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## **A. Programs**

Note on Key Themes reported by Goal: Illinois has chosen to report on some key themes that were not specifically named in the state's original Plan of Work. This is done because of the interest that the federal partner has expressed by listing all of the themes found in the respective plans of the states and territories.

### **Illinois Agriculture at the Crossroad**

Illinois agriculture and the College of ACES (Agricultural, Environmental and Consumer Sciences) both stand at a crossroad, and deciding which direction to go is complicated by a dilemma. The conflict is this: agricultural technology benefits those who compete with Illinois farmers in commodity agriculture. At the same time, Illinois agricultural technology, marketed globally, creates real economic growth in the state.

How can we resolve this dilemma in a way that works best for Illinois' agricultural producers and all its citizens? We can do so by pursuing two goals. First, the College of ACES can focus on developing value-added and knowledge-based opportunities for Illinois farmers. Second, we can create economic development by helping Illinois industries market commodity technology globally.

Since the creation of the University of Illinois in 1867, the people in this institution—particularly those in what has become the College of ACES—have successfully met numerous challenges. Diseases that once ravaged Illinois livestock and crops are barely a memory. Yields reach levels unimagined even 50 years ago, and livestock producers use technology and methods their predecessors would likely find astounding.

As difficult as the road ahead may appear, it is filled with opportunities. There is no doubt that if we apply the talent, dedication and creativity inherent in our state's producers and educators, the rough spots will be made smooth and the destination reached.

Today, more than a century after its founding, the College of ACES identifies opportunities in three priority areas: food, fiber and fuel agriculture; urban and amenity agriculture; and individuals, families and communities. The first might be termed "traditional" agriculture, the production of staple crops and meat products. The second represents the rapidly expanding areas of home and professional horticulture and environmental science. The third reaches beyond the old borders of consumer and home economics to encompass quality of life, community and economic development, and family relationships.

From: *Illinois Agriculture at the Crossroad*, By Robert A. Easter, Dean, College of Agricultural, Consumer and Environmental Sciences, University of Illinois (See:<http://www.aces.uiuc.edu/farmltabweb/1.html>)

## Value Added – Value Project

The Value Project seeks to improve farm income and rural communities in Illinois through the expansion of specialty farm products and value-added agriculture. The Project's approach is unique within the research community. First, it is *interdisciplinary*, involving scientists from agricultural economics, agricultural engineering, agricultural and Extension education, animal science, crop science, economics, geography, and rural sociology. Second, the project is *inter-institutional*, including Western Illinois University (WIU), the University of Illinois at Urbana-Champaign (UIUC) including University of Illinois (UI) Extension. Even more unique, the Project is problem-oriented, systems-based, and utilizes multiple research methodologies (surveys, case studies, on-farm trials, and participant observation).

Another important feature of the Value Project is its *seamless* integration of Research and Extension activities, with Extension team members playing an active role in both data collection and the dissemination of research findings. The Project utilizes a combination of conferences, field days, Extension meetings, publications, mass media (radio, TV, and newspaper), the Internet, and locally organized leadership teams to disseminate research findings. Finally, the Value Project is *farmer-centered* and *demand-driven*. A diverse statewide Project Advisory Committee provides overall guidance, while local leadership teams provide direction and input within each target area of the project.

The **problem** addressed by the Value Project is low farm income and its impact on rural communities. To address this problem, the team conducts *just-in-time* Research and Extension activities to assist Illinois farmers in taking advantage of new and emerging specialty crop and livestock opportunities, as well as to assist them in organizing into groups, such as *producer alliances*, to improve their prospects for capturing new export and value-added processing opportunities.

Project impacts are both direct and indirect. Although the Value Project is highly applied, it is producing significant research outputs that will impact the scientific and agricultural communities. Stakeholder groups within the state are most concerned with the *direct economic impacts* of specialty farm products and value-added processing on farmers' incomes. Another impact derives from the *social capital* associated with getting farmers organized into effective groups, such as producer alliances or new generation cooperatives. Finally, there are professional and programmatic impacts on the participating staff and institutions. C-FAR is a major financial supporter of the Value Project. In order to expand these impacts beyond C-FAR resources, WIU, UIUC, and UI Extension are making substantial in-kind financial contributions to the Value Project. The Value Project WWW site is at:  
<http://web.aces.uiuc.edu/value/progress/progress.htm>



## **Illinois Farmers Embrace Sideline Businesses**

Among the activities in the Value Project, has been a survey of Illinois producers that found one in six producers are supplementing their farm income with sideline businesses which use their farm as the base for a business. These sidelines businesses range from snowplowing to home repairs to dealing in antiques.

See: <http://www.aces.uiuc.edu/farmltabweb/3.html>

## **Illinois-Missouri Agricultural Biotechnology Alliance (IMBA)**

The mission of the Illinois-Missouri Agricultural Biotechnology Alliance (IMBA) is to increase the volume of profitable business in the U.S. food and agriculture sector by improving the diversity, quality, safety, affordability, and convenience of products and services marketed by the sector. The general objectives of IMBA are:

1. To develop new and improved uses for corn and soybeans and products that can be manufactured profitably from them.
2. To increase the value of corn and soybeans as a raw material for manufacturing various products, including food, feed, fiber, fuel, or chemical feedstocks.
3. To lower the unit cost of producing, processing, distributing, retailing, and utilizing corn, soybeans, and products manufactured from them.
4. To maximize positive and minimize negative effects of the corn and soybean industries on the environment.
5. To conserve non-renewable resources consumed in the corn and soybean industries.

The alliance is funded by a Congressional Special Grant administered by the United States Department of Agriculture (USDA). To date, a total of 34 projects, many with multi-year time lines, have been selected for funding. Among other products the Alliance supports AgBioForum, a unique, web-based journal designed to reach and educate a broad audience on issues of central importance to agricultural biotechnology. It supports research to enhance oils in soybean and corn, to create soybean lines resistant to sudden death syndrome and to elevate levels of functional food substances in corn.

For more information see: <http://imba.missouri.edu/>

## **Illinois' Green Industry - Surveying the Illinois Green Industry to Assess its Value, Attributes and Needs**

In 1999, the combined value of the Illinois green industry was \$3.95 billion, total workforce numbered about 160,000, and the industry's payroll totaled just over \$1.74 billion. Forty-two percent of all taxes paid by the industry, or about \$250 million, were to state and local governments. The industry's economic employment and income multipliers were 1.52 and 2.70, respectively. The fair market value of green industry assets was estimated at just over \$8 billion as of December 31, 1999.

Also in 1999, Illinois end users maintained about 1.54 million acres of turfgrass. Twenty-two percent of product and 41 percent of service sector firms were unable to fill all of their open positions in 1999. Biological pest control was the most frequently reported landscape and lawn care practice where current information was considered inadequate by service sector businesses. A shortage of skilled labor was cited as a critical problem, as well as the need for greater communication between the industry and Extension specialists and educators. Another need voiced by many respondents was for help in developing improved marketing plans. These findings highlight the economic importance of the green industry to Illinois' economy and living environment and the subsequent need to enhance support for appropriate teaching, research, and out-reach programs.

The green industry in Illinois is widespread, ranging from nurseries and garden centers to parks, playing fields, golf courses, and residential properties. Its 9,000-plus businesses play a critical role in Illinois' economy and living environment by providing a vast array of landscape products and services.

Product sales are as follows: \$889,486,000 nurseries and garden centers, \$5,722,000 Christmas trees, \$38,706,000 sod and grass with a wholesale total of \$18,264,000. The retail sales include \$228,248,000 from nurseries and garden centers, \$433,127,000 from florists and \$22,478,000 from other retail sales categories. The service sector data shows \$64,741,000 in landscape design only, \$1,458,346,000 in landscape and lawn care, \$91,536,000 in tree care and \$29,132,000 in interiorscape service receipts.

With a direct economic value of \$3.95 billion, the green industry touches the lives of nearly every Illinois citizen. Consumers were found to maintain over 1.54 million acres of turfgrass in association with trees, shrubs, and flowers. The industry's impact is also felt through its payment of \$250 million in state and local taxes and by its purchases of allied inputs, equipment, and facilities. The fair market value of the green industry's physical assets was found to exceed \$8 billion.

In addition, the combined green industry workforce in Illinois totaled nearly 160,000 people with an annual payroll of more than \$1.74 billion.

Green industry businesses identified the factors that contribute most to their success. Without question, the factor most affecting business success and/or expansion was the ability to hire skilled labor, pointing to the need for a larger pool of skilled labor. Other identified needs included greater communication between the industry and Extension specialists and educators, better marketing plans, and more research for biological control mechanisms and other landscape management practices.

### **College of ACES Establishes Organic Task Force**

During the past decades, the University of Illinois has been conducting limited research and education on organic agriculture. These efforts have generally been initiated by individual researchers or Extension personnel as part of larger programs and have lacked coordination. In the fall of 2001, twenty faculty and staff came together from the College of ACES, the Illinois Natural History Survey, the Agroecology and Sustainable Agriculture Program and University of Illinois Extension's Crops, Horticulture, Integrated Pest Management, and Ag Entrepreneur Development Teams to discuss the role of the University in organic education and research.

As a result of this meeting, an Organic Task Force was established. The task force consisted of both campus-based faculty and Extension field staff. Its objectives were to assess the needs of stakeholders; identify current activities and interest among university of Illinois faculty and staff; communicate the results of the assessments; and develop an ongoing communication process to ensure stakeholders provide input and learn about outcomes.

Stakeholder input on their needs is continuing but key informant interviews have been conducted along with two listening sessions held in DeKalb and Lincoln. Evident from both interviews and listening sessions was the consensus that University of Illinois has a vital role to play in organic research and education. A separate article reports the results of the listening sessions.

<http://www.aces.uiuc.edu/asap/organics/index.html>

### **CSREES GOAL 1: An agricultural production system that is highly competitive in the global economy**

#### **Indications of the Scope of Research and Extension Programs under Goal 1 - See Appendix A.**

As in previous years, about two-thirds of the College's research portfolio is invested in Goal 1 projects. Roughly 20 percent of Extension's efforts have been directed toward Goal 1 educational activities. Extension activities under Goal 1 included almost 300,000 face-to-face teaching contacts by Extension-paid employees.

***Key Theme – Adding Value to New and Old Agricultural Products***

**Soybean Gene Expression and Regulation**

- a. We examined the processing and subcellular localization of a chimeric gene consisting of the bovine milk protein, beta-casein, under the control of a soybean seed lectin promoter and its 32 amino acid signal sequence in the seeds of transgenic soybean plants. The beta-casein expressed in developing soybean seeds is a doublet with apparent molecular weight slightly smaller than the bovine beta-casein and expression of the protein was highest in immature cotyledons. The casein proteins were purified from the immature soybean seeds by immunoaffinity chromatography and were analyzed by two-dimensional gel electrophoresis, blotting, and amino terminal sequencing. The N-terminal sequences of both of the doublet soybean casein polypeptides were identical to the N-terminal sequence of the bovine beta-casein, which indicated that the 32 amino acid lectin signal sequence was cleaved precisely from the chimeric protein in developing soybean seeds. Immunolocalization experiments showed that the casein protein was found in the protein storage vacuoles (PSV) in developing and mature soybean seeds.
- b. Impact - We describe the processing and subcellular localization of a foreign protein expressed in transgenic soybean seed. The precise removal of the 32 amino acid lectin amino terminal sequence from the chimeric lectin-casein fusion indicates that the lectin expression cassette can be used for production of pharmaceutical or other recombinant proteins of added value in the developing soybean seed.
- c. Source Of Funding - Hatch, Other Federal Funds, State
- d. Scope Of Impact - National

***Key Theme – Animal Genomics***

**Production of 25,000 Cattle EST's and Development of a High Resolution Radiation Hybrid Map**

- a. In collaboration with Jim Womack (TX), approximately 1,000 additional genes have been added to the 5,000 rad cattle radiation hybrid (RH) map. Using this data, the creation of the second RH generation whole-genome map consisting of more than 2,000 genes is currently in progress. The markers were selected with COMPASS software using cattle ESTs submitted to GenBank from all sources. The markers were selected specifically to close gaps in the RH and comparative maps. The process has proved to be very efficient as demonstrated by preliminary analysis of several chromosomes.

We expect to publish the second generation map by the end of 2002 This will complete the work specified under USDA/NRI resource grant AG99-35205-8534. Recently, a new web version of

COMPASS (COMPASS II) was developed and made available free of charge to the research community (Natarajan et al., 2002). The new web tool predicts comparative (human) bin in addition to chromosome location. This tool is extremely powerful for comparative positional candidate gene identification and for selecting genes to refine the chromosomal breakpoints in comparative maps. See <http://keck1.biotec.uiuc.edu:8887/examples/servlets/mainpage>. The newest version of COMPASS (COMPASS III) will utilize human genome sequence information to make precise predictions of gene locations on the cattle genome. The tool will be implemented in the new Livestock Genome Sequencing Initiative for scaffolding cattle and pig BAC-ends onto cattle and pig chromosomes, respectively.

- b. Impact - The RH map will provide a basic tool for cattle genomics and the comparative map will facilitate identification of candidate genes for economically important traits. The comparative mapping database under construction will allow large scale mapping of genes in other mammalian species in silico. Web COMPASS II is an extremely valuable tool for comparative mapping and identification of candidate genes for production and health traits.
- c. Source of Funding - NRI Competitive Grant, State
- d. Scope of Impact - National

### **High-Resolution Physical Mapping of the Porcine Genome by BAC Fingerprinting**

- a. The identification specific genes that influence economically important genes will require the construction of detailed physical maps for positional cloning. An effort to construct a high-resolution physical map using large-insert BAC clones was initiated. Currently, ~7,000 clones of the RPCI-44 BAC library have been fingerprinted and ~2,880 additional clones are being completed each week. An initial assembly of the fingerprint information will be conducted at 1X genome coverage (~19,000 clones), estimated March 15, 2002. Additional assemblies will be conducted in 1X genome equivalent segments or an estimated every 7 weeks. Approximately 5X genome coverage should be completed by late 2002. This effort is also being coordinated with complementary projects being initiated by The Wellcome Trust Sanger Institute (Cambridge, United Kingdom) and INRA (Dr. P. Chardon, Jouey-en-Josas, France). The combined effort is aimed at the construction of a 15X coverage physical map of the porcine genome by January 2003, in preparation for a draft genome sequencing effort within the next 5 years.
- b. Impact - The physical map constructed upon completion of this project will provide the swine genomics community with a valuable resource for fine-mapping of genes influencing

economically important traits. Furthermore, this detailed physical map will serve as the basis for sequencing the swine genome.

- c. Source of Funding - NRI Competitive Grant
- d. Scope of Impact - National

***Key Theme – Animal Health***

**Hormonal Control of Immunoglobulin Uptake by Porcine Mammary Epithelial Tissue**

- a. The long-term goal is to understand the factors which control transepithelial immunoglobulin transport by the sow's mammary gland. The specific objective of this period was to develop polymerase chain reaction analyses for use in determining the effects of the lactogenesis on expression of genes associated with protein secretory mechanisms in porcine mammary tissue, including immunoglobulin transport systems. Preliminary analyses of gene expression indicate that a differential expression of mammary synthesized milk proteins occurs in the sow's mammary gland, with beta-casein and lactoferrin expression increasing a few days prepartum, while alpha-lactalbumin expression is increased nearer to the time of parturition. Expression of calpactin I (also called annexin II), which is involved in many secretory mechanisms of the cell, did not change substantially during the peripartum period in sow mammary tissue. In contrast, expression of clathrin, which is associated with receptor-mediated cellular uptake and transcellular protein transport, is lower during the prepartum period and then increased on the day of parturition and during early lactation. This latter observation is consistent with increased immunoglobulin transport occurring around the time of parturition.
- b. Impact - Insufficient transfer of passive immunity from mother to neonate via colostrum is a significant concern, particularly in species such as swine. Health of the neonate piglet is central to achieving optimal sow productivity, and successful transfer of passive immunity from the sow to the neonate is central to maintaining health of the piglet. Results from this study may lead to approaches for increasing concentrations of immunoglobulin in the sow's colostrum.
- c. Source of Funding - Animal Health and Disease, State
- d. Scope of Impact - National

**Biophysical Models for Poultry Production Systems**

- a. Deflector walls may be installed downstream of ventilation fans to reduce concentrations of odor, but little information is available on the effects of these deflector walls on fan performance. There was no significant reduction of fan performance if the wall was located at least 4x fan diameter downstream. Among the fans tested,

airflow was reduced 10 to 17% when the wall was located 2x or less fan diameter downstream. Fan ventilating efficiency was affected slightly more than airflow performance.

Another research project that involved dietary available phosphorus (AP) relationships during exposure to hot environmental temperatures demonstrated that diets deficient in AP had a much greater effect on production of laying hens than the heat stress conditions to which the hens were subjected. Spray applications of 24 and 48% standard liquid aluminum sulfate to the surface of laying hen manure reduced mass generation rate of ammonia. Manure pH and moisture were also influenced by the aluminum sulfate application. Manure mass and surface area influenced the linearity of ammonia gas released to the environment. The methods used to spray manure including the frequency-concentration relationship should be further investigated.

- b. Impact - Results from our ventilation design, nutrition-environment interactions, and manure-ammonia generation control research have direct application to poultry housing design and management. They also will influence power use, air emissions, and soil contaminant management that are associated with confinement housing of poultry.
- c. Source of Funding - Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project With IA, MD, MI, MN, NE, PA, TX

### **Economic Optimization of Wean-to-Finish Production and the Quality of Illinois Pork**

- a. Eight experiments have been carried out to establish the effects of facility design and animal management strategies for wean-to-finish production units on pig performance criteria (e.g., average daily gain, feed intake, gain:feed and variation in performance) and meat quality (e.g., color, water holding capacity and eating quality). As proposed, the strategy for completion of the project has involved both an on-farm research program and an economic analysis of the results using a computer simulation model. Work in the first year (2000 - 2001) has focused largely at the on-farm research program. Studies have been completed on three commercial pig units involving more than 10,000 pigs. In addition, early results have been reported to pig producers and industry consultants through a series of seminars in January 2001 and another series already being planned for 2002, hosted by University of Illinois Extension, Illinois Pork Producers Association, and the University of Illinois Department of Animal Sciences. Reports also have been published in both the scientific

literature and the popular press. Continuation of the research is underway. Two key areas have been highlighted for focusing research in the second year of the project: (1) management to reduce variation in piglet performance immediately post-weaning and (2) management for optimal pig removal and marketing.

- b. Impact - The results of this research are being used by pig producers, building and equipment manufacturers, and consultants when designing new facilities and when making modifications to existing structures. These results have implications for optimum facility management and use for both conventional grow-finish and wean-to-finish housing systems and are being applied within the industry.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

### **Physiologic Mechanisms Involved in Regulation of the Immune System**

- a. The first studies carried out on the mechanisms by which peripheral immune stimuli signal the brain to induce fever, activation of the hypothalamic-pituitary-adrenal axis and sickness behavior in animals emphasized the importance of fenestrated parts of the blood-brain barrier. These areas of the brain are known as circumventricular organs, and they allow blood-borne proinflammatory cytokines to regulate brain functions. The discovery in the mid-1990s that subdiaphragmatic sectioning of the vagus nerves attenuates the brain effects of systemic cytokines, together with the demonstration of an inducible brain cytokine compartment, shifted the attention from circumventricular organs to neural pathways in the transmission of the immune message to the brain. Since then, neuroanatomical studies have confirmed the existence of a fast route of communication from the immune system to the brain via the vagus nerves. This neural pathway is complemented by a humoral pathway that involves cytokines produced at the level of the circumventricular organs and the choroid plexus and at the origin of a second wave of cytokines produced in the brain parenchyma. Depending on their source, these locally produced cytokines can either activate neurons that project to specific brain areas or diffuse by volume transmission into the brain parenchyma to reach their targets. Activation of neurons by cytokines can be direct or indirect, via prostaglandins. The way the neural pathway of transmission interacts with the humoral pathway remains to be elucidated. However, one potential advance in this area has been made from studies devoted to learning whether an endogenous interleukin-1 receptor antagonist is expressed in the brain. This protein is the natural inhibitor of the biological effects of interleukin-1 during inflammation. Interleukin-1 receptor antagonist refers to three isoforms: one secreted and two intracellular forms (types I and II). We therefore investigated the expression of interleukin-1 receptor antagonist



isoforms in the rat brain in vivo in response to an i.p. injection of lipopolysaccharide.

The interleukin-1 receptor antagonist was studied at the messenger and protein levels by reverse transcription-polymerase chain reaction and western blot analysis, respectively. Interleukin-1 receptor antagonist messenger RNA was constitutively expressed in the brain and its expression increased in response to lipopolysaccharide. The three interleukin-1 receptor antagonist protein isoforms were up-regulated after lipopolysaccharide treatment in a time-dependent manner. Their relative expression differed according to the isoform and brain region studied. Double immunofluorescence staining revealed interleukin-1 receptor antagonist positive neurons and microglia in hippocampus 24 hours after lipopolysaccharide stimulation. These results demonstrate for the first time that brain cells are able to produce interleukin-1 receptor antagonist isoforms in response to a peripheral immune challenge with a predominance of the secreted over intracellular forms.

- b. Impact - These data establish that both a neural pathway involving the afferent vagus nerve and a humoral pathway that regulates cytokine synthesis in the brain controls clinical symptoms of sickness during disease. Regulation of the IL-1 receptor antagonist in the brain may be controlled by both systems.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

### **Control of Animal Parasites in Sustainable Agricultural Systems**

- a. Neospora caninum is a protozoal organism that is important to the beef and dairy industries, because it infects cattle and causes abortion, reduced milk production, and reduced rate of gain. Neosporosis is one of the most common causes of bovine abortion in the U.S. and around the world. Multistate Project funds for University of Illinois participation in W-102 (\$5,000 annually) are used to travel to the annual meeting with participants from other institutions around the U.S. to develop and share teaching and outreach materials for the use of members, and to initiate preliminary research trials of bovine neosporosis. Results of these seed projects have been used to successfully compete for institutional and USDA funds for larger projects to understand bovine neosporosis, how it is transmitted, and how to prevent it. Knowledge of bovine neosporosis and how to prevent it fits in with the core goals of the W-102 project.
- b. Impact - W-102 participation assists with dissemination of knowledge needed to control bovine neosporosis and assists in the development of new projects designed to understand this economically important disease of cattle.

- c. Source of Funding - Multistate Research Fund
- d. Scope of Impact - Regional Research Project With CA, GA, KS, LA, MN, MO, MS, MT, UT, TX, VA, WA

**Recombination of Swine Herpes in Wild Mus**

- a. Our laboratory has surveyed wildlife as a potential reservoir of pseudorabies virus. The environmental escape of virus into wildlife surrounding infected farms has been evidenced. Virus carried by wild animals that migrate between farms can potentially be transmitted and re-emerge into domestic swine. Not addressing the potential for wildlife as a reservoir of PrV can therefore be a problem in eradication of the virus from domestic pigs. Experimental infection of wild caught Mus will be used to help evaluate risks of recombination. Objectives: 1) Genotype virus from brains of vaccinated/challenged Mus to see if it is vaccine, challenge parental strain or a recombinant. 2) Assess virulence of recombinant compared to parental strains. 3) Determine if latent vaccine virus can be reactivated after challenge with a wildtype strain. 4) Apply PCR gene detection to wild, seropositive Mus to assess for the presence of complete or partial viral genomes.
- b. Impact - Virus carried by wild animals that migrate between farms can potentially be transmitted and re-emerge into domestic swine. Not addressing the potential for wildlife as a reservoir of PrV can therefore be a problem in eradication of the virus from domestic pigs.
- c. Source of Funding - Hatch
- d. Scope of Impact - National

***Key Theme – Animal Production Efficiency***

**The Creation and Implementation of the Illinois Heifer Development Program**

- a. The majority of beef enterprises are small- and medium-size enterprises and these enterprises are finding it increasingly difficult to compete in a global marketplace. To stay competitive, fundamental changes in beef enterprise management, particularly in the raising and merchandising of heifers, were needed.

To respond to the need, the Illinois Heifer Develop Program—a comprehensive, coordinated extension education program that utilizes total quality management procedures of raising replacement heifers—was implemented in Illinois to increase the quality of breeding stock and increase market opportunities for producers. The program taught beef producers how to raise value-added heifers that have greater marketing potential and greater potential as herd replacements. The program was implemented in five phases: weaning, pre-breeding, breeding, pregnancy

examination, and sale. The program's lead creator was Darrel J. Kesler, Extension Reproductive Biologist at the University of Illinois (217.333.2902; [djkesler@uiuc.edu](mailto:djkesler@uiuc.edu)).

Traditional and unique education methods including a field study education program were used and diverse audiences were targeted that included both beef producers and veterinarians. In addition, funds for research and education were obtained (from the Illinois C-FAR program and University of Illinois Extension) to conduct a research study throughout the state on heifers that were enrolled in the program. A total of 35 producers and nearly 1,500 heifers were included in the study. Results of the study demonstrated that heifers may be synchronized and bred at a predetermined time with pregnancy rates equal to or higher than if bred based upon estrous detection. This application significantly reduces time and labor; the major obstacle to the utilization of estrus synchronization, artificial insemination, and bulls with acceptable EPDs (expected progeny differences). Heifer sales to profit from excess heifers were held in conjunction with the program. Although the sale is an attractive component of the program, the herd replacements significantly improve the quality of the herd, particularly after the program has been used for several years.

- b. Impact - Although the Illinois Heifer Development Program has only been in place for three years, it has been valuable for the diverse target audiences' business and quality of life as reported in a survey conducted throughout Illinois.
  - Before implementing the program, 25% of beef producers synchronized estrus and used bulls with acceptable EPDs vs. 93% after the program was implemented.
  - The program renewed producers' interest in the beef industry and improve their lives through increased enterprise profitability.
  - Producers were asked "Has the Illinois Heifer Development Program been valuable for your business and quality of life?" and their response was 4.7 using a scale where 5 is definitely.
  - Consumers are affected as well because as heifer quality increases, quality of beef produced for consumption subsequently increases. Producers and consumer are both rewarded through animal identification and quality assurance. Although this program impacted producers and consumers in Illinois, it can be implemented throughout the U.S.
- c. Source of Funds - Smith-Lever, State
- d. Scope of Impact - Initially Illinois, Multistate Possible.

## **Roles of TNF Alpha PPAR Gamma in Enhanced Loss of Body Fat During Periparturient Diseases in Dairy Cows**

- a. DNA probes for bovine TNF-alpha and bovine peroxisome proliferator-activated receptor (PPAR)-gamma were constructed using published sequence information for bovine TNF-alpha and porcine, mouse, and human PPAR-gamma. The cDNAs were sequenced to verify the constructs. A ribonuclease protection assay for each of these sequences is being developed. These assays will be used to measure mRNA transcript abundance in total RNA isolated from adipose tissue biopsies. Adipose tissue was obtained from five cows that were overfed and in good body condition and five cows that were underfed and in poor body condition. Biopsies of subcutaneous adipose tissue were obtained at 30 days before expected calving and at 1 day after calving. Data on mRNA abundance will be correlated to data for energy balance, body condition, and plasma NEFA concentrations.
- b. Impact - Identification of key control points that influence the degree of body fat mobilization in dairy cows could lead to specific strategies to improve the success of the transition period and decrease the incidence of metabolic disorders around the time of calving. Such disorders are an enormous drain on profitability and a serious detriment to animal well-being.
- c. Source of Funding - Animal Health and Disease, State
- d. Scope of Impact - National

## **Regulation of Nutrient Use in Food Producing Animals**

- a. Previously we have shown that photoperiod manipulation, specifically long days, increases milk production in lactating cattle. Relative to short day photoperiod (SDPP), long day photoperiod (LDPP; 16 hours light and 8 hours dark) increases serum concentrations of prolactin (PRL) and decreases the duration of elevated melatonin (Mel) secretion, though neither of these hormones appears to be directly responsible for the effect on milk yield. Photoperiod is also without effect on circulating growth hormone (GH) in cattle. Despite a lack of effect on GH, we have determined that the galactopoietic effect of LDPP is associated with an increase in circulating insulin-like growth factor-I (IGF-I). In addition, LDPP increases IGF-I in growing steers. Finally, feeding melatonin to mimic a short day photoperiod pattern of circulating melatonin suppresses the long day induced increment in IGF-I. Circulating concentrations of any hormone vary as a function of secretion and clearance. Secretion may be influenced by alteration in a stimulatory factor (i.e. another hormone) or in the reception of that stimulatory signal (i.e. signal reception/transduction).

With regard to IGF-I, GH is a known stimulator of secretion. Clearance of IGF-I is influenced by the relative amounts of IGF

binding proteins (IGF-BP), particularly IGF-BP2 and -BP3 in cattle, yet LDPP did not affect circulating IGF-BP-2 or -3. Thus, we have focused on GH signal reception, specifically, GH-receptor (GH-R) mRNA abundance as an index of GH-R capacity. GH-R expression in the liver results from transcription of three separate promoters: P1, P2, and P3. P1 is liver specific whereas P2 and P3 are active in many tissues, including the liver. There is evidence in cattle that P1 expression decreases around parturition and this leads to a specific decline in GH-R 1A transcript and a reduction in IGF-I transcription and secretion. These changes are evident despite an increase in circulating GH at that time. In contrast, beyond the periparturient period, increases in GH (i.e. bovine somatotropin) stimulate P1 and thus GH-R 1A specifically.

These data suggest that alteration in GH-R mRNA expression is a mechanism to regulate IGF-I secretion in cattle. Certainly other cellular mechanisms may be affected by photoperiod to alter IGF-I secretion, but GH-R mRNA is a logical starting point to provide preliminary data to test the hypothesis that photoperiod, acting via changes in PRL or Mel secretion, alters expression or activity of GH-receptor (GH-R) in the liver. We tested this hypothesis using 12 steer calves exposed to either SDPP (n=6) or LDPP (n=6) for 12 weeks. Hepatic biopsies were collected at 21 day intervals to assess GH-R and IGF-I mRNA, and blood samples were collected weekly to quantify circulating IGF-I, PRL and GH. Compared with SDPP, LDPP increased circulating PRL and IGF-I, but did not affect GH or GHR 1B or 1C mRNA. Further, neither GHR 1A nor IGF-I mRNA increased in calves on LDPP relative to those exposed to SDPP. These data suggest that shifts in sensitivity to endogenous GH do not cause IGF-I increases following exposure to LDPP.

- b. Impact - Environmental cues are used by animals to influence physiologic control of growth, lactation and reproduction. One of the most consistent and highly adapted cues is the annual cycle of photoperiod. Thus, appropriate manipulation of photoperiod can be used to improve animal productivity. Improvements in production efficiency are particularly relevant to capital-intensive pursuits such as dairy production. Milk yield increases of 10% over one lactation, without any effect on composition, could have enormous impact on marginal returns to the producer.

In Illinois, a 10% increase on the average lactation yields \$204/cow or \$24.5 million for the entire herd in the state. This impact is magnified tremendously when extended to the 9.2 million cows in the U.S. herd. The fact that photoperiod manipulation is non-invasive holds appeal for producers and consumers alike. Results of this project will increase understanding of the physiological mechanism that underlie the photoperiodic response, and potentially provide new insight to other manipulation points to improve productive efficiency.

- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project With CA, ME, MD, NJ, NY, PA, VT

### **Illinois Dairy Days**

- a. Dairy Days are an annual series of meetings held at ten different locations in the state. The goal of these programs is to actively teach dairy managers about new trends in the dairy industry in order to help them become more profitable. The primary reason producers give for attending these programs is have cited for attending this program to learn more about recent dairy research and for a chance to talk with a University of Illinois staff face-to-face.
- b. Impact - Producers attending the 2002 Dairy Days were asked to respond to a mail survey during the summer of 2002. The overall response rate for the survey was almost 70 percent. Seventy of the producers responding indicated in an open-ended question one item which they had learned as a result of this year's Dairy Days. The most common items listed as something learned were proper nutrition, waste management, disease control, and multiple-milking strategies. Forty-three percent of the producers volunteered that they had made changes in their operation. They most commonly stated changes were incorporating a multiple-milking strategy, using a more aggressive feeding program and changing lighting.

Number of producers changing knowledge - Estimated to be 125.

Number of producers making practice change - Estimated to be 77.

Dairy Days are sponsored by University of Illinois Department of Animal Sciences, U of I Extension, U of I College of Veterinary Medicine, and the Illinois Department of Public Health, Alternative Drug Residue Penalty Fund.

- c. Sources of Funds - Smith-Lever, State and Other
- d. Scope of Impact - Primarily Illinois.

## **Dairy Showcases**

- a. The 2002 Dairy Showcase consisted of morning and afternoon tours held Monday through Friday of the last week of June. Ten tours were held with an overall attendance of 504. Evaluations were distributed at eight of the ten tours with just under 32 percent responding. Of those responding over half (56 percent) were producers and almost one-fourth (23 percent) were agribusiness. The remaining 21 percent were largely students, farm hand and press. Most (56 percent) reported driving five to 50 miles to attend the event with about 11 percent reporting driving more than 50 miles.

Over 84 percent cited some benefit to participation in the tour(s). The most comment benefit (25 percent) was to get new ideas followed by the chance to see the farm operation and facilities (21 percent). Other benefits were information and handouts as well as overall management practices. The vast majority (96 percent) said they would attend other farm tours following this format. More than 40 percent said they would attend because of the opportunity to see new ideas and practice in action. Another 37 percent reported they would attend because they liked the “real-life, hands-on experience” the tour provided.

- b. Impact - Number of producers benefitting from the tours estimated to be 237.
- c. Sources of funds - Smith-Lever, State
- d. Scope of impact - Primarily Illinois

## ***Key Theme – Biofuels***

### **Evaluation of Biomass-Derived Alternative Fuels for Off-Road Vehicles**

- a. Laboratory and field tests on E diesel continued this year with public and industry interest in the project growing. After a second meeting early in 2001 with industry representatives and with two farmers who had participated in the E diesel project during 2000, the on-farm evaluation of E diesel was expanded from two tractors and two combines to four tractors and four combines. All eight vehicles were fitted with data logging equipment for recording engine performance information and vehicle position during the side-by-side in-field operations.

After the Spring and Fall 2001 seasons, fuel usage records continue to consistently show a 3 to 5% increase in fuel consumption when operating on E diesel, however, the operators reported no significant differences between the vehicles running on the blend and those running on standard diesel fuel. The engine that has been running on E diesel in the one combine is to be removed and torn down for inspection by Deere and Company. In

the laboratory an International T444E engine has been set up for a 500-hour durability test on a 10% ethanol-diesel blend.

The preliminary performance evaluation on both standard diesel and the blend has been completed and the durability test has been initiated. The performance tests show a 7.5% reduction in power at rated speed, which is a greater reduction than was anticipated from the decrease in fuel energy content. Efforts are underway to set up a combustion model using KIVA III, a computer program for performing detailed in-cylinder analysis of combustion processes, to analyze the combustion and emissions characteristics of bio-fuels. This modeling approach will help to provide a means of evaluating the effect of bio-fuel properties on the combustion process as well as strategies to optimize combustion and reduce emissions.

- b. Impact - After one year of on-farm testing, E diesel has made a sufficient impact on the farmers involved in the project for them to request that the evaluation be expanded to include other tractors and combines used on their farms. Details of this project have impacted various organizations with particular reference to the National Corn Growers Association and the Equipment Manufacturers Institute, who published details of the project in a document released to its members in November 2001. These on-farm demonstrations and laboratory tests of E diesel in standard, unmodified engines are providing convincing evidence for farmers and industries that this fuel is a viable alternative to standard diesel.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

### ***Key Theme – Biotechnology***

Also, see Goal 1 Overview Statement, Illinois-Missouri Agricultural Biotechnology Alliance (IMBA)

### **Enhancing Disease Resistance In Genes**

- a. Our initial research was focused on the isolation of resistance to Rhizoctonia blight. In particular, we identified a tall fescue (*Festuca arundinacea*) cross between Rhizoctonia resistant 'Tarheel' and susceptible 'Coronado' to have a dual purpose. We found the opposite interaction with 'Coronado' being resistant to the devastating disease called gray leaf spot and 'Tarheel' being susceptible. Therefore, we are approaching this population with dual goals. In addition, we have made multiple other crosses to study resistance to other diseases. We are studying gray leaf spot on perennial ryegrass (*Lolium perenne*) and dollar spot on creeping bentgrass (*Agrostis stolonifera*). Both of these diseases are very important requiring a great deal of resources for fungicidal control.



The approach proposed for our work with Rhizoctonia blight on tall fescue is being duplicated on these other host-pathogen systems. It basically follows: identify resistant parents, create mapping populations from these parents, identify genetic inheritance, identify DNA markers associated with resistance, and use these markers to probe for new resistant germplasm. We have completed a majority of the gray leaf spot research. We were able to identify patterns of inheritance and found difficulties in identifying DNA markers associated with resistance. We are currently screening a tall fescue population for resistance to Rhizoctonia brown patch. Unforeseen delays in producing our creeping bentgrass population will require us to collect 2nd generation seed in the summer of 2002. We should be able to complete Sclerotinia dollar spot inheritance studies in the fall of 2002 with this population. If other funding can be acquired, we will begin identifying markers associated with resistance to dollar spot.

- b. Impact - The environmental impact of pesticides and fertilization have been questioned due to the potential downstream effects they have on water quality and, eventually, human and animal health. In addition, the advances in genetics have given us tools to get more out of our crops with fewer inputs. This reality is becoming evident with increasing research on small grasses used for forage and turf. Disease resistance is a key feature targeted in this research. We expect our contribution to the development of disease resistant germplasm and the isolation of genes controlling resistance will result in lower management costs and improved environmental impact.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

***Key Theme - Niche Market***

**New Premium Beef in Chicago Grocery Stores**

- a. Consumers, producers and grocery stores are all benefitting from a new premium beef product thanks to U of I Extension. Called Illinois Crown Beef this new product is now available in Chicago-area grocery stores—the Blue Goose Super Market, St. Charles; Co-Op Markets, Chicago; and Sunset Foods, Highland Park.

“Consumers are able to purchase the high-quality product they seek, livestock producers are selling their animals at a much higher price, and grocers are selling more beef to their customers,” Said Richard Knipe, U of I Extension animal scientist. “It’s a closed food chain that rewards the production of a higher-quality product, something the more mainstream commodity food chain is unable to do.”

Knipe and a team of U of I specialists began exploring premium meat products as a way to help hard-pressed, mid-sized livestock producers, but it has turned out to be useful for independent grocers, too.

“We need to provide high-quality, consistent beef to our customers,” said Dale Instefjord, store manager at Blue Goose Super Market in St. Charles. “I was telling Rich Knipe about it one day, and the bells started going off. He knew of some other independent grocery stores in the Chicago area with an affluent customer base like ours.”

- b. Impact - Improved customer satisfaction, higher profit margins for retailers, processors and producers
- c. Source of Funding - Smith Lever, Research, State
- d. Scope of Impact - Illinois

***Key Theme - Organic Agriculture***

**See Goal 1 Overview Statement, College of ACES Establishes Organic Task Force.**

***Key Theme - Ornamental/Green Agriculture***

**See Goal 1 Overview, Illinois’ Green Industry - Surveying the Illinois Green Industry to Assess its Value, Attributes and Needs**

**Biocontrol of Soilborne Pathogens**

- a. Mycoviruses, viruses that infect fungi, have been studied in several plant pathogen systems, and in some cases they have been found to affect the pathogen's ability to cause disease. The objectives of this research are to screen fungal pathogens of soybean for the presence of double stranded RNA mycoviruses, to determine if any detected mycoviruses positively or negatively affect the pathogen's ability to cause disease on soybean, and to characterize the dsRNA viruses that are present. Fungal isolates are screened for the presence of mycoviruses through a process of extracting and detecting double stranded RNA (dsRNA).

Because fungi do not normally produce dsRNA, any detected dsRNA is believed to indicate infection of that fungus by a mycovirus. Forty four isolates of *Fusarium solani* f.sp. *glycines*, the causal agent of sudden death syndrome of soybean, were tested for the presence of dsRNA mycoviruses. Twenty nine of the 44 isolates (66%) contained dsRNA. One isolate contained 3 fragments, 10.6, 2.3 and 1.9 kilobase pairs (kb) in size. Seven isolates contained 2 fragments (11.0 kb and 2.0 - 2.4 kb in 2 isolates, and 5 isolates containing 2 fragments, 9.0 - 11.0 kb in size). Nineteen isolates contained single fragments which ranged in size from 9 to 13 kb, and two isolates contained single

fragments, 1 or 2.6 kb in size. In a greenhouse pathogenicity assay, isolates with only small dsRNA fragments were the most virulent, while isolates with only large bands were the least virulent. Isolates with no dsRNA fragments or both large and small fragments were intermediate in virulence. A significant amount of variation in pathogenicity among isolates was not associated with the presence of dsRNA. We concluded that dsRNA is present in a high proportion of soybean-infecting isolates of *F.s.g.* We found significant variation in pathogenicity among isolates, and a correlation between dsRNA presence and the virulence of the isolates.

- b. Impact - With increased concerns about the environmental impact of chemical pesticides and the general lack of control strategies for many soilborne, root infecting plant diseases, the development of biologically based disease control strategies offers many advantages. In this research, we are investigating the effect of mycoviruses, viruses that infect fungi, on the ability of plant pathogenic fungi to cause disease. Such viruses have the potential to be used as biological control agents if they suppress the pathogenicity of the fungi they infect.
- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project with IA, IN, KS, MI, MN, ND, NE, NJ, NY, OH, WI

### ***Key Theme – Plant Health***

#### **Genetic Manipulation of Sweet Corn Quality and Stress Resistance**

- a. Chilling-dependent photoinhibition in plants is correlated with decreases in the variable fluorescence of photosystem II (usually parameterized as Fv/Fm) in vivo, which implies decreased photochemical conversion efficiency of PS II. This parameter was evaluated for variation in chilling tolerance among 214 F2:3 families of a RFLP mapped population of sweet corn seedlings at the third to fourth leaf stage (W6786 su1Se1 X IL731a su1se1).

Initially ten families of this population were examined in a growth chamber, after 1 hour at 10 degrees C and 1000 mmol m<sup>-2</sup> s<sup>-1</sup> PPFD, revealing significant differences among the families in tolerance and recovery capacity. A second experiment was conducted with the 214 F2:3 families of the population grown in a growth chamber and at three planting dates in the field during the spring of 2001. The PLABQTL program detected seven marker locus-QTL (Quantitative trait locus/i) associations for the chilling tolerance trait. One QTL, at 3.096 (chromosome 3 in the maize genome, 96 centiMorgans from the marker closest to the telomeric region of the short arm of this chromosome), was consistently identified in both the growth chamber and field experiments. Another QTL at 8.025, which described a higher percentage of

phenotypic variance ( $R^2: 9.4$ ), was identified across field measurements. The five other marker-QTL associations were located at 7.174 and 8.064 in the second planting, at 3.131, at 4.148, and at 9.074 in the third field planting. Therefore, it was concluded that the Fv/Fm ratio was a discriminatory parameter for the evaluation of light damage during chilling events, and for the identification of QTL associated with chilling tolerance.

- b. Impact - There is significant variation among maize genotypes in seedling tolerance to chilling. However, this trait is associated with a range of biochemical and biophysical characters.

The mechanisms of tolerance include the activities of enzymes of photosynthetic carbon metabolism at low temperature, D1 protein turnover, xanthophyll cycle activity, concentrations of  $\alpha$ -tocopherol and various active oxygen scavengers, and activities of enzymes associated with active oxygen scavenging. Unraveling the primary basis of improved tolerance from these multiple possibilities requires a genetic approach. The advent of molecular marker technology has enabled the development of saturated genetic maps in maize, which has been used in this study to associate DNA markers with seedling chilling tolerance.

Identification and mapping of QTL associated with enhanced chilling tolerance is the first step in a breeding program utilizing marker assisted selection to develop sweet corn genotypes with improved seedling growth performance in environments under sub-optimal temperature regimes. This information can be used in sweet and field corn breeding programs to provide a selection tool for cold tolerant genotypes that can be planted earlier in the season for marketing opportunities or new production areas where environmental conditions hinder profitable production.

- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project with FL, HI, ID, IN, MN, NY, OH, OR, PA, WI

### **The Role Of Ethylene In Ozone-Induced Damage To Photosynthesis**

- a. Surface ozone is one of the most damaging air pollutants to plants, causing reductions in photosynthesis and in plant yield. Data of the U.S. EPA indicates that rural ozone pollution decreases soybean yields 10-20% on average in Illinois, equivalent to \$250-500 million in lost revenue. One well-known response of plants to ozone is the increased production of the plant hormone ethylene. Although there appears to be a correlation between increased ethylene production and increased ozone-induced damage, the mechanism of the interaction between ethylene and ozone in producing this damage is unclear. Is the ethylene response simply a parallel pathway, i.e., is ozone primarily responsible for damage? Is the ethylene molecule itself responsible for inducing damage?

pathways via some signal transduction pathway with ethylene the primary signal molecule? Does ethylene interact with ozone to produce chemical compounds which are primarily responsible for the damage?

The objective of this research is to understand the interaction between the air pollutant ozone and the plant hormone ethylene in producing damage to photosynthesis in soybean by testing these alternative hypotheses. We have an ethylene-insensitive mutant strain of soybean (T119N54) which contains a mutation in an ethylene-binding protein (ETR1). Mutants are capable of producing ethylene, but cannot detect it. Exposure to 400 ppb ozone for 3 hours resulted in a decrease in photosynthesis for wild type (control) plants while mutant plants showed no decrease. This indicates that ethylene plays a role in ozone-induced damage to photosynthesis. Plants lacking ethylene receptors are protected from ozone damage. These results support the hypothesis that ozone induces ethylene formation, which is the signal molecule for damage induction.

Further work with ethylene formation inhibitors and varying levels of ozone will provide more insight into the role of ethylene in ozone-induced damage to photosynthesis. In addition, ozone fumigation under field conditions is critical for a more complete understanding of the effects of ozone on soybean yield. To this end, we have worked, in conjunction with the SOYFACE research facility, to develop and test a system in which open-air ozone fumigation of soybean in the field will be possible. The system proved itself capable of maintaining ozone at a target 50% increase over ambient to a precision of +/-5%. The system is now ready to be used during the field season of 2002. We are completing a confidentiality agreement with Monsanto that will allow us to use a wider range of ethylene insensitive and hypersensitive mutants in subsequent work.

- b. Impact - Rural ozone pollution can decrease soybean yield 10-20% in Illinois, resulting in up to \$500 million in lost revenue. Previous studies indicate that ethylene insensitivity may lead to ozone insensitivity; therefore, ethylene insensitive mutants or lines may be useful in developing soybean varieties resistant to ozone. Also, mutant analysis may reveal specific genes to be selected to increase ozone resistance.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

### **Control of Phytophthora Blight of Bell Peppers**

- a. The research on control of Phytophthora blight (*Phytophthora capsici*) of pepper emphasized three major objectives: 1) evaluate the efficacy of fungicides for control of the blight, 2) screen pepper cultivars for resistance to *P. capsici*, and 3) induce resistance in the

plants against *P. capsici*.

Several fungicides were tested for their efficacy in suppressing *P. capsici* on bell pepper cultivar King Arthur in a field, infested with *P. capsici*. Only Acrobat MZr provided partial control of *P. capsici*.

To determine the resistance in peppers, 57 cultivars and lines of bell pepper were tested for their resistance. Eight-week-old seedlings were inoculated with *P. capsici* and evaluated for the incidence of Phytophthora blight. Only 3 cultivars (Emerald Isle, Paladin, and Reinger) and 4 lines were found with satisfactory resistance. These cultivars/lines were also tested in the field. All of the resistant cultivars/lines survived well in the field, whereas the susceptible cultivars became infected and most of the plants died. Actigard and red-light treatment were tested to induce resistance in bell pepper against *P. capsici*. Actigard was sprayed on the plants in the field, which provided only a partial control of *P. capsici*. Four-week-old seedlings of pepper cultivars California Wonder, grown under continuous red light in a greenhouse, were inoculated with *P. capsici*.

Control plants, either grown under natural light or continuous white light, were inoculated. Only 36 % of the red-light-treated plants became infected with *P. capsici*, while 100% of the control plants died.

- b. Impact - More than 1,000 acres in Illinois are planted in peppers. The farm-gate value of pepper crops in Illinois exceeds \$3,000,000. Phytophthora blight causes up to 100% yield losses in pepper fields (an estimated average of 35%). Controlling the disease would have a significant impact on grower income.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

#### **Use of Resistance to Control Leaf Blight, Ear Rot and Stalk Rot Diseases of Corn**

- a. Studies on inheritance of resistance to *Aspergillus* ear rot and aflatoxin production in corn caused by the fungus *Aspergillus flavus* were initiated using the resistant inbred line MI82 in crosses with susceptible inbred B73. Resistance is highly heritable, however, environmentally dependent. We also initiated studies on the resistance from Oh516 crossed with inbred line B73. In studies with resistance from inbred line Tex6 and Mp313e, we have crossed resistance into the widely used commercial inbred FR1064. This was done with marker assisted selection. It appears highly likely that we will be able to cross resistance from two different sources into a commercially usable inbred to create a commercially viable resistant corn inbred. In other research we developed inoculation techniques for *Diplodia* ear rot which was

extremely serious in the Midwestern United States in the Summer of 2000. We identified an inoculation technique that is able to distinguish between resistant and susceptible corn hybrids. Also, we determined the value of a commercially available fungicide for control of Diplodia ear rot in corn seed production.

- b. Impact - This research has identified sources of resistance to ear rot and aflatoxin production and should provide the genetic basis for control of this cancer producing mycotoxin. Results are important to corn production, grain marketing, and to human health. We also developed methods that can be used to identify hybrids highly susceptible to Diplodia ear rot which is causing serious concern throughout the midwestern United States mostly because of the wide use of conservation tillage.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

#### **Soybean Cyst Nematode Screening Clinics**

- a. Soybean Cyst Nematode (SCN) is the leading yield-reducing pest in soybeans, annually costing Illinois growers more than \$100 million in lost revenue. Soybean cyst nematodes are microscopic roundworms that feed within plant roots. Infested plants often do not express any above ground symptoms, particularly in the high organic matter soils located in northern Illinois. While SCN has been a problem in southern areas of the state for several decades, it has only been in recent years that it has begun to impact northern growers.

In an effort to increase the awareness of soybean growers about this pest, University of Illinois Extension has conducted more than 50 SCN Soil Screening Clinics in northern Illinois. Crop Systems and Integrated Pest Management educators have screened more than 1500 producer-submitted soil samples to determine infestation levels.

- b. Impact - Post program evaluations have indicated that more than 60 percent of participants have implemented different or new management practices as a result of Extension's SCN Clinic and/or soil test results. Also, 95 percent of participants agree to the statement, "As a result of the SCN meeting or test results I received, I have a better understanding of the SCN life cycle and soil sampling procedures for SCN detection."
- c. Source of Funds - Smith-Lever, State
- d. Scope of Impact - Illinois

#### ***Key Theme – Plant Production Efficiency***

##### **The Influence of Corn and Soybean Phenology on Western Corn Rootworm Densities**

- a. In 2001, we continued our investigation to evaluate the potential effect that phenological asynchrony of corn and soybean fields may have on the population dynamics of a new strain of western corn rootworm. We conducted research on large tracts of land in east central Illinois (near the epicenter of crop rotation problems) as well as in northwestern Illinois (outside of the problem area). Four ranges of corn and soybean development were created by altering planting dates and crop varieties. Absolute population estimates of western corn rootworm egg densities were determined for both experimental sites. Densities of eggs in early-planted corn (4/15/00) were significantly lower than in later planted corn (5/15/00) and in four varieties of soybean in the east central Illinois site. In northwestern Illinois, eggs were laid only in the corn plots regardless of planting date (4/24/00 or 5/15/00). No eggs were laid in the two soybean varieties in northwestern Illinois. These results indicate that crop phenology influences egg laying and that the new strain of western corn rootworm has not reached northwestern Illinois.
- b. Impact - Because egg laying in our soybean treatments was not detected in northwestern Illinois, producers should continue to rely on crop rotation as the key management strategy for corn rootworms in that region of Illinois. This results in a savings \$15 per acre/savings to northwestern Illinois producers who rotate corn and soybeans.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

**Plant Germplasm and Information Management and Utilization**

- a. The perennial species in the genus *Glycine* currently in the research collection are as follows: *G. albicans*, *G. arenaria*, *G. argyrea*, *G. canescens*, *G. clandestina*, *G. curvata*, *G. cyrtoloba*, *G. dolichocarpa*, *G. falcata*, *G. hirticaulis*, *G. lactovirens*, *G. latifolia*, *G. latrobeana*, *G. microphylla*, *G. pindanica*, *G. stenophita*, *G. tabacina*, and *G. tomentella*.



- b. Impact - The perennial wild species related to the soybean are excellent sources of genetic diversity needed to improve soybean cultivars. Within these perennial wild species, sources of resistance were located to soybean cyst nematode, white mold, sudden death syndrome, and other economically important pathogens.
- c. Source of Funding - Hatch, Multistate Research Fund, Other Federal Funds, State
- d. Scope of Impact - Regional Research Project With IN, IA, KS, NE, OH, MI, MN, MO, ND, SD, WI

### **Assessing Crop Rotation Effects in Illinois**

- a. Support was provided to research on the effect of rotational sequence order on the yields of corn (*Zea mays* L.), soybean (*Glycine max* L. Merrill.), and wheat (*Triticum aestivum* L.), rotated in either of the two possible orders. Corn-soybean rotations were included for comparison, along with continuous corn and soybean at one location.

The study is underway at three locations in Illinois - Monmouth, Perry, and Brownstown. Each of the plots is split for different maturities of corn and soybean, and for tillage, including tilled and no-tilled sub-plots. Averaged over 3 years at Monmouth, soybean grown after wheat yielded 2.3 percent more than soybean following corn. Corn following wheat in a 3-year rotation (C-S-W) yielded 7.7 percent more than corn following soybean in a 2-year rotation (C-S), and about the same as corn that followed soybean in the 3-year rotation W-S-C. Tillage decreased the yield of corn following wheat in the W-C-S rotation, but increased the yield of corn following soybean in the W-S-C rotation.

Continuous corn with tillage yielded about 10 percent less than corn rotated with soybean, and no-till, continuous corn produced the lowest yields of all, only 7.3 t/ha, or 23 percent less than corn rotated with soybean. Soybean following wheat in the W-S-C rotation yielded about 5 percent more than soybean rotated with corn, and about 2 percent more than soybean following corn in the W-S-C rotation. Continuous soybean yielded about 28 percent less than soybean rotated with corn. In the 3-year rotations, wheat that followed soybean yielded about 10 percent more than wheat that followed corn.

- b. Impact - This research is continuing to build a foundation that will allow crop producers to assess relative economic returns to different cropping sequences and practices, particularly when including wheat in the rotation. Results are not yet conclusive on this long-term study, but at the Monmouth location, it appears that the wheat-corn-soybean rotation has a profit potential about equal to that evident from the corn-soybean rotation. This will be very useful information as producers try to diversify cropping systems in areas where the corn-soybean rotation occupies virtually all of

the cropped area.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

### **Corn and Soybean Classics**

- a. University of Illinois Extension Specialists and Researchers have used a series of regional meetings to bring current research directly to corn and soybean producers. This program involves a cadre of Crop Science Specialists, most of whom have joint Extension and Research appointments. The program is planned and executed around Illinois' producers expressed desire to hear about the research being conducted from the scientist who is actually conducting the research. This approach is effective. Each year between 95 to 97 percent of the participants surveyed responded "YES" to the question "Will your attendance assist you in making more informed management decisions?" Over the three year period, more than 3,100 producers have attended this series.
- b. Impact – About 2,945 instances of participants being better prepared to make more informed management management decisions. This does not include the impacts from publishing the proceedings in print and the WWW and the multiplier impacts of having consultants and agribusiness representatives who serve as wholesalers of research information to producers.
- c. Source of Funds - Smith-Lever, Hatch, state.
- d. Scope of Impact - Illinois

### ***Key Theme: Urban Gardening***

#### **Farmers' Market Nutrition Program**

- a. Low-income mothers who shop at the WIC food centers on Chicago's South Side now have the chance to buy fresh vegetables grown in Chicago community gardens and to pick up tips on nutrition and cooking with fresh produce.

The Farmer's Market Nutrition Program is a joint effort of University of Illinois Extension and the Illinois Department of Public Health WIC program. Six community vegetable gardens supported by the Extension Urban Gardening Program provide the WIC food center with a variety of fresh vegetables and fruit. In the past, examples of vegetables have been green beans, sweet potatoes, cabbage, broccoli, zucchini, tomatoes, and green peppers. Also fresh fruit like peaches, melons and apples have been provided.

WIC recipients can redeem WIC food coupons for the vegetables, as well as for fresh fruits. Extension Expanded Food and Nutrition Education Program (EFNEP) staff visit the WIC center twice a week to present cooking demonstrations and offer recipes that feature zucchini, tomatoes and green peppers. The EFNEP staff also provides nutrition information to WIC participants and their children.

"Many of the WIC participants have never tasted fruits and vegetables fresh from the garden," said Willene Buffett, Unit Leader. "This program introduces them to new, healthy foods and gives them some recipes, so they will have some ideas on how to serve the foods to their families."

The six gardens providing vegetables to the farmer's market are the Jackson Park and Washington Park community gardens, the Cook County Sheriff's Garden, Su Casa, Quincy Street Garden, and the garden at the Chicago High School for Agricultural Sciences. The gardeners receive payment from the WIC program for their vegetables.

<http://www.urbanext.uiuc.edu/chicago/programs/farmerswic.html>

- b. Impact - About 4,500 low-income mothers with young children use the WIC center at 62nd and Halsted, the site of a former Jewel food store. Since the summer of 1994, urban gardeners provided fresh vegetables to about 30,500 WIC participants.
- c. Source of funds - Smith-Lever, State, Local
- d. Scope of impact - Illinois

## **CSREES GOAL 2: A safe, secure food and fiber system.**

The College of ACES addresses food safety and security concerns at multiple levels from the molecular to the home food preserver; to risks facing the elderly and young children. Research projects funded by Hatch, state and other funds are exploring ways to reduce or eliminate hazards at their source. Scientists at the University of Illinois are examining the components of soy, broccoli, tomatoes, and berries to help understand the interactive health effects of bioactive components in foods.

To avoid food-borne illness once food leaves the processor, consumers and commercial food handlers need to select, store and use food in such a way that its safety and quality is maintained. University of Illinois Extension programs take the research-based food safety information to commercial food handlers and citizens, including youth. Illinois regulations require that at least one certified food handler be onsite wherever food is prepared or served to the public. Consumers learn safe food handling through face-to-face meetings, publications, the WWW, as well as from Master Food Preservers and by asking University of Illinois personnel specific food handling, preservation or safety questions. Some are in response to a crisis (e.g., "Power has been off for two days... what do I do about the food in my freezer?")

Each year, U of I Extension provides food safety, preparation and nutrition education to over 2,000 youth through Youth Cooking Schools. Extension educators answer thousands of consumer food safety and food preservation questions from consumers annually.

For a number of Illinois citizens, especially children in poverty, the question is not just if their food is safe...it's whether there is sufficient food at all. University of Illinois Extension has addressed this question through poverty simulations, which sensitize citizens to these issues, and by facilitating collaborations with and among local organizations and agencies.

### **Indications of the Scope of Research and Extension Programs under Goal 2 - See Appendix A.**

Food safety and quality were addressed by 36 research projects during the past year. Research staff commitments included almost 11 scientist years and over 30 professional and technical staff years. University of Illinois Extension-paid staff members had more than 200,000 face-to-face teaching contacts under this goal. Prior evaluations of these kinds of informal educational programs have shown between 50 to more than 95 percent of persons reached adopt approved food handling practices. In addition to these face-to-face contacts, U of I Extension workers and volunteers respond to more than 25,000 of food safety/food preservation calls annually.

***Key Theme: Food Accessibility and Affordability***

**Impact of Technology on Rural Consumer Access to Food and Fiber Products**

- a. This project explores the attitudes of rural consumers toward television and Internet sources for information search and purchase of food and fiber products. Experimental data collected from 258 rural consumers in six states suggest that exposure to Internet sources leads to positive changes in attitudes toward the sources, but exposure to home shopping networks leads to negative attitudinal changes. Publications describing this research are in progress.

These experimental consumers were surveyed in the spring of 2002 to determine effectiveness of incorporating hands-on experiences on actual purchase behaviors. Survey data collected from 2,198 rural consumers in 11 states are being analyzed to test Roger's Diffusion of Innovation theory; data will suggest factors that speed up or slow down the adoption of the Internet for purchase of products. Furthermore, factors will be identified that discriminate between adopters and non-adopters of the Internet for purchases. Additional analyses of these survey data, which are in progress, include determination/development of the following: a) differences in information search based upon product category and demographics, b) levels of satisfaction with product sources, c) levels of innovation of adopters of the Internet for purchases, d) effect of perceived time poverty on frequency of Internet purchases, and e) a profile of adopters and non-adopters of the Internet for purchasing products. Fact sheets and a website have been developed to describe progress on this project.

- b. Impact - Eleven states are participating in this regional research project which assesses rural consumer shopping patterns and attitudes toward the use of computer and television shopping technologies. The project will increase understanding of rural consumers and will facilitate development of programs that familiarize rural consumers with the broad array of product information about and convenient sources of food and fiber products. These data will also help rural retailers adjust to the changing marketplace, thereby enhancing economic and community development in small town areas.

All consumers purchase food and fiber products, making the project relevant to all areas of the United States. In particular, non-metropolitan areas in the U.S. will benefit. Specific outcomes include the following: a) decrease barriers to consumer use of emerging communication technologies, b) provide basis for development of Extension consumer counseling programs related to survival and quality of life in rural communities, c) inform both product and service providers as well as consumers about access to product information, d) develop Extension and rural community

programs that strengthen rural small business development through technology transfer, and e) help small retailers incorporate appropriate technologies into their business operations to adjust to the changing business climate in the 21st century.

- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project with CO, NY, IA, KY, MN, MS, NE, ND, OH, OK, WI

### **Genetic Enhancement of Health and Survival for Dairy Cattle**

- a. The objective of this study was to compare milk loss and treatment costs for cows with clinical mastitis that were given antibiotics in addition to supportive treatment or supportive treatment alone.

Between January 1994 and January 1996, 116,876 daily milk records on 676 lactations were taken at the University of Illinois Dairy Research Farm. Clinical mastitis was diagnosed during 124 lactations with 25,047 DM records, and 1,417 of the daily milk records were on days when clinical mastitis was present. Cows with clinical mastitis were randomly assigned to one of two treatment groups: N (supportive treatment only) or A (antibiotics in addition to supportive treatment). Extent of antibiotic and supportive treatment varied according to twice daily severity scores. Projected and actual daily milk yields were estimated utilizing a random regression test-day model and the differences were summed over 305 days of lactation to estimate lactational milk yield loss. The actual amount of discarded milk was added to milk yield loss to determine total milk loss per lactation. A cost analysis that included milk loss and treatment costs was then performed.

Cows with clinical mastitis that only were given supportive treatment lost 230 (SEM = 172) kg more milk and incurred 94 (SEM = 51) dollars more cost per lactation than cows given antibiotics and supportive treatment. Cows given only supportive treatment showed a response pattern of 305-day milk yield loss and economic loss per lactation that varied two to three times as much as cows treated with antibiotics.

- b. Impact - Based on reduced milk loss, better reliability (less variable response), and lower economic loss, the addition of antibiotics to supportive treatment was more efficacious and cost effective than supportive treatment alone.
- c. Source of Funding - Hatch, Multistate Research Fund, State

- d. Scope of Impact - Regional Research Project With IN, IA, LA, MN, NE, NY, NC, PA, VA, WI

***Key Theme: Food Quality***

**Nutritional Adequacy of Food Selections of Hospitalized Patients**

- a. We have made substantial progress in our study of the use of a traditional ala-carte meal selection approach in the hospital environment compared to a novel limited alternative structured diet. Both phases of the study have been completed and the data are currently being analyzed. The initial part of the study examined patient preference and satisfaction issues relating to quality of food service.

We examined the patient's perception of overall satisfaction, variety and meal quality of food and portion sizes. In general, all factors were rated highly for all three daily meals with both diet selection plans. This data is still being analyzed, but overall satisfaction remained high and unchanged. Perceptions of variety in the meal were minimally diminished with the more restricted diet approach. Perceptions of quality appeared to increase with the more restrictive dietitian planned limited meal selections. Assessment of portion sizes remained essentially unchanged.

We are currently analyzing data concerning actual food consumed with both menu/diet selections. We will be examining whether the patient's perceptions of satisfaction, variety, quality, and portion size are reflected in actual food consumed. In addition, we will be examining the comparative nutritional adequacy of the two diet approaches.

- b. Impact - Our preliminary data comparing a traditional and novel meal selection dietary approach for inpatient nutrition suggests that overall patient satisfaction is stable or improved with a menu plan based upon careful structuring by a dietitian to allow for nutritionally optimal meal selections while maintaining a reasonable degree of variety.

We are still analyzing data concerning the actual nutritional value of food consumed under both menu plans. Food service issues of patient's perceptions of meals in the hospital are important. Moves toward more efficient meal planning and provision in the hospital setting are hopefully paralleled by continued patient satisfaction and evidence of the nutritional value of such interventions.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

**Positional and Functional Identification of Economically**

## Important Genes in the Pig

- a. To identify genomic regions harboring ETL that influence growth, carcass and meat quality parameters in swine, an F2 resource family referred to as the Illinois Meat Quality Pedigree (IMQP) has been established. To develop a population segregating for a number of genes influencing these traits, the pedigree was generated from the mating of Berkshire (high eating quality, slower growth, lower lean yield) and Duroc (moderate eating quality, high intramuscular fat, rapid and lean growth) founder individuals. The pedigrees are currently composed of 142 F2 litters with a total of 1,105 individuals.

To date, 801 individuals have been harvested and data has been collected for growth, carcass and meat quality traits. Genetic markers for chromosomes 1, 2, 6 and 14 are currently being genotyped, another 90 markers are being screened for informativeness in these families. Following the identification of chromosomal regions that contain ETL, efforts to specifically identify the causative genes will require the construction of detailed physical maps for positional cloning. An effort to construct a high-resolution physical map using large-insert BAC clones was initiated. Currently, ~7,000 clones of the RPCI-44 BAC library have been fingerprinted and ~2,880 additional clones are being completed each week. Assembly of the fingerprint information will be initiated at 1X genome coverage (~19,000 clones), estimated March 15, 2002. Additional assemblies will be conducted in 1X genome equivalent segments.

An alternative to positional cloning strategies to identify specific genes is based on the analysis of function and expression of genes that regulate traits of economic importance. To achieve this goal, construction of a cDNA microarray for the analysis of gene expression in pig muscle was initiated. In FY 2000, 3 cDNA libraries were constructed using tissue collected at various time points throughout muscle development. Using these libraries, random sequencing of clones has produced 7,561 high-quality EST sequences of >200 bp in length (>Phred20). An initial set of 3,194 sequences have been analyzed resulting in 1,618 unique sequence clusters. Further analysis revealed 1,410 of the porcine cDNAs had significant similarity ( $1e-5$ ) to one or more database sequences. Clones representing 1,256 of these sequences have been used to construct a porcine microarray for preliminary analysis. The additional 4,367 ESTs are currently being analyzed for redundancy and similarity to database entries.

Given the redundancy of the initial EST set, an estimated 1,900 clones should be available for array construction. This would provide a combined total of ~3,350 genes for transcriptional profile analysis in the pig. In addition, informatics analysis of 90,390 porcine gene and EST sequences is being conducted for the potential construction of an oligonucleotide array representing



each unique porcine gene cluster. Muscle tissue samples from all harvested animals of the IMQP have been collected. Microarrays are being used to examine differential expression between individuals with divergent phenotypes for meat quality traits.

- b. Impact - The IMQP will allow the identification of regions of the genome harboring genes influencing meat quality. Initially, these regions and the linked markers within can be used for marker-assisted selection in breeding programs for the improvement of pork quality. The physical map produced by large-insert fingerprinting will serve as a resource for the positional cloning of ETL identified in genome scans. Additionally, the physical map produced will be the initial step in sequencing of the pig genome. Combining the IMQP and microarray analysis will aid in understanding the underlying genetic mechanisms involved in the divergent meat quality phenotypes.
- c. Source of Funding - Hatch, Multistate Research Fund, Other Federal Funds, State
- d. Scope of Impact - Regional Research Project With IA, KS, MI, MN, NE, OK, UT

### **Improvement of Thermal and Alternative Processes for Foods**

- a. The purpose of this work is to develop and verify methods for measurement and prediction of engineering and biochemical properties of foods as needed in process design and analysis, and product development. Variability of modified food starch characteristics is an issue for both starch processor and end user of modified starch. It is thought hybrid plays a role in modification characteristics, but since hybrids are mixed as they enter the wet milling process, their influence has not been determined.

Waxy and regular dent corn hybrids were laboratory wet milled to obtain starch for processing. Starch samples were acetylated using a typical modification process and characterized using a rapid viscoamylograph (RVA). Efficiency of the reactions were determined. In waxy corn starch samples, an effect due to hybrid was found, but no consistent trends observed in waxy hybrids tested. Differences were detected also due to crop year. Interestingly, no correlation ( $R^2 < 0.3$ ) between RVA properties, widely used to characterize starches, and reaction efficiency were observed. Dent starch results are now being analyzed.

A second objective is to identify and describe transport mechanisms occurring in food processes. Fouling of food processing equipment is a major problem in the food industry since many process streams contain proteinaceous compounds responsible for fouling. Of interest was the effect of fouling on efficiency of the corn refining industry, which depends on evaporator concentration of various process streams, such as corn

steepwater, to allow handling and storage of coproducts. Implications of process design on fouling rates of corn steepwater were being measured using an annular fouling probe. Improvement in efficiency of this process would have dramatic impact on process economics as well as product quality.

Microfiltration membranes were used to filter corn steepwater to reroute large protein and carbohydrate molecules away from evaporators. To measure effects of membrane filtration, the fouling probe was used to measure relative rates of fouling of unfiltered steepwater and material permeating the membranes. It was found that microfiltered steepwater had fouling rates seven times slower than those unfiltered steepwater.

- b. Impact - Effect of genetic variability on process efficiency has been measured for starch modifications. The effect of process technique, membrane filtration versus centrifugation, on evaporator efficiency has been determined. Understanding these effects will lead to lower cost processes and higher valued food products.
- c. Source of Funding - Multistate Research Fund
- d. Scope of Impact - Regional Research Project With CA, FL, IN, IA, MI, MN, MO, NE, NJ, NY, NC, ND, OH, OR, PA, SD, TX, WA, WI

### **Characterization and Analysis of Aroma (Odor) Components of Foods, Flavorings and Agricultural/Industrial Materials**

- a. Gas chromatography-olfactometry (GCO), aroma extract dilution analysis (AEDA) and GC-MS were applied for the determination of character-impact aroma components of low-, medium-, and high-heat-treated nonfat dry milk (NDM).

Key compounds were identified as 2,5-dimethyl-4-hydroxy-3(2H)-furanone (Furaneol), butanoic acid, 3-(methylthio)propanal, o-aminoacetophenone, delta-decalactone, (E)-4,5-epoxy-(E)-2-decenal, pentanoic acid, 4,5-dimethyl-3-hydroxy-2(5H)-furanone (sotolon), 3-methoxy-4-hydroxybenzaldehyde (vanillin), 2-acetyl-1-pyrroline, 2-acetyl-2-thiazoline, hexanoic acid, phenylacetic acid, octanoic acid, nonanal, and 1-octen-3-one. Odor intensities of Furaneol, butanoic acid, methional, o-aminoacetophenone, sotolon, vanillin, (E)-4,5-epoxy-(E)-2-decenal and phenylacetaldehyde were higher in high-heat-treated NFD than others.

Sensory evaluation results revealed that heat generated flavors have a major impact on NFM flavor. Aroma components responsible for typical aroma of British farmhouse Cheddar cheese were identified by use of GCO, AEDA, and GC-MS. p-Cresol was responsible for a "cowy/barny" aroma note, whereas an intense "soil-like" note was due to 2-isopropyl-3-methoxypyrazine. At

much lower intensity, 2-isobutyl-3-methoxypyrazine contributed a "bell pepper-like" note. Within the same wedge of cheese the concentration of p-cresol and 2-isopropyl-3-methoxypyrazine were lower at the narrow end (center) than at the rind side. Direct addition of p-cresol ( $\geq 100$  ppb) or 2-isopropyl-3-methoxypyrazine ( $\geq 3$  ppb) in a mild domestic Cheddar cheese resulted in increases in intensities of cowy/barny and earthy/bell pepper aroma notes.

Key aroma components of cooked tail meat of American lobster (*Homarus americanus*) were identified by GCO, AEDA, GC-MS, GCO of decreasing static headspace (GCO-H) and decreasing dynamic headspace (GCO-DHS) volumes. 3-Methylbutanal, 2,3-butanedione, 3-(methylthio)propanal, 1-octen-3-one, 2-acetyl-1-pyrroline, and (E,Z)-2,6-nonadienal were identified as predominant odorants by all techniques. Highly volatile methanethiol and dimethyl sulfide were detected by headspace methods only. The above eight compounds along with three unidentified compounds (with crabby, amine, fishy odors) were found to predominate in the overall aroma of cooked lobster tail meat. Soy, rice and hydrogenated soy lecithins were added to milk with lactic acid fermentation to characterize and elucidate formation of volatile off-flavors.

Sensory panelists detected off-aromas in fermented milk containing unmodified soy or rice lecithin. Instrumental analysis by GCO revealed that off-flavor compounds included (E,E)-2,4-nonadienal and (E,Z)- and (E,E)-2,4-decadienal. Formation of 2,4-decadienals occurred with the first 4 hours of lactic acid fermentation and reached maximum levels within 14 hours of incubation. Enzymatic assays confirmed that washed cells of *Lactococcus* produced hydrogen peroxide. Hydrogenated soy lecithin was found suitable for use in cultured dairy products, but use of other soy or rice lecithin resulted in off-flavor formation due to oxidation of polyunsaturated fatty acids.

- b. Impact - Identification of compounds responsible for food flavor (character-impact compounds) will lead to a greater understanding of chemical pathways involved in flavor formation, which will in turn lead to food products having flavor profiles. Similarly, identification of environmental off-odors (e.g. odors emitted from animal production facilities) can lead to development of better methods for analyzing and monitoring these compounds. These methods can then be used to measure the efficacy of improved production strategies in reducing the odor problem.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

### **Component Interactions for Efficacy of Functional Foods**

- a. This program targets safety and efficacy of four functional foods, and consists of nine projects in four research, two educational and three outreach areas. The University of Illinois, University of Missouri and Purdue University are collaborating. The four foods are soy, broccoli, tomatoes and berries.

Components of soy are being tested in cancer models to select protective compounds. Colon and breast cancer cells are being studied for actions of estrogen, phytoestrogens, and growth factors. Results indicate that isoflavones from soy inhibit cancer growth. Isolation and screening of additional components are expected to identify effective compounds and their mechanisms.

A berry cell culture system is producing proanthocyanidins and a broad range of polyphenolics. Cultures of wild blueberries and related berries have been initiated. A scale-up of production is in progress. Cell culture and fruit extracts have been tested using a range of separation techniques for flavonoid recovery.

Broccoli extracts have been evaluated for bioactive glucosinolate hydrolysis products and antioxidants. Antioxidant capacity was correlated with water-soluble extracts. Specific components with antioxidant activity were carotenoids and flavonoids. Effects of broccoli grown in a range of Se concentrations on cancer cells are being investigated.

Tomato cell culture is being developed. Culture will yield radio labeled bioactive components. A kinetics study using C14 lycopene is in progress indicating lycopene, in multiple chemical forms, accumulates in the liver and remains elevated in serum for 24 hours.

Education - The Functional Foods for Health (FFH) Website is being expanded. Studies are abstracted in the Research section. FFH has been linked to Lycopene.org, and the Stratsoy Soy and Human Health sites. Total hits to FFH website for the last year exceeded 267,000. A symposium was held in conjunction with the 10th Annual Conference of the FFH. IFAFS participants discussed research objectives and received feedback. The 2nd IFAFS consortium will be held at Purdue University.

Outreach - the Functional Foods Educational Kits developed through the Illinois Council on Food and Agricultural Research (C-FAR) are being revised and distributed to Registered Dietitians. Testing is continuing with full distribution in Spring 2002.

Study of knowledge of oncology nurses about functional foods and dietary supplements indicates nurses are not familiar with the concept of functional foods. Oncology nurses in the three states are being targeted as those with most contact with cancer patients and education about living with cancer.

Purdue University developed The Extension Trainer software that provides a training environment for technical information over the Internet. Content for the programs is produced and reviewed by researchers and extension specialists. Participants return for a follow-up survey to measure impact. Survey data are analyzed for statistical differences due to participation.

- b. Impact - The overall program is expected to enhance the understanding of the interactive health effects of bioactive components in foods and to expand the knowledge of consumers about functional foods. Current information based on scientific research is being disseminated to web-users and to specific target audiences. Investigations on mechanisms and interactions of bioactive components and their effects on cancer will allow useful combinations of components that allow lower, safer doses to be used in attaining desired effects. Information on the health benefits of bioactive components can help guide consumers to make knowledgeable choices in the marketplace. Analysis of the capacity of these components to modulate enzymes that clear harmful substances from the body will be useful in improving general health beyond the nutritive value of the food. It is important to identify metabolites as these may be the bioactive forms of compounds in foods that are effective in preventing cancer.

Outreach efforts are expected to disseminate current, reliable information to target groups that have immediate and concentrated needs. There is a need to develop and disseminate information about functional foods, dietary supplements and cancer. The impact of the EX-Train program will be able to be measured. The program can be customized for target audiences which allows other science-based programs to be developed for functional foods and dietary supplements.

- c. Source of Funding - NRI Competitive Grant, State
- d. Scope of Impact - National

**Also see Goal 1 - Key Theme: Urban Gardening, (Chicago) Farmers' Market Nutrition Program**

***Key Theme: Food Resource Management***

**Optimization of Agricultural Building Technologies**

- a. Activities have included: 1) Working with National Pork Board on guidelines for certifying that swine have been raised humanely, 2) preparation of an overview assessment of trends in the North American swine industry with focus on new facilities and operational technologies and costs, and 3) ongoing evaluation of livestock and greenhouse equipment and systems.
- b. Impact - Major national food retailers are strongly encouraging certification guidelines and programs to reassure consumers that animals used in food are raised humanely. Economic and technical ongoing assessment of livestock production technology is critical to industry health.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

**Beef Carcass Meat Affected by Age, Breed, Feeding Program, and Marbling EPD**

- a. Ninety-six individually-fed Simmental X Angus steers have been early weaned and placed on a finishing diet at approximately 90 days of age. The steers were fed a diet of whole corn, corn silage and a soybean meal based supplement. Ultrasound measurements for backfat, ribeye area and marbling have made at 60 day intervals. All cattle were harvested when they were approximately 14 months of age weighing 640 Kg. Carcass measurements have been taken as have steaks for tenderness evaluation. This data will be combined with a third years data to evaluate the effect of marbling EPD, days on feed, and corn price on the premium need to justify feeding cattle from the low choice to the average choice quality grade.
- b. Impact - If beef producers know how marbling EPD and carcass quality grade influence cost of production they will be able to determine the optimum amount of time to feed a given group of cattle. This information will help producers adjust their feeding practices based on cost of gain and the premiums available for average choice quality.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

***Key Theme: Food Safety***

**Sources of Genetic Resistance to Reduce Fumonisin in Corn-Based Food**

- a. We identified 29 unrelated inbred lines of corn that contribute high levels of resistance to Fusarium ear rot and production of the mycotoxin, fumonisin. The sources of resistance were identified by screening 1,589 inbreds crossed to the susceptible inbred line FR1064 which is widely used in numerous popular corn hybrids. The 29 inbred lines in F1 crosses were highly resistant in trials conducted in Urbana, Illinois where ears were inoculated twice with a mixture of isolates of *Fusarium proliferatum* and *F. verticillioides*. The F1 crosses also were evaluated in Ponzer and Winterville, North Carolina with natural infection that was severe. The resistant F1 crosses were re-evaluated this past summer as inbred lines per se, F1 crosses, the F2 generation and the back-cross susceptible generation. These experiments are being done in Urbana, Illinois and Hauptstadt, Indiana with double inoculations. From these studies we will identify the three or four sources of resistance to be used in studies on inheritance of resistance.
- b. Impact - This study identified resistance to Fusarium ear rot and production of fumonisin that is the first step toward developing resistant commercially-acceptable corn hybrids. Resistant hybrids offer an environmentally friendly and relatively inexpensive control of the problem. This research is important because of food safety concerns with fumonisin and potential regulation on the export and/or utilization of grain containing fumonisin.
- c. Source of Funding - NRI Competitive Grant, State
- d. Scope of Impact - National

**Food Safety and Food Preservation Teaching Contacts**

- a. Food selection, preparation, preservation and storage present food safety challenges. University of Illinois Extension is recognized by many consumers as a resource for answering questions and concerns relative to food safety and preservation. Annually, Extension personnel receive over 25,000 requests for help relative to food safety and preservation. Telephone interviews with samples of these consumers reveal that more than 95 percent of them adopt the practices recommended by Extension.
- b. Impact - Between 1999 and 2001, there have been more than 71,250 instances where consumers have used Extension to help them adopt food safety practices.

This understates the full impact of Extension on consumer food safety practices because it does not include the impact of circular letters, website information and group instruction in food safety by Extension staff and volunteers.

- c. Sources of Funds - Smith-Lever, State, Local
- d. Scope of Impact - Illinois

### **Commercial Food Handlers Need to Wash Their Hands Too**

- a. According to the National Restaurant Association, the average foodborne illness outbreak costs a single business \$75,000 including lost business, medical costs and litigation. As of 1999, Illinois requires certified food service sanitation managers to attend a minimum of five hours of training to retain their certification. In the past three years, 2,398 foodservice staff have been re-certified through refresher courses taught by University of Illinois Extension Educators. These courses have done more than meet a minimum re-certification requirement; over 79 percent reported improving one or more food handling practices as a result of the training. Since many establishments have only three or four certified employees, one can assume that this training has impacted about 475 establishments (assuming four persons trained are equivalent to one establishment.) Currently Extension Educators are training an average of 50 to 100 commercial food handlers per month.
- b. Impact – Over the past three years:
  - 1,894 food handlers improved one or more food handling practices
  - More than 600 food establishments maintain safer food handling practices

- c. Source of Funds – Smith-Lever, State
- d. Scope of Impact – Illinois.

### **Youth Cooking Schools**

- a. Cooking Schools have taught basic nutrition, food safety and food preparation to youth between the ages of eight and 12 years. Directed toward low-income youth, the educational campaign is conducted at no cost to the children.

In the past five years, more than 10,800 youth have participated in more than 500 schools; each school consisting of five half-days of hands-on educational activities.

Getting children involved with food is an effective way to improve eating habits and health. Hands-on cooking experiences can expose children to new foods, teach them about healthful eating



and develop their sense of self-efficacy. This experience increases the likelihood of a change to better eating habits. Plus, according to the young cooks, "It's lots of fun!"

Cooking Schools are a collaborative effort. For instance, a retired chef from Marriott donates his time at one site in Peoria. And all the programs have achieved a high degree of visibility and success in their communities.

Outcomes were determined by pre- and post-tests. After participation in the program, more children reported following safe food practices, preparing food items and selecting foods according to the Food Guide Pyramid. Typical outcomes (summarized across multiple sites and two years of pre- and post-tests) include: over 18 percent showed increases in knowledge about how bacteria can cause food poisoning. On average, 12 percent gained knowledge on how to avoid cross-contamination of food. In 1999, ten percent more could identify how to correctly cook ground meat in the post-test than in the pre-test. In 2000 more than 20 percent increased their post-test score in this area. The increase in youth who can correctly identify the number of servings of bread and cereals, fruits and vegetables and meat and meat alternates was statistically significant across sites and years. Youths showed a statistically significant average gain of two points on the post-test after the program. Over two-thirds (68 percent) showed a gain in post-test scores over pre-test scores.

- b. Impact – Sixty-eight percent of youth show gain in food safety, nutrition and preparation tests
- c. Source of Funds - Federal, State, Local
- d. Scope of Impact – Illinois

***Key Theme: Food Security***

**Food Security Local Collaborations**

- a. For the last 12-month reporting period, 71 of 76 local University of Illinois Extension offices reported establishing collaborations to address access to food issues with more than 1,060 other organizations and/or agencies or volunteer groups.
- b. Impacts - Collaborations developed with more than 1,060 cooperating agencies and organizations to meet local hunger needs
- c. Sources of Funding – Smith-Lever, State and Local
- d. Scope of Impact – Illinois

**4-H “Can” Make a Difference**

- a. For the third year in a row, University of Illinois Extension *4-H "Can" Make a Difference* food drive has been honored for Outstanding Leadership on Behalf of Those in Need as part of the Statewide Food Drive of the Year 2001 award, presented by the Illinois Food Banks/Second Harvest Network.

First Lady Laura Lynn Ryan served as the Honorary Chair of *4-H "Can" Make a Difference* food drive. The program has hundreds of corporate and organizational sponsors, including United Parcel Service, Illinois Agricultural Commodities Groups, Illinois State Police and Illinois Food Manufacturers. Also key to the success has been five years of Feeding the Hungry grants from Kraft Foods through the National 4-H Council.

- b. Impact:
- The 4-H efforts set a new record last year by collecting 166,000 pounds (83 tons) of food.
  - 213,000 hours of service on the part of youth throughout Illinois, as well as adult volunteers and staff.
- c. Sources of Funds - Smith-Lever, State, Local, Private
- d. Scope of Impact - Illinois

### **CSREES GOAL 3 – A Healthy and Well-Nourished Population**

The College of Agricultural, Consumer and Environmental Sciences is a world leader in the areas of human nutrition, the enhancement of naturally occurring food components which aid good health (functional foods) and in the development of commercial food processing techniques and food products. The College's research and outreach efforts span from basic molecular research to practical advice on good nutrition and food practices for consumers in Illinois and internationally.

The College's Research and Extension efforts also assist consumers and communities in issues of health care and creating and providing healthy environments through the adoption of good health practices including a balance between physical activity and a healthy, nutritious diet.

#### **Indications of the Scope of the Research and Extension Programs under Goal 3 - See Appendix A**

Last year the College of ACES had a total of 44 research projects relating to Goal 3. These efforts include almost nine scientist years and more than 34 staff years of technical and professional staff support. University of Illinois Extension had more than half a million face-to-face teaching contacts related to maintaining a healthy, well-nourished population. College and Extension WWW sites related to human nutrition received more than one million "hits" each month.

#### ***Key Theme: Human Health***

##### **Regulation of Phosphatase Expression and Impact on Body Fat**

- a. We have chosen swine as a model animal because: 1) leaner meat production is an important issue for pork industry, and 2) swine is a good model to study lipid metabolism of humans. Microarray techniques will be used to investigate gene expression patterns of insulin signaling pathway, glycolysis, fatty acid synthesis and fatty acid oxidation. We are currently adding more genes of interest to a microarray that already contains more than 3,000 genes. Differences in gene expression in fast/fed state and strains will be compared.
- b. Impact - Obesity is a growing health problem in the U.S. It would be our responsibility as agricultural/food research institutions to take action against this challenge by exploring better nutritional intervention and by developing food production technologies to meet the goal. Understanding basic regulatory mechanism of fat deposition will contribute to this purpose in two ways. First, it will increase the knowledge in nutrition to prevent obesity. Second, the same knowledge can be utilized for leaner meat production by animal industry.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

**How Natural Environments Enhance Human Functioning:  
Identifying the Mechanism**

- a. This project involves two lines of research testing for the mechanism by which exposure to "green" views and settings enhances human functioning. Three journal articles describing the findings were published in 2001, and one is in press. All four articles are in top journals in the area; three were accepted on first review. Two appear in highly selective Special Issues of their respective journals.
- b. Impact - Previous research has shown that regular contact with natural settings supports healthy human functioning. By identifying the mechanism underlying these impacts, this project should provide guidelines as to how often an individual should have contact with nature, the duration of exposure, and the forms of nature that would be optimal or sufficient for enhanced functioning. Initial findings suggest that even small, simple green spaces (a few mature trees with some grass) suffice for the effect, but that exposure should be frequent and perhaps extended (e.g., half an hour daily or more than once a day).
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

**The Role of Estrogen Receptor-A in Adiposity and Leptin**

- a. The regulation of fat deposition is not fully understood, though this process has major implications for animal and human health. In addition, there is substantial interest in manipulating the amount of fat (adipose tissue) in animals for economic purposes. The development of transgenic and knockout animals has enhanced our ability to understand how certain genes regulate growth, development, physiology and homeostasis. Our lab is using a knockout mouse that has been genetically altered so that it is missing estrogen receptor alpha. These estrogen receptor alpha knockout (ERKO) mice allow us to study effects of estrogen receptor alpha by comparing anatomical and physiological differences between ERKO and wild-type controls which exhibit normal estrogen receptor alpha expression. Our data indicated that estrogen/estrogen receptor alpha signaling is critical in female and male white adipose tissue. Recent results indicate that ovariectomy of ERKO mice alters the amount of fat, food consumption and adipose size. These mice lack ER, and only express ER. The ability of ovariectomy, and the effect of the decreased signaling through ER on adipose deposition in the ovariectomized ERKO

mice, suggests the ER also has an effect on fat deposition, though in the normal animal this effect is normally obscured by the more pronounced effects mediated through ER.

- b. Impact - Obesity is an increasing human health problem, and factors controlling obesity in food animals are also an important issue. Estrogen has been known to play a role in adipose tissue, but its important for male adipose tissue was not clear. Our results indicate that estrogen regulates adipose tissue in both sexes; in addition, our most recent work suggest both ER and ER have a role in the regulation of adipose tissue.
- c. Source of Funding - Animal Health And Disease, State
- d. Scope of Impact - National

**What is the Single Most Important Thing You Can do to Keep from Getting Sick?**

- a. According to both the U. S. Surgeon General and the Center for Disease Control, the single most important thing you can do is wash your hands. And wash them properly. University of Illinois Extension use a number of different programs to teach and reinforce proper hand washing. These are delivered through the Family Nutrition Program, in the Commercial Food Handlers Recertification Program and in school programs taught by volunteers.
- b. Impact - More than 35,343 school-aged children, homeless families, adults and seniors participated in more than one program on the importance of handwashing. Specific impacts included:
  - There has been a decline in absenteeism in schools from colds, flu and hepatitis A (schools get more funding when more children attend)
  - School staff report that more soap and paper towels are being used
  - People show up for programs and wash their hands before they help prepare or eat food
  - Teachers report that students ask to wash their hands before meals
  - There is a lot of singing heard in school bathrooms that lasts for at least the 20 seconds needed to get hands clean
  - Follow-up questions asked of school staff indicates that students are maintaining these habits

- Janitors who attend programs work to get warmer water in bathrooms, soap and towels
- Parents call local offices to thank staff for the clean hands habits that children are learning
- Clients can demonstrate properly how to wash hands

- c. Source of Funds - Smith-Lever, state, local
- d. Scope of Impact - Illinois

### **Dining with Diabetes**

- a. Illinois has the sixth largest prevalence of diabetes in the U.S., with approximately 567,000 adults having been diagnosed with diabetes. It is estimated that an additional 3 million people in Illinois are at increased risk of undiagnosed diabetes because of the risk factors of age, obesity, and sedentary lifestyles.

More than 1500 people with diabetes and/or their caregivers have participated in the educational series, Dining with Diabetes. All U of I Extension Nutrition and Wellness Team Educators have been involved in the state-wide implementation of this dynamic program. Not only have significant knowledge and behavior results been achieved, but coalitions have been forged with state and local agencies as well in order to improve the health and well-being of those with diabetes in Illinois.

Dining with Diabetes is a nutrition education program with cooking demonstrations for people with diabetes and their families. Extensively revised by Illinois Extension educators over the past 3 years, the 3 sessions plus a 6-month reunion meeting are designed to help participants better plan a healthy food intake, thus leading to better control of blood glucose levels. Each session includes tips for managing diabetes, cooking demonstrations, and taste testing of healthy recipes.

The goals of Dining with Diabetes include:

- Increasing knowledge of healthy food choices for the diabetic diet.
- Presenting healthy versions of familiar foods that are easy to prepare.
- Demonstrating cooking techniques that use new or more healthful ingredients.
- Encouraging behavior changes by providing tasting of healthy foods.
- Providing opportunities for participants to share and learn from one another.

- b. Impact - Overall, mean post-test knowledge scores have improved from 77% to 84% correct. There was significant improvement in

the participant's belief that they could overcome barriers to achieving a healthy diet. They also felt more strongly that there were benefits to their health if they maintained a healthy diet.

Impact on one lady as reported by Pam Jacobs, Unit Leader, Monroe County:

Twelve individuals attended the six-month Dining with Diabetes seminar reunion. The program had a great impact on one individual who shared the following information. At the beginning session, she was totally relying on a walker to get around. Six months later she is free of using the walker, she has lost 18 pounds and her doctor and nutritionist told her to keep following what she learned in this class because it was definitely making a positive change in her health.

She said,

*"This program really helped me understand how to prepare recipes which I can eat and how to take care of my diabetic condition." "The information helped me put it all together and it became clear to me what I need to do to take care of myself."*

Carol Schlitt, Extension Nutrition and Wellness Educator, was thrilled and said,

*"You made my day!"*

The lady, very serious, replied,

*"You made my life!!!"*

- c. Source of Funds - Smith-Lever, State, Local.
- d. Scope of Impact - Illinois

### **Walk Around Illinois**

"So far participants have walked the equivalent of walking around the boarder of the state 30 times!!!"

- a. Approximately 60% of adult Americans (20-74 years of age) are either overweight or obese. At least 13% of U.S. children are obese with many additional being overweight. A major cause of obesity and being overweight is a lack of physical activity.

Being overweight and obese increases the risk for hypertension, coronary heart disease, stroke, diabetes, and some cancers. In the U.S., three hundred thousand people die each year due to obesity-related causes

For these reasons University of Illinois Extension has designed a "Walk Around Illinois" program to encourage walking among all ages. The program is designed as a self-directed program where participants set their own goals and monitor their walking activity

using a pedometer supplied by Extension. The number of steps per week is recorded and reported to U of I Extension.

A small subset of the adult participants are participating in a research component of this program. Blood pressure, body weight, and percent body fat are monitored at baseline and at three months, six months, and one year into the program to determine program effectiveness.

- b. Impact - Twenty-five counties in Illinois are participating in “Walk Around Illinois.”

Since it officially began on 2/15/02, participants have counted their steps and so far have taken over 83 million. This means that Illinois residents have walked over 39,300 miles or about 30 times around Illinois.

Several counties have organized their own walking programs. Knox County has “University of Illinois Extension Walk Club” with over 1,000 participants.

Adams/Brown/Pike counties have the “Go Active!” program with over 1,400 participants. These programs and others like it provide encouragement and sustain the motivation of the participants through the use of newsletters with information on nutrition and wellness.

The main reasons participants give for participating in the Walk Around Illinois programs is to improve their overall health, control their weight and to look and feel better.

Participants have reported that wearing the pedometer and keeping track of their steps is fun and motivating.

Some report that as a result of participating in these programs they are eating healthier and have lost weight.

- c. Source of Funding - Smith-Lever, local
- d. Scope of Impact - Illinois

***Key Theme: Medicinal Plants***

**Factors Affecting Production of Phytomedicinal Chemicals by Plants**

- a. Studies were conducted on St. John's Wort (*Hypericum perforatum* L.) to examine how growth environment factors determine the level of hypericins produced in the leaves of this plant. The hypericins are a series of naphthodianthrone compounds that appear to have a role in plant defense and in the antidepressant medicinal action of this plant. It was found that a decrease in



nitrogen supply to St. John's Wort plants resulted in increased production of hypericins. Production of hypericins was also increased with an increase in light intensity. Using a leaf dissection technique, it was shown that hypericins are sequestered in the dark glands associated with the leaves. Elevation in light intensity but not decreased nitrogen supply increased the number of dark glands developed on the leaves. The effects of light intensity and decreased nitrogen supply on production of hypericins were shown to be independent yet additive physiological and biochemical processes.

- b. Impact - Understanding how the growth environment of medicinal plants influences production of phytomedicinal chemicals will lead to growth conditions for optimal production of these alternative crops. Determining the factors that control phytomedicinal chemical production in plants is also important for maintaining consistency in production of phytomedicines.
- c. Source of Funding - Hatch
- d. Scope of Impact - National

#### **Antimutagens and Anticarcinogens from Agricultural Processing By-Products**

- a. The objectives of this research are (i) to develop rapid mammalian-cell assays to detect antimutagens and cancer cell growth repressors, (ii) to chemically fractionate commercial processing by-products of soybean, (iii) to isolate biologically active compounds from these fractions and (iv) to chemically characterize the antimutagens and/or cancer cell growth suppressors.

We developed and calibrated a microplate assay which integrates measurements of cell metabolism, cell growth, cytotoxic/cytostatic mode of action, and cell cycle status. After incubating HT29 human colon cancer cells for 72 hours in a range of concentrations of soybean isoflavones, cell metabolism was measured in each well at 450 nm using the mitochondrial dehydrogenase-mediated reduction of the tetrazolium salt XTT to a water soluble formazan. After the microplates were rinsed, live cells from the same wells were stained with crystal violet and each well was analyzed for absorbancy at 595 nm. These data provided a direct measurement of cell density.

To determine whether a specific isoflavone at a given concentration repressed the growth of the cancer cells by a cytotoxic or cytostatic mechanism, the number of dead cells in each well were determined with a Coulter counter and the ratio of dead to live cells for the negative control and each treatment group were calculated. A ratio that differed from the negative control indicated a transition from cytostatic to cytotoxic effects. Cell

cycle analysis of the treated cells was conducted by immobilizing cells to microscope slides within an agarose gel, followed by lysing the cell membranes and staining the DNA with ethidium bromide. Analysis of the stained nuclei with a fluorescence microscope interfaced with a computer generated the optical fluorescence intensity of each nucleus. These data provided a distribution of the DNA content per nucleus and the cell cycle stages of G1, S and G2 could be determined after a histogram of the data was prepared.

We applied these new assays to the analysis of soybean fractions that contained isoflavones. Daidzein and glycitein were antimutagens against an aromatic amine carcinogen. Genistein, genistin, daidzein, and daidzin expressed cancer cell growth repression with  $IC_{50}$  values of 11.5, 18.1, 50.5, and 111.7 mg/ml, respectively. However, genistein expressed genotoxic activity in mammalian cells while a related compound, daidzein, was not genotoxic. At cytostatic conditions, genistein blocked the cell cycle of human colon cancer cells at the G2 stage while daidzein reduced the growth rate but did not block a specific cell cycle stage.

The data from these new assays indicate that commercial agronomic products and by-products may yield a wealth of commercially available antimutagens and anticarcinogens that may be suitable as chemoprotectant food supplements.

- b. Impact - We developed new assays to identify chemicals that protect mammalian cells from the DNA-damaging action of aromatic amine carcinogens and agents that repress the growth rate of human colon cancer cells.

Chemicals were isolated from a soybean commercial processing by-product that protected mammalian cells from induced DNA damage. Other agents were able to retard the growth of human cancer cells.

These data demonstrate that value-added compounds derived from commercial agronomic by-products have the potential of being developed into pharmaceutical agents.

- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

## **CSREES GOAL IV – Greater Harmony Between Agriculture And The Environment**

### **Indications of the Scope of the Research and Extension Programs under Goal 4 – see Appendix A**

Last year the ACES had 133 research projects under this goal involving more than 30 scientist years and more than 67 staff years of professional and technical support. During the same year, U of I Extension had over 175,000 face-to-face teaching contacts related to Goal 4.

#### ***Key Theme – Agricultural Waste Management***

##### **Farm and Watershed Level Policy Analysis: Agro-Environmental Implications**

- a. Research on two projects was undertaken. The first project examined the cost-effectiveness of alternative green payment policies relative to a least cost pollution tax. It also examines the implications of green payment policies for agricultural production. The green payment policies analyzed here are cost-share subsidies to share the fixed costs of adoption of a conservation technology and input reduction subsidies to reduce the use of a polluting input as well as a combination of the two types of subsidy payments.

Two versions of each policy are examined; one where entitlement is restricted to currently operating units and the other that allows unrestricted entry. We found that a restricted combined green payment policy, although second best to a pollution tax, does not impose significantly higher costs of abatement than a pollution tax policy. The restricted cost-share and the restricted input reduction subsidy are also similar in their costs of abatement and these costs are close to those with a pollution tax even at fairly high levels of abatement. However, an unrestricted cost-share subsidy leads to substantially higher costs of abatement as compared to the other policies considered here. While the unrestricted cost-share policy leads to the lowest level of gross social welfare it leads to the highest level of farm income.

The budgetary implication of alternative policies also varies, with the cost of an unrestricted cost-share policy being almost four times as large as that of an input reduction subsidy. Alternative types of green payment policies vary considerably in their implications for aggregate output. Unrestricted cost-share subsidy policies can have substantial effects on aggregate output that can influence the pattern of trade between countries. Thus they may not only be socially costly but also ineligible for green box exemption under the Uruguay Round Agreement.

The second research project examined the extent to which uncertainty about potential yields influences the value of site-specific technologies. The economic and environmental benefits of these technologies arise from two sources: information gathering and variable rate nitrogen application. Application of the model to fields in Illinois shows that the value of variable rate nitrogen

application is higher on fields with low average potential yields, high spatial variability, positively skewed potential yield distributions, responsive yield to nitrogen, and low uncertainty. Variable rate application decreases nitrogen use by reducing the extent of over-application. However, in the presence of uncertainty about potential yields, the incentives to over-apply nitrogen irrespective of the method of application, uniform or variable rate, can reduce the economic and environmental benefits of site-specific technologies.

- b. Impact - The results of the first project are useful to policy makers as they consider the design of green payment policies. They show that not all types of green payment policies should be eligible for green box exemption under the Uruguay Round Agreement. Some types of payments can have large impacts on agricultural production.

The second project shows the value of reducing uncertainty about weather and its impact on crop yields to farmers switching to variable rate nitrogen management. It also shows that the potential benefits of reducing this uncertainty should include both the private benefits for farmers and the social benefits of reduced nitrate run-off because in the presence of uncertainty farmers tend to over-apply nitrogen even with site-specific technologies.

- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

***Key Theme: Air Quality***

**Odor And Dust Control Technologies For Livestock Facilities**

- a. Previous reports have shown that wet scrubbers on swine building exhaust fans show a lot of potential to reduce dust and some gas emissions at relatively low cost. A new version wet scrubber was designed, constructed and installed on 36 inch fan on a swine finishing building. The new design better matches the water quantity and droplet size to the airflow and an elbow is used to direct the fan airflow upwards. The wet scrubber will eventually be combined with a chimney to exhaust the air approximately 10 meters above ground level. Effect of the scrubber on air performance of the fan was negligible. Studies on removal efficiencies of dust and ammonia are ongoing. Work to improve ventilation and environmental control continues through the Bioenvironmental and Structural Systems (BESS) lab. Most commercial fans used in U.S. agriculture have been tested and results are posted in [www.bess.uiuc.edu](http://www.bess.uiuc.edu). A particle image velocimetry method was developed to measure airflow patterns in rooms.
- b. Impact - Wet scrubbers for animal building exhaust fans will be a low-cost alternative for reducing dust and gas emissions. Improving

performance of ventilation equipment is reducing operating costs and improving animal environments.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

***Key Theme: Forest Resource Management***

**Developing Methodology for Assessing the Air Quality of a Process Forest Growth Model on a Spatial Scale**

- a. With the process model being used for this study, multiple variables are correlated with each other and are usually needed to be mapped jointly. Because of the variability of accuracy over space, spatially quantifying uncertainties of maps and identifying the main error sources are also necessary to provide useful information for reducing errors and risks in decision-making. However, the joint mapping and spatial uncertainty analysis are very difficult mainly because of interactions among variables and imperfection of existing methods. On the other hand, there is abundant evidence that considering interactions among variables and spatial information from neighbors can result in the improvement of maps. But, there are no methods available to assess the effect of interactions and spatial information.

This year we developed a remote sensing-aided method for that purpose. The method is based on the integration of joint sequential co-simulation with Landsat TM image for mapping and polynomial regression for spatial uncertainty analysis. The method was applied to the case study in Dixon Springs, Illinois. The results showed that in addition to unbiased maps, this method reproduced the spatial variability of the variables as well as the spatial correlation among them, and successfully quantified the effect of variation from all the components on the predictions from the gap model.

- b. Impact - Making predictions without analyzing the associated uncertainty may mislead decision-makers as to the quality and reliability of those predictions. Decision-makers should know up front about the errors and the causes of the errors. Errors and uncertainty will not disappear just because they are not assessed. Decision-makers who will be making decisions based on models with errors will only realize the errors after the decisions are already implemented. The purpose of this project is to develop methods for assessing uncertainty before models are used to make decisions.
- c. Source of Funding - McIntire Stennis Funds, Other Federal Funds, State
- d. Scope of Impact - National

***Key Theme – Integrated Pest Management***

## **Mosquito and Agricultural Pest Management in Riceland Ecosystems**

- a. Objective 1: To determine the best chemicals to use in riceland systems in terms of their providing maximum control of rice pests (esp. the rice water weevil) and riceland mosquitoes while causing the least amount of harm to non-target organisms. In collaboration with AR, (Meisch) it was found that *Bacillus sphaericus* provided 75% initial control of *Anopheles* larvae but gave no residual control and that *Psorophora* initial control was over 90% but gave no residual control. (See associated publication, Dennet et al below).

Objective 2: To determine the best nonchemical tactics to use in riceland systems to manage problems with rice pests, weeds, and mosquitoes. No investigations under this Objective.

Objective 3: To develop a database on the bionomics of rice pests, riceland mosquitoes and beneficial aquatic fauna coming to associate with harvested rice fields flooded during the winter. Investigations are ongoing to study biology, ecology and pathogen compatibilities of *Anopheles quadrimaculatus* and *Culex salinarius*. This is a long-term study and will continue throughout 2002 mosquito season in IL and AR.

Objective 4: To update and refine existing databases on the local distribution, genetic relationships and disease vector potential of mosquito species occurring in rice-producing areas of the U.S. Initial laboratory studies have provided results that indicated the reverse transcriptase (RT) - polymerase chain reaction (PCR) assay for detection of St. Louis encephalitis virus was validated for the detection of SLE and West Nile virus in both immature and adult stages. Planned field studies in rice and associated wetland are planned for the upcoming season (2002).

- b. Impact - Our research provides the expertise to investigate the potential risks of rice land mosquitoes to transmit pathogens to man and animals. This expertise in collaboration with other investigators aid in developing strategic plans to address management of mosquitoes using IPM methodologies. Also our research on the efficacy of natural products and microbial insecticides targeting mosquitoes and other arthropod pests of rice will provide environmentally safe products that still are very effective in killing mosquitoes.
- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project With AR, CA, FL, LA, TX

## **Development of Pest Management Strategies for Forage Alfalfa Persistence**

- a. We have been assessing invasion of alfalfa by the exotic pest, alfalfa blotch leafminer (ABLM), in collaboration with scientists from the Departments of Entomology and Crop Sciences at the University of Illinois, the Center for Economic Entomology at the Illinois Natural History Survey, and several Illinois IPM Extension Educators.

In 2001, two sampling efforts were undertaken, one in early May and another in late July. The first survey examined counties north of I-80, and the second survey inspected sites in 37 counties north of Champaign, IL. Two sites per county were randomly selected for sampling; samples consisted of randomly selecting 20 stems per site and collecting 10 sets of ten sweeps from each site. Plant samples were returned to the Illinois Natural History Survey for examination.

Plant damage was quantified as the number of trifoliates per stem with signs of leafminer damage, and the mean number of adult leafminers per 10 sweeps was estimated. The first set of samples has been processed and evidence of ABLM has been detected in 14 of the 20 counties that were sampled. Adult populations were highest in DeKalb, Stephenson and McHenry Counties, where the number of adult ABLMs peaked around 9-10 flies per ten sweeps. There was also a high incidence of adult damage in these counties, with 95% of stems displaying pinhole feeding at one site in Stephenson County. However, there were never more than 25% damaged trifoliates on a single stem at this site. Other sites had considerably smaller infestations, and no mines were found at any of those sites.

The second set of samples (collected in July) presents a different picture of the infestation. Half of the plant damage has been quantified, and the sweep samples are nearing completion. Only 4 of the 68 sites sampled show adult populations. These populations are in Stephenson, JoDaviess, Lake and Bureau Counties, and populations do not exceed 2 adults per ten sweeps. A larger proportion of the sites show plant damage, though we are still tabulating these data. It is unknown whether the dramatic decline in adult numbers is due to the normal phenology of the pest or whether other factors have contributed to a decline in the population.

A degree-day model has been developed and independently validated for ABLM, and we will retrospectively determine the phenological stage that ABLM populations were in during the two sampling periods. This, coupled with the stem samples, may shed light on the status of ABLM during the second sampling period. In addition to collecting pest data, we have collected parasitoids from the sweep samples to determine whether biological control agents may have accompanied the invasion of ABLM in Illinois. No *Dacnusa Dryas* have been found, and efforts to identify potential *Chrysocharis liriomyzae* are underway.

- b. Impact - Invasion by the exotic leafminer will impact alfalfa in Illinois and other Midwestern states, and affect persistence and yield

of the alfalfa stands. By assessing the pace of invasion of the leafminer and the delayed following by the parasitoids, we can see the process of pest increase after invasion and decrease after arrival of the parasitoids, demonstrating the value of the biological control agents.

- c. Source of Funding - Multistate Research Fund
- d. Scope of Impact - Regional Research Project With IN, KY, MD, MI, MN, MO, NE, NY, OH, OK, PA, SD, VA, WI, WY

### **Digital Imaging System Provides Answers to Plant Pest Problems**

- a. For both homeowners and professionals, fast and accurate answers to most plant and pest problems are available at University of Illinois Extension offices around the state. A wide array of Extension experts are linked directly to those offices through the Distance Diagnostics System.

Using the latest digital equipment, the staff at local offices can take high-quality images of the plant and pest problems. The images along with information about the problem are then submitted to the appropriate experts. Last year, more than 20 percent of the samples were diagnosed within two hours of submission and nearly 75 percent within 48 hours.

- b. Impact - In 2002, more than 700 people in every part of the state received answers to their plant and pest problems through the Distance Diagnostics System. This technology allows every Extension office in the state to have almost instant access to U of I experts.

Accurate identification of plant and pest problems permits the use of appropriate, environmentally-safe control measures.

- c. Source of Funding - Smith Lever, state, local
- d. Scope of Impact - Illinois

### ***Key Theme – Natural Resource Management***

#### **The National Atmospheric Deposition Program**

- a. NRSP-3, the National Atmospheric Deposition Program (NADP) provides quality-assured data and information on the exposure of managed and natural ecosystems and cultural resources to acidic compounds, nutrients, base cations, and mercury in precipitation. These data support research and informed decisions on air quality issues related to precipitation chemistry and are used by scientists, policy-makers, educators, and the public. The NRSP-3 provides a cooperative framework (SAES, universities, government agencies-



federal/state/local/tribal, non-governmental organizations) that supports 3 precipitation chemistry networks: the National Trends Network (NTN), the Atmospheric Integrated Research Monitoring Network (AIRMoN), and the Mercury Deposition Network (MDN).

On 12/31/01, there were 232 NTN stations collecting 1-week precipitation samples in 48 states, Puerto Rico, the Virgin Islands, and Quebec Province, Canada. The NTN provides the only long-term nationwide record of wet deposition chemistry in the USA. Complementing the NTN was the 10-site AIRMoN and 63-site MDN. Data from daily precipitation samples collected at AIRMoN sites support continued research of atmospheric transport and removal of air pollutants and development of computer simulations of these processes. The MDN offers the only regional measurements of mercury in U.S. precipitation. MDN data are used to quantify mercury deposition to water bodies that have fish consumption advisories due to this toxic chemical.

In 2001, 42 states listed such advisories, which also were issued for coastal ME, the Atlantic Coast from the VA-NC border to the southern tip of FL, and the U.S. Gulf Coast. NADP data (individual data points, seasonal and annual averages, trend plots, maps, reports, manuals) are available on-line at the URL, [nadp.sws.uiuc.edu](http://nadp.sws.uiuc.edu). In 2001, this site received nearly 43,000 unique visitors, a 7 percent increase over 2000. Site users logged more than 109,000 sessions, and the site received over 1 million hits for the first time in its history.

Since 1998, usage has increased by over 300 percent. Most frequently accessed data products continued to be color contour maps of pollutant concentrations and depositions. Site users viewed 88,367 maps in 2001 and retrieved 18,535 data files. User statistics show that researchers primarily use NADP data to study atmospheric deposition and watershed processes, as well as effects on aquatic and terrestrial ecosystems and cultural resources.

Universities account for 35 percent of NADP Internet site users, followed by federal agencies (21 percent) and public schools (18 percent). Research and educational usage have averaged 60 percent to 40 percent, resp. In a new application of NTN samples, scientists are measuring oxygen-18 and deuterium to evaluate the relative contributions of the Gulf of Mexico, North Pacific Ocean, and Atlantic Ocean as the water vapor sources leading to precipitation. An accessible database is being developed for the isotope research community using oxygen-18 and deuterium measurements from 80 NTN sites over 14 years. These sites will comprise the U.S. contribution to the Global Network for Isotopes in Precipitation.

- b. Impact - Using precipitation chemistry data from the NADP, researchers have calculated that atmospheric deposition of nitrogen represents 10 percent to over 40 percent of new nitrogen loading to some nitrogen-limited, eastern U.S. coastal waters.

- c. Source of Funding - Multistate Research Fund
- d. Scope of Impact - Regional Research Project With CA, CO, GA, IN, IA, KS, MI, MN, NA, NH, OH, PA, UT, VA

**Investigating How Competing Actors Claim Regulatory Gaps in the Privatization of Marine Fisheries: Lessons from South Africa**

- a. Concluded contract with the Environmental and Geographical Sciences Unit at University of Cape Town for research support services during field visits.
  2. Visited South Africa to interview artisan fishermen, corporations and administrators and collect archival legal data on fishing rights distribution patterns for the first phase of the policy renewal period 1994 to 2001.
  3. Transcribed field notes and analyzing data to determine how policy shifts from a community led, participatory process to a corporate-driven, bureaucratic model for centrally allocating fishing rights affect the constitutionally protected political imperatives for equity and sustainability in the fishing industry.
  4. Presented preliminary findings at 44th annual African Studies Association conference, Houston Texas and preparing a scholarly paper for publication in the 2002 Law and Society Review entitled Contested legalities: How post apartheid social coalitions in South Africa use law to influence fisheries policy outcomes.
  5. Preparing for follow up field trip to Cape Town, South Africa during summer 2002 by recruiting a graduate student from the Human Dimensions of the Environment focus area of the University of Illinois at Urbana Champaign to work on this program and preparing a research board funding proposal.
- b. Impact - This research will contribute to knowledge on how changing relationships between state, market and civil society caused by privatization processes influence fisheries policy arrangements in terms of policy coalitions, discourse, rules and resources. Practically, it is expected to impact how fisheries policy arrangements are institutionalized in the post-apartheid South Africa.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

**Genotoxicity of Low Level Agrichemical Exposure**

- a. Grey tree frog tadpoles were collected from five watersheds and used as biological indicators of the effects of agricultural practices on the environment of the watersheds. Tadpoles were transported to the laboratory and housed in tanks under controlled conditions until their nuclear DNA could be analyzed. Tadpoles were homogenized, and nuclei were isolated and stained with propidium iodide. The homogeneity of nuclear DNA was analyzed using an Epics XL flow cytometer. The coefficients of (CV) variation of the G1 peaks were then compared. Alterations in the cell cycle and chromosome integrity are among potential adverse effects environmental change can have on developing tadpoles and metamorphs. Whole cell clastogenicity was used to monitor changes in these parameters. An increase in CV is representative of an increase in the heterogeneity of nuclear DNA. Genotoxic substances have been shown to increase the heterogeneity of DNA within a nucleus. Tadpoles from sites 1A and 1B had the largest CVs. These sites are from the same watershed. This watershed has the most potential for agricultural waste runoff. Indications are that some unknown factor in this agricultural waste runoff watershed is genotoxic to these organisms.
- b. Impact - Amphibians are valuable biological indicators of environmental change due to their aquatic development, emergence onto land enabling efficient examination, and essential roles in ecological functions. Amphibians can serve as good potential biological indicators of impact of agricultural practices on the environment.
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - National

### **IPM via Distance Education**

- a. IPM team members have moved the delivery of educational programs to a new level. An Insect Management Series, Weed Management Series and a Private Pesticide Applicator Training Clinic were delivered to clientele via the University of Illinois Latitude Bridge system.

The Weed Management Series consisted of three sessions: Weed Ecology/Biology, Mode of Action/Herbicide Resistance and WeedSoft. Two campus based IPM team members taught the three sessions. Seventeen local Extension offices, statewide, hosted the program with a total of 220 people participating in all three sessions.

The Insect Management Series consisted of three sessions: Insect Ecology, Use of Insect Ecology in Managing Urban Pest and Applying Ecological Principles to Manage Insect Pests of Field Crops. Three campus based IPM team members and one center based IPM team member taught this series. Twenty-three local offices, statewide, hosted the Insect Management Series and total number of participants for all three sessions was 227.

The third educational program offered via the Latitude Bridge was a distance Private Pesticide Applicator Training Clinic. This program was offered at four sites in Northern Illinois with 85 total participants. The program was taught by two center based IPM educators, one campus based IPM team member, two center based Crops Systems educators and one unit-based Natural Resources educator. An evaluation of this method of delivering Private Applicator training showed the average test score of participants for this delivery method of 86.4 with 93.2% of the participants passing the test and securing their Private Applicator license. This compares to a statewide average test score of 83.9 and 95% of participants passing the test to secure their license.

- b. Impact - Based on the score results of the PAT certification, it would appear this method of distance education is just as effective as face-to-face with program delivery costs reduced by removing both travel time and travel expense for presenters and participants.
- c. Source of Funding - Smith-Lever, state, local
- d. Scope of Impact - Illinois

#### **Retail Store Personnel Learn About IPM and Pesticide Safety**

- a. There were three meetings across the state to teach local store personnel about IPM and pesticide safety. The sessions took place in Quincy, Decatur, and Rockford, and were organized by the local county Extension offices. Each event offered training in pest identification, management suggestions and pesticide safety, and promoted University of Illinois Extension publications and the use of local resources, such as Master Gardeners, to aid the stores with their customer questions. Stores that sent employees to these sessions received a bag with the complete set of Illinois Natural History Survey insect identification cards, the “Home, Yard, and Garden Pest Guide” (circular 1374) and “57 Ways to Protect Your Home Environment (and Yourself)” (NCR pub.583). Participants had ample opportunity to interact with the trainers, ask questions and try their skills at identifying “unknown” samples. This program is intended to promote pest management suggestions that include IPM principles in order to provide better customer service and environmental stewardship.
- b. Impact - Store personnel trained to provide better customer service and promote good environmental practices.
- c. Source of Funding - Smith-Lever, State, Local
- d. Scope of Impact - Illinois

#### **BugMasters Field Crop Scouting Program**

(This program also contains elements of Nutrient Management.)

- a. Crop protection chemicals are a major investment for growers, and a vital component in most farm operations. However, both agricultural and non-agricultural interests are critically examining the issue of pesticide use. Several weed and insect pests have developed resistance to currently used pesticides. Reports of pesticides in ground and surface water are making headlines. EPA is reviewing a number of pesticides for impacts to the environment, and some are likely to be removed from the market. Through the adoption of Integrated Pest Management, farmers can minimize the negative consequences of pesticide use, and can often increase returns by avoiding needless or uneconomical pesticide applications.

Efficient, economical, and sustainable use of agricultural fertilizers has also become a critical issue in modern crop production. Increasing fertilizer costs, especially nitrogen, make it necessary to optimize fertilizer use efficiency. Research shows that excessive rates of fertilizer application, coupled with improper application timing, are combining to create environmental problems as excess fertilizers enter surface waters and eventually accumulate in Gulf coast waters. Proper fertilizer management, coupled with effective soil erosion management principles, will greatly reduce the potential of negative environmental impacts and increase agricultural productivity.

## Educational Objectives

1. Improve general crop troubleshooting skills, review basic agronomic principles, and practice problem solving techniques for profitable and responsible crop management decision-making.
2. Acquaint participants with the principles of Integrated Pest Management, emphasizing proper identification, the use of economic thresholds, and alternative control techniques.
3. Improve participants' problem identification skills in the field where problems are likely to be encountered.
4. Acquaint participants with available references to assist in identification and evaluation of pest problems.

## Activity and Teaching Methods

Participants host workshops on their farms, with meetings held every two weeks beginning with the onset of corn emergence. The workshop begins with a brief lecture on the present stage of crop development, problems associated with this growth stage, and with current environmental situations. The group then goes into nearby fields and is assigned tasks, such as determining the average plant population of the field, or scouting for a particular pest problem. The group “troubleshoots” the problem with assistance from the instructor. This involves determining if the problem is pest, environment, or management related. If a pest causes the problem, then the pest must be correctly identified and, using economic thresholds as appropriate, the participants determine if control is warranted. Pest control includes chemical, as well as cultural, mechanical, and biological control options. If improper management, or adverse environmental conditions cause the problem, then the potential crop impacts of the injury and possible remediation is discussed.

### b. Impact -

- Participation per site ranges from 10-30 individuals per session.
- More than 400 individuals have participated in the program during the last three years.
- 400 (100 percent) of participants have indicated that they increased their knowledge through participation in the program
- 312 (78 percent) of participants have either newly adopted, or increased their use of crop scouting practices to make pest management decisions.

- The average participant scouted 730 acres of corn, and 740 acres of soybeans six times each season. This totals to 227,760 acres of corn and 230,880 acres of soybeans.

Participant Comments:

- *“I feel this is a very important management tool. While it is difficult to shut the tractor down [to attend], I feel in the long run it pays. Keep up the good work!”*
- *“Great course. There is strong support to continue with the program next year in our county.”*
- *“A great learning experience.”*
- *“These classes help keep the farmer up to par on new technologies and other ways to grow a better crop. Thanks!”*
- *“Our group would be interested in continuing throughout the season, without Extension personnel having to be present every time. With digital cameras and other technology, Extension could be consulted by phone, internet, etc.”*
- *“I decided to scout for cutworms rather than use an insecticide at planting. This resulted in a \$15/acre cost savings and reduced environmental impact because no insecticide was applied.”*

**Key Theme – Pesticide Application**

**Best Management Practices To Reduce Pesticide Runoff From Turf**

- a. Pesticide contamination of ground and surface water has been an important research area for the last 15 years. Turf is a unique agricultural system because of the continuous plant cover and high levels of surface organic matter. These factors tend to mitigate the potential for subsurface losses of pesticides; however, surface losses, i.e. runoff, may be significant from turfgrass areas. This project seeks to develop best management practices that may be used to reduce the amount of pesticide runoff from turf.

The project began during 2001 and most of our effort went into plot construction and testing. A total of twelve plots were constructed. Each plot measures 9.15 by 3.05 meters. The plots had an existing slope of 4-6 %, and were graded to a 5 % slope along the entire plot area. Grading was used to ensure a 0 % slope perpendicular to the 5 % slope face. Two irrigation systems were installed and each system can deliver 4.6 cm rain/hour. Thus, two storm intensities can be used, either 4.6 or 9.2 cm rain/hour. At the base of each runoff plot is a collection system that consists of a sheet metal funnel that channels all the water coming off each plot into a separate collection

pit. The collection pit contains a 40-liter stainless steel vessel to collect runoff. A sump pump was placed in the bottom of the collection vessel to continuously pump water into larger above ground containers.

One study was conducted during late August of 2001 to test the system and examine the effect of clipping removal immediately after applying pesticides versus clipping return. Ten of the twelve plots worked flawlessly, but the other plots did not produce acceptable quantities of runoff. Further engineering of those plots was necessary. Samples collected from the ten properly functioning runoff plots are being analyzed.

All twelve runoff plots should be fully functioning during 2002 when a number of experiments are planned. We will test the effect of clipping removal versus return, length of time between application and runoff event, and the effect of post-application irrigation on the amount of pesticide runoff from a subsequent runoff event. In all tests, three pesticides will be used with widely varying water solubilities. Pesticides classified as water soluble, sparingly soluble, and water insoluble will be used in each experiment to better understand how the nature of the pesticide affects runoff results.

- b. Impact - This project is designed to determine which management practices can be utilized by turf managers to minimize pesticide runoff that can occur during runoff events. Pesticide runoff is a concern for turf systems and has been shown to occur under a variety of conditions.

This research attempts to develop strategies for minimizing pesticide runoff during runoff events. Further, the nature of the pesticide will also be investigated to determine whether strategies may be have to be modified based upon the water solubility of the pesticide being employed. This project will provide useful information to turf growers on measures they can utilize to reduce the amount of pesticides leaving their site.

- c. Source of Funding - Hatch
- d. Scope of Impact - National



***Key Theme – Riparian Management***

**Long-Term Ecological Processes In Riparian Forests**

- a. Phenological and productivity measurements continue on more than 20 permanent sites on the Kankakee, Illinois, Mississippi, Wabash and Ohio Rivers. Results are being summarized for this 23-year data set to evaluate the impacts of land use changes on productivity and to compare phenological events and bottomland productivity on a latitudinal gradient from northern Illinois to Tennessee. Additional plots were established this past year in a mature bottomland forest on the Wabash River in southern Illinois to quantify litterfall patterns and nutrient dynamics as part of a long-term study in the eastern mixed mesophytic forest.
- b. Impact - Knowledge of wood production and biological processes in streamside forests provides important information for better management of these forests for private and public landowners.
- c. Source of Funding - McIntire Stennis, Other Federal Funds, State
- d. Scope of Impact - National

***Key Theme: Soil Erosion***

**Extension Seen as Number One Source of Information in Making Equipment Decisions Related to Adoption of Strip-Till and No-Till Systems**

- a. Eight hundred forty-nine producers in 43 Illinois counties received surveys about using strip-till bars. The survey was conducted by Soil and Water Conservation Districts, Natural Resource Conservation Service and the Illinois Department of Agriculture. Surveys were returned by 459 producers for a return rate of 54 percent.
- b. Impact - Extension was ranked as the number one source of information when making a new equipment decision. Extension ranked higher than farm magazines, Soil and Water Conservation Districts, implement dealers and even other farmers' experiences.
- c. Source of funding (for educational programs in this area) - Smith-Lever, Hatch, State, Local
- d. Scope of Impact - Illinois

## **Tillage Seminars**

- a. Best management practices are critical to limiting soil erosion and preventing water problems. Regional tillage seminars are held annually through out Illinois. Over the past three years more than 740 participants have attended. Typically three-fourths of the participants are farmer owner/operators.
- b. Impact - Typical results are that all participants rate the seminars as “good” to “excellent.” All will rate the program as useful to very useful. Evaluation at one site this past year found that 57 percent of those attending were new attendees.
- c. Sources of Funding – Smith-Lever, State and Local
- d. Scope of Impact – Illinois

## ***Key Theme – Soil Quality***

### **Soil Invertebrate Abundance and Occurrence in Relation to Management and Soil Factors in Illinois**

- a. Processes important to the functioning of soils are mediated by living organisms that belong primarily to the soil decomposer food web. Many other inhabitants of the soil and soil surface play important roles in the plant-based food web; they include plant pests as well as natural enemies of these pests. In agricultural systems, the choice of management practices may influence soil dwelling invertebrates and the processes they mediate in unknown ways. Concern has been expressed about the potential for unexpected environmental impacts resulting from the widespread production of transgenic crops, such as corn engineered to express the insecticidal endotoxins of the bacteria *Bacillus thuringiensis*.

A replicated plot study initiated in 2000 was continued to investigate the potential influence of Bt endotoxin (Cry1Ab, Cry9C and Cry3Bb) expression in corn plants on soil invertebrate communities and decomposition, and to compare this to the influence of a standard insecticide program for control of European corn borer (*Ostrinia nubilalis*) and corn rootworms (*Diabrotica* sp.).

In 2001, the hybrid expressing Cry9C was not grown. Litter bags containing a common substrate (wheat straw) were buried in each of the plots to assess treatment effects on decomposition rates and decomposer microarthropod assemblages. Litterbags containing either leaves or stalks of corn expressing these endotoxins, as well as leaves or stalks from comparable non-transgenic corn lines were buried in one plot (no insecticide, no Bt-endotoxin expression) to assess the influence of crop residue quality on decomposition rates

and microarthropod succession. All litter bags from 2001 have been retrieved and partially processed.

After crop senescence and just before harvest, earthworm populations were sampled in each of the plots by formalin expulsion. Analysis of 2000 decomposition and earthworm data was completed. No evidence was found that decomposition was influenced by insecticide treatment, corn hybrid or the expression of endotoxins, but data were variable with proportions of litter remaining at the end of the incubation period varying by a factor of up to 5. Corn leaves decomposed more rapidly than corn stalks. Numbers and biomass of earthworms, both by species and in total, were not influenced in 2000 by insecticides (ANOVA). Numbers of total earthworms and of *L. terrestris* were influenced in 2000 by corn type, but this could not be attributed to the expression of endotoxins (ANOVA). Mass abundance of *L. terrestris* was reduced about 40% by the expression of Cry1Ab endotoxin (ANOVA).

Analysis of community and population structure of earthworms (the latter defined by size classes) using analysis of similarities (ANOSIM) revealed differences between blocks and insecticide treatments, but no clear effect of endotoxin expression in corn could be identified. Differences due to insecticide treatment were attributable to higher numbers of *L. terrestris* in smaller size classes in insecticide treated plots. Insecticide treatment may reduce predation on earthworm juveniles or cocoons.

- b. Impact - Important soil processes, such as decomposition, nutrient recycling and soil formation, are mediated by soil organisms. Specific information of the distribution of soil invertebrates and of the influence of environmental factors and management practices on their populations will guide management to optimize their beneficial effects, and contribute to the development of methods for their use in monitoring soil conditions.

This study will provide information on the influence of Bt-transgenic corn production, hybrid selection and corn insecticides on soil invertebrates and crop residue decomposition, and help

assess the relative ecological risks of alternative management strategies.

- c. Source of Funding - Hatch
- d. Scope of Impact - Illinois

*Key Theme – Water Quality*

**Outcomes of Nitrogen Fertilizer Management on Tile Drained Watersheds**

- a. This project is now well underway. Farmers were signed up for the past crop year, with about 40% of corn acres enrolled in using nutrient management programs that we believe will reduce use of nitrogen fertilizers. We hope to document a concomitant improvement in river nitrate concentrations. Therefore, we conducted field sampling of rivers draining each of the treatment and control watersheds. River samples are collected at least weekly from each watershed, with more intensive sampling during events. Precipitation and climate data are being collected for each watershed. Modeling work is just getting underway, with various models being examined to see which can best be used on these tile drained watersheds. We plan to have materials available for extension aspects of the project during the next year.
- b. Impact - The impact of this project may be significant in influencing producers to add less nitrogen fertilizer to their corn acres. This could greatly reduce the loss of nitrate through tile drainage lines, improving local water quality as well as reducing exports of nitrogen to the Gulf of Mexico, where hypoxia occurs.
- c. Source of Funding - NRI Competitive Grant, State
- d. Scope of Impact - National

## **CSREES GOAL 5 – Enhanced Economic Opportunity and Quality of Life for All Americans**

Goal 5 parallels the mission of the College of ACES which is: “To enhance the quality of life for people and communities through teaching, research and outreach programs focused on human activity, food, fiber, and natural resource systems.

### **Indications of the Scope Research and Extension Programs under Goal 5 - See Appendix A**

The College has 48 research projects under Goal 5 which involve more than 15 scientist years and almost 28 staff years of professional and technical support. University of Illinois Extension has almost one million face-to-face teaching contacts classified under this goal.

### ***Key Theme – Agricultural Financial Management***

#### **Market Risk Management, Information and Price Relationships: Illinois Commodities**

- a. The Illinois Resource Allocation Model (IRAM) was updated by re-estimating the demand and supply econometrics and updating the data used in the optimization program. The model was used to assess income implications of Farm Bill proposals. A VaR model was used to test the performance of alternative volatility forecasts for fed cattle, feeder cattle, and corn prices. VaR was also used to estimate optimal hedges in the soybean complex, and to identify factors influencing Illinois elevator bid prices for corn. Work continued in the area of evaluating market advisory services through the AgMAS project. Findings and reports are of considerable interest to producers, lenders and agribusinesses.
- b. Payment and production implications for Illinois and Midwest farmers of Farm Bill proposals from Combest, Harkin, Lugar, and others were estimated and reported during the fall of 2001 to lenders, agribusinesses, and farmers to help them with their decision-making and forecast processes. Agricultural firms can use the Value-at-Risk technique to effectively assess risk exposure, optimal hedges, and determine which instruments of risk management to use. Behavioral models can be use to identify those factors affecting whether farmer-hedgers use the futures market or not. The AgMAS results suggest that 1) services as a group have not provided advice that resulted in an average corn price above the average market price, 2) services as a group provided advice that resulted in an average soybean price marginally above the average market price, 3) services as a group provided advice that resulted in an average wheat price below the average market price, 4) performance of an individual advisory service from year to year is not predictable, and 5) the marketing

style of services varies considerably, but is somewhat consistent from year to year.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

### **Economic Performance Of Market Advisory Services**

- a. Data on corn, soybean and wheat marketing recommendations of advisory services was collected for the 1995/1996 through 1998/1999 crop years. The returns to the recommendations were calculated as a weighted-average net price that would be received by an Illinois producer who precisely follows the marketing advice. Analysis indicated a modest ability for advisory services to outperform the soybean market, with thirteen of nineteen services evaluated for all four years having a four-year average soybean price that exceeded the average benchmark price. The same services demonstrated less ability to outperform the corn market, with only ten of the services yielding a four-year average corn price that exceeded the benchmark price. The services demonstrate significant under-performance in the wheat market, with only two of eighteen services tracked for all four years yielding a four-year average wheat price that exceeded the average benchmark price.

There is little evidence that pricing performance is predictable from year-to-year and services that do outperform the average benchmark over time demonstrated more risk than the benchmark price. Finally, a survey of Illinois market advisory service subscribers indicates that only about ten percent of producers follow an advisor's recommendations precisely. The results of the project address one of the major price risk management challenges of corn, soybean, and wheat producers. The results are of particular value to small- and medium-sized producers who may lack the resources to develop the comprehensive price risk management tools and strategies necessary to remain competitive.

Perhaps the best statement regarding the benefits of the project were provided by a market advisory service, who commented: Doane endorses the AgMAS effort. The unbiased, third-party evaluation promises to bring increased accountability to the industry. Over time, we believe that the unbiased evaluation of Doane and our competitors will force the industry to perform more effectively. Farmers will be the winners. The results of project research have been widely disseminated to the public. Future work on the project will focus on defining the marketing style used by each advisory service and the construction of optimal portfolios of services.

- b. The project website <http://web.aces.uiuc.edu/farm.doc/agmas/index.html> is a popular destination for producers interested in marketing research. For example, since the release of 1998 pricing performance results for corn and soybeans, over 7,000 copies of the report have been downloaded from the project web site. According to data from the Social Science Research Network (<http://www.ssrn.com>), this number of downloads is in the top ten for all academic finance and economics papers available on the web. In addition, a number of articles about the research appeared in the farm media. Articles featuring project research have appeared in Successful Farming, Farm Journal, Prairie Farmer, Top Producer, High Plains Journal and numerous other farm magazines and newspapers. Finally, the research results have been presented at more than twenty outreach meetings.
- c. Source of Funding - CSREES Special Grant
- d. Scope of Impact - National

***Key Theme - Character/Ethics Education***

**How Character Counts Changed Wanless Elementary School**

- a. During the spring and summer of 2001, Wanless faculty received training from University of Illinois Extension and Josephson Institute of Ethics. During 2001-02 school year Wanless Elementary School began teaching and living the Character Counts! model. This model encourages all faculty and staff to use the Six Pillars of Character (trustworthiness, respect, responsibility, fairness, caring, and citizenship) in every aspect of student life.

The Six Pillars of Character greet you as you enter the front door with a sign above that door. The pillars are also found on assignment banners in the hallway, a mural on one hall's wall and posters in each classroom. The teachers involved older students in molding the character of all people at the school. Each pillar is introduced via an all-school assembly. One assembly featured the teachers, but the fourth and fifth grade actor's club provided the other five skits or sketches to help explain each Pillar. Deb Rudis, speech pathologist and Actor's Club sponsor, explained that her goal for Actor's Club was to provide a way for students to learn a bit about acting and to help them understand the Six Pillars. That goal was far surpassed! Mrs. Rudis claimed that, "Several of the students were headed down the wrong path when we started the year. However, it was quite amazing to see each student begin to live the Six Pillars of Character. They modeled responsibility by having their lines memorized. It was evident that they developed a true sense of respect and concern for others that was not necessarily visible prior to Character Counts. One student demonstrated the pillar of fairness, claiming that, 'It wouldn't be fair for me to have the lead again.'"

Teachers choose how they reinforced each Pillar's meaning for his/her students. Some use lessons from "Exercising Character", "Exercising Character in Schools", or "Character Critters." These lessons include games and hands-on activities. Assignments that feature the Six Pillars are often attached to the hallway banner for that specific trait. This strengthens the student's understanding of words they see each day. The final awards assembly included not only math, science, music, and sports awards, but awards for trustworthiness, respect, responsibility, fairness, caring, and being good citizens.

b. Impact -

Character Counts helped Wanless because there were less fights. (5<sup>th</sup> grade)

Fairness has changed me because I play by the rules. Also I take turns and share. (3<sup>rd</sup>/4<sup>th</sup> grade)

Character Counts has really helped me to get through a lot of hard times this year. It has also helped others deal with the 9/11 tragedy. (5<sup>th</sup> grade)

It has helped our school so much that people are respecting other people like we are supposed to. (5<sup>th</sup> grade)

Now there's less littering on school property. More parents help out at school and respect each other and classrooms . . . now at home everybody shares something they get. No one argues. It's pretty cool at home now. (5<sup>th</sup> grade)

A lot of people are trustworthy, they don't lie when they are asked a question, they sometimes have the courage to do the right thing, but not always (WOW! true honesty). They are also respectful, they follow the golden rule, they don't hit or hurt anybody, they treat people like they want to be treated. (4<sup>th</sup> grade)

Students are nicer and the adults are nicer, too. (4<sup>th</sup> grade)  
Character Counts has made Wanless the best school . . . Say like someone who hates you and comes up to you and says "I'm sorry for calling you names and being mean, too. Yow! Let's be friends."

People in Wanless turn in things to the lost and found, raise their hand instead of yelling out, are patient and don't interrupt others, kids wait quietly in line, and say please and thank you. (4<sup>th</sup> grade)

c. Source of Funding - Smith-Lever, State, Local

d. Scope of Impact - Illinois

***Key Theme - Child Care/Dependent Care***

**Caregiving Relationships: For People Who Care For Adults**

a. *It's early spring 2002 on a cold Saturday afternoon. Two women*



*have just entered the conference room of a neighborhood public library on the southeast side of Chicago. The younger woman patiently guides the older woman to two seats in the back. She reaches into her tote bag to retrieve an orange that has been carefully peeled and sectioned. She begins to hand the older woman the orange, section by section. Her task is tedious. The older woman is quite messy as she eats which necessitates that the younger women be diligent with the napkins she finds in her tote bag. As each section of the orange is passed to the older woman, she gives little recognition of it except to place it in her mouth and begin chewing. One of the times though, she responds uncharacteristically. As the older woman receives the orange section, she smiles and says, "Thank you." The younger woman puts her arm around the older woman, smiles and says, "You're welcome, Mama." Once the program begins, the younger woman introduces herself by saying, "Hi! My name is Beulah and this is my mom. She's 94 years old and I take care of her."*

Beulah came to the program as did the other participants because they are caregivers for adults. Some are professional caregivers but many are family members caring for loved ones. The people in that library conference room are not unusual. As a result of the fact that Americans are living longer, more and more adults find themselves caring for another adult. The number of adult caregivers is steadily growing and as the "baby boomer" generation ages, the number of adult caregivers will continue to rise.

The University of Extension Family Life Team in response to the growing number of Illinois adult caregivers and their need for education developed the program, "Caregiving Relationships: For People Who Care for Adults". It was developed after consultation with caregivers and the agencies that serve caregivers to determine what educational needs caregivers had. It was determined that what caregivers most needed was education designed to help reduce and to help them respond to the emotional pressures associated with caregiving. These emotional pressures related to the stress of caregiving include guilt, grief, dealing with losses, anger, and frustration. For example, caregivers report frustration with the lack of respite care, changing roles, difficulty working with professionals, and conflict with family members. The goals of helping caregivers with these pressures are the prevention of elder abuse and the strengthening of the relationship between the caregiver and the care – receiver.

The education provided in the six session program "Caregiving Relationships: For People Who Care for Adults" is appropriate for delivery to the caregivers themselves (as was Beulah's experience) or because caregivers are often too busy to attend classes, for delivery to those who work with caregivers. Especially unique to the written materials included in the educational program are easy to read, easy to reproduce brochures that can be used one – on – one with caregivers at a time convenient to them.

- b. Impact - Since the printing of the curriculum in late 2001, educators have used it in teaching workshops to social service providers, university graduate students, mental health professionals, over 60 staff members of area agencies on aging, participants attending caregiver symposiums, and delegates at the Governor's Conference on Aging. To date, more than 800 individuals have been introduced to the program. The response to it has been overwhelmingly positive. Professionals who work with caregivers have responded that:

*"I can really use this when I am working with families."* - Minister.

*"The brochures will be good to give families of our residents."*  
Nursing home chaplain

*"This is very useful material. We want to have you come and train our volunteers."* - Hospice director

While it is significant and gratifying to note how valuable professionals find the education available through "Caregiving Relationships: For People Who Care for Adults," it is the response of adult caregivers such as Beulah and others like her who embrace the education that really capture its impact.

As the Saturday afternoon program at the public library came to a close last spring, Beulah began the process of readying herself and her mother for the return home. She dutifully disposed of the trash the snack of orange sections had created and gently dressed her mom to face the outside cold. As she worked, she politely motioned to the Family Life Educator who had facilitated the afternoon's program. When the Educator reached her, Beulah grasped the Educator's hand and said with tears in her eyes,

"You know, sometimes this is such hard work that I just don't know if I can do it one more day and then God sends me some help. Today helps, the pamphlets help and you're the angel who helped."

## ***Key Theme – Community Development***

### **Neighborhood and Community Factors, Social Support Networks and Preschool Children's Socio-Emotional Development**

- a. Data were collected on preschool children and their families to parallel data collection efforts over the last four years. Participants were children who were attending the university affiliated Child Development Lab (CDL) as well as preschools in two rural Illinois communities. We have used a multi-informant, multi-method approach to obtaining data on children's social adaptation and family process. These data have included classroom observations of children's behavior, social network and support interviews, and sociometric interviews of peer acceptance. Teachers also rated children's behavior using two standard social behavior rating scales. In addition to classroom data collection, families

participated in laboratory procedures, home visits and completed questionnaires regarding parenting beliefs and social resources.

The combined dataset is currently being assembled and analyzed. Several findings contribute to the literature on family/peer relations. How children perceive their social environments and social supports is significantly related to their social competence in the classroom setting. Furthermore, the quality of parent/child interaction assessed in the home and characteristics of the neighborhood/community context in which families reside influence children's socioemotional development. Finally, the ways in which parents structure their conversations with their children about past events is related to the quality of the parent/child relationship and children's social problem-solving skills.

- b. These data highlight multiple factors in different developmental contexts (family, community, classroom) that support the healthy development of children and families. These data served as an empirical base for a grant proposal examining how children construct beliefs about parent and peer relationships.

This four-year longitudinal project was funded by NSF's Children's Research Initiative. The information obtained from this project is valuable for both parent and teacher education programs that promote the well-being of children and families. Additionally, workshops will be conducted with child-care teachers that focus on issues defined by the teachers as important in their centers. Finally, this project has served as a valuable research experience for over 60 undergraduate students since its conception and as the basis of a thesis for one doctoral student.

- c. Source of Funding - Hatch, State
- d. Scope of Impact - National

## **Community and Citizen Reaction To Large-Scale Swine Facilities In Illinois**

- a. The objective for year four (the upcoming year) was to balance the objections raised in newspaper articles about the potential problems associated with building large-scale swine facilities with a survey that indicated the perceptions of actual problems from farmers, nearby residents, zoning officials, journalists and activists three years after initial news coverage. Due to an advance in monies which temporarily covered expenses prior to the Year 4 granting period, the survey data collection was completed -- with an extremely high response rate of 72 percent -- and the data coded and cleaned. As of September 25 the initial runs on frequencies have been done and we are currently working on a report to stakeholders.
- b. There is a significant difference in perceptions of both problem and importance of agriculture between farmers and other community residents. There is an underlying reservoir of resentment toward large-scale hog farms on the part of many residents, or - at least - that residents are significantly more willing to believe that there are associated problems with large-scale swine farms than farmers.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

## **Festivals and Special Events Workshops**

- a. Festivals, fairs and special events are "big business" in many communities. They offer the citizens and visitors alike, the opportunity to celebrate, preserve local culture and "showcase" the community as a means of attracting visitors and businesses to the area. Throughout Illinois there are literally thousands of special events that are held annually. These festivals, homecomings and special "holidays" generate hundreds of thousands of dollars into the host communities and help promote the community to future investors.

Special events like fairs and festivals are a cause to celebrate and most are the result of endless hours of effort by volunteers and organizations that help plan, promote and carry out the event. Until now, there have been few opportunities for these volunteers to learn more about "how to do the job better" except by trial and error and word of mouth.

Workshops are jointly sponsored by University of Illinois Extension, the U of I Department of Leisure Studies, Illinois Regional Tourism Development Councils, local Convention & Visitors Bureaus, Western Illinois University's Recreation, Park and Tourism Administration, the Illinois Arts Council and the Two Rivers Arts Council.

Over 2,000 individuals from throughout the state have participated in one or more of the Festival & Special Event Managers Workshops since 1992. During the summer of 2002, the U of I Extension Program Planning and Assessment unit conducted a mail survey of participants in workshops held between 2000 and 2002. A total of 198 participants were included in the survey. Eighty-eight questionnaires were received for a response rate of 47.8 per cent.

- b. Impact - Based on information gained from participation in the workshop: 65% of respondents indicated the following areas of change.
  - 45% made changes in event planning;
  - 39% made changes in marketing;
  - 37% made changes in how they go about building community support;
  - 31% made changes in their use of the Internet for Marketing;
  - 28 % made changes in their approaches to Grant Writing and Sponsorship;
  - 20% noted expansion in their use of volunteers.

Participants noted a great deal of information sharing with others following the workshops, 82% of respondents indicated that they had shared information gained from the workshops with others: 57% shared information with local government officials, 40% shared information with either Chambers of Commerce or Convention and Visitors Bureaus; 29% shared information with service organizations; 25% shared information with economic development organizations; 20% shared the information with businesses and the media.

Respondents were asked to indicate the number of people they shared information from the workshop. The number receiving the information ranged from 0 to 300, the average numbers was 26 and the total was 1,710.

86.4 % said they would recommend attending the workshop to other people.

- c. Source of Funds - Smith Lever, State, Local
- d. Scope of Impact - Illinois

## ***Key Theme – Family Resource Management***

### **A Five-Year Study of the Impact of Welfare Reform on African American Families and Children in Chicago**

- a. The project began on October 1, 1999. During this third year of investigation, progress has been made in several key areas: 1) Continued biweekly and monthly visits with families; 2) Continued observation of target family members in home and neighborhood settings; 3) Continued interviews with target family members on key topics (e.g. family life, welfare reform); 4) Ongoing qualitative data analysis of field data (e.g. interview and observational field notes); 5) Development of inductively-derived theoretical models concerning family processes and economic change for further exploration. The preliminary findings suggest variations in how women are coping with welfare reform. Some women are making the transition to economic independence through employment, while others are not. Several issues remain unclear: What differentiates women who find employment and how employment fully impacts adult and child well-being.
  - b. Impact - This study should provide insights for policy makers concerned with welfare reform and the well-being of families and children. Key insights will include: 1) What are the characteristics of poor families with children who will be affected by welfare reform? 2) How effective is welfare reform--have its goals been achieved? 3) What are the effects of reform mandates on adults and children? 4) How can welfare reform be targeted to the variable needs of families?
- c. Source of Funding - Hatch, Other Federal Funds, State
- d. Scope of Impact - Illinois

### **All My Money**

- a. Many community social service organizations use money management educational curriculum to teach low-income audiences how to use and manage their resources. Many adults need to learn basic skills in areas such as how to save money and use a checking account.

University of Illinois Extension developed a curriculum, All My Money, for social service organizations in Illinois to use with their clients. The eight lessons include topics on making spending choices, envelope budgeting, planning spending, understanding credit, handling credit problems, building consumer skills, taking consumer action, and checks and checking accounts. The curriculum is available in both English and Spanish. A resource box included in the curriculum contains play money, spending choices game cards, an emergency buying card to carry in your wallet, bank statements, checkbook registers, and other tools for teaching money

management.

- b. Impact -Using the conservative assumption that, on average ten clientele were reached by each of the 540 agency personnel receiving training, 5400 individuals and families have received the training. (Note some agency personnel have reported reaching hundreds of clients.)

To help assess the impact of the program on program recipients, agency staff were asked to forward evaluations completed at the last session of the program. To date, 19 agencies have returned client evaluations. Eighty six percent of clients said their ability to manage money had improved.

Fifty two percent reported that they often or almost always ran out of money before the program, only nine percent said they would after the program.

Before the program, only 32% said they often or almost always talked about money with family compared to 57% after the program. Thirty two percent of participants said they often or almost always paid bills late before the program. That figure decreased to just 11% percent after the program. The proportion who said they often or almost always compare prices and quality before buying (60%) increased to 84%.

Impact on agency staff - Agency staff completed the same evaluation when they finish their training. Evaluations from 540 staff members have been tabulated. While their money management and consumer behaviors were already stronger than clients before their training, 91% said their ability to manage money had improved. The proportion of agency staff who ran out of money often or almost always decreased from 18% to four percent. Those who talked with family about money nearly doubled, from 38% to 72%. The proportion who ever paid bills late (sometimes, often, or almost always) dropped from 45% to 16%.

- c. Source of funds - Smith-Lever, State, Local
- d. Scope of Impact - Illinois

### ***Key Theme – Impact of Change on Rural Communities***

#### **Rural Visions: Townships Shaping the Future**

- a. Rural Visions was a collaborative effort of Township Officials of Illinois (TOI) and University of Illinois Extension. This series of programs was designed to build a base of information about current programs and services of rural townships, document their successes, and discern areas where improvement was needed.

Specific Objectives of these Rural Visions meetings were:

Examine township services in light of demographic and technological changes  
Identify what programs and services offered by rural township governments were working effectively and efficiently  
Identify programs and services that were not operating well, and identify ways to improve their effectiveness  
Identify new services or programs that townships would like to develop.

The project involved 27 four-hour meetings around the state, where Extension staff and TOI personnel met with elected township officials from rural townships.

During the meetings, officials reviewed current demographic trends in their area. They met in small (facilitated) groups to discuss what was working in their townships as well as problems they were experiencing in carrying out their responsibilities. Through this process, participants also learned how officials from other townships carried out their responsibilities and developed strategies for change.

- b. Impact - Interestingly, for many officials, an important benefit of these discussions was this opportunity to share accomplishments and problems with *other officials*. As officials left the meetings, they frequently said they valued the opportunity to learn from other township officials. For example, when Road Commissioners shared success stories about cooperative buying and staffing; those exchanges led to changes in numerous townships in the way roads are funded, maintained, signed, cleared, and posted. In other sessions, Supervisors discussing their frustrations with general assistance usually received several suggestions of alternative remedies.

The Board of Directors and staff of TOI have responded in many ways to the needs clarified through these discussions and to the strategies developed by officials. Actions that TOI has taken in response to the needs and strategies developed include:

- Legislation enacted in 2002 to allow a one-time transfer of General Assistance funds to the general fund.
- Legislation enacted in 2002 allowing the establishment of a capital fund for townships and road districts.
- Establishment of a number of county associations of township officials to facilitate collaboration and mutual learning.
- Increased emphasis on computer training and related courses at conferences and other TOI training programs.
- The series confirmed the need for “nuts and bolts” educational programming, as well as other courses that address the deficiencies cited by officials, such as grant-writing and volunteer management.
- Exploration of issues such as a cap on liability for General Assistance clients continues
- Development of a curriculum on understanding local government for high school students; this was created as a collaborative project between TOI, the Illinois Municipal League, the Illinois Association



of County Board Members and Commissioners, and University of Illinois Extension.

- Strengthened partnership opportunities between county Extension offices and townships.

c. Source of Funds – Smith-Lever, state

d. Scope of Impact - Illinois

### ***Key Theme - Jobs/Employment***

#### **Extension Aids Displaced Workers in Decatur and Surrounding Areas**

- a. A community and region hard-hit by three plant closings over a several-month period have gained assistance from a University of Illinois Extension-launched program. The Displaced Worker program was established in Decatur in September 2001 and has aided to date 1,500 to 2,000 workers and their families.

“This is the only Extension program of its type in Illinois,” explains Rex Nicole, who heads the program for the Macon County Extension Unit. “We may be the only unit program that goes outside its county of origin, too, as the plant closings affect not only Decatur but communities in surrounding counties as well.

“A number of people in communities like Shelbyville, Pana, and Sullivan, for example, work in Decatur and worked at the factories that closed.”

Extension staff in Macon County conceived the Displaced Worker program as Bridgestone/Firestone, Zexel, and Crane Pump announced plans to close their Decatur operations.

While Extension funds were used to launch the program, it received a major boost early in 2002 with a \$500,000 grant from the Illinois Attorney General’s office.

Nicole describes the Displaced Worker program as a “point of entry” for workers dealing with the impact of job loss. Rather than seek out various agencies and programs, unemployed workers can use Extension’s program as a one-stop source of information and direction.

“We network for them and connect them to resources that are available in the community to help,” she explains. “This covers a broad range of services. We can also direct them to funding sources for help with grocery and power bills as well as retraining programs.”

Representatives of a broad array of social service and government agencies, educational institutions, and private employers serve on an advisory board for the program.

The program's services are free to the displaced workers and the information they share in one-on-one meetings with Nicole and her staff is privileged and confidential.

Nicole believes the Macon County approach is easily adaptable to other areas impacted by job loss.

- b. Impact - 1,500 to 2,000 workers and families assisted.
- c. Source of Funding - Smith-Lever, State, Local
- d. Scope of Impact - Illinois

### **University of Illinois Extension Web Site Aids Job Seekers with Interview Skills**

- a. Job-seekers concerned about making a positive impression in interviews with prospective employers have a place to go for tips about putting their best foot forward. "Looking Your Best for Work" is offered on the Web by University of Illinois Extension. The web site, part of the Urban Programs Resources Network, is located at: <http://www.urbanext.uiuc.edu/dress/index.html> .

"Making a good impression is important and this site provides information that can help people get off to a good start," said Jane Scherer, U of I Extension urban programs specialist. "With the economic problems of the past year, we've seen an increasing number of people entering the job market again after layoffs or plant closings. Additionally, we have many first-time job seekers. Often, individuals in both groups can benefit from the tips on this site."

Among the site's categories are: Dress to Impress, Clothing Choices for Women, Personal Grooming for Women, Clothing and Grooming for Men, Getting the Clothing You Need, Interviews, and On the Job Success.

"How you look and present yourself can make the difference between getting and not getting the job as well as a promotion," said Scherer. "Clothing choices, grooming, interview tips, and positive body language are important areas and anyone seeking a job or promotion could benefit from reviewing them."

- b. Impact - 20,000 hits in the first few months of operation.
- c. Source of Funding - Smith-Lever, state
- d. Scope of Impact - Illinois, potentially national

### ***Key Theme - Parenting***

#### **Parenting Again Newsletter**

- a. According to the 2000 Census figures, 103,717 grandparents have grandchildren living with them for whom they are the primary caregiver. Statistics are not available for those grandparents who may contribute significantly to the care for grandchildren who do not live with them such as providing day care when a parent is working.

To help address the complex issues that these second-time face, University of Illinois Extension provided the *Parenting Again* newsletter. The monthly publication offered suggestions and ideas on topics ranging from discipline, to finding resources and support groups, to understanding children's needs.

The newsletter has been used by 53 local Extension office to reach more than 2,140 grandparents by direct mail. An additional 771 grandparents were reached by other distribution methods (e.g., such as picking the newsletters up at group meetings), and 69 other organizations and agencies copied and distributed newsletters to an additional unknown number of grandparents.

- b. Impact - A reader survey was included in the November newsletter. Return postage was not provide, but those who supplied a return address were promised a refrigerator magnet "101 Ways to Praise Your Child." Because of response bias, the results may not be typical of all readers. A total of 112 responses were received.

When asked, "How much of the Parenting Again newsletter do you typically read?"

89 percent reported reading all of it  
10 percent reported reading half of it  
1 percent reported reading none of it

When asked, "Do you find the articles in Parenting Again easy to read and understand?"

100 percent said "Yes"

When asked whether readers saved issues or articles:

84 percent said "Yes"  
16 percent said "No"

When asked whether they had learned new things from reading Parenting Again,

93 percent said "Yes"  
2 percent said "No"

When asked how much they had learned as a result of reading Parenting Again,

80 percent said "a lot" or "a fair amount"  
15 percent said "a little" or "nothing"

When asked to rate how well Parenting Again met their needs,

36 percent rated the newsletter excellent  
55 percent rated the newsletter good

5 percent rated the newsletter fair

When asked whether they had done anything different as a result of reading Parenting Again,

59 percent reported a changed behavior

23 percent reported they were not doing anything differently

Explanations included:

- Correct my grandchildren
- I have been able to address issues
- How to persuade a child to do things & let them think it is their idea! It works & they actually do better at their tasks that way!
- I try to give her choices before punishment. She usually picks the right choices.
- Discipline ideas
- We create snacks together. We ask more about what she does in school every day.
- Think & explain
- Been a little easier on his dress code
- I can look at things differently and see his (grandson) point of view.
- Explaining why certain disciplines must be given, rather than just punishing when I am displeased.
- More patient about things to do with them to keep them occupied
- Made me understand my grandchild's needs and wants
- The issue on sex – We have now had more to talk about.
- Spend more one-on-one time – establish open communication helping them feel comfortable coming to me with difficult issues.
- Age difference and how to handle it
- Tried different ideas – homework help, discipline, recipes also!
- Learned more patience and got a better understanding
- I have relaxed my cooking expectations and turned a lot of housekeeping chores over to others who offered to help
- Listening at lower levels
- Better understanding
- Diet, snack ideas
- New conversation/discussion techniques
- Explain why discipline used wrong & right
- I have been able to help grandparents who are responsible for their grandchildren with articles from the newsletter.
- Mostly the newsletter reinforces my thoughts. The new thing we are trying to do is have family meetings.
- Tried to listen more and not criticize
- Spending more time with children
- It helped on issues for relating to my grandchild
- They have modified child study habits, saving \$ & self care improved
- It is has given me a better understanding of teens.

#### Other notable information

- In addition to statewide distribution, several subscription requests came from other states.
- Parenting Again was posted on the Extension Urban Programs Website as well as the Southern Region Family and Consumer Website.
- The Illinois Department on Aging advertised the availability of the newsletter to their clientele.
- Recently, a writer and editor of a new website for black grandparents in Georgia requested the use of the Parenting Again materials for her website.

#### ***Key Theme – Promoting Business Programs***

##### **Family Business Viability In Economically Vulnerable Communities**

- a. The NE-167 Regional Research Committee met twice during 2001, the first time January 4-6 in Honolulu, Hawaii, and the second time from October 18-20, in Oklahoma City, Oklahoma. In Hawaii, project scientists from 12 states spent considerable time examining and developing an understanding of the new 2000 National Family Business Survey data set. Final copies of basic documents for this phase of the project (e.g., coding manual, case completion status sheet, questions for introductory scenarios and telephone interviews) were distributed. The community economic sustainability scales have been challenging; however, good progress is being made on collecting this remaining necessary portion of the data. In Oklahoma City, scientists were able to take a detailed look at all diskettes, files and actual structure of the data. Data from this phase of the project were successfully merged with the 1997 National Family Business Survey data. There continue to be a few difficulties collecting the economic sustainability indicators, but they are nearing completion. This portion of the data is crucial to the overall goals of the project. The purpose of the second phase of the project, for which additional data were collected in 2000, will allow us to compare the interaction of family business systems in economically vulnerable and nonvulnerable communities, to identify effects of community structure and characteristics on families and their businesses, and to estimate the economic and social contributions of family businesses to communities over time.
- b. Impact - Family firm data used in combination with community and family data will provide a rich source of information to assist in policy development for governments, financial institutions, and an array of professional entities serving businesses, communities, and families. It also will provide information to support educational outreach activities. Understanding of the data will enhance the stability and security of families who own and operate businesses (more than 90% of U.S. businesses are family owned and controlled), and quantify their contributions to local, state, and national community and economic development.

- c. Source of Funding - Hatch, Multistate Research Fund, State
- d. Scope of Impact - Regional Research Project With HI, IN, IA, MN, MO, NA, NY, ND, OH, PA, RI, UT, VA, WI

**Optimization of Agricultural Production Facilities for Entrepreneurial Business**

- a. One of the chief factors for production in the agribusiness sector is that the pressure for low-cost, high-speed production. For all but the largest of companies, any kind of system-wide optimization is out of the question because of the costs, time and expertise required. More importantly, in small- to medium-sized companies most production and packaging operations are evolved rather than designed. In these operations, capacity is often added a piece at a time, and without any systemic redesign for overall system efficiency. Large corporations have always had access to the skills and tools necessary for this type of redesign, but smaller companies cannot afford them, essentially becoming trapped in a cycle of inefficiency. This becomes particularly acute as existing resources (such as facility space) are used up and demand continues to increase, with the peculiar effect of companies becoming victims of their own success. The solution, therefore, is to adapt the existing tools for use by smaller companies which may have technically skilled personnel available, but do not have discrete engineering staffs.

Our pilot study in a local producer of packaged foods has had profound results, giving a 6% efficiency improvement and improving direct profits by \$1,600,000 per year in the single operation that was studied. This suggests that a simple implementation of optimization techniques can have a profound effect on the economic viability of the small to medium sized businesses that make up the majority of job and economic growth in the American economy.

- b. The impact of this project is expected to reach beyond the food industry and provide new algorithms for improving the production efficiency of industries dominated by small to medium sized business that are typically completely neglected in university research.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

***Key Theme – Workforce Preparation – Youth And Adult***

**Effective Distance Delivery of Educational Programs for Professional Development of Agricultural Education and Extension Personnel**

- a. The second year of this project focused on in-service opportunities offered to Extension professionals, specifically those programs offered by the College of ACES to Extension personnel. An analysis of programs offered in other states was also conducted this year with data gathered on the type of delivery system used in providing the professional development activities. A data gathering instrument to determine perceived needs of Illinois extension personnel was developed during year two, pilot tested and will be used during year three of the project. Further study of agriculture teacher's, specifically beginning teacher's, in-service needs was also concentrated on this year. A survey of assistance needed during the induction year for both teachers and extension personnel will be conducted in year three of this research.

To date, the professional improvement needs of both Illinois agriculture teachers and University of Illinois Extension Educators have been prioritized. Preferences among multiple forms of distance delivery methods for professional improvement educational programs for Illinois agriculture teachers and University of Illinois Extension Educators has also been determined. Initial work on constraints to offering distance educational programs to Illinois agriculture teachers and University of Illinois Extension Educators has begun and this objective will be completed early in year three of the project. With the first three objectives of the project nearly complete, work has begun on the development of a systematic plan for educational programs to meet high priority professional improvement needs of Illinois agriculture teachers and University of Illinois Extension Educators. The systematic plan will be presented to administrators and stakeholders by mid-year of 2002. Evaluation of the effectiveness of distance delivered educational programs for professional development will begin this year with emphasis on the graduate courses being offered as credit towards the M.S. in Agricultural Education.

Currently, approximately 25 students, primarily agriculture teachers, are taking distance-delivered courses through the off-campus master's program in agricultural education. Input from the evaluation studies will be used to refine a systematic model for providing professional development programs for Illinois agriculture teachers and University of Illinois Extension Educators.

- b. Implementation of a systematic model for delivering professional development programs to Illinois agriculture teachers and University of Illinois Extension Educators will result in increased efficiency. Both teachers and extension personnel will benefit from increased accessibility to quality programs for professional development.
- c. Source of Funding - Hatch, State
- d. Scope of Impact - Illinois

***Key Theme - Youth Development***

## **4-H Camp Clover**

- a. Not every youth can be reached through the traditional community 4-H club. For this reason, University of Illinois Extension has a variety of “delivery systems” to assist youth in becoming competent adults.

But what about kids during the summer? For the past three years, U of I Extension has sponsored Camp Clover. Between 2000 and 2002 more than 11,000 “4-H Clover Campers” have gained knowledge and skills about the world around them while learning to relate well to others. A new health session introduced this past summer was “Physical Activity for Fun.” Physical activity is key in combating the epidemic of obesity among youth. More than 80 percent of the 1,850 youth participating in this session learned to determine if exercise was effectively increasing their heart rates and planned to try a new physical fitness activity at home. Some 1,400 youth learned how to select an appropriate diet and safely prepare food. Youth learned more about their community and performed community service projects: discovered aerospace, environmental and plant sciences, and learned more about living in today’s world of diverse cultures.

Camp Clover is an effective way to reach youth not served by traditional 4-H clubs. Only one out of every eight campers were current 4-H members.



b. Impacts - (2002): By “course taken:”

Adventures in Our Community (940 Campers)

- 96% identified a community strength
- 95% identified a community need
- 97% could name a good citizen deed
- 85% completed a community service project

WOW! Wild Over Work (1831 Campers)

- 63% increase in number of available jobs identified

Polish 4-H Adventures (1090 Campers)

- 99% completed a Polish art project
- 50% designed their own Polish art project
- 97% sampled a Polish food
- 93% wrote letters to Polish friends
- Campers identified new learnings about Poland  
nearly equal to two per camper

Food Pyramid Revisited (1462 Campers)

- 65% could name all 5 food groups at the end of day
- 91% demonstrated proper ways to use kitchen knives
- 94% named correct serving sizes in fruit and  
vegetable and milk groups
- 77% correctly answered 7 of 10 food safety questions

Food Science You Can Eat (571 Campers)

- 77% identified a carbohydrate food source
- 83% identified a high fat food source
- 55% identified 3 or 4 causes of bacterial growth
- 65% identified a factor that slows bacterial growth

Physical Activity for Fun (1853 Campers)

- 96% believed in the importance of warming up  
muscles
- 83% planned to try new physical activity they could  
do at home
  
- 37% showed someone else how to do one of the  
fitness activities
- 88% learned how to take a pulse
- 68% enhanced their agility by decreasing the time it  
took to complete an obstacle course

Aerospace Adventures (1016 Campers)

- 98% designed & tested an airplane and/or rocket
- 74% modified their airplane design
- 74% modified their rocket design

Wonders of Science (2240 Campers)

- 77% recognized that detergent in water is harmful  
to some animals

95% predicted and then determined the presence of starch in different foods  
64% explained a way that help helps animals that live in underwater forests  
92% demonstrated the importance of recording scientific findings

Adventures with Plants and Soils (549 Campers)

72% identified the best soil for retaining the correct amount of water for plants  
95% identified the 3 parts of a seed  
89% identified the 7 parts of a flower  
64% ate a seed or flower for the first time  
89% identified the age of a tree

### **Junior Master Gardener Program**

- a. The Junior Master Gardener program is a new and innovative international youth gardening program of the Cooperative Extension systems network. The Illinois JMG program was implemented as a partnership between the University of Illinois Extension Master Gardener program and Illinois 4-H in 2000. Horticultural expertise and skills in working with youth are offered by local Master Gardeners, Extension educators and Extension youth educators as well as teachers and parent volunteers. The goals of this program are to: develop leadership life skills; identify community needs and volunteer service opportunities; enhance positive youth development through peer teaching and cross-generational mentoring; improve the quality of life through horticultural projects and increase the availability of horticulture and environmental education.

The curriculum targets youth at three different age groups: Level 1 (Grades 3-5), Level 2 (Grades 6-8), and Level 3 (Grades 9-12). Modeled after the popular national Master Gardener Program, JMG offers hands-on learning about topics such as plant growth and development, soils and water, ecology and environmental horticulture, insects and diseases, landscape horticulture, fruits and nuts, vegetables and herbs, and life skills and career exploration

- b. Impact - The Illinois Junior Master Gardener Program reached over 800 children in Illinois through 28 registered groups in 2002. The program curriculum was taught in schools, after-school programs, 4-H clubs, day care centers, home school settings and one-day workshops.

One JMG group, the Hardin County Jammin' Clovers, recently received the honor of being named JMG group of the month by the National Junior Master Gardener Administration at Texas A&M University. This small group- only 9 members- has been very big in accomplishments. The Jammin' Clovers have received the prestigious 2002 Illinois State 4-H Club/Group award.

- c. Source of Funding - Smith-Lever, State, Local
- d. Scope of Impact - Illinois

**Illinois Rural Recreation Development Project**

- a. The Illinois Rural Recreation Development Project (IRRDP) was designed to assist rural communities of under 7,500 population develop their recreation potential. Urban areas in Illinois have long enjoyed year-round public recreation programs. Rural communities, however, lack resources and professional leadership for the provision of general recreation services. The purpose of the Illinois Rural Recreation Development Project was to address the immediate unmet needs in small rural communities for summer recreation programs leading to long-term development for recreation services.

A key component of this program is “Summer Daze.”

The Summer Daze Youth Recreation Program is a day camp experience for youth 6 to 13 years old. The 8-week program meets three times per week for 3 hours. Each week has a designated theme in which activities are programmed to reflect that theme. Participants are introduced to unique recreation experiences including non-traditional physical activities (e.g., frisbee, golf, bocci). The Summer Daze Youth Program aims at developing skills for life-long recreation engagement through experiential learning (nutrition, physical activity, volunteerism) and leisure education (leisure attitudes, awareness, skills, resources). Each community sets the schedule and fees.

Project partners include U of I Extension, Futures for Kids, Western Illinois University, Illinois Arts Council, and Carle Center for Rural Health and Farm Safety.

- b. Impact - Between 2001 and 2002 more than 1800 youth served.- Ten communities have developed self sustaining summer recreation programs.

“These kinds (IRRDP) of ventures are essential for the enhancement of individual and community health. The Illinois Rural Recreation Development Project gives local communities a new kind of life, a different opportunity. The IRRDP gives many individuals valuable experience, which allows them to volunteer this experience to citizens of all ages and encourages local communities to operate independent of them.” Stated U.S. Representative Tim Johnson.

- c. Source of Funding - Smith-Lever, state
- d. Scope of Impact - Illinois

**“Going Solo” Creative Tools For Teaching Entrepreneurship**

- a. "Going Solo" is an activity based curriculum and computer simulation game which teaches adults and young people entrepreneurship and basic business management skills. A team of University of Illinois educators first developed the Going Solo materials in 1993. The team saw entrepreneurship education in schools accomplishing many objectives. Rural communities and economically disadvantaged urban areas with few career opportunities for its young people could teach them to create their own job opportunities through self-employment. A good entrepreneurship education program also could teach communication decision making and problem solving skills to young adults. The team saw the potential in such a program but found a shortage of materials that could accomplish the task. As a result, the group challenged themselves to create a set of materials that could teach the technical aspects of business and yet be interactive enough to make it fun for students and teachers alike. The demand for such a product was confirmed through focus groups and teacher interviews.

The result is a 16-module activity based curriculum including topics from record keeping to business etiquette and a computer simulation game that allows teams (or companies) to start businesses and compete against one another in a virtual market place. The modules provide the technical support for decisions made during the game. A flexible format was built into the materials so it could be used in venues as short as one day or as long as a semester.

Going Solo is also discovering audiences in other countries. In 1998, the Going Solo team conducted its first international training session. A group of 20 Bulgarian educators was taught to use the Going Solo materials and Computer simulation. The United Nations Industrial Development Organization funded the project. Since then 15, other countries have purchased the curriculum and the International Association of Home Economist's sponsored a second international training session for 21 educators from 12 Caribbean nations.

This past year Illinois educators who had attended the Going Solo training workshops were surveyed. Forty-one reported having used the curriculum during the past 12 months with a total of 1,683 students. Most (61 percent) had used the curriculum as part of a high school vocational educational program with an additional 29 percent reporting having used the curriculum in a traditional classroom.

Teachers were asked to assess the effectiveness of the curriculum. Over 90 percent reported the curriculum had helped students to:

- establish a practical understanding of basic business concepts
- learn creative problem solving
- learn decision-making skills
- work as a team member
- reinforce mathematics and language arts skills

- b. Impact – 1,683 youth learn business concepts, problem solving and decision-making skills, teamwork
- c. Source of Funds – Smith-Lever, state
- d. Scope of Impact – Illinois

### **Biotechnology Camp**

- a. Biotechnology Camp is an overnight event for youth in seventh and eighth grades in northwestern Illinois. The camp has been held twice, in September 2001 at Rockford and in May 2002 at Oregon. The camp focuses on hands-on learning experiences to teach youth about scientific inquiry focusing specifically on the field of biotechnology.

It is an unfortunate fact that many youth are “turned-off” from science based on experiences in the formal classroom. They believe that science is dull, and has no practical applications in the “real world”. Researchers have found that junior high is a crucial time for youth, a time when they are forming opinions about what is interesting to them and what subjects they are likely to pursue in the future. Ultimately, this lack of interest in science will result in students finding themselves in lower-paying careers that do not require advanced work in science and mathematics.

In order to address the problems outlined, a two-day camp focusing on biotechnology was planned and conducted for junior high aged youth in northwestern Illinois. The centerpiece of the camp was a murder-mystery. Youth worked in teams to find clues and conduct experiments in order to solve the mystery.

Youth also heard from science practitioners, including: a county coroner, a crime scene investigator, a researcher in the area of cloning, Extension staff, and faculty from University of Illinois. They learned from these individuals how they put science to work every day in order to do their jobs and ultimately help people. Additionally, workshops were planned to help youth understand what academic preparation is needed in order to pursue science-related careers. Time was also devoted to the ethical issues related to biotechnology.

Over the past two years the camp has reached 200 + youth.

- b. Impact - In order to determine the level of knowledge gained by participants, a pre and post test evaluation was conducted. It showed that the participants as a group, gained knowledge on all questions:

<u>% Correct Pre-Test</u>	<u>% Correct Post –Test</u>	
Q1. DNA meaning	31%	
85%		
Q2. Complimentary sequence	46%	66%
Q3. Nitrogenous base is	66%	92%
Q4. Using biotech	96%	100%
Q5. number of bases	23%	
	74%	

- c. Source of funds - Smith-Lever, state, local, private
- d. Scope of impact - Illinois

## CSREES Management Goals

### *Key Theme - Multicultural and Diversity*

#### **Urban Extension Launches New Sites in English, Spanish**

- a. A new web site that will provide learning stimulation for students in home school and classroom programs as well as those on summer break has been launched on University of Illinois Extension's Urban Programs Resources Web site. Extension has also translated many of the pages on the popular Web site into Spanish.

*"At this point, the number of 'hits' we are receiving on the Spanish language pages are almost equal to the amount we are receiving on the English pages-- and this without any publicity about the existence of the Spanish pages,"* said Jane Scherer, U of I Extension Urban Programs Specialist." (In total the Urban site received about 1.5 million hits per month.)

The Spanish language pages can be reached at:  
<http://www.urbanext.uiuc.edu/espanol/>

## **B. Stakeholder Input Process**

Stakeholders provide continuous feedback in terms of programming needs as well as programming results. The College of ACES has many channels for stakeholder input. The College, the Office of Research, the Office of Extension and Outreach, all academic departments, and many programs and projects in the College have advisory councils made up of stakeholders. The advisory councils meet at least yearly, but in many instances more frequently than that, and are active participants in determining the direction of the College units as well as specific programs. Several hundred stakeholders, representing both organizations and individuals, participate in this process on an annual basis. Stakeholder input is typically oriented towards input in the nature of the decision-making within the units and projects in the College, as well as focusing directly on the results from the College's activities for the stakeholder groups or for the state population at large. Stakeholders who function in an advisory capacity typically do not distinguish between research and outreach outcomes, and they form a powerful voice for the effective integration of research and extension activities.

The Council on Food and Agricultural Research (C-FAR) was organized to increase state funding for food and agricultural research. C-FAR is made up of such organizations as the Illinois Farm Bureau, the Audubon Council of Illinois, the Illinois Dietetic Association, the Horseradish Growers of Illinois, Illinois Rural Partners, and nearly 50 other equally diverse state organizations. While these organizations frequently disagree sharply on specific aspects of agricultural production and policy, nutrition, and rural development, all agree that a results-focused research program will provide a valuable contribution to resolving many of the issues affecting the health of the Illinois population, agricultural production and rural development. C-FAR has been successful in obtaining additional funding from the state legislature to enhance College-based agricultural research at the University of Illinois and other state institutions. Because C-FAR has been willing to expend the effort to increase the support for research it has acquired a significant role in helping to define the research agenda. By focusing continuous attention on the need to solve "real-world" problems and insisting on the timely sharing of research results with constituent groups, C-FAR has made a significant impact on the way in which the research and outreach agendas are being defined in the College.

Every Extension unit has a local council, which provides ongoing input in Extension program planning and evaluation. Councils are active in helping to identify local needs and provide formal and informal feedback on Extension activities. During the last year more than 7,200 volunteers served on local Extension councils and planning committees throughout the State. The chair of each council, or his/her designee, also serves on the regional advisory council in each of the five regions in Illinois. Finally, Extension has a state advisory committee made up of three representatives from each region who meet at least twice a year for a multiple-day session with the state Extension administration to provide input on programming needs and Extension processes.

To strengthen the role of advisory councils at all levels, Extension has initiated an ongoing program of council training. In addition to training that takes place at the council level, a statewide-organized training effort is taking place through regional meetings to strengthen the capabilities of council members. The training sessions



have targeted new council members. In addition, Extension has completed a Council Guide that provides all council members with background information on Extension policies, procedures, and programs.

Extension is currently engaged in a multi-year review of all local units, with special emphasis on programming quality, local programming impact, diversity of stakeholder input and the needs of underserved audiences.

In program planning, Illinois relies very heavily on local input. The program planning process is structured on a four-year “rolling” basis. Each year, one of the four core programming areas, Nutrition, Family and Consumer Sciences, Agriculture and Natural Resources, 4-H Youth Development, and Community and Economic Development, is engaged in an in-depth program needs assessment process. In FY02, the program planning process focused on Community and Economic Development. All local units were asked to identify local programming needs and to involve a diverse group of people in identifying issues pertaining to Community and Economic Development.

**C. Program Review Process**

No significant changes have been made in this process.

#### **D. Evaluation of the Success of Multi and Joint Activities**

Throughout this report we have reported consistently on integrated Extension and Research activities in terms of programming and outcomes.

##### ***Multi-State Activities***

The following multi-state activities have both an extension and research component: Midwest Plan Service; Illinois-Indiana Sea Grant Program; North Central Regional Center for Rural Development (NCRCRD); the Agri-Ecology/Sustainable Agriculture Program; the National Needs Assessment for Agricultural Safety and Health; and the FSNEP National Program Coordinators Team. All are ongoing processes that include institutionalized review. Illinois participates in the institutionalized reviews of each of these groups, but does not necessarily undertake an evaluation of its own. The entities just mentioned each have an advisory or executive committee that is multi-state and combines Extension and research representation. The committees report to the North Central Regional Extension Directors at regular intervals.

The Illinois-Indiana Sea Grant Program was evaluated in preparation for the hiring of a new Extension specialist in aquaculture. As part of the preparation for the hiring process, representatives from the University of Illinois, Purdue University, and the Sea Grant program evaluated the accomplishments of the program and identified the directions in which the program needs to progress. Specific impacts from Sea Grant efforts are reported under Goal 4 of the programs section of this report.

The collaboration between the University of Illinois and Purdue University in terms of producing the grain and livestock marketing newsletters (Ag Outlook Guide) has been a very successful ongoing activity. The collaboration has allowed both states to provide useful and timely information to producers in areas in which they may not have sufficient research and outreach strength to carry out this activity independently. A similar collaboration exists to produce the National Pork Industry Handbook – a resource with a national reputation.

The fact sheets for the Local Government Information and Education Network have undergone peer review as well. The Journal of Extension is itself a peer reviewed publication.

The multi-state conferences are evaluated to they have contributed to improved program development and implementation to meet the needs of Illinois stakeholders. For some it is too soon to assess their overall impact in meeting the needs of all Illinois citizens. The Spanish language conference has been evaluated by the cooperating states. A report of the follow-up efforts by the states was presented to the North Central state Directors who have agreed to continue the regional efforts in Spanish language programming.

**E. Multi-State Activities**

**E. Multi-State Activities**

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 University of Illinois  
 State Illinois

Check one:  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
<u>Midwest Plan Service</u>	<u>23,112</u>	<u>22,896</u>	<u>22,896</u>	_____	_____
<u>Illinois-Indiana Sea Grant Program</u>	<u>31,190</u>	<u>70,509</u>	<u>5,000</u>	_____	_____
<u>NCRC for Rural Development</u>	<u>2,684</u>	<u>2,684</u>	<u>2,684</u>	_____	_____
<u>Part-time Farming/Sustainable Agriculture</u>	<u>37,903</u>	<u>33,311</u>	<u>39,436</u>	_____	_____
<u>Farm Progress Show</u>	<u>12,709</u>	_____	_____	_____	_____
<u>IL-Missouri Strategies &amp; Opportunities Conf.</u>	<u>22,600</u>	_____	_____	_____	_____
<u>Illinois Outlook Guide</u>	<u>4,275</u>	<u>5,000</u>	<u>5,150</u>	_____	_____
<u>National Needs Assessment</u>	<u>11,000</u>	<u>11,000</u>	<u>11,000</u>	_____	_____
<u>FSNEP Nat'l. Prog. Coordinators Team</u>	<u>8,684</u>	<u>7,845</u>	_____	_____	_____
<u>National Pork Industry Handbook</u>	_____	<u>2,932</u>	<u>2,932</u>	_____	_____
<u>4-H National Centennial Celebration</u>	_____	_____	<u>10,000</u>	_____	_____
<u>Local Gov't Information &amp; Education Network</u>	_____	_____	<u>51,000</u>	_____	_____
<u>Neld Assessment</u>	_____	_____	<u>7,500</u>	_____	_____
<u>Journal of Extension Professionals Assessment</u>	_____	_____	<u>2,000</u>	_____	_____
<u>Multi-State Conferences</u>	_____	_____	<u>14,065</u>	_____	_____
<b>Total</b>	<b><u>154,157</u></b>	<b><u>156,177</u></b>	<b><u>173,663</u></b>	_____	_____

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 Director

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 Date

## **Multi-State Extension Activities**

Midwest Plan Service - Midwest Plan Service provides a regional opportunity to publish research-based Extension publications of use to the North Central Region. States in the North Central Region participate financially in Midwest Plan Service and are users of the publications. The base of publications for Midwest Plan Service has been in agricultural engineering, but more recently farm management and agricultural production areas have been added to the publications of Midwest Plan Service.

Illinois-Indiana Sea Grant Program - The Illinois-Indiana Sea Grant Program provides up-to-the-minute information on great Lakes issues, emphasizing concerns in the southern Lake Michigan region. Topics addressed include water quality, aquaculture and seafood safety, biological resources, sustainable coastal development, and coastal processes. It is funded by NOAA, University of Illinois, and Purdue University. <http://www.iisgcp.org/>

North Central Region Center for Rural Development (NCR CRD) - NCR CRD coordinates and supports research and Extension activities in the areas of community and economic development throughout the North Central Region. The NCR CRD has a number of programmatic emphases which vary over time as the needs arise. Funding is provided to Iowa State for coordinating programs.

Agroecology/Sustainable Agriculture Program (Part-time Farming) - The Agroecology/Sustainable Agriculture Program (ASAP) promotes research and extension which protects Illinois' natural and human resources while sustaining agricultural production over the long term. The program includes cooperative efforts of North Central land grant institutions and other partners, as facilitated and funded in part by the USDA Sustainable Agriculture Research and Education (SARE) program through the University of Nebraska. SARE offers competitive grants related to applied research and extension pertaining to sustainable agriculture.

Ag Outlook Guide - This is a collaborative effort of Illinois, Purdue and Indiana to produce grain and livestock price newsletters.

National Needs Assessment for Ag Safety and Health - Three year project to convene a consensus-building process that would host a conference and publish a document on ag safety and health to serve as a resource in national policy discussions. Representatives from Colorado State, Purdue, University of California and others are included on the planning committee.

FSNEP National Program Coordinators Team - The Food Stamp Nutrition Education Program National Program Coordinators Team is funded by the North Central Region to facilitate communication between FNS and CSREES and to build state capacities for effective program delivery and evaluation to ensure the quality of the nutrition education programming associated with FSNEP.

National Pork Industry Handbook - This is a collaborative effort of Illinois, Purdue and other states to provide pork producers with up-to-date information on all phases of pork production and marketing. <http://www.extension.iastate.edu/Publications/PM1420.pdf>

4-H Centennial Celebration - Travel to participate in the national 4-H Centennial Celebration in Washington, D.C.

Local Government Information & Education Network - This program provides a variety of educational programs, materials and services to local government officials. Includes an annual series of informational updates via audio conferences, planning of annual conferences for professional associations, quarterly newsletters, fact sheets, and a series of publications on the roles and responsibilities of governmental officials. The network continues to work in areas of poverty, land use and civic education. As a result of work with the multi-state land use team, the fact sheets, written by Extension staff in Indiana and Ohio, have been adapted for Illinois. <http://www.uic.edu/UI-Service/programs/UIUC289.html>

NELD North Central Assessment - NELD North Central is a program of the twelve north central states' Cooperative Extension Services as part of the National Extension Leadership Development Program. The program is to enhance leadership in the Cooperative Extension Service at all levels and provide vision as well as cutting-edge organizational tools for Extension leaders and administrators. <http://www.aces.uiuc.edu/~neld/about.html>

Journal of Extension Professionals Assessment - The Journal of Extension is the peer-reviewed journal of the U.S. Cooperative Extension System. It seeks to expand and update the research and knowledge base for Extension professionals and other adult educators to improve their effectiveness. journal. <http://www.joe.org/>

Multi-State Conferences - Multi-State conferences attended by Extension personnel: NCRCRD/Iowa State University "Spanish Speaking Populations Conference" in Chicago 12/01; "National Family Life Extension Specialist Conference" in Kansas City 3/02; "Cooperative Extension and the Digital Divide-Exploring Opportunities Conference" in Nebraska, 11/01; "National CRED Conference" in Florida, 2/02; Several "National Extension Leadership Development Conferences" (NELD) in Houston.

File: multistateextension02.wpd

**F. Integrated Activities (Smith-Lever Act)**



**F.Integrated Activities (Smith-Lever Act)**  
**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 University of Illinois  
 State Illinois

Check one:  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
<u>Illinois-Indiana Sea Grant Program</u>	<u>31,190</u>	<u>          </u>	<u>5,000</u>	<u>          </u>	<u>          </u>
<u>Part-Time Farming</u>	<u>37,903</u>	<u>33,311</u>	<u>39,436</u>	<u>          </u>	<u>          </u>
<u>Farm Progress Show</u>	<u>12,709</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Pest Management Program</u>	<u>4,500</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Illinois Environmental Policy Review</u>	<u>2,500</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Program Support for New Faculty</u>	<u>158,131</u>	<u>107,429</u>	<u>54,468</u>	<u>          </u>	<u>          </u>
<u>Program Support for Joint Research/Ext</u>	<u>195,874</u>	<u>229,181</u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Ag Entrepreneur Dev Initiative</u>	<u>          </u>	<u>60,085</u>	<u>40,627</u>	<u>          </u>	<u>          </u>
<u>Conferences and Field Days</u>	<u>          </u>	<u>35,400</u>	<u>14,825</u>	<u>          </u>	<u>          </u>
<u>Integrated Swine Program</u>	<u>          </u>	<u>9,319</u>	<u>45,411</u>	<u>          </u>	<u>          </u>
<u>Information Technology Support</u>	<u>          </u>	<u>85,000</u>	<u>50,874</u>	<u>          </u>	<u>          </u>
<u>Global Value-Added Ag Center Initiative</u>	<u>          </u>	<u>          </u>	<u>27,694</u>	<u>          </u>	<u>          </u>
<u>Human-Environment Research Lab Program</u>	<u>          </u>	<u>          </u>	<u>3,333</u>	<u>          </u>	<u>          </u>
<b>Total</b>	<b><u>422,288</u></b>	<b><u>527,138</u></b>	<b><u>510,849</u></b>	<u>          </u>	<u>          </u>

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 Director

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 Date

### **Integrated Activities (Smith-Lever Act Funds)**

Illinois-Indiana Sea Grant Program - The Illinois Indiana Sea Grant Program provides up-to-the-minute information on Great Lakes issues, emphasizing concerns in the southern Lake Michigan region. Topics addressed include water quality, aquaculture and seafood safety, biological resources, sustainable coastal development, and coastal processes. It is funded by NOAA, University of Illinois, and Purdue University. <http://www.iisgcp.org/>

Agroecology/Sustainable Agriculture Program (Part-time Farming) - The Agroecology/Sustainable Agriculture Program (ASAP) promotes research and extension which protects Illinois' natural and human resources while sustaining agricultural production over the long term. The program includes cooperative efforts of North Central land grant institutions and other partners, as facilitated and funded in part by the USDA Sustainable Agriculture Research and Education (SARE) program. SARE offers competitive grants related to applied research and extension pertaining to sustainable agriculture.

Farm Progress Show - The Farm Progress Show is one of the premier opportunities in the Midwest for producers and others associated with agriculture to learn about current innovative technology. The show rotates between Illinois, Iowa, and Indiana. When the Farm Progress Show is located in Illinois, the College of Agricultural, Consumer and Environmental Sciences puts together a major display that integrates the education research and Extension functions of the College.

Pest Management Program - On-farm applied research and extension efforts in fruit and vegetable entomology.

IL Environmental Policy Review - Newsletter articles written by researchers that educate city and county officials and citizens of Illinois about state, regional and federal policies and issues concerning the environment including safe food and the quality of air and water.

Program Support - Program support for new faculty and faculty who have joint research/extension appointments.

Agricultural Entrepreneur Development Initiative - Designed to provide resources and technical assistance in business planning, product development, value added products and marketing. Program is associated with research projects funded by state funds. The "Illinois Branded Livestock Project" is an example of product development under this initiative.

Conferences - Various beef, dairy, sheep, swine and grazing meetings and conferences as well as Agronomy Days, Corn/Soybean Classics, Field Days and the Livestock Waste Management Conference showcasing current research and extension initiatives.

Integrated Swine Program - This is a multi-discipline applied research project involving research and extension to investigate approaches to improving physical and financial performance of Illinois swine farms. The research will be carried out on producer units and data will be collected that will allow full economic evaluation of management changes.  
[http://www.ansci.uiuc.edu/ellislab/ISP\\_Publications/9\\_isp\\_publicationsWF02.html](http://www.ansci.uiuc.edu/ellislab/ISP_Publications/9_isp_publicationsWF02.html)

Information Technology Support - Support for services related to the design, development and web management of research and extension programs as well as program impact and reporting systems.

Global Value-Added Agriculture Center Initiative - This project involves an analysis of value-enhanced crop and livestock markets, technology, farm surveys, and strategic planning for different eco-regions. This project has added a global dimension by investigating markets for value-enhanced corn and soybeans in Japan and Mexico. The project conducts conferences, workshops, and business development meetings for Illinois producers who are interested in pursuing new value-added opportunities.

Human - Environment Research Laboratory Program - This is a multi-disciplinary research lab dedicated to studying the relationship between people and the physical environment. The mission is to generate information about human-environment relationships to guide policy, planning, and design of environments brought by theory and research methods of psychology and concerns of environmental design, policy and planning.  
<http://www.herl.uiuc.edu/integratedsmithlever02.wpd>

**G. Integrated Activities (Hatch Act Funds)**

**Table G. Integrated Activities (Hatch Act)**  
**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: University of Illinois  
 State: Illinois

Check one:  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
<u>Illinois-Indiana Sea Grant Program</u>	<u>24,952</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Sustainable Agriculture/Part-Time Farming</u>	<u>163,767</u>	<u>167,720</u>	<u>185,152</u>	<u>          </u>	<u>          </u>
<u>Farm Progress Show</u>	<u>13,474</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Pest Management Program</u>	<u>6,200</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Illinois Environmental Policy Review</u>	<u>6,808</u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>Program Support for New Faculty</u>	<u>124,040</u>	<u>177,268</u>	<u>132,265</u>	<u>          </u>	<u>          </u>
<u>Program Support for Res/Ext</u>	<u>          </u>	<u>208,481</u>	<u>236,020</u>	<u>          </u>	<u>          </u>
<u>Conferences and Field Days</u>	<u>          </u>	<u>17,593</u>	<u>7,298</u>	<u>          </u>	<u>          </u>
<u>Integrated Swine Program</u>	<u>          </u>	<u>86,867</u>	<u>62,102</u>	<u>          </u>	<u>          </u>
<u>Information Technology Support</u>	<u>          </u>	<u>40,016</u>	<u>42,701</u>	<u>          </u>	<u>          </u>
<u>Global Value-Added Ag Center Initiative</u>	<u>          </u>	<u>          </u>	<u>25,000</u>	<u>          </u>	<u>          </u>
<u>Human-Environment Research Lab Program</u>	<u>          </u>	<u>          </u>	<u>3,333</u>	<u>          </u>	<u>          </u>
<b>Total</b>	<b><u>339,241</u></b>	<b><u>697,945</u></b>	<b><u>693,871</u></b>	<u>          </u>	<u>          </u>

\_\_\_\_\_  
Director

\_\_\_\_\_  
Date

## **Integrated Activities (Hatch Act Funds)**

Illinois-Indiana Sea Grant Program - The Illinois-Indiana Sea Grant Program provides up-to-the-minute information on Great Lakes issues, emphasizing concerns in the southern Lake Michigan region. Topics addressed include water quality, aquaculture and seafood safety, biological resources, sustainable coastal development, and coastal processes. It is funded by NOAA, University of Illinois, and Purdue University. <http://www.iisgcp.org/>

Agroecology/Sustainable Agriculture Program - The Agroecology/Sustainable Agriculture Program (ASAP) promotes research and extension which protects Illinois' natural and human resources while sustaining agricultural production over the long term. The program includes cooperative efforts of North Central land grant institutions and other partners, as facilitated and funded in part by the USDA Sustainable Agriculture Research and Education (SARE) program. SARE offers competitive grants related to applied research and extension pertaining to sustainable agriculture.

Farm Progress Show - The Farm Progress Show is one of the premier opportunities in the Midwest for producers and others associated with agriculture to learn about current innovative technology. The show rotates between Illinois, Iowa, and Indiana. When the Farm Progress Show is located in Illinois, the College of Agricultural, Consumer and Environmental Sciences puts together a major display that integrates the education research and Extension functions of the College.

Pest Management Program - On-farm applied research and extension efforts in fruit and vegetable entomology.

IL Environmental Policy Review - Newsletter articles written by researchers that educate city and county officials and citizens of Illinois about state, regional and federal policies and issues concerning the environment including safe food and the quality of air and water.

Program Support - Program support for new faculty and faculty who have joint research/extension appointments.

Conferences - Various beef, dairy, sheep, swine and grazing meetings and conferences as well as Agronomy Days, Corn/Soybean Classics, Field Days and the Livestock Waste Management Conference showcasing current research and extension initiatives.

Integrated Swine Program - This is a multi-discipline applied research project involving research and extension to investigate approaches to improving physical and financial performance of Illinois swine farms. The research will be carried out on producer units and data will be collected that will allow full economic evaluation of management changes.

[http://www.ansci.uiuc.edu/ellislab/ISP\\_Publications/9\\_isp\\_publicationsWF02.html](http://www.ansci.uiuc.edu/ellislab/ISP_Publications/9_isp_publicationsWF02.html)

Information Technology Support - Support for services related to the design, development and web management of research and extension programs as well as program impact and reporting systems.

Global Value-Added Agriculture Center Initiative - This project involves an analysis of value-enhanced crop and livestock markets, technology, farm surveys, and strategic planning for

different eco-regions. This project has added a global dimension by investigating markets for value-enhanced corn and soybeans in Japan and Mexico. The project conducts conferences, workshops, and business development meetings for Illinois producers who are interested in pursuing new value-added opportunities.

Human - Environment Research Laboratory Program - This is a multi-disciplinary research lab dedicated to studying the relationship between people and the physical environment. The mission is to generate information about human-environment relationships to guide policy, planning, and design of environments brought by theory and research methods of psychology and concerns of environmental design, policy and planning. <http://www.herl.uiuc.edu>

integratedhatchfunds02.wpd

**APPENDIX A: FY2002 Annual Report Statistical Tables**



**Table 1 - University of Illinois College of ACES: Research Funding and Staff Support**

<i>FUNDING AND STAFF SUPPORT (FY 2002)</i>							
	<i>GOAL I</i>	<i>GOAL II</i>	<i>GOAL III</i>	<i>GOAL IV</i>	<i>GOAL V</i>	<i>TOTAL</i>	<i>MULTI-STATE</i>
Total CSREES Research	5,640,160	507,430	626,530	1,427,922	599,693	8,801,735	1,592,268
Total Other Federal Research Funds	3,378,042	165,767	349,285	637,220	299,118	4,829,432	298,979
Total Non-Federal Funds	27,134,840	3,024,980	2,764,505	6,632,330	2,506,654	42,063,309	6,859,434
<b>Total All Research Funds</b>	36,153,042	3,698,177	3,740,320	8,697,472	3,405,465	55,694,476	8750,681
<b>Total Number of Research Projects</b>	355	36	44	133	48	616	58
Scientist Years	87.2	10.9	8.9	30.6	15.3	153	24.4
Professional And Technical Support	261.2	30.9	34.4	67.3	27.6	421	55.9
<b>Total Staff Support</b>	348.4	41.8	43.3	97.9	42.9	574.3	80.3

**Table 2 - College of ACES: U of I Extension Funding and Teaching Contacts**

	<i>GOAL I</i>	<i>GOAL II</i>	<i>GOAL III</i>	<i>GOAL IV</i>	<i>GOAL V</i>	<i>TOTAL</i>
Federal Funding - All Sources	2,342,701	749,155	1,902,162	901,195	5,617,305	11,512,518
State Funding	6,046,193	1,933,466	4,909,223	2,325,862	14,497,500	29,712,244
Local Funding	2,469,338	789,651	2,004,986	949,910	5,920,954	12,134,838
Other Funding	3,222,801	1,030,595	2,616,761	1,239,753	7,727,598	15,837,508
Total Estimated Expenditures by GPRA Goal	14,081,033	4,502,866	11,433,132	5,416,720	33,763,356	69,197,108
Total Estimated Face-to-Face						
Teaching Contacts by Goal	299,490	201,408	517,866	175,028	962,704	2,156,496
Estimated Knowledge/Practice Changes using the conservative assumption that 50% participants achieve some level of change						
	149,745	100,704	258,933	87,514	481,352	1,078,248
Total 4-H Youth as indicated by the 4-H enrollment system						
					383,654	
<b>NOTE: Values were extrapolated from the Extension reporting system used to meet U of I positive time reporting requirements and monitor U of I Extension's affirmative action program. Reported values are approximations.</b>						

Expend data source: U\ext02exp.ppt Goal Calculation by Program Area.xls Estimated Expenditures and Audience Counts from 2002