese. This year he has arranged for a Wisconsin creamery to process his milk into high quality Kosher cheeses. At a recent New York trade show, his five Kosher cheeses each won first place.

    - A legally deaf young dairy farmer has been assisted in controlling his milk quality. A milking time analysis showed a leaky balance tank, milking procedures that did not stimulate milk let down, and a vacuum pump that was not delivering adequate air flow. The pump and balance tank were replaced. A more vigorous milk let down protocol was initiated and within 90 days the somatic cell count was reduced from 800,000 to 350,000.

    - A small dairy farmer who recently moved from California was assisted with facilities that enabled him to sell Grade B milk. Suggestions on building free stalls, a 2-stall parlor, milk cooling and nutrition have been successfully established. He and his

family hosted a Latino dairy farm delegation on how to establish a modern, yet small dairy farm and still have superior quality milk.

- Program 142. Underrepresented audiences of organic producers are provided ICM programming through targeted recruitment and partnerships for program delivery and impact.

- Program 200.

    - Programs With New Spanish-Speaking Residents: During the last few years, thousands of new residents have moved to Iowa. The native language of many of these new residents is Spanish. They have moved into nearly all counties in Iowa, but especially where there are agricultural processing jobs available. In response to these new residents, Iowa State University Extension to Communities has initiated several new educational and research programs directed at working with communities to bridge the cap in community services and in improving communications between Spanish-speaking residents and English-speaking residents:

        - Community Voices Programs is taught in spanish to establish a dialog between new Spanish-speaking residents and the leaders of the receiving community and to identify community issues and provide a forum for working together to solve them.

        - Diversity Conferences to increase awareness of Hispanic cultural issues in the communities and open a dialog to discuss how to deal with these issues.

        - The Impact of Immigration of Small to Mid-Sized Iowa Communities to determine the impact of immigration on the community and the lessons that could be learned to help other communities prepare for in-migration.

        - Presentations at Regional Extension Staff Immigration Conferences on immigrant housing issues in rural Iowa, the impact of immigration on small Iowa communities, and the Community Voices program.

    - Des Moines Enterprise Community: The five neighborhoods bordering the north side of Des Moines have been designated the “Enterprise Neighborhood” by the U.S. Department of Housing and Urban Development. Many residents in the Enterprise Neighborhood are low-income and the neighborhood is the most racially and culturally diverse area in Iowa. While this diversity is enriching, it also poses problems because of language barriers and mistrust among groups. In an effort to provide educational outreach to the Enterprise Neighborhood, a series of five leadership classes entitled “Tomorrow’s Leaders Today,” was conducted over three years. The classes featured a standard curriculum of skill building topics and challenged graduates to become involved in community development in their neighborhoods. At the conclusion of the classes in the spring of 2001, all graduates were invited to help develop and attend a “Graduate Alumni Class”, which involved 5 workshops. Workshop topics included a personality assessment tool to help

participants understand and respond individual differences; panels featuring diverse racial and cultural speakers, and a class on grant writing. The COPC Project has sparked a number of neighborhood improvement efforts, including nuisance abatement, clean-up campaigns, citizen crime watch terms, and community gardening. A number of class graduates have assumed leadership roles on their neighborhood boards. The TLT leadership classes have already yielded results, but much of the impact will be measured over the coming years as graduates assume leadership positions in their neighborhoods and put their understanding of diversity and newly developed skills to practice.

- Grandparents Raising Grandchildren. In most states, statutes are not responsive to needs of grandparents. Legal options for grandparents having primary support of a grandchild are limited, emotionally draining, and expensive. A national Extension-sponsored satellite, "Grandparents Raising Grandchildren: Legal and Policy Issues," was offered at 14 sites in Iowa. Intergenerational dialogues on community issues included 413 people representing each of five generations in three communities and 101 people participated in educational programs encouraging intergenerational awareness. ISUE Specialists were part of 37 coalitions addressing aging issues. 936 adults participated in other aging related educational programs including caregiver communication, understanding aging, and grandparenting. Participants rated the program high. It increased their understanding and awareness of laws and public policies, legislation, and development of state/local policies and programs to assist caregivers. Over one-third planned to explore how their organization/agency can help bring about needed changes in state laws and public policies impacting relatives as parents.

- Parent Education Project Adapted for Latino Families. The Latino population in Southwest Iowa is increasing and cultural resources are limited. ISUE Families Field Specialists translated family life, nutrition and resource management materials into Spanish for the "Families Knowing and Growing" parent education bags. In one evening, at the Latino Resource Center in Red Oak, Iowa, 19 bags were distributed to families requesting assistance. Participants especially liked the children's books where translations had been added, helping them learn English; they requested more than one book in the future. The materials increased their perception of importance they have as parents to the development of their children. This successful parent education project has offered the opportunity for collaboration between ISU Extension Community Development, The Latino Resource Center and the public schools.

- Humboldt County Volunteer Money Management Program. Social service agencies frequently face the need for assistance in helping elderly and disabled SS and SSI recipients in performing routine financial management tasks. ISU Extension Resource Management Specialist contacted the State Department of Elder Affairs to establish a Volunteer Money Management Program. She worked with Community Services staff to establish a program advisory board, and plan the first volunteer training in March 2001. The program works directly with AARP national office for program supervision. It has trained 8 volunteers since it began. Agency and community representatives are participating in advisory board meetings, providing guidance and assistance. The impact is far-reaching: 1) clients' well-being is secure when they have help managing money; 2)

some, who would otherwise be institutionalized or homeless, can live safely on their own; 3) businesses have stable paying customers; and 4) fewer demands are placed on other human service agencies. The program coordinator has relied on support from Extension in the areas of volunteer training, advisory board process, establishing program management/monitoring systems and other technical assistance.

- Fatherhood - Me & My Dad Website. ISU Extension Family Life Specialist created the "Me & My Dad" website (www.extension.iastate.edu/dads) to assist fathers in strengthening relationships with their children. The site includes: current research related to fathering; monthly interviews with a real dad, features on literacy activities for dads & kids, news releases, displays, bookmarks and presentations; weekly tips for strengthening relationships and staying connected; and questions/responses from real fathers on specific issues. It is promoted through monthly e-mail contacts, news releases, displays, bookmarks, and presentations to community groups. The site is averaging 1,100 visitors monthly.

- Blood Pressure Screen and Interactive Displays. Southeastern Iowa asked for help with preventative health screens in the rural community. ISUE developed a successful interactive health screen and display to get members of the rural population, particularly men, to get blood pressure checks. The display also consisted of: the Iowa Concern Display, hand grip dynamometer, biofeedback, biodots and stress testing cards, mental health inventory, and Extension publications. When public health nurses took blood pressures, 350 (138 males) people had theirs checked; 35 were classified as referrals. Seven counties duplicated the display at county fairs. This cooperative effort encourages work across program areas involving public health nurses as community partners. Several counties want the display again next year. County Health nurses in all the counties indicated a willingness to donate time at fair events.

- Families Living In Poverty. More children and their families are living in poverty. There is a 50 percent increase over the past 20 years in the poverty rate for children under age 18. 28 ROWEL Poverty Simulations have been conducted for 1,334 participants.

- In the Sioux Center, Iowa, school district, ISUE offered the simulation to help educators work more effectively with low-income youth and families. 75 faculty enrolled. As a result, the majority of staff say they are more aware of special situations/problems at the school level due to poverty and feel they know how to support children. The district made major changes: the field trip cost policy was rewritten; more families are matched to agencies; hats, mittens, snow pants, used instruments, Halloween costumes, etc., are supplied to children needing them; MS and HS breakfast programs are promoted; and classroom fee waivers have been initiated.

- The Woodbury County Head Start agency wanted staff to better: understand families they serve, understand how staff can have a positive impact on their lives, and assess policies for effectively working with these families. 4 Poverty Simulations were held for 240 staff members for Head Start, Early Head Start and 23 other community agencies in the county. Success is due to a collaborative planning committee – ISU Extension, Woodbury County Community Action Agency, Promise Jobs, and Early Head Start.

ISUE staff provided leadership for the committee and facilitated simulations. As a result of the simulation, participants said they would work to increase patience, improve listening skills, increase respect, and keep networking. ISUE and other county partners plan to continue to work together to provide information and resources to assist limited resource families.

- Reaching Teen Moms and Other Families with "Special Needs". Reaching teen mothers and other families with "special needs" is a challenge. Quality educational programs accommodating wide skill levels are expensive and generally not available in rural communities. Recruiting and retaining teen moms in a parent/child nurturing program is difficult. Few group programs allow parents and children to interact in a positive environment with children their own age. ISUE Families Field Specialists secured funds and brought Kindermusik® to rural NE Iowa in 1998. There was only one licensed instructor in the 3-county area. Since then, six (6) additional instructors have been added. $32,000 from the Community Empowerment Grant provides scholarships for families to participate in the program. 313 children from 298 families received 3,601 hours of instruction through Kindermusik® this year. 7 teen moms are enrolled. Parents and children are singing together more, reading together, and socializing with other children.

- Moving Towards Celebrating Diversity. Small communities in Iowa are experiencing an influx of immigrants. Postville, Iowa, is a unique community of about 1,800; 600 plus residents speak over 13 different languages, and have immigrated from 24 countries. ISU Extension Field Specialist is a member of the Postville Diversity Committee whose mission is cultural awareness and education. Projects developed over the past two years are:

    - window displays and newspaper articles featuring a different country monthly. Individuals from that country furnish and arrange items in the display. Adult ESL students write articles about their hometown, a custom or a holiday celebration.

    - Sunday afternoon film series featuring films from Russian, Jewish and Mexican cultures exploring the role of family. Musical entertainment and food is provided.

    - A community garden. This year there were: 4 Mexican gardens, 3 Russian gardens, after school club garden, diversity committee garden, and two Postville resident gardens. ISU Horticulturist provided assistance in vegetable gardening. Comments received by the Diversity Committee have been positive. The city government, businesses, school, the faith community, ISU Extension, NICC, and several members of the community have collaborated to make these events happen.

- Payee Success Story. In 1996, 15 community agencies indicated need for a money management service in Franklin County, Iowa. Individuals who need this help are diverse, although national statistics show that slightly over half are female and over 60. The Franklin County Money Management Program (FCMMP) offering Representative Payee and Bill Payer Services was established. Over the years, a local advisory council formed. They developed a marketing brochure and hired a coordinator for volunteers. ISU Extension housed the program. Local banks and the Board of Supervisors

contributed funds. Volunteers were recruited through AARP members and volunteer trainings were held. $7,800 was raised to support the effort. 9 Representative Payee and Bill Payer volunteers were trained along with 8 advisory council and staff. In March 2001, the FCMMP agreed to affiliate with AARP, resulting in older citizens living independently and reducing the need for Medicaid beds in long-term facilities. In addition, the service will help disabled, drug and alcohol dependent, and mentally ill residents retain their independence.

- Nutrition Education for Pregnant and Parenting Teens. Practical education about prenatal care, including health and nutrition during pregnancy, is needed to help reduce numbers of low birthweight babies. Des Moines Public Schools offers the GRADS program (Graduation, Reality, and Dual-Role Skills), for pregnant and parenting students, enabling high school completion. ISUE EFNEP Program Assistants taught a series of EFNEP nutrition lessons once during the year to GRADS students. This year, they reached 76 teens with nutrition messages (41% were pregnant or nursing). Teachers report students are more aware of healthy foods for them and their babies and of food label information. 2 GRADS teachers have had students prepare some recipes in class. One student qualified for a special restaurant cooking course partly because of her EFNEP nutrition education and graduation certificate.

- Low Income Families Pledge to Eat Healthier. Many low-income Iowans are unaware of the recommendations for good health and hesitate to spend money on fresh produce. A recent report listed Iowa next to last in the US in consumption of five servings a day. An awareness campaign for the general public resulted in nearly 100 southeastern Iowans signing a pledge to try to eat 5-a-day. Those responding to an evaluation said they increased consumption of fruits and veggies since signing the pledge. Three ISUE Field Specialists developed a plan for building on this success and extended the pledge to families in the FNP/EFNEP (Expanded Food and Nutrition Education Program), hoping to increase consumption among low-income Iowans. ISUE FNP Assistants enrolled 45 participants. Monthly for three months, they received nutrition fact sheets and fruit and vegetable recipes. After the program, respondents indicated eating more fruits and vegetables, trying new recipes using fruits and vegetables and understanding what 5-a-day means. The FNP Assistants taught the Fruits and Vegetables lesson more often and reported participants appreciated the materials they received.

- Women's Financial Information Program. Women are sometimes not confident in handling finances and do not know where to go for help. ISU Extension Families Specialist offered the Women's Financial Information Program in Northwest Iowa to provide sound financial education to women. The program covered: Getting Organized, Where Are You Now? Where Do You Want To Be? How Does Your Cash Flow? Banking and Credit; Insurance; Social Security; Investing for Retirement; Estate Planning; and Working With Professionals. 22 women have reported success as a result of learning how to save money, investing for retirement, and generally feeling more confident in dealing with finances.

- Lee County Families Learn to Improve Eating Habits. Healthy Iowans 2010, a plan to improve the health status of Iowans, encourages establishing healthful eating as a child,

in which the family plays a key role. ISUE has found "book bags" to be a successful way to reach children and their families with much information. Family Resource Center staff in three Lee County, Iowa, school districts asked the ISU Extension Nutrition Field Specialist to develop a book bag for second graders and their families. She developed the bags using The Edible Pyramid and activity sheets for parents and children to read and complete together. This project encourages parent child interaction and literacy with a focus on eating a variety of foods and using the Food Guide Pyramid to make healthy choices. Moms, dads, siblings, grandparents, etc., participated in the learning experiences of the "book bags," strengthening literacy skills and family relationships, learning to follow the food guide pyramid, and, thus, enhancing family nutritional status.

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

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

2) 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. Midwest Plan Service

The Midwest Plan Service (MWPS) enhances the outreach, research, and teaching programs of the land-grant universities of the 12 states in the North Central Region by preparing and distributing educational materials that are based on the coordinated recommendations of the extension and research units of the participating institutions. These materials include, but are not limited to agricultural engineering and the interaction of engineering with other disciplines. Iowa Extension supported the multi-state work of MWPS through a payment of $22,248 during FY2001.

2. NELD

The National Extension Leadership Development Program (NELD) was created to enhance leadership in Cooperative Extension at all levels and to provide current and future extension leaders with the vision, courage, and tools to deal with a rapidly changing world. This program is a part of extension's overall national leadership effort. During FY2001, Iowa Extension supported the National NELD program with a payment of $3,687. There is also a NELD program supported by extension in the North Central Extension region. Iowa Extension has staff currently participating in the North Central NELD Program. Expenses for these staff amounted to $18,347 during FY2001.

3. North Central Regional Center for Rural Development

   The North Central Regional Center for Rural Development (NCRCRD) is a cooperative program among the 12 states in the North Central Extension region. NCRCRD initiates and facilitates rural development research and education programs in the region. NCRCRD also provides regional and national leadership in rural development by identifying, developing and supporting programs on emerging issues. Iowa Extension supported the multi-state work of NCRCRD through a payment of $2,553 during FY2001.

4. Pork Industry Handbook

   The Pork Industry Handbook (PIH) is a national project supported by state extension services. The project has published over 125 new and over 125 revised fact sheets using the services of over 800 authors and reviewers from 49 states as well as USDA. Versions of the PIH are available on CD-ROM. Iowa Extension supported the multi-state work of the PIH through a payment of $7,926 during FY2001.

5. Agriculture and Natural Resources Extension Program Director

   The State Director for Extension Agriculture and Natural Resources (ANR) programs in Iowa spent time during FY2001 on national and regional programs/activities. These activities included a small farm task force, sustainable agriculture (SARE), integrated pest management, pesticide applicator training, multi-state organic agriculture training, North Central Region pest management center, and general ANR program coordination among the state ANR program directors. This represented about 10% of the ANR Director's time, which was equal to $11,000 in salary during FY2001.

6. Families Extension Program Director

   The State Director for Extension Families programs in Iowa spent time during FY2001 year on national and regional programs/activities. These activities included service on the national ECOP financial literacy and welfare reform ad hoc committee; work in support of the National Network for Children, Youth and Families; assistance with spreading the Iowa Strengthening Families Program nationwide; support of Building Work Assets efforts; Housing Maintenance Hotline, the Impact of Entertainment Media Violence on Children and Family satellite series and general families program coordination among the state Families program directors. This represented about 7.5% of the Family Director's time, which was equal to $7,892 in salary during FY2001.

7. 4-H Youth Extension Program Director

   The State Director for Extension 4-H Youth programs in Iowa spent time during FY2001 on national and regional programs/activities. These activities included national and regional meetings of state directors of 4-H Youth, serving as a member of the National 4-H Council Board of Trustees, serving as a member of the 4-H Name and Emblem Committee, and ongoing efforts with state 4-H Youth staff from Minnesota and Wisconsin to work on tri-state efforts in staff development, volunteer development, and evaluation. This represented about 7% of the 4-H Youth Director's time, which was equal to $7,519 during FY2001.

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

Institution: Iowa State University
State: Iowa

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Midwest Plan Service	22,248	22,248			
NELD	10,899	22,034			
North Central Regional Center for Rural Development	2,553	2,553			
Pork Industry Handbook	7,926	7,926			
Ag Prog Director (National & Regional Resp.)	10,500	11,000			
Families Prog Director (Nat'l & Regional Resp.)		7,892			
Youth Prog Director (Nat'l & Regional Resp.)		7,519			
Total	54,126	81,172			

_____ _____
Director **Date**

Form CSREES-REPT (2/00)

F. Integrated Research and Extension Activities:

Hatch Act Funds:

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

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

Food Crops (Program 1):

- Research focused on variety and cultural technique interaction across the state for strawberries, apples, and vegetables. Field testing on apple scion/rootstock combinations continued at several sites. Results have shown a strong interaction between location and rootstock indicating that existing/new growers need to select the right combination for optimum profit. Vegetable growers indicated at winter meetings and summer field days the need to evaluate variety influence on earliness practices for tomatoes and peppers. Accordingly, the research program was modified to include colored plastic mulch effect on early production of fresh market tomatoes. An observational trial was initiated with eight pepper varieties and three planting dates to evaluate uniformity of production throughout the growing season.

Plant Germplasm (Program 4)

- Corn breeding trials were conducted throughout Iowa, reflecting different soil types and climatological zones. Furthermore, the Iowa Corn Performance Test was implemented for the 82nd consecutive year. Iowa farmers were provided information about hybrid performance, disease and insect resistance and grain quality. This information was provided to ISU clientele electronically, verbally, and through publications. Field days were held, and grower meetings conducted. The information disseminated is critical to the economic stability of Iowa corn producers.

Crop Production and Management Strategies (Program 5)

- A number of important programs contributed to this goal including soybean variety tests, specialty corns, weed management, forage production, and fertility tactics. Production practices for high value corn hybrids were developed. Research was conducted to determine the cause of lodging problems in Iowa corn production. Research continues on investigations about the evolution of herbicide resistant weed populations, and weed population shifts in weed communities. Fertilizer research provided Iowa growers with optimum amounts of nutrients to maximize production efficiency and profitability. Evaluations of soybean varieties, particularly genetically modified varieties were conducted across Iowa. Information resulting from the research was used to generate extension publications, production

recommendations, and bulletins. Meetings were conducted to provide growers with this information, field days were scheduled across Iowa, and questions answered via the telephone and email.

Green Industry (Program 7)

- Research results from projects on ornamental and turfgrass trials, herbicide and growth regulators, disease tolerance, fertilizers, and environmental research were presented at ornamental and turfgrass field days. Over 600 Iowans participated in the field days and recommendations were available in written reports.

Improved Grazing Systems (Program 8)

- Research demonstrating that corn crop residue grazing has no effects on subsequent soybean yields implies that beef cow-calf producers can take advantage of the low costs associated with crop residue grazing without adversely affecting subsequent crop production. The importance of this research area resulted in considerable interest at field days on this project at Chariton and Atlantic, Iowa.

Physiological Basis of Animal Reproduction (Program 9)

- Information was conveyed to youth and adults on the care and management of horses. Program content included pasture management; horses, kids and ethics; nutrition, youth development, breeding horses, and exercising horses.

- Provided extensive technical and educational support on the impacts for animal and human health of feeding biotechnology-derived crops to dairy, poultry, and livestock. Groups addressed include the National Institute for Animal Agriculture and other state and national groups.

- Organized and planned a national educational conference for those who raise dairy heifers. Topics covered during the conference included heifer/calf nutrition, business management, employee communications, health, and waste/environment. Approximately 325 participants attended this very successful 2001 conference.

- Organized a national tour including learning demonstrations for custom dairy heifer growers (~150 attendees). Demonstrations included hoof trimming, best management practices for vaccinations/injections, herd biosecurity, records management, nutrition/feeding, breeding and insemination tips, and calf and heifer health evaluations.

- Coordinated a regional symposium on biotechnology-derived crops for the dairy and livestock industries. This symposium was attended by approximately 200 participants, including scientists, extension educators, agricultural service representatives, government representatives, and the media.

Genetic Enhancement of Agriculturally Important Animals (Program 10)

- Integrated activities included experiments with poultry (egg- and meat-type birds) to determine the genes associated with important economic traits. Studies were conducted to identify specific DNA markers that could be used to improve animal health and pre-harvest food safety. Outputs included several invited international presentations to transfer information to target audiences of agribusiness and university scientists, and publications on the research results.

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

- Integrated activities included experiments with swine and poultry on the regulatory role of nutrition in animal production traits. Various diet formulations, feed additives and bio-active compounds were examined for their effects on metabolic pathways and on functions of cells and tissues. The impact of specific natural compounds on enhanced characteristics of animal-derived food products ("functional foods") was studied. Outputs included the additional knowledge gained from the research and distribution of that information via presentations and publications.

Potential of Alternative Livestock (Program 12)

- A growing number of Iowans are engaged in aquaculture (fish farming) and game ranching as a primary or supplemental income source. This program provides basic information on cultural and husbandry principles and techniques, pertinent regulations, and marketing that novices to production industries require, as well as new research-based knowledge to maximize production efficiency, enhance profits, and ensure that their operations comply with environmental and health (animal and human) standards required by more advanced practitioners. Stakeholders of this program include Iowa fish farmers and game ranchers and state and federal agencies that have regulatory authority in the alternative livestock industry.

International Economic Competitiveness and Agricultural Risk Management (Programs 13 and 14)

- With a new farm bill being debated this year, the demands by commodity groups, House and Senate agriculture committees, and the press for analysis and interpretation were high. One example of such analysis is that CARD helped the House Ag Committee understand that that their farm bill commodity title had a high likelihood of exceeding WTO spending guidelines. Subsequently, they modified their final farm bill language to require spending cuts if WTO limits are exceeded. Another example is that Director Bruce Babcock traveled to Washington in April 2001 to testify before the Senate Committee on Agriculture, Nutrition, and Forestry. His comments were based on the Food and Agricultural Policy Research Institute's (FAPRI) baseline projections for commodities and livestock.

- The Center for Agricultural and Rural Development published the results of its econometric research and policy analysis projects in 40 CARD Series papers in the 2001 federal fiscal year. The quarterly outreach newsletter, *Iowa Ag Review*, synthesized much of this research and analysis, targeting food, farm, and environmental issues of interest to Iowans.

- The *FAPRI U.S. and World Agricultural Outlook* is available via the FAPRI website in several formats, and data is now available for specific commodities, countries, and activities. It is hoped that easy access to this information and the full body of CARD and FAPRI content will further inform future debate on policy that affects agriculture, trade, food, and the environment.

- CARD staff and faculty presented their research at several national and international conferences and symposia. These included presentations to farm groups on risk management topics, particularly sessions that help producers make sound choices when considering crop insurance options. A presentation on livestock revenue insurance pilot programs was broadcast over the Iowa Communication Network on January 15, 2001. This pilot program was developed by CARD researchers in conjunction with the Iowa Pork Producers Association, the Iowa Farm Bureau Federation, and three Iowa-based crop insurance programs. The new insurance product will be sold to Iowa hog producers beginning in 2002.

- The Center's website continues to receive a high volume of traffic to its loan deficiency payment (LDP) tool, where producers can find daily LDP rate information, along with an explanation of the program and alternatives.

Agricultural Information Technology (Program 15)

- Many consumers express concern about consuming products produced using biotechnology. In some countries there are restrictions on import and sale of such products. Producers of these products, companies in the agro-biotechnology industry such as Monsanto and Syngenta have engaged in information wars with consumer and environmental advocacy groups such as Greenpeace and Friends of the Earth. So that we might better understand the impact of information (and misinformation) on consumer choices, a project was developed to analyze consumer willingness to pay for products with different characteristics and different labels. The project focused specifically on assessing the effects of GM food labels on consumers' willing to pay for foods that might be genetically modified. Results showed that consumers are willing to pay about 14 percent more to consume foods that they perceive as being non-GM. Hence, mandatory GM food labels are not in the best interest of the biotechnology industry, but may make consumers better off. Results of this work are being distributed to consumer and industry groups.

Food Safety (Program 17)

- Research developments on lactobacilli as a dietary supplement to pigs for the inhibition of salmonellae (resulting in healthier pigs and safer pork) have been disseminated through various printed and televised media.

- Technical support (knowledge and testing) is provided to several Iowa-based companies.

Improving Human Foods (Program 18)

- A multistate research project has developed and validated tools to quantify fruit and vegetable intake and determine stage of readiness of change using the Stages of Change

Transtheoretical Model. Focus groups with young adults in five states (including IA) found newsletters to be more acceptable than a proposed web-based option for this age group. More focus groups are ongoing in more states to confirm this preliminary finding as interventions are designed. The intervention phase of this research will be implemented with low-income young adults including African American and Hispanic subjects. Recruiting and working with subjects will be done by Extension paraprofessionals with participants in EFNEP, WIC, and FSNP.

- Sensory testing has helped producers and manufacturers assess the extent to which meat products will have desirable appearance, flavor and texture attributes as well as safer, more healthful or economically advantageous formulations.

- A soy saponin database in under construction using foods from the USDA Iowa State University Isoflavone Database. Soy saponin concentrations are not correlated with isoflavone concentrations across a variety of products. This database will be of use to food industries, scientists and the lay public.

Soil Resources Management (Program 21) and Sustainable Agriculture

- The efficient use of fertilizers, including manure, continues to be a significant issue in Iowa crop production. Inappropriate use of these inputs results in unneeded expenses and contributes to the environmental decline of Iowa. Research and outreach programs on soil resource management provides Iowa agriculture with the latest and most objective information to a number of clients including Iowa farmers, the agchemical industry, and water quality professionals. Specifically, phosphorus and nitrogen use was investigated and innovative ways to improve use efficiency were researched. Better use of animal wastes were researched to minimize environmental contamination while increasing crop production efficiency. This program is critical given the importance of pork and poultry production in Iowa. Information was disseminated via all forms of media, field days, and personal visitations.

- Swine production in hoop structures: Information gained in the research trials has been used in extension meetings and the development of national publications that were released by MidWest Plan Service and the Pork Industry Handbook.

- Carcass composting demonstration project: constructed two demonstration sites. Experience of operation was shared with other swine producers that were interested in adopting carcass composting as a low cost, environmentally friendly alternative to rendering, burial, or incineration. A web-site was developed as well.

Integrated Pest Management (Program 22)

- Public and private soybean varieties were evaluated for resistance to three diseases caused by fungi (white mold, sudden death syndrome, frogeye leafspot) and to the soybean cyst nematode. Results of these trials were made available to seed companies and the public through publications and on the ISU extension web site.

- Commercially available corn hybrids were evaluated for their reaction to Gray Leaf Spot disease caused by the fungus *Cercospora zea-maydis*. Results were made available on the ISU extension web site.

- Information regarding new registrations and registration changes of agricultural and biological-control products was communicated to Extension educators in plant pathology, entomology, horticulture, and agronomy at Iowa State University, as well as to commercial producers of so-called "minor" crops in Iowa, via IR-4 Newsletters and presentations by the PI at field days and winter meetings. Growers and Extension educators in Iowa have been made aware of changes in pesticide availability and registration on a timely basis. This awareness resulted in better compliance with Federal pesticide laws and more cost-effective, environmentally sound disease management.

Animal Waste Management (Program 23)

- Results of this work are being used to assist producers, public agencies and other stakeholders with usable results to minimize problems with animal production and the environment. Much of the research is being disseminated through Extension activities such as Manure Applicators Certification Program as well as many other public education and training events across the state.

- Researchers spent time 1) evaluating the effectiveness of alternative technologies for treating open feedlot runoff, and conveying that information to the Iowa Cattlemen, IDNR, and EPA personnel for consideration by EPA as part of their rewrite of CAFO regulations, and 2) meeting with Animal Agriculture Consulting Organization (AACO) and the Iowa Egg Council about stockpiling poultry manure, and the environmental hazards the stockpiles represent.

Improving Water Resources Management in an Agroecosystem (Program 24)

- This program focuses on several issues of importance to understanding the interrelationship between water quality and agriculture: 1) describing the sources of water quality problems and the feasibility of remedial measures for lake and watershed restoration; 2) calculating economic and cultural benefits derived from societal uses of the water resources; 3) constructing models of critical habitat for endangered fish and freshwater mussels that allow water resource development but maintain biodiversity; and 4) contributing to environmental databases for improved state and federal water resource management programs. Stakeholders of this program include Iowans who utilize the state's water resources, state and federal agencies that manage those resources, and environmental NGOs.

Improving Environmental Quality in a Changing Landscape (Program 26)

- This program focuses on basic research on evaluating agricultural landscapes and several forms of habitat manipulations and restorations within such landscapes that will help policy makers and resource managers to better understand the implications of agricultural policy on Iowa's wildlife populations. Stakeholders of this program include Iowans who utilize the state's natural areas and wildlife, and state and federal natural resources agencies.

- Residents in the immediate vicinity of Clear Lake have been increasingly concerned in recent years about the deterioration of water quality in the lake and the degradation of recreational areas. Recreational visitors to the lake and surrounding areas have expressed similar concerns. Researchers and extension personnel in the Departments of Economics and Animal Ecology have responded to these concerns by developing an integrated project to analyze the willingness of residents, visitors and the community to pay for improving the environmental quality of the area. In the fall of 2000 a survey of Clear Lake visitors and residents was undertaken to collect information on the willingness of these groups to pay for improvements in water quality at Clear Lake. The survey was developed in an iterative process working with residents and community leaders in the city of Clear Lake and the surrounding region. Researchers from Iowa State visited with community leaders on site to do focus group work and to better understand the value that people place on the lake. This information is being used by community leaders and state government officials in developing plans for improving water quality in the lake.

- The potential for greenhouse gases to raise the ambient atmospheric temperature and lead to global warming has been of concern in the past two decades. One alternative to reduction in the use of fossil fuels which leads to higher levels of CO_2 in the atmosphere is to increase the level of carbon sequestration in agricultural soils. Such sequestration of carbon not only improves the overall environment but also is a potential revenue source for farmers. Utilizing conservation practices, mainly conservation tillage practices, farmers can help store substantial amounts of organic carbon in agricultural soils, thereby reducing the carbon dioxide level in the atmosphere and helping reduce global warming. The state of Iowa has a great potential in providing such a service, due to the rich organic matters in its soils. In the research portion of the project, the financial incentives necessary for Iowa farmers to adopt conservation tillage were determined. These estimates also indirectly provide the marginal costs of carbon sequestration. Work on the development of meaningful markets for carbon sequestration is beginning in conjunction with a number of within state clientele groups.

Rural Development (Program 27)

- Funds have assisted in organizing and planning research projects on human development in agricultural settings (agricultural teachers, Extension professionals, and agri-business professionals) and focused on the role of education in this development. Our planning and delivery of outreach educational programs for our clientele is contingent on the results of this research. The research program is directly integrated into the delivery of educational programs and has a direct impact on the use of the technical subject matter. These projects are a study of the processes of education and their role in the use of technical agriculture skills and knowledge.

- The North Central Regional Center for Rural Development (NCRCRD), located at Iowa State University, is one of four regional centers coordinating rural development research and education throughout the United States. The mission of the NCRCRD is to initiate and facilitate rural development research and education programs to improve the social and economic well-being of rural people in the region. The NCRCRD also provides leadership in rural development regionally and nationally by identifying, developing and supporting programs on the vanguard of emerging issues.

- Based on interaction with clientele groups, particularly the Iowa AgState Group, which is composed of representatives of commodity organizations, the Farm Bureau, and state government, community concern over slow or non-existent economic growth and development in rural areas of Iowa became apparent. To address this serious concern, a research was undertaken to analyze rural non-farm employment growth during 1969-1996 in the seven-state Heartland Region. The study identified factors that help to explain sectoral employment growth. In contrast to other studies the emphasis was on rural as compared to urban growth and development. Results of this project have been shared with state (Iowa AgState), national (2001 American Agricultural Economics Association Meeting, the 2000 Canadian Agricultural Economics Association Meeting), and international (Hungary, China) audiences. Project results were used to develop a white paper, "Impacts and Implications of Iowa Labor Policy for Growth of the Iowa Agricultural Sector and Rural Areas," prepared for the Iowa AgState Group in March 2001. A specific issue that was considered for the Iowa AgState Group was the impact of rural diversity on employment growth, but the results proved ambiguous. The results were also used by a group of Iowans reconsidering the impacts Iowa Code 9H on future opportunities to add value and identity preservation in the Iowa pork industry.

- Research identifies potential for agricultural diversification, new markets, and resource protection in rural areas; economic strategies employed by women in a globalizing economy; and needs for technical assistance and education by women starting food-related micro-enterprises. Results were disseminated in November at a three-state conference for women in sustainable agriculture, co-organized by the investigator.

Fiber Related Products (Program 28)

- Based on research results, sun protection information was added to the NC-170 website http:// txnc17.human.cornell.edu and to the ISU website http://www.iastate.edu/~tc-ext. A Guard Your Hands with Gloves exhibit and card-stock flyer showing the EPA Chemical Resistance Category Chart and was prepared in Iowa for statewide use. Three presentations on sun project research at an international meeting in Seoul, Korea reached an international audience. Presentations for educators at the Extension workshop of the International Textiles and Apparel Association and at the American Association of Family & Consumer Sciences Annual meeting concerning use of clothing for sun protection extended findings to other professionals.

Value Added Agriculture (Program 29)

- The Center for Crops Utilization Research seeds research programs that develop products and processes that add value to corn and soybeans. Center staff assist ISU scientists, emerging and established private companies, grain producers and in developing new technologies, as well as in helping ISU scientists find companies who are interested in commercializing new technologies developed at ISU.

    - New research on soy oil polymer plastics, negotiations are underway with a major corn wet-miller to commercialize this technology. Formulation changes have resulted in improvements in the performance properties of a soy-protein-based adhesive for use in

medium density fiberboard. This team also has begun working with a Wisconsin company on the use of the resin in veneer-product production systems. A biodegradable plastic road-marker product is has moved into field trials with the Iowa DOT. A biomass conversion, pilot-scale processor facility, in cooperation with the Iowa Energy Center, and their BECON facility, has been constructed. This demonstration project focuses on quickly refining and catalyzing soy and waste animal oils for bio-diesel fuel. A minimum-water degumming process underwent a plant trial at Iowa Soy Specialties, Vinton, Iowa. This is a new process for efficiently using water for degumming soy oils, with high commercial applicability.

- Several patents have been granted or licensed, these include: A patent filed on a corn and Trypsicum cross; patent licensed to Protein Technologies Corporation, regarding the processing GMO soy protein concentrate; a patent has been granted on the identification and isolation of a soy antioxidant compound with high lubricity; and a patent granted on a new soy-based adhesive resin wood product technologies.

- Other outreach activities have included: establishing an internet-based food-processing research resource database; redesign and upgrading of the Center's electronic newsletter, with an expanded mailing list; redesign and upgrading of the Center's website; marketing of instructional posters on soy and corn utilization; and a presence at several workshops and trade shows. Funded by the Iowa Corn Promotion Board, two major reports: *Identifying Valuable Corn Quality Traits for Livestock Feed* and *Identifying Valuable Corn Quality Traits for Starch Production*, were published in Cereal Foods World by the American Association of Cereal Chemists, Inc. The Iowa Grain Quality Initiative sponsored a meeting attended by 220 growers and processors developing specialty crop systems for specific markets. Iowa Grain Quality Initiative personnel visited Washington, D.C., to participate in the EPA advisory panel on the Cry9C alergenic protein present in the Starlink GMO-corn variety. In the past year, tours of CCUR have been conducted for several hundred regional, national, and international visitors.

- The CCUR Industry Incubator program has several resident companies. These include Proliant, Ames, Iowa; Ajinomoto, Ottumwa, Iowa; and Kemin Industries, Des Moines, Iowa. Proliant, Ames, Iowa; and Exseed Genetics, LLC, Ames, Iowa, are now headquartered in the ISU research Park, but continue to conduct research in the CCUR laboratories and pilot plants.

- The functionality of soy protein from different seed varieties (both value-enhance and genetically modified) manufactured using both traditional and nontraditional processing methods was evaluated. Food and non-food value-added products using the protein were developed. In the non-food area, these investigations have led to the development of soy-protein-based adhesive technology that has been patented and is currently being commercialized. In the food area, the functionality of low-fat soy-protein-flour manufactured using extruder-expeller technology and the applications of the flour in a cake doughnut formulation and as a textured soy protein replacement for ground beef in hamburger were determined.

- A natural and low-cost refining method for mechanically pressed soybean oil was developed. This technique can be adopted by local processors to produce value-added and gourmet soybean oils.

- Hydrogenated soybean oil was proven to be a suitable alternative to petroleum paraffin in decorative and aroma-therapy candle applications. The research demonstrated that the soy wax candles are cleaner burning and that the physical properties of soy wax can easily be modified by composition modification. This allows further entry into various niche markets for a participating Iowa company.

- Continued development of biodegradable plastics from soy protein, having good performance characteristics and a competitive price, progressed on to blends incorporating poultry feather waste and synthetic biodegradable polymers. Poultry feather waste was investigated as a way to enhance the water resistance of biodegradable plastics.

- Microbial contamination of locally produced apples and apple cider is being surveyed to reveal baseline data on the number and types of organisms present in the products, and dictates what processing conditions are needed to increase the safety of these products.

Activities:
Poultry Production Systems

Honwei Xin (faculty member in Ag and Biosystems Engineering, partial salary paid from funds set aside for integrated research and extension work):

- Working with Iowa egg industry, Dr. Xin investigated and demonstrated a cost-effective heat stress relief method of direct surface evaporative cooling which is being increasingly adopted by the industry. The new cooling technique has the potential to save Iowa egg industry millions of dollars by reducing mortality and sustaining productivity during adverse summer weather conditions.

- Dr. Xin is a co-leader of a multi-state, multi-disciplinary team consisting of academic faculty, commodity stakeholders, and government agencies that aims to investigate quantification and reduction of gaseous emissions from poultry production facilities. The project is expected to yield the much needed, science-based data on ammonia emission factors and emission reduction techniques for U.S. poultry production conditions. The data will contribute to the establishment and implementation of regulatory guidelines for confined animal feeding operations. Furthermore, dissemination of the project findings will help poultry producers sustain their production competitiveness by adopting cost-effective techniques to reduce the adverse impacts of emissions on the environment, animals and workers.

- Dr. Xin has been actively associated with the state and regional poultry commodity groups in addressing the emerging issues of the industry with respect to production efficiency, air and water quality, and animal welfare.

Grain Quality

- Various programs and technologies were created to support identity-preservation and/or traceable product distribution of U.S. grain. These technologies will be essential to resolve consumer concerns and to support marketing of high value grains: New calibration algorithms were developed to optimize performance of near-infrared analyzers when large amounts of calibration data were available. These algorithms were applied to the identification of genetically modified grains. They were also included in copyrighted internet networking software for measurement instruments. A web-based quality assurance system was developed for a large country elevator. The elevator will be applying for ISO 9000 certification in 2002. Information on impact and response to biotechnology concerns (StarLink, RoundUp Ready) was created and web distributed.

Seed Science

- Research results are shared with ~1800 academic and nonacademic seed professionals worldwide via the *Seed Science Newsletter*, a biannual publication. The newsletter is also available electronically. Other communication efforts to answer inquiries on seed quality with research-based information are supported.

- Research at the Seed Science Center has supported an active extension program directed at seed industry professionals. The Seed Science Center conducted a number of short courses to train industry employees how to best use sophisticated seed conditioning equipment to obtain the best results in cleaning, sorting, and grading seeds for commercial uses. An annual conference is held to report the findings of recent research in all phases of seed science including improved methods to improve germination, seed health, and viability.

Smith-Lever Act Funds:

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

Program 106. Commercial Greens Industry (Consumer Horticulture)

Jeff Iles: Research projects have led to improved selection of adapted species and varieties and to the development of efficient management techniques that sustain ornamental crops and reduce the need for fertilizers and pesticides. Integration between research and extension was achieved by rapidly disseminating this information to industry horticulturists at the Iowa Turfgrass Field Day, Shade Tree Short Course and the Iowa Turfgrass Conference.

Integrated activities for Dr. Iles, such as those described above, represented about 41% of his total time and accounted for a salary expense of $28,507 during FY2002.

Mark Gleason: The extension program is based on the research of Dr. Mark Gleason and others in the Integrated Pest Management arena. A key point of emphasis is helping growers improve the timing of fungicide sprays and maintain good disease control while significantly reducing the number of fungicide applications.

Extension programming occurs through oral presentations (short courses, radio and TV interviews, one-on-one client contacts) and written articles in publications, such as the Home

Horticulture newsletter, Fruit and Vegetable Growers newsletter, extension publications, magazine and newspaper articles and conference proceedings.

Integrated activities for Dr. Gleason, such as those described above, represented about 47% of his total time and accounted for a salary expense of $34,185 during FY2002.

Program 107. Iowa Beef Center

Dan Loy and Dan Morrical (faculty members in Animal Science on joint appointments between research and extension and participate in the Iowa Beef Center):

The Iowa Beef Research Report details comprehensive results on research in nutrition, breeding, economics, health and other areas. During FY2001, these reports were made available to producers and others through extension's publication system, and they were also sent to other universities. Recent research reports were also posted on the Web sites of Iowa State's Iowa Beef Center. The Iowa Beef Center web page was redesigned which led to an increase is use by clients.

Field days were carried out in the summer and fall at Iowa State's outlying research and demonstration farms to review the current status of beef, sheep and swine studies. These farms also published annual reports that were distributed to visitors at field days and other times. The Armstrong Farm beef feedlot committee continued to work with faculty to develop research and extension programs relevant to the local needs in Southwest Iowa.

The year round forage planner is a cooperative effort of research and extension through the Iowa Beef Center and the departments of animal science and agronomy. This planning tool for extending the grazing season is based almost exclusively from research funded by the Leopold Center for Sustainable Agriculture. This decision tool is being filed tested and will be a valuable asset to Iowa cow calf producers as they deal with pasture compliance issues within the new farm bill.

Research on ethanol co-products in cattle finishing rations was completed in cooperation with several other land grant universities. The research results were summarized in extension fact sheets and used at grower meetings.

Integrated activities for Dr. Loy, such as those described above, represented about 62% of his total time and accounted for a salary expense of $49,571 during FY2001. Integrated activities for Dr. Morrical, such as those described above, represented about 62% of his total time and accounted for a salary expense of $46,458 during FY2001.

Program 108. Iowa Pork Industry Center

Tom Baas: Results of recent meat quality research conducted by National Pork Producers Council in conjunction with ISU have been delivered to producers throughout Iowa and at four national seminars. This includes results from the NPPC Quality Lean Growth Modeling Project, National Barrow Show Progeny Test, and NPPC Maternal Line Program. Results have been presented at several regional seminars around the state of Iowa and in written form. Power Point presentations are available for Field Livestock Specialists to use at local meetings.

Interaction with producers and other stakeholders has underscored the need to emphasize research on meat quality and its use in implementing value-added marketing programs. Baas has directed his efforts toward helping producers understand the genetics of meat quality and how quality traits are measured and evaluated. This is an essential part of any value-added program. In addition, he has worked with producers to implement the new industry-wide Production and Financial Standards, which will provide them, access to the national database. These data can be used for benchmarking with producers throughout Iowa and the U.S.

Integrated activities for Dr. Baas, such as those described above, represented about 55% of his total time and accounted for a salary expense of $40,310 during FY2002.

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

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

Dale Farnham: Narrow-row corn research was conducted to help producers and agribusinesses better understand the possible benefits and/or limitations to narrow-row corn production. Results were shared with producers and agribusinesses through oral presentations (crop clinics, short courses, radio and TV interviews, one-on-one client contacts) and written articles in publications, such as the Integrated Crop Management newsletter, extension publications, magazine and newspaper articles and conference proceedings.

A site-specific crop management project is a large multidisciplinary study aimed at answering some of the practical questions surrounding the new precision ag technologies and field variability. This project was borne out of producer interests and has been funded by soybean check-off dollars through the Iowa Soybean Promotion Board. Oral presentations and written articles have been used to distribute the results.

The research conducted enhances and supports my Extension education activities. This research is very practical and applied. Many of the topics are generated through discussions with clients/stakeholders. As new technologies emerge, new questions arise regarding application and implementation of these new technologies.

Integrated activities for Dr. Farnham, such as those described above, represented about 32% of his total time and accounted for a salary expense of $21,854 during FY2002.

Marlin Rice: The field crop entomology extension program is based primarily on the research efforts of Marlin Rice, Jon Tollefson, Larry Pedigo and John Obrycki. In addition, regional research and ARS research results are integrated into the program as appropriate. Research efforts are targeted at developing pest management programs for European Corn Borer, Corn Rootworm, Bean Leaf Beetle and other insect pests of corn, soybeans and alfalfa.

Extension programming is delivered via the Integrated Crop Management newsletter (over 3,000 paid subscribers), extension publications, the web, radio and TV interviews, and newspaper and magazine articles, producer crop clinics, field days, conferences and in-depth workshops. In addition, one-on-one assistance is provided to producers and local input supply dealers via the telephone or site visits. Education delivery also occurs through the 14 Extension Field Crop

Specialists and 100 county extension education directors. The research program is responsive to the input from all stakeholders and extension field staff.

Integrated activities for Dr. Rice, such as those described above, represented about 54% of his total time and accounted for a salary expense of $41,245 during FY2002.

Gary Munkvold: Research programs are aimed at developing a better understanding of the biology of plant pathogens in order to devise effective and sustainable disease management strategies. One key research project is Gray Leafspot management in corn and the effectiveness of Bt corn in reducing corn stalk and ear rots and mycotoxin contamination of grain.

Extension programming is delivered via the Integrated Crop Management newsletter (over 3,000 paid subscribers), extension publications, the web, radio and TV interviews, and newspaper and magazine articles, producer crop clinics, field days, conferences and in-depth workshops. In addition, one-on-one assistance is provided to producers and local input supply dealers via the telephone or site visits. Education delivery also occurs through the 14 Extension Field Crop Specialists and 100 county extension education directors. The research program is responsive to the input from all stakeholders and extension field staff.

Integrated activities for Dr. Munkvold, such as those described above, represented about 51% of his total time and accounted for a salary expense of $34,078 during FY2002.

Robert Hartzler: The primary delivery of research results for Dr. Hartzler during FY2001 was through the extension weed science webpage. This provided a direct conduit to deliver field research results to producers and agribusinesses. The webpage also provided updates on research in progress that pertained to specific problems during the growing season. The webpage was also used to deliver research results from beyond Iowa State. Many of the articles were reviews of papers from journals such as Weed Science or Weed Technology. This proved to be a useful link to transmit research results from a larger body of researchers back to producers who can utilize the information in actual production.

A recent research focus has been the determination of weed emergence sequences for common agronomic weeds. This project has led to the development of several extension tools that have aided the development of integrated weed management programs. This project also led to a regional research project investigating the genetic variation of
giant ragweed populations from states in the cornbelt.

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

Integrated activities for Dr. Hartzler, such as those described above, represented about 41% of his total time and accounted for a salary expense of $30,238 during FY2002.

Stephen Barnhart (faculty member in Agronomy on joint appointment between research and extension): Dr. Barnhart is a Forage Production and Management Specialist. Forages are integral to crop, livestock and conservation enterprises in Iowa. During FY 2001 he contributed forage species and management recommendations and experimental treatment suggestions in several on-going, cooperative research projects. He also served as Principal Investigator on applied research projects. Input for many of the treatments and research problems came from interaction with extension clientele. Extension clientele were included in research planning discussions, cooperated with on-farm research and demonstration activity, and served an important role in advising during the development of educational materials and university outreach programs.

Integrated activities for Dr. Barnhart, such as those described above, represented about 60% of his total time and accounted for a salary expense of $44,369 during FY2002.

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

Institution: Iowa State University
State: Iowa

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Food Crops	26,852	23,793			
Plant Germplasm	627	1,534			
Crop Production and Management	20,009	28,538			
Green Industry	4,000	1,640			
Improved Grazing Systems	43,868	56,223			
Animal Physiology	6,589	9,385			
Animal Genetics	92,036	88,147			
Alternative Livestock	6,400	1,099			
International Economic Competitiveness	31,864	16,474			
Agricultural Risk Management	33,477	16,474			
Agricultural Information Technology	3,770	71			
Food Safety	3,830	5,781			
Improving Human Foods	17,575	22,526			

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Soil Resources Management	21,518	28,233			
Integrated Pest Management	30,635	40,655			
Animal Waste Management	4,339	20,599			
Water Resources Management	6,650	5,229			
Environmental Quality	6,750	9,182			
Rural Development	47,444	36,247			
Fiber-Related Products (Textiles and Apparel)	16,266	15,046			
Value Added Agriculture	7,330	9,441			
Quality of Life	587	0			
Grain Quality: Marketing & Delivery	25,760	25,760			
Poultry Production Systems	7,750	10,955			
Seed Science	22,555	27,491			
Total	489,481	500,523			

Director **Date**

Form CSREES-REPT (2/00)

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

Institution: Iowa State University
State: Iowa

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Beef Center	49,000	96,029			
IPM/ICM	40,000	171,784			
Pork Center		40,310			
Consumer Horticulture		62,692			
Total	89,000	370,815			

Director **Date**

Form CSREES-REPT (2/00)