2017 University of Illinois Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

The College of Agricultural Consumer and Environmental Sciences [ACES] Strategic Goal

In the coming months and years, the strategies and the methods employed by the college to achieve success will need to be flexible, but the essential goals remain the same: global preeminence in our scholarship and exceptional value to society, especially on issues relevant to Illinois.

ACES will be recognized as the global leader in learning, discovery, and engagement in the most promising areas of scholarship broadly relevant to agricultural, consumer, and environmental sciences. ACES will be acknowledged in Illinois, across America, and around the world for preparing globally-competitive undergraduate, graduate, and mid-career students, for first-class discovery research that is purposefully translated into practice, and as the preferred source of knowledge that informs sound individual and collective decisions, transforms lives, and deepens cooperative relationships.

University of Illinois Extension

The mission of University of Illinois Extension [Extension] is to provide practical, research-based information and educational programs to enable people to improve their lives and communities through learning partnerships that put knowledge to work. The planned programs included in this document describe successful programs that Extension faculty and staff plan to continue in addition to a number of new initiatives that address the issues facing Illinois residents. These programs will be led by experienced staff who are committed, knowledgeable, and respected by Extension stakeholders.

Support from Extension stakeholders is critical, as Illinois experiences a continuing and significant deficit in the state's fiscal status and has failed to pass a state budget and to release FY 2016 funds at the time of this document submission. In addition, at the time of this document submission, the governor has recommended a 31.5 percent FY 2016 budget reduction for higher education - a proposal that, if enacted, would cut general revenue funding [GRF] for the University of Illinois by nearly $209 million. In addition, his budget includes a 20 percent decrease in direct appropriation to Extension that includes: [1] Dollars to match locally-allocated funds for Extension; [2] Support for 4-H youth programming; and [3] Support for programming in Cook County. These actions and the inability of the governor and legislators to pass a budget present a serious risk in maintaining the scope of Extension programs, participation, and impact.

Although allocation of two years of funding has elapsed, Extension hopes to sustain programming with campus partners who have engaged in eight cross-campus initiatives to: [1] Raise the visibility and relevance of outreach across university units and among stakeholders in the state with the purpose of developing stronger and more meaningful connection with stakeholders; [2] Creating a model for working across campus units to support and expand the university's land-grant mission of outreach; [3] Developing collaborative, change-oriented projects that respond to or address a need evident or identified at the community level; and [4] Fostering or developing outreach from interdisciplinary work.

The Illinois Agricultural Experiment Station [Office of Research] [IAES]

IAES is administratively assigned to the College of ACES and is a directly reviewed subsidiary for campus budget review purposes. The unit is situated in the Office of Research and manages a portfolio of research projects underwritten by statutory federal and state appropriations, as well as grants and contracts. IAES research encompasses programs in the College of ACES and in other units funded in part through the IAES. These units include the Colleges of Veterinary Medicine, Engineering, Liberal Arts and Sciences, and Law, as well as the Illinois Natural History Survey. The IAES also funds some research with partners in other institutions.

Faculty and staff with research responsibilities in the College of ACES have some percentage of their research appointments in the IAES. In identifying and responding to new opportunities, the IAES plays a leadership role in articulating and interpreting the research efforts of faculty, departments, and programs in the college, in the spirit of the Hatch Act, and aims to catalyze multidisciplinary research focused on agriculture, food, the environment, and communities. The long-term strategic goal of the College of ACES is to undertake new investments in research that are a balance between discovery and application, as well as between long-term and short-term outcomes, to ensure both new knowledge creation and relevance to the state's food, agricultural, environmental, and human interests. The IAES is devoted to mission-oriented outcomes focused primarily on development of a sound and competitive agriculture industry. Research and practical translation of knowledge to solve specific problems for IAES stakeholders enables their continuing competitive advantages. IAES research benefits the nation by applying relevant science to the unique conditions of the State of Illinois, including her soil, climate, ecosystems, and agricultural communities. To produce science that matters, the research portfolio demands strong entrepreneurial motivation, as well as elements that are very responsive to those with a stake in the agricultural and food system. More than ever, our research must respond swiftly to the rapid pace of change in today's era of globalization.

Modifications in the Plan of Work

Program delivery by Extension educators with responsibility for consumer economics will be addressed in both the Agricultural and Consumer Economics planned program and the Human Health and Human Development planned program.

Importance of Hatch Funds

The funds provided to support research through the Hatch Act provide basic capacity funding for the State Agricultural Experiment Stations. Hatch funds allow the Illinois station to fund translational research capacity that allows us to turn discoveries into tools and technologies that farmers, livestock producers, and other stakeholders can use, they support strategic investments in research initiatives of importance to Illinois stakeholders, they enable targeted research efforts balanced between discovery and application as well as between long-term and short-term outcomes, and they provide critical seed funding for faculty research efforts that lead to further competitive and private-sector support. Hatch funds are used to support the seven stations of the **Illinois Research and Education Network** [St. Charles, Brownstown, Dixon Springs, South Farms, Orr, Monmouth, and Shabonna], to support the **Integrated Bioprocessing Research Laboratory** [formerly the **Center for Advanced Bioenergy Research**], the **National Soybean Research Laboratory** [**NSRL**], the **Plant Breeding Center**, the **Center for Family Resiliency**, and the **Environmental Change Institute**. They also help fund the ongoing work of the **National Atmospheric Deposition Program** [which has provided measurements of the chemicals in precipitation since 1977], as well as the identification and development of high-yielding biomass crops for sustainable energy production, improvements in crop production through breeding, genetics, and pest management, better stewardship of our forests, watersheds, and other natural resources, progams focusing on human health and development [such as obestity, nutrition, and child development], and work to better insure the

availability of a safe and secure food supply for all Americans.

Importance of Smith-Lever Funds

At this point in time there is much uncertainty regarding state funding for the university and for Extension and Smith-Lever allocations are critically important in sustaining Extension's capacity to address priority issues that are global, national, and statewide in scope. Should loss of state funding occur, the requirement that Smith-Lever funds be matched provides an incentive for local stakeholders to sustain their local funding ensuring that Illinois Smith-Lever funds are allocated.

Should the state's funding crisis be favorably resolved, Smith-Lever dollars would continue to serve as an important resource in supporting actions to more efficiently maintain issue-relevant program delivery through current and emerging technologies to reach a broad segment of our population. In addition, Smith-Lever funding enables access to resources to maintain a staff presence throughout the state essential in meeting the needs of limited resource audiences who need personal supportive interaction in addressing health issues such as child obesity and food security.

Smith-Lever funds are also very valuable in ensuring that Extension can address priority issues through staff support for multi-state activities that include the **Illinois-Indiana Sea Grant Program** and to initiate innovative programs such as the **Master Naturalist** program that enhances understanding of climate change and its relation to environmental stewardship. These funds also have created capacity resulting in new funds to support ongoing efforts related to safe food production and demonstration of biomass conversion as a viable alternative energy source. The flexibility provided by Smith-Lever funds also allows Extension to continue to support successful grant-funded programs that address priority issues after the grant funding is no longer available.

The Planned Programs

Agricultural and Biological Engineering - Research activities will focus on a project with the primary objective of improving the efficiency of liquid agricultural chemical application systems, work to better understand the impacts of environmental management on poultry and the conducting of experiments on the use of water-cooled perches for laying hens kept in heat stress conditions, research focusing on quantifying the changes in watershed hydrology, and research designed to increase corn yield by aiding the breeding process using an agricultural engineering perspective. Extension efforts will focus on manure management and technological advancements related to preserving soil and water quality, safe application of pesticides, farm safety, and on biomass conversion to heat and electricity.

Agricultural and Consumer Economics - Extension educational activities will include a new statewide opportunity for conducting Annie's project focused on the development of various farm financial management skills [including marketing and risk management] and **Financial Wellness for College Students** that will encompass a series of webinars as well as in-person support through trained peer educators [students who are interested or majoring in consumer science]. Research activities will focus on an effort to assess price patterns in agricultural futures markets, a project with the goal of analyzing new programs and policies for farm assistance and conservation, research on local, state, federal, and selected international laws that constitute the legal environment for agriculture, an exploration of government's influence on household finance and home purchase, and an investigation into the economic impacts of policies and interventions designed to help developing world small farmers.

Animal Health and Production - Research activities will include the development of genetic resources for goats, work to improve our understanding of the environmental and animal well-being implications of alternative systems, work to develop a surface-enhanced Raman spectroscopy-based avian influenza virus diagnostic assay, an exploration of the role of colostrum in promoting and modulating the health and

development of the neonatal bovine intestine, and a project with the long-term goal of understanding the individual molecules and pathways influencing health, production, and behavior traits in livestock. Extension activities will include annual statewide programs that address animal production and health for swine, beef, dairy, sheep, goats, poultry, and horses for owners, producers, and 4-H youth, as well as information related to companion animals.

Community Resource Planning And Development - Extension activities will focus on community planning, leadership development, and building entrepreneurial communities. Research activities will include a study that examines how patterns of judicial involvement prior to and during the divorce process vary by type of intimate partner violence and a project with the overall goal of examining the complex relationships between family socioeconomic conditions, daycare, schooling experiences, and socio-emotional growth during childhood.

Food Safety And Food Security - Extension programs related to food security will address corn, soybean, fruit, and vegetable crop production and management including integrated pest management, support for local food systems development, access to adequate healthy food for those at greatest risk of hunger, safe food preparation and preservation, and a three year grant-funded training for school food service professionals. Research activities will focus on investigating the material conditions that reduce or reproduce household food insecurity, a project with the goal of implementing a strategy toward healthy, safe, and secure fresh and processed pork products, an exploration of the use of power ultrasound to minimize the food safety risk of fresh produce, an effort to attract more customers to the farm by helping growers identify rootstocks that will reduce tree height without compromising fruit quality, and the identification of methods that extend the shelf life, improve the nutritional quality, and enhance the safety of fresh cut produce.

Human Health And Human Development - Research activities will include research to prevent the burden of adult obesity among women, a project that will generate information about how immigrant Latino parents living in rural and non-metropolitan communities negotiate the challenges of parenting adolescents, an investigation into the ability of tomato powder, broccoli powder, and soy germ to reduce the progression of prostate cancer, a project that seeks to examine the potential for family mealtime practices to moderate biological risk for childhood obesity, research to identify and better understand the protective factors that maintain relationship quality during the transitions to marriage and parenthood, and an evaluation of the impact of dietary botanical estrogens on breast cancer growth and progression. Although Extension provides access to a wide array of methods and information related to family life, interdisciplinary programs will address individual and family issues primarily for early childhood and aging stages of the life cycle to enhance human health and development. Extension activities will focus on: [1] Childcare provider education; [2] Maintaining cognitive health; [3] Fostering financial wellness; and [4] Reducing the risk of obesity and managing chronic diseases with an emphasis on proper nutrition and physical activity.

Natural Resources And The Environment - Extension activities will focus on soil and water management [encompassing information on enhancing carbon sequestration in plants and soils and reducing plant stress in coping with climate variations], forestry management, the development of volunteer natural resource stewards [**Master Naturalists**], and environmental stewardship education for new and inexperienced small acreage landowners and youth. Research activities will include a reexamination of current measurements of the impact of climate change on agriculture, a project with the overall goal of documenting phosphorus input and output budgets in constructed wetlands, work to improve our understanding of the influence of environmental conditions and time since invasion on forests ecosystem structure and function, and efforts to better understand the ecology of landscapes with significant commitments to agricultural production [restoration and "set aside" programs are crucial to the conservation of wildlife; understanding the ecology of these sites is therefore essential].

Plant Health, Systems And Production - Research activities will include the development of additional

methods for controlling H. glycines, research to improve our understanding of the intrinsic structural, chemical, and biological changes in the corn kernel and soybean seed during storage and processing, research with the overall goal of better understand the biology of X. cucurbitae and determining the etiology and epidemiology of bacterial spot, the implementation of genomic selection into Illinois breeding programs to significantly bolster productivity, the development of improved winter wheat varieties adapted to Illinois, and continuing research under the University of **Illinois Soybean Breeding Program** to develop new experimental lines and to test lines for yield. Extension activities will address alternative agriculture production, invasive and/or exotic pest diagnosis and management, integrated pest management, and selection and plant management practices for maintaining healthy lawns and public properties while protecting natural resources through the assistance of trained volunteers [Master Gardeners].

Sustainable Energy - Extension programming will focus on disseminating biofuel research findings and information on other alternative energy resources, as well as ways to advance successful and profitable commercialized biomass-based heat and electric energy to reduce the use of non-renewable energy sources. Research activities will include an investigation of the technical and economic potential for sugarcane ethanol production in Brazil, an examination of the effects of riskiness of energy crops compared to conventional crops, the breeding of Miscanthus cultivars with improved winterhardiness and high yield-potential in the central and northern Midwest, and the establishment of a demonstration laboratory-scale system that has the capacity to develop two gallons per day of biocrude oil from manure and algae grown in a manure water treatment system.

4-H Youth Development - Drawing on research conducted in the College of ACES in nutrition and health, leadership, and youth involvement in groups, as well as the expertise of faculty in the Colleges of Engineering, Pharmacy, Dentistry, and Medicine, the National Center for Rural Health, and the Graduate School of Library and Information Science, the University of Illinois Extension **4-H Youth Development Program** is focused on providing experiences that support and enhance positive youth development. Educational priorities for all 4-H delivery systems remain focused on: [1] College and career readiness; [2] Food access; [3] Environmental stewardship; [4] Leadership; and [5] Health. Volunteer training and 4-H enrollment expansion in reaching youth living in metropolitan areas and youth of Hispanic ethnicity will also receive significant attention.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2017	150.0	0.0	180.0	0.0
2018	150.0	0.0	180.0	0.0
2019	150.0	0.0	180.0	0.0
2020	150.0	0.0	180.0	0.0
2021	150.0	0.0	180.0	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Expert Peer Review
- Other (Extension Staff Program Teams)

2. Brief Explanation

Research and outreach projects and programs have always been subject to a review process. Formula-funded research projects undergo a merit review process at the departmental level by at least three faculty members in a related discipline to insure the projects are scientifically sound, relevant to society's needs, and not duplicative of efforts undertaken elsewhere. Formula projects are then submitted to NIFA for final review and approval. Internal research grants are all reviewed internally. Greater detail on the Hatch review process is included in the Annual Report.

In Extension, state program leaders working with staff have been charged with the responsibility for ensuring that Extension programs are research-based. Campus faculty and staff are expected to deliver the majority of statewide programs. In most cases, local programs and curriculum will be developed by more than one educator and reviewed by several of their peers who have the same assigned specialized areas of delivery. Curriculum materials are sometimes sent for review directly to peers in other states and 4-H curriculum materials are often sent through a national jury process. In addition, during annual staff performance reviews attention is given to programming quality. Finally, the merit of all new program efforts and a selected number of ongoing programs are evaluated by participants regarding content and delivery. Evaluations of impact have been developed for an increasing number of statewide programs and are expected to continue to increase. Reporting program impacts is enabled by the "success story" section of the individual field staff monthly reporting system and through the annual performance appraisal self-assessment which is then reviewed by program leaders and field staff supervisors. Efforts will continue related to identifying and evaluating the actual knowledge, practice, and condition change outcomes generated in or by program participants and their environments.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The Office of Research supports scientists in the College of ACES who are working to solve some of the world's most critical challenges. ACES research is on the forefront of discoveries, having both local relevance for the citizens of Illinois and global impact for the world's scientific community. Our research and education centers, located throughout the state of Illinois, provide a vital testing ground where research can generate practical applications to benefit consumers, farmers, commodity groups, agricultural organizations, environmentalists, conservationists, government agencies, industry, and business.

Interactions between ACES research and Extension faculty and multi-county Extension staff have been and will continue to be through periodic meetings that address the development and promotion of integrated planned programs in global food security and hunger, sustainable energy, and food safety. In 2012, formal working groups of campus faculty and Extension field staff were appointed to develop new Extension state plans of work. Interactions of ACES research and Extension faculty and staff at national conferences and professional associations will provide opportunities to identify multi-state interest in research and Extension program development. Examples of integrated and multi-state efforts that address these priorities include: [1] Co-location of Extension educators with researchers at six experiment station locations such as the **Dixon Springs Agricultural Center** to facilitate integrated crop and livestock production programs that address global food security and hunger; [2] Integrated efforts through the **Integrated Bioprocessing Research Laboratory** [formerly the Center for Advanced BioEnergy Research] to carry out research and explore the use of biomass as a viable sustainable energy source; [3] Delivery of research at multi-state conferences for producers of food crops that focus on production as well as safe food handling practices; [4] The **Illinois-Indiana Sea Grant** program's focus on water quality and it's relation to climate change [a high priority of educational interest in Illinois] including efforts to address improper use, storage, and disposal of pharmaceutical and personal care products; [5] Integrated efforts through the campus **Institute for Sustainability, Energy, and Environment** to address climate change and sustainable energy; [6] Participation in a number of North Central Extension multistate joint meetings and networks that provide educational resources such as the **North Central Center for Rural Development** mini-grants and webinars; [7] Renewal of **Farm to School** programming with the filling of a position that is focused on access to healthy fresh food for school children that may lower the risk of obesity; and [8] Disaster planning drawing on **Extension Disaster Education Network** [EDEN] resources and training.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

At the campus level, **Inclusive Illinois, one campus, many voices**, represents the commitment of the University of Illinois to cultivating a community at Illinois where everyone is welcomed, celebrated, and respected. Through education, engagement, and excellence, each voice creates the Inclusive Illinois Experience. At the college level, the College of ACES seeks to encourage diversity and multiculturalism among its faculty, staff, and student body and has committed itself to the following four goals: [1] To increase the cultural diversity in the undergraduate student body; [2] To create a college environment that values differences among students, faculty and staff; [3] To strengthen the human expertise of the food and agricultural sciences through cooperative relationships between ACES departments and other colleges and universities, government agencies and industry; and [4] To increase the number of minority and women faculty and staff.

Considerable efforts have been made and continue to be made to ensure that nontraditional stakeholders are given a voice in identifying needs to be addressed and in shaping the research and programmatic responses to these needs through membership on college and Extension advisory groups [includes 9.4% minority group members] and through informal input. Currently 7% of the Extension webpage views received are to Spanish sites. More than 50 Extension websites are available in Spanish as well as two in Chinese and one in Korean. Facing the possibility of additional funding reductions for the second time in three years Cook County may need to make further reductions in the scope of priorities and programming for under-served and under-represented populations. However, Cook County staff has offered and will continue to offer programs focused on the following two priority issues: [1] Science,

technology, engineering, and math [STEM]; and [2] Urban community health. The **Expanded Food and Nutrition Education Program [EFNEP]** and the **Supplemental Nutrition Assistance Program [SNAP-Ed]** will likely continue to be the primary outreach models to reach under-represented and under-served audiences in multiple locations in the state. The 4-H youth development educators assigned to metro areas will continue to engage youth in under-served areas of the state including those of Hispanic ethnicity who currently make-up 9.1% of the previous year's 4-H enrollment.

3. How will the planned programs describe the expected outcomes and impacts?

Hatch Multistate projects represent a significant component of the total Hatch portfolio. Both Hatch and Hatch Multistate projects are reviewed on an annual basis when deciding which projects to feature in the Plan of Work and Annual Report. Of course, projects included represent only the Illinois research portion of a given program. Multistate committees publish an Annual Report of their work that allows stakeholders to view the impact of the project on a regional or national basis. When selecting programs to be included in the Plan of Work, special attention is given to including those that display a significant Extension/research partnership. Examples currently include programs supporting agribusinesses [**farmdoc**], work focused on childhood obesity [**Abriendo Caminos**], and work focused on safe food production. Individuals providing leadership for multistate and integrated activities will be asked to submit a report that includes documentation of the indicators of outcomes and impacts. Several avenues are utilized for disseminating results to stakeholders including **ACES@Illinois** [the annual College of ACES update supported by integrated funds]. For examples, please see the stakeholder input section of our Annual Report. Evaluations noted at the end of each POW section have been developed to measure outcomes and impacts based on the content of the programs. Most evaluations will be collected at the end of face-to-face programs but some will involve a second follow-up to the program to determine practices implemented. Descriptions of outcomes and impacts measured can be entered by staff in the staff reporting systems. Findings are used in marketing and promotion of the activities to future participants as well as included in the web-based and printed county and state reports distributed to local stakeholders and Illinois' state and federal legislators. The Director of Communications for University of Illinois Extension along with eight multi-county based staff and four campus based staff with assignments in publicity and promotion will enhance Extension's ability to report expected outcomes and impact.

4. How will the planned programs result in improved program effectiveness and/or

Multistate projects play a unique role in the ACES research portfolio. Multistate research allows researchers to collaborate with other investigators on issues that are of regional [and in some cases national] significance, to develop new relationships that lead to further collaborations, and to interact with top scientists who share similar research interests but also bring to the table viewpoints from stakeholders in their part of the country that may be significantly different. Joint activities are also especially important in that they allow Extension educators to have access to cutting-edge research while at the same time allowing investigators to receive input from stakeholders through their participation in Extension programs. Multistate Extension activities are expected to prevent duplication of work and allow sharing of expertise across state lines. Extension multistate conferences and distance education delivery will tap into the varied expertise of university faculty and staff in each state. Likewise, many planned multistate and integrated activities involve delivery through websites, which have no geographical boundaries.

Output targets with respect to participation, academic publications, and completed research projects provide a basis for monitoring research and Extension program implementation. Measures of outcomes provide a basis for estimating program effectiveness. The monitoring of both kinds of measures provides a basis for determining effectiveness, a necessary precursor to determining efficiency.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Other (Department Advisory Committees)

Brief explanation.

All programs in the college are continually subjected to a diverse process of stakeholder input. The college, the Office of Research, the Office of Extension and Outreach, academic departments, and many programs within the college have advisory groups and councils made up of stakeholders. In this context, stakeholders may represent organized entities in the state with a particular interest in a program area, but they also include individual stakeholders. In addition to stakeholder input provided through formal means such as the advisory groups and councils, college administrators, educators, partners, students, and alumni all play roles in seeking out stakeholder input [as of this writing, the college is preparing for the ExplorACES open house which will be held in March].

Local Extension councils are comprised of volunteers nominated locally and appointed by the College to provide advice on educational programming. The makeup of the councils [includes 9.4% minority group representatives] reflects local populations and local participation in Extension programs. Multi-county local Extension advisory councils are comprised of individuals that include a diverse representation from each of the counties. These councils are asked to identify issues and/or suggest program priorities to meet local needs that are reflected in multi-county plans of work. Staff members are asked and provided with resources to involve council members in selecting three to five of the twelve state plans of work that were of greatest priority and modify them to reflect the local situation and educational activities to be delivered. These multi-county plans draw upon the 2013-2014 statewide plans of work and are modified to reflect local priorities and planned program responses which are updated annually. In addition to the local multi-county Extension advisory councils, regional councils and a statewide council also are tapped for input. Re-establishment of the State Program Planning and Assessment committee will ensure that attention is given to ways that might help Extension county directors to enhance council input.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

A variety of methods and techniques are used to identify individuals and groups, with several specific examples discussed in detail in our Annual Report. These examples include activities conducted by the associate dean of research, Extension administrators and educators, and departments within the College of ACES.

As part of the University of Illinois Extension Affirmative Action plan, county Extension directors and Extension educators identify individuals to serve on formal local multi-county, regional, and state advisory groups for Extension. These groups will play a key role in identifying research and Extension priority activities, as well as suggesting others who should be contacted. In addition, Extension staff members network and establish relationships with individuals and groups in assigned areas to assess priority needs. Extension staff will need to continue those efforts in the coming years in order to sustain local funding. In addition, some multi-county Extension units have data that has been collected through surveys completed by local stakeholders and in public meetings designed to identify issues and program interests. The State Program Planning and Assessment Committee will consider options for gathering statewide stakeholder input regarding interests and needs such as the one developed in 2012 by Extension to assess the needs of current Extension volunteers. Extension administrators at the regional and state level also network with traditional and non-traditional internal and external individuals and groups and will use these contacts to seek suggestions for other key stakeholders that can be contacted to provide direction for research and Extension.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

As mentioned in our Annual Report, the Associate Dean for Research [Dr. Neal Merchen] places a high priority on identifying stakeholders and collecting input in a variety of ways [building on the many relationships with stakeholders Dr. Merchen has already developed as Head of the Department of Animal Sciences]. The College Office of News and Public Affairs will continue to solicit comments through news releases, publications, and broadcasts. Most Extension stakeholder input on program content will likely be gathered from program participants through end-of-program surveys, discussions with multi-county Extension Advisory Council members, and meeting with local and state organizations. Efforts at the department level will continue to include one-on-one conversations, surveys, workshops, and extending invitations to specific groups and individuals to serve on advisory committees. Field days, the **ExplorACES** open house, and events hosted by the Office of Advancement are examples of recurring efforts to collect stakeholder input.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Continuation, redirection, or initiation of new research and Extension programs draws heavily on stakeholder input from formalized groups and various needs assessment methods. Stakeholders play a critical role in identifying currently-unmet needs in research and outreach programs, and their input is used to sharpen the research priorities of college departments and to insure that publications, Extension programs and other outreach efforts are focusing on those areas of greatest concern to stakeholders. The State Extension Program leaders will continue to meet with multi-county Extension educators in identifying priority programs to be delivered and those programs not addressing high-priority areas will be discontinued.

Stakeholder groups including industry partners, alumni, local and **State Extension Advisory Council** members, and **Extension Partners** [a grassroots group formed to support Extension] members will continue to be influential in expressing research and Extension needs to local, state, and federal government officials responsible for restoring, continuing, or increasing funding for research and Extension that can be used in budgeting, allocating or reallocating funds, and identifying needed faculty and staff expertise.

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agricultural And Biological Engineering

2. Brief summary about Planned Program

Leadership is provided by the Department of Agricultural and Biological Engineering [ranked best in the nation in 2015 by U.S. News and World Report]. The overarching goal of agricultural and biological engineering work is to enhance complex living systems involving agriculture, food, the environment, and energy. The Department of Agricultural and Biological Engineering works toward this goal by applying principles from many scientific and engineering disciplines. Geographically located in an area of intense agricultural production with access to excellent transportation facilities and surrounded by a large concentration of agricultural and industrial equipment manufacturers and food processors, the department is in an enviable position to serve all areas of the agricultural community. Many agricultural engineering graduates who have been educated and trained in the modern teaching facilities and research laboratories of the University of Illinois Agricultural Engineering Sciences Building are now employed throughout the nation. Interaction and cooperation with these graduates and other alumni allow the department to seek input from stakeholders around the world.

Areas of focus covered in this planned program [or in others when appropriate] include bio-based processing and production systems, biomass and renewable energy, precision and information agriculture, agricultural and biosystems management, agricultural safety and health, food quality and safety, environmental stewardship, land and water resources, spacially distributed systems, structure and facilities for living systems, indoor environmental control, bio-sensors, bio-instrumentation, bio-informatics and bio-nanotechnology, intelligent machinery systems, automation of biological systems, and advanced life support systems. Faculty and staff in the Department of Agricultural and Biological Engineering with joint research and Extension appointments will focus their outreach education efforts on manure management, integrated pest management, environmentally-safe application of pesticides, drainage systems, agricultural safety and health, indoor air quality/ventilation, use of the latest applicable advancements in technology, and biomass conversion for heat and electricity [biomass conversion for heat and electricity is reflected in the Sustainable Energy planned program].

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	20%		10%	
133	Pollution Prevention and Mitigation	20%		10%	
141	Air Resource Protection and Management	10%		10%	
315	Animal Welfare/Well-Being and Protection	0%		10%	
401	Structures, Facilities, and General Purpose Farm Supplies	10%		10%	
402	Engineering Systems and Equipment	5%		15%	
403	Waste Disposal, Recycling, and Reuse	15%		10%	
404	Instrumentation and Control Systems	10%		15%	
405	Drainage and Irrigation Systems and Facilities	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Engineering technology plays a major role in developing and maintaining competitive livestock and crop industries in Illinois. It also contributes to increasing worker safety in agriculture and related industries. Such technology is also addressing concerns and problems related to odor and air quality, animal waste, animal treatment, protection and management of water resources, and biomass conversion to heat and electricity.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That new technologies can be developed that are cost-effective in the field [and affordable for smaller crop and livestock producers] and that resources will be available to continue to develop and refine these

technologies.

2. Ultimate goal(s) of this Program

To improve agricultural productivity through the use of intelligent machines, to integrate biological science and engineering for enhancement of living systems, to use holistic approaches to provide engineering solutions, and to mitigate conditions through knowledge and practices regarding manure management to preserve or improve water and air quality.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	4.0	0.0
2018	0.0	0.0	4.0	0.0
2019	0.0	0.0	4.0	0.0
2020	0.0	0.0	4.0	0.0
2021	0.0	0.0	4.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include research designed to increase corn yield by aiding the breeding process using an agricultural engineering perspective, an assessment of silver nanoparticles [AgNPs] toxicity to denitrifying bacteria in soils [concerns about the release of engineered nanoparticles and their impact on terrestrial ecosystems have initiated our current AgNPs investigation], a project with the goal of developing a framework and methodology for collecting information and evaluating field-based supply chain logistics with a global perspective in order to be able to implement global engineering solutions concerning agricultural machinery, the development of a routine for the design of subsurface bioreactors [to evaluate the sensitivity of NO3-N losses, crop yields, and water availability from tile drain systems it is essential to characterize the effects of different tile drain spacing and depths], work to address resource management issues related to water and nutrient applications, the development of a living laboratory that provides "plug and play" capabilities for studying the advances of agricultural production components, a project with the primary objective of improving the efficiency of liquid agricultural chemical application systems [through the development of a real-time droplet size monitoring system for low-pressure field sprayers], work to better understand the impact of environmental management on poultry, and the conducting of experiments on the use of water-cooled perches for laying hens kept in heat stress conditions [it is anticipated that this type of housing system will provide for improved bird comfort and a reduction of meat stress effects, resulting in improved egg production and egg shell quality].

Activities will also include research focusing on the environmental impact of anthropogenic nanoparticles on viz. photosynthetic cyanobacteria [these organisms convert solar energy to simple sugars and are primary producers is most aquatic ecosystems], a project with the goal of developing tools and techniques that can be used to accurately predict best management practices performance effectiveness across a

range of spatial scales specific to sediment, nutrient, and pathogen transport [achieving this aim will permit more informed and cost effective watershed management decision making], research focusing on quantifying the changes in watershed hydrology [water quantity and quality] under changing climate and land use and how they impact ecosystem services in terms of sediment delivery and aquatic biodiversity, and a study designed to optimize the design of vegetative filter strips [VFS] to prevent the transport of infective microbial pathogens to receiving waters while maintaining an effective removal of nutrients and pesticides [reducing or eliminating contaminants at the source and before entering streams and rivers will prevent the transmission of these contaminants in irrigation and livestock watering by downstream users].

Extension activities will include website expansion and online quizzes and training sessions to certify that livestock managers are knowledgeable about manure management. Workshops and online agricultural safety materials will address farm safety topics such as roadway collisions involving farm equipment and safe grain storage handling, and individualized services will be available to disabled farmers through the **AgrAbility Unlimited** project. All other Extension efforts related to natural resources, soil drainage and tillage, pesticide application, indoor air quality/ventilation, and bio-based energy production and use are noted in other planned program sections [see Sustainable Energy, Natural Resources and the Environment, and Food Safety and Food Security].

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (Online Certification Modules)	● Web sites other than eXtension ● Other 1 (Manure Central [State Website]) ● Other 2 (Online)

3. Description of targeted audience

Members of the target audience will included the farmers, members of the scientific community involved in greenhouse engineering, undergraduate, graduate and professional students interested in the areas of nanotechnology, environmental engineering, and in biotechnology and related fields, scientists, policy makers, watershed managers, landowners, agricultural engineers, researchers in the livestock industry, animal scientists, livestock producers, the agricultural equipment industry, chemical companies, poultry producers, professional pesticide applicators, growers, pesticide registrants, pesticide and adjuvant retailers, crop consultants, and individuals, companies, and governmental agencies involved with the livestock, biofuels, and wastewater treatment industries. Extension target audiences will focus on educating Illinois commercial and private pesticide applicators, nationwide aerial applicators, technical service providers [TSP's] who specialize in developing comprehensive nutrient management plans, livestock producers, and custom manure haulers.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Maximizing Efficiency And Minimizing Drift For Agricultural Aerial Applications
2	Improving Emission Control Technologies For Livestock Buildings
3	Implementation Of Global Engineering Solutions Using Agricultural Machinery
4	Development And Use Of A Manure Management Plan
5	Reducing The Risks Associated With Bioactive Compounds In Wastewaters

Outcome # 1

1. Outcome Target

Maximizing Efficiency And Minimizing Drift For Agricultural Aerial Applications

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 404 - Instrumentation and Control Systems
- 141 - Air Resource Protection and Management
- 133 - Pollution Prevention and Mitigation
- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Improving Emission Control Technologies For Livestock Buildings

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 141 - Air Resource Protection and Management
- 133 - Pollution Prevention and Mitigation
- 402 - Engineering Systems and Equipment
- 404 - Instrumentation and Control Systems
- 401 - Structures, Facilities, and General Purpose Farm Supplies

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Implementation Of Global Engineering Solutions Using Agricultural Machinery

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 404 - Instrumentation and Control Systems
- 402 - Engineering Systems and Equipment
- 401 - Structures, Facilities, and General Purpose Farm Supplies

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Development And Use Of A Manure Management Plan

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 403 - Waste Disposal, Recycling, and Reuse
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 5

1. Outcome Target

Reducing The Risks Associated With Bioactive Compounds In Wastewaters

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 403 - Waste Disposal, Recycling, and Reuse
- 133 - Pollution Prevention and Mitigation
- 402 - Engineering Systems and Equipment
- 405 - Drainage and Irrigation Systems and Facilities

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Competing Programmatic Challenges

Description

External factors include the development of new technologies in closely related fields, demand for a given agricultural product, and environmental concerns. Decreased state funding appropriations due to the state fiscal deficit is also a significant external factor.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Perioidic end-of meeting questionnaires distributed at manure management workshops.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Agricultural And Consumer Economics

2. Brief summary about Planned Program

The Department of Agricultural and Consumer Economics [ACE] targets research and outreach programs aimed at improving the economic and environmental wellbeing of producers, consumers, and families. Drawing on economics, business, and law, the department analyzes issues related to individuals and families, agriculture and natural resources, and food - all ranging in scope from local to global. Researchers in the department partner with Extension specialists to deliver agriculturally related educational programs as well as to address economic needs of residents of Illinois and beyond. This planned program encompasses the research and outreach activities carried out by campus faculty with expertise in agricultural economics and by Extension educators with responsibility for local foods and small farms programming. This planned program also focuses on educational outreach by Extension educators with assigned responsibility for consumer economics related issues. Additional outreach by these educators may be found in the Human Health and Human Development planned program.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	0%		5%	
601	Economics of Agricultural Production and Farm Management	15%		10%	
602	Business Management, Finance, and Taxation	10%		10%	
603	Market Economics	15%		15%	
604	Marketing and Distribution Practices	10%		10%	
605	Natural Resource and Environmental Economics	5%		10%	
606	International Trade and Development Economics	0%		10%	
607	Consumer Economics	30%		10%	
610	Domestic Policy Analysis	0%		10%	
801	Individual and Family Resource Management	15%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Leadership for research and outreach activities is provided by the Department of Agricultural and Consumer Economics. ACE faculty and campus staff have disciplinary backgrounds in economics, law, finance, and business, and consumer economics and use their expertise to lead innovative research, outreach, and education programs in Illinois and around the world, including Africa, Asia, Canada, South America, and Europe.

Agricultural producers, including those engaged in horticultural businesses, express concerns about their enterprise's sustainability and profitability and about how to manage changes and risks with competing demands for limited resources. In addition, domestic and foreign policies that characterize today's global society require recognition of how those demands influence the viability of their enterprises and the appropriate responses they can and should take. Extension educators will focus on issues associated with developing basic financial management skills for older youth, college students, and young adults and for those considering or operating a small farm.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That international developments in agricultural law have an increasing impact on the legal situation in the United States, that farmers lack the information to best utilize crop yield and revenue insurance products, that many current environmental economic tools are simplistic and could provide better insight to policy makers if they were enriched by considering special issues [such as paying closer attention to heterogeneity of land, consumers, and producers], and that resources will continue to be available to allow agricultural economists at Illinois to continue to provide thoroughly-researched advice to policy makers and producers at both the local and national levels.

2. Ultimate goal(s) of this Program

To inform and improve decisions related to Midwest commercial food and agricultural sectors involving production, financing, marketing, and risk management, to identify and estimate the impact of federal and state policies on rural communities, agricultural producers, and society, to help inform the policy making process, to describe and measure the wellbeing of rural communities resulting from changes in economic and regulatory conditions, and to equip youth with basic financial management skills.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	6.0	0.0
2018	0.0	0.0	6.0	0.0
2019	0.0	0.0	6.0	0.0
2020	0.0	0.0	6.0	0.0
2021	0.0	0.0	6.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include an effort to apply the most recent and appropriate methodological proposals to assessing price patterns in agricultural futures markets in the U.S., a project with the goal of analyzing programs and policies for farm assistance and conservation in terms of managing and mitigating risks and better understanding the interaction between risk management, subsidy support, and risk mitigation through conservation programs [the focus will be to better understand both the policy design and supporting justifications for policy outcomes], research on local, state, federal, and selected international laws that constitute the legal environment for agriculture to evaluate their impact on agricultural production and agri-business and the protection and conservation of the environment, and an effort to measure the impact on economic outcomes of policy changes and new technologies in the food and agricultural system

[this research will explore both the consequences of such changes, measuring the impacts of those changes on issues of direct interest to food producers, consumers, and processors in the U.S. and abroad, and the causes of the changes, analyzing the political and social forces that bring them about]. Activities will also include an exploration of government's influence on household finance and home purchase using a comparative approach, continuing work on the **Varietal Information Program for Soybeans** [VIPS] site designed to share soybean protein research information in a useful and cost effective manner to enable public institutions and other organizations to communicate information to food processors, feeding organizations, and the agriculture community about the activities, investments, and outcomes of grower-supported soy protein work for the developing world, an investigation into the economic impacts of policies and interventions designed to help developing world small farmers cope with inefficiencies caused by poorly functioning input and output markets [the research will explore both the drivers and the consequences of these inefficiencies and the economic effects of public and private sector initiatives to resolve market failures, as well as the decisions and investments of farmers themselves], the development of greatly needed information on the causes, consequences, and likely future of farmland prices, and a project with the overall goal of improving our understanding of the factors affecting productive use of capital within the agricultural system across all participants with active stakes in the sector.

Extension activities will focus on farm financial management including marketing and risk management delivered by campus faculty [it should be noted that Extension field educator positions with expertise in this area have been eliminated in the reorganization of Extension effective July 1, 2011]. Delivery methods will include continuous updating and promotion of the **farmdoc** website, regional **Economic Summit** conferences featuring research updates, workshops on using web-based farm management related tools such as the **Farm Analysis Solution Tool** [FAST], tax schools, and podcasts. Individuals who are current or future small farm owners will also be able to access information to identify the risk in maintaining or entering into small farm plant or animal production enterprises through **Putting Small Acres to Work** and other programs provided by faculty and Extension educators responsible for local foods and small farms educational outreach. Extension consumer science programs will include **Financial Wellness for College Students** [consisting of a wide array of technologies including a series of webinars as well as in-person support through trained peer educators that addresses basic financial management information] and **Welcome to the Real World**, a simulation that gives students [age12 through young adults] a taste of future income and expenses [this simulation is currently in the process of being updated].

The **Center for Economic & Financial Education** is also located in the Department of Agricultural and Consumer Economics and is responsible for campus-based integrated research and outreach for educational conferences, training, and resources for teachers and financial professionals.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class	● Newsletters
● Workshop	● TV Media Programs
● One-on-One Intervention	● Web sites other than eXtension
● Other 1 (Webinars)	● Other 1 (Podcasts)

3. Description of targeted audience

Members of the target audience will include academics and industry professionals from across the U.S. and around the globe, farmers, landowners, policymakers, regulators, practicing lawyers and academic lawyers in the U.S. and abroad, government regulatory agencies, processors and retail distributers of

agricultural products, private firms with agricultural interests, public and private utility companies, international and domestic scholars in economics, financial planning, psychology, law, and demographics, financial educators, students, financial planning practitioners, soybean growers, food manufacturers, livestock feed manufacturers, NGO and USAID staff, professional farm managers, financial managers in the agricultural investment community, agricultural lenders, academic economists, agricultural production students, farm credit system lenders, agricultural policy committees, federal reserve banks, and academic researchers with an interest in agricultural finance. Extension activities will target crop and livestock producers, land owners, financial advisers, tax consultants, middle school and high school youth, college students, and young adults.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Page File Requests Made To Farmdoc
2	Number Of Web Hits On The Varietal Information Program For Soybeans Website
3	Toward A Better Understanding Of The Causes, Consequences, And Likely Future Of Farmland Prices
4	Number Making Decisions To Reduce Risk In Agriculture Production
5	Exploring The Impact Of Recent Commodity Market Developments On Market Efficiency
6	Exploring The Impact Of Government Policy Decisions On Household Finance
7	Investigating The Communication Technologies Used To Share Information About Soy Protein Applications
8	Number Of Youth, College Students, Or Adults That Increased Knowledge And Skills In Managing Income And Expenses
9	Individuals Improving Financial Capability And/Or Adopting Consumer Behavior Skills

Outcome # 1

1. Outcome Target

Page File Requests Made To Farmdoc

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 604 - Marketing and Distribution Practices
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number Of Web Hits On The Varietal Information Program For Soybeans Website

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 602 - Business Management, Finance, and Taxation
- 604 - Marketing and Distribution Practices
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Toward A Better Understanding Of The Causes, Consequences, And Likely Future Of Farmland Prices

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 610 - Domestic Policy Analysis
- 605 - Natural Resource and Environmental Economics
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target

Number Making Decisions To Reduce Risk In Agriculture Production

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 610 - Domestic Policy Analysis
- 602 - Business Management, Finance, and Taxation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Exploring The Impact Of Recent Commodity Market Developments On Market Efficiency

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 610 - Domestic Policy Analysis
- 601 - Economics of Agricultural Production and Farm Management
- 606 - International Trade and Development Economics
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Exploring The Impact Of Government Policy Decisions On Household Finance

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 610 - Domestic Policy Analysis
- 603 - Market Economics
- 602 - Business Management, Finance, and Taxation
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Investigating The Communication Technologies Used To Share Information About Soy Protein Applications

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 604 - Marketing and Distribution Practices
- 606 - International Trade and Development Economics
- 605 - Natural Resource and Environmental Economics
- 601 - Economics of Agricultural Production and Farm Management
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 8

1. Outcome Target

Number Of Youth, College Students, Or Adults That Increased Knowledge And Skills In Managing Income And Expenses

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 607 - Consumer Economics

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

Individuals Improving Financial Capability And/Or Adopting Consumer Behavior Skills

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 602 - Business Management, Finance, and Taxation
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes

Description

Changes in legislation, changes in state and national economic variables such as employment, interest rates, and availability of capital, and challenges faced in the emerging private research and development sectors in developing countries.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

An end of program evaluation has been and will continue to be distributed to youth participants in **Welcome to the Real World**.

Mentees of the **Master Money Mentors** program will complete a form or engage in an interview regarding practices changes made.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Animal Health And Production

2. Brief summary about Planned Program

Leadership for animal health and production research and outreach programs is provided by Extension Educators, the Department of Animal Sciences, and the College of Veterinary Medicine. Our research and Extension programs address efficiency, profitability, and well-being of dairy and beef cattle, pigs, small ruminants, and poultry and enhance the supply of food for a growing world population. Our programs in companion animal biology and humane care education create information for pet owners and help them to understand the value of positive relationships between humans and animals. Fundamental research in physiology, nutrition and behavior solve animal science problems that can also have a significant impact on medical problems in humans.

Extension and outreach is conducted primarily by campus faculty and by two Extension Educators located at the **Dixon Springs Agricultural Center** in Southern Illinois and at the **Orr Agricultural Research and Demonstration Center** in Western Illinois, by one Extension Educator who facilitates statewide 4-H youth livestock projects and activities, and by those Extension Educators with responsibilities for education regarding small acreages used for livestock production. Additionally, Extension programs are conducted on both a multi-state and in-state basis organized to address specific species.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	20%		15%	
302	Nutrient Utilization in Animals	5%		20%	
303	Genetic Improvement of Animals	5%		15%	
305	Animal Physiological Processes	5%		10%	
307	Animal Management Systems	25%		10%	
311	Animal Diseases	15%		20%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
806	Youth Development	15%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Illinois ranks fourth in hog production and has a number of areas where land is more conducive to grazing animals than row crop production. Priorities in the Animal Health and Production planned program focus on production management [addressing new issues involving health, feeding, reproduction, genetics, and management] but also deal with issues that cut across several other planned programs, such as human development [companion and recreational animals], positive youth development [teaching youth about the importance of caring for animals and capitalizing on the animal as a tool for youth development], natural resource utilization [with an emphasis on environmental protection and water quality], agricultural economics [improving marketing skills and business planning], and of course, food safety [developing educational programs that encourage participation in quality assurance, residue avoidance, and **Hazard Analysis Critical Control Point** [HACCP] programs].

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

It is assumed that consumption of and demand for meat and dairy products will remain. Concerns over animal treatment present a need that researchers and Extension Educators are well positioned to meet. As resources continue to tighten at both the state and national levels, every effort will be made to continue to serve these needs as they relate to both Illinois and national stakeholders.

2. Ultimate goal(s) of this Program

The goals of this planned program are to develop management practices that enhance efficiency of production of food-producing animals, to develop nutrition and management practices that optimize the health of domestic animals, to develop management practices that enhance animal wellbeing and minimize the impacts of animal production on the environment, to improve methods for diagnosis, prevention, and treatment of infectious diseases in food animals, to develop new strategies to improve food safety, to educate animal producers and owners on keeping their animals healthy, and to provide veterinarians with the latest health information to best serve their clients.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	8.0	0.0
2018	0.0	0.0	8.0	0.0
2019	0.0	0.0	8.0	0.0
2020	0.0	0.0	8.0	0.0
2021	0.0	0.0	8.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Future activities will include work to develop a surface-enhanced Raman spectroscopy [SERS] based avian influenza virus diagnostic assay that will allow for rapid detection of avian influenza, research to improve our understanding of the role of global nutrition in the cow's diet before and after calving on its endocrine function and fertility, a project with the long-term goal of understanding the individual molecules and pathways influencing health, production, and behavior traits in livestock and biomedical species, the development of genetic resources for goats [our preliminary data has found that some goat ERVs are insertionally polymorphic, and thus could be used as genetic markers, while the relatively lower degree of genetic marker development in the goat suggests that retrotype markers would add to our knowledge of a livestock species of growing importance to U.S. agriculture], testing of the hypothesis that postnatal viral infection and subsequent activation of brain microglial cells disrupts neurodevelopment resulting in reduced resilience, the identification of molecular pathways involved in regulation of HPA [hypothalamic-pituitary-adrenal] activity in foxes [this will ultimately provide new insight into regulation of stress-induced behaviors in other mammals], work to improve our understanding of the environmental and animal well-being implications of alternative systems [with the increasing number of alternative systems installed and the growth in niche markets such as local and organic, understanding the environmental and animal well-being implications of these systems becomes vitally important], an exploration of the role of colostrum in promoting and modulating the health and development of the neonatal bovine intestine, and a study that

seeks to establish a unique and versatile model ecosystem to help identify and control the principal drivers of swine intestinal and respiratory microbiome configurations that are associated with health, production, and the development of antimicrobial resistance.

Activities will also include work to identify the uterine factors in the ewe that play an important role in establishment and maintenance of pregnancy, an effort to better understand the mechanisms whereby environmental and/or physiological stressors modulate immune responses to various pathogens as well as how stressors influence the pathogenesis of infection [the importance of understanding the physiological impact of stress is underscored by the fact that during the course of production, livestock are exposed to a myriad of stressors including pesticides and other environmental toxicants, fluctuations in temperature, housing, weaning stress, and reproduction practices], research to develop a way to administer transmucosal meloxicam rectally with successful achievement of plasma concentrations [this would further increase ease of administration for producers and minimize handling of the piglets], a project with the goal of determining the concentration of digestible energy and nutrients in soybean meal produced in the U.S. [making it possible to more accurately formulate diets for pigs, resulting in improved animal performance, reduced diet costs, and reduced excretion of nutrients into the environment], a project that will generate an integrated view of the multiple adaptations of the cow to nutritional management and other environmental factors [such knowledge will be helpful in identifying targets that can be manipulated via nutrition or other means to decrease the risk of disease during the transition period], research with the ultimate goal of determining which measures of performance recorded on developing heifers are good indicators of their efficiency as brood cows, and a project focusing on understanding the ovarian variation in the pubertal induction response to PG600 and methods that affect the synchrony of follicle development, estrus and ovulation in mature gilts treated with progestagen.

Extension activities will include establishing and maintaining the Extension commercial agriculture website. Programs addressing dairy production will include **Illinois Dairy Summits** and multi-state conferences. Seminars and regional programs that provide research updates on livestock production for specific species of livestock such as the beef cattle conferences and field days and the **Executive Pork Producers Program** will be ongoing. In addition, workshops, podcasts, and webinars that focus on small ruminant animals will be developed and targeted for new farmers. The 4-H horse and livestock clinics, horse and livestock judging events, and ethics training and online certification for new 4-H members enrolled in livestock are also major program activities that will be conducted. A related series of certification workshops focusing on manure management is included in the Agricultural and Biological Engineering planned program. The Food Safety planned program also includes specific activities related to livestock production.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (Webinars) ● Other 2 (Online Courses)	● eXtension web sites ● Web sites other than eXtension

3. Description of targeted audience

Members of the target audience will include poultry producers, veterinarians, the general public, veterinary and biomedical orthopaedic researchers, veterinary surgeons, beef and dairy farmers, nutritionists, students, national and international dairy goat farmers, scientists in academia, industry and government researching molecular mechanisms that influence performance, health, and behavior in food and biomedical animals, livestock producers, farmers, pork producers, nutritionists in feed companies, swine integrators, animal scientists working in the fields of nutrition, physiology, reproduction, and genetics, breed associations, beef cattle producers, pharmaceutical and animal nutrition companies, and scientists involved in investigating the development of effective vaccines against porcine reproductive and respiratory syndrome virus. Extension audiences will include youth, owners of companion animals, and small acreage owners seeking to raise livestock.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Research Projects

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Increased Knowledge Of Livestock Care And Management
2	Improved Control Of Porcine Reproductive And Respiratory Syndrome
3	Improving Our Understanding Of The Role Of Nutrition On Fertility
4	Identifying Genes, Transcripts, And Pathways Associated With Health In Livestock
5	Improving The Health Of Dairy Goats Through The Development Of New Genetic Resources
6	Improving Control Methods Of Strangles Infection In Horses
7	Enhancing The Efficiency Of Feed Utilization In Beef Production Systems
8	Aspirations To Enhance Profitability Of Livestock Production And Management
9	Aspirations To Reduce Risks In Livestock Production

Outcome # 1

1. Outcome Target

Increased Knowledge Of Livestock Care And Management

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 301 - Reproductive Performance of Animals
- 311 - Animal Diseases
- 307 - Animal Management Systems
- 806 - Youth Development
- 315 - Animal Welfare/Well-Being and Protection

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Improved Control Of Porcine Reproductive And Respiratory Syndrome

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 301 - Reproductive Performance of Animals
- 305 - Animal Physiological Processes
- 311 - Animal Diseases
- 315 - Animal Welfare/Well-Being and Protection
- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Improving Our Understanding Of The Role Of Nutrition On Fertility

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 301 - Reproductive Performance of Animals
- 305 - Animal Physiological Processes
- 302 - Nutrient Utilization in Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Identifying Genes, Transcripts, And Pathways Associated With Health In Livestock

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 303 - Genetic Improvement of Animals
- 305 - Animal Physiological Processes
- 315 - Animal Welfare/Well-Being and Protection
- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1862 Research

Outcome # 5

1. Outcome Target

Improving The Health Of Dairy Goats Through The Development Of New Genetic Resources

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 305 - Animal Physiological Processes
- 315 - Animal Welfare/Well-Being and Protection
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Improving Control Methods Of Strangles Infection In Horses

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 305 - Animal Physiological Processes
- 315 - Animal Welfare/Well-Being and Protection
- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Enhancing The Efficiency Of Feed Utilization In Beef Production Systems

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 305 - Animal Physiological Processes
- 315 - Animal Welfare/Well-Being and Protection
- 301 - Reproductive Performance of Animals

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Aspirations To Enhance Profitability Of Livestock Production And Management

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 311 - Animal Diseases
- 315 - Animal Welfare/Well-Being and Protection
- 301 - Reproductive Performance of Animals
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

Aspirations To Reduce Risks In Livestock Production

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 311 - Animal Diseases
- 307 - Animal Management Systems
- 301 - Reproductive Performance of Animals

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Government Regulations
- Other (Public perceptions)

Description

Consumer preferences for animal products are one important external factor [such as a preference shift from milk to bottled water or from beef to pork or chicken]. Of the utmost importance is maintaining public confidence that animals are treated humanely. Changes in legislation and the increasing difficulty of maintaining funding and staffing levels are also very important external factors. In addition, drought can affect grazing practices and profitability.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

An evaluation will be distributed and collected from all attendees at grazing, beef production, or **Putting Small Acres to Work** programs to seek to determine the degree of knowledge change related to livestock topics addressed. Participants will also be asked to indicate one management technique that they plan to implement. Those responses will be used to develop an evaluation that will be mailed, e-mailed, or distributed to returnees attending the next year's program to seek responses on practice changes from those who attended the previous year.

Online quizzes will be used to test youth knowledge of ethical treatment of livestock.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Community Resource Planning And Development

2. Brief summary about Planned Program

Social and economic changes in the United States and around the world are affecting individuals, organizations, and communities. Leadership for community development rests with the University of Illinois Extension Community and Economic Development program team and program leader. The team works in partnership with University of Illinois faculty and others who provide research to support programs. Partners include the Institute for Government and Public Affairs and the Department of Urban and Regional Planning.

University of Illinois Extension educational outreach will be primarily through academic professionals located on campus and in multi-county units providing practical, research-based information and programs for communities, organizations, businesses, and leaders to address local needs, rural and urban. Extension programs will focus on community planning, building entrepreneurial communities, and leadership development. With respect to community participatory planning, a special effort will be given to involving youth and in planning for disasters. Depending on local priorities and available resources, Community and Economic Development Extension Educators will collaborate with other educators to address developing needs and accessing local food systems. In addition, educators will provide primary delivery of education to enhance the availability of data and the decision-making skills of local officials, strengthen the leadership skills of emerging and current community leaders, facilitate input for community planning processes, help communities develop policies and practices that encourage youth and adult entrepreneurship and development of workforce soft skills, and increase the knowledge and skills of business owners and managers to foster successful businesses. Given the challenges faced by Illinois communities of all population sizes, this planned program will play an important role as community leaders and residents address their needs.University of Illinois Extension educational outreach will be primarily through academic professionals located on campus and in multi-county units providing practical, research-based information and programs for communities, organizations, businesses, and leaders to address local needs, rural and urban. Extension programs will focus on community planning, building entrepreneurial communities, and leadership development. With respect to community participatory planning, a special effort will be given to involving youth and in planning for disasters. Depending on local priorities and available resources, Community and Economic Development Extension Educators will collaborate with other educators to address developing and accessing local food systems. In addition, educators will provide primary delivery of education to enhance the availability of data and decision-making skills of local officials, strengthen the leadership skills of emerging and current community leaders, facilitate input for community planning processes, help communities develop policies and practices that encourage youth and adult entrepreneurship and development of workforce soft skills, and increase the knowledge and skills of business owners and managers to foster successful businesses. Given the challenges faced by Illinois communities of all population sizes, this planned program will play an important role as community leaders and residents address their needs.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	70%		35%	
802	Human Development and Family Well-Being	5%		25%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	15%		10%	
805	Community Institutions and Social Services	5%		20%	
806	Youth Development	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Illinois communities face a host of issues that demand leadership and strategies to address the rapidly changing social and economic landscape and are struggling to create a competitive advantage in a rapidly changing global economy. Many communities in Illinois are experiencing declines in population and a slowing economy. These communities are characterized by a lack of viable community organizations, businesses, workforce opportunities, and recreation opportunities. These and other communities may also be characterized by a lack of planning, few people who are willing to serve in leadership positions, and local officials who need quality information, tools, and skills to revitalize their communities.

Extension will give priority to community development, an approach which calls on Extension Educators to work with community residents to identify assets to improve the community and foster economic development and to find ways to mobilize these assets to improve business retention, expansion and start-up strategies, recreation, and tourism. A complementary priority is to build a cadre of local officials and community leaders who are well informed about their responsibilities and the issues of importance in their communities and regions, are able to serve political subdivisions and community organizations, and make critical decisions. A third priority is to involve local residents from all sectors of the community, including youth, to participate in analyzing and addressing quality of life and infrastructure issues.

2. Scope of the Program

- In-State Extension
- In-State Research

- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

[1] Community residents, given training and information, are able to develop approaches to the issues they and their communities face. [2] Local policies and environments will in turn influence business and economic development. [3] Resources [local, state and federal] will remain adequate to fund the needed research and Extension programs.

2. Ultimate goal(s) of this Program

Researchers are studying community activism, mobilization, and leadership in rural communities to assist in developing strong institutions that will foster revitalization in rural communities and limited-resource urban neighborhoods. Extension seeks to increase the knowledge and skills of current and future leaders of local government, organizations, and agencies to make decisions that improve the economic and social conditions of targeted communities. Ultimately, Illinois communities will become more vital and sustainable, with populations which are stable and with adequate community resources and active civic groups. The education and participation of youth and young adults in these efforts will create a personal investment in their communities, encouraging long-term commitments and connections to local communities.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	1.0	0.0
2018	0.0	0.0	1.0	0.0
2019	0.0	0.0	1.0	0.0
2020	0.0	0.0	1.0	0.0
2021	0.0	0.0	1.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include a study that expands upon an existing dataset of divorcing mothers from rural and suburban communities in central Illinois to examine how patterns of judicial involvement prior to and during the divorce process vary by type of intimate partner violence [IPV] and whether type of IPV is associated with different interventions and outcomes over time and a project with the overall goal of examining the complex relationships between family socioeconomic conditions, daycare, schooling experiences, and cognitive, behavioral, and socioemotional growth and development during childhood.

Extension programming focused on economic development will include providing decision-makers with access to relevant secondary data and education regarding strategies and government policies that support entrepreneurs, knowledge of tools that can enhance the growth of new businesses and product development, and knowledge and skill development related to customer service that includes marketing that is based on the values of various generations, as well as skills in working with various generations of volunteers and employees. Activities will also focus on supporting youth and adult entrepreneurship as well as workforce preparedness. Extension Educators will also draw on and promote programs such as **Ready Business** available from the Extension Disaster Education Network.

Activities focused on developing leadership in communities and organizations will include providing resources [data and webinars] for county officials to understand their roles and responsibilities and issues they may face [as well as strategies to address these issues], education and experiences to build leadership knowledge and skills through leadership academies and conferences for youth and adults, and online self-study modules on applied research skills.

Activities addressing community planning will include identifying issues through exchanges with other communities, working with units of government or other community groups to develop plans for locally-driven planning projects, or creating vision and action plans to bring about positive community changes such as planning for disasters. In addition, attention will be given to providing community service and leadership information and opportunities for youth in identifying, analyzing, and addressing a need in their community.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● Other 1 (Webinars) ● Other 2 (Community Forums)	● Web sites other than eXtension ● Other 1 (Fact Sheets)

3. Description of targeted audience

Members of the target audience will include mothers who co-parent after separation, including those who do and do not experience intimate partner violence, family court judges, family law attorneys, parent educators, health care providers, researchers and graduate students from the fields of human development, sociology, and education, graduate students studying biology, psychology, and sociology, scholars and researchers from diverse disciplines including education, ethnic studies, family studies, social work, sociology, and urban planning, community-based programs and organizations that focus on enhancing family life, promoting positive child-youth development, and building strong communities, local families, and policy makers focusing on education, family strengthening, and community building. Extension audiences will include elected and appointed officials, current and emerging community leaders, current or potential business owners/managers, entrepreneurs, economic development organizations, community organization leaders, youth and adult residents of targeted communities, and individuals in impoverished communities.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Research Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number Of Individuals Reporting New Leadership Roles And Opportunities Taken
2	Number Of Plans Developed, Adopted, Or Adjusted By Communities Through Resident Engagement
3	Number And Dollar Value Of Volunteer Hours Invested In Community-Related Projects
4	Number Of Community Or Organization Programs Or Activities Initiated
5	Improving Programs For High School Students Through A Better Understanding Of The Strategies Used By Effective Program Leaders
6	Exploring The Extent To Which Different Types Of Intimate Partner Violence Are Associated With Different Patterns Of Judicial Involvement, Interventions, And Legal Outcomes
7	Examining The Complex Relationships Between Family Socioeconomic Conditions And Child Development
8	Dollar Value Of Resources Leveraged/Generated For Communities

Outcome # 1

1. Outcome Target

Number Of Individuals Reporting New Leadership Roles And Opportunities Taken

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development
- 608 - Community Resource Planning and Development
- 802 - Human Development and Family Well-Being
- 805 - Community Institutions and Social Services
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number Of Plans Developed, Adopted, Or Adjusted By Communities Through Resident Engagement

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 805 - Community Institutions and Social Services
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number And Dollar Value Of Volunteer Hours Invested In Community-Related Projects

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 806 - Youth Development
- 805 - Community Institutions and Social Services

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number Of Community Or Organization Programs Or Activities Initiated

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 805 - Community Institutions and Social Services
- 608 - Community Resource Planning and Development
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Improving Programs For High School Students Through A Better Understanding Of The Strategies Used By Effective Program Leaders

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 608 - Community Resource Planning and Development
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions and Social Services
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 6

1. Outcome Target

Exploring The Extent To Which Different Types Of Intimate Partner Violence Are Associated With Different Patterns Of Judicial Involvement, Interventions, And Legal Outcomes

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 805 - Community Institutions and Social Services
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 802 - Human Development and Family Well-Being
- 608 - Community Resource Planning and Development
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Examining The Complex Relationships Between Family Socioeconomic Conditions And Child Development

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 805 - Community Institutions and Social Services
- 806 - Youth Development
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Dollar Value Of Resources Leveraged/Generated For Communities

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Programmatic Challenges

Description

Competing public and programmatic priorities can influence the level of attention provided to community economic development, as can environmental conditions that affect areas such as water quality and natural disasters. Other external factors include employment opportunities in a given community; migration into or out of the area, interactions between community, county, state, and national lawmakers, and the impacts of national priorities on local issues.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

End of meeting evaluation and follow-up information will be gathered via online or paper surveys from participants in the following programs: [1] Leadership academies [knowledge gained and new roles taken]; [2] **On the Front Line** [customer service] workshops; [3] Training for newly elected officials [knowledge gained and use of knowledge gained in making-decisions], and [4] **Consumer Age Matters** [business marketing based on targeted generations, recruiting and working with volunteers, and/or working with employees].

With respect to community planning evaluation, contact will be made by Extension Educators with the person responsible for a community plan that has been developed as a result of interactions with Extension to document plan completion, adoption, and implementation and the number of individuals involved. Contacts will also be made with community leaders to determine the dollar value of resources leveraged/generated and the new community/organization programs or activities that have been initiated

as a result of interaction with Extension.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety And Food Security

2. Brief summary about Planned Program

While we have attempted to segregate programs for this Plan of Work, perhaps more so than any other theme food safety and food security are issues that flow throughout virtually every planned program in this report. Educators under the 4-H Youth Development planned program work to fight hunger by helping youth to grow and donate food to feed the hungry and to develop healthier eating habits, work in Agricultural and Biological Engineering improves productivity in areas such as the utilization of intelligent machines, work in Agricultural and Consumer Economics in areas such as international law and improving production through better agribusiness management, Animal Health and Plant Health through production, Sustainable Energy through efforts to minimize the impact of crop use for fuel on food availability, and the obvious linkages to Human Health and Human Development. The focus of food security programs to be delivered as a part of this planned program represent the integrated efforts of research and Extension faculty and staff to strengthen the quantity and quality of food crop production and accessibility to meet both global and local needs to alleviate hunger and ensure a safe food supply.

Research on food product development and improving the safety of food processing techniques while improving the nutritional quality of food products rests with the Department of Food Science and Human Nutrition and the Division of Nutritional Sciences. University of Illinois Extension Educators who focus on local foods and small farms, horticulture, or nutrition and wellness will deliver educational programming focused on safety practices related to food production, processing, and handling, as well as food preparation and service to the public based on research centered in the Department of Crop Sciences, Department of Animal Sciences, and Department of Food Science and Human Nutrition.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	5%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
205	Plant Management Systems	10%		0%	
501	New and Improved Food Processing Technologies	0%		10%	
502	New and Improved Food Products	0%		15%	
503	Quality Maintenance in Storing and Marketing Food Products	10%		5%	
504	Home and Commercial Food Service	20%		0%	
603	Market Economics	0%		5%	
701	Nutrient Composition of Food	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	5%		5%	
703	Nutrition Education and Behavior	15%		10%	
704	Nutrition and Hunger in the Population	15%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%		10%	
806	Youth Development	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Given that Illinois is among the top states in corn, soybean, and hog production and accounts for nearly six percent of all agricultural exports, priority will be given to enhancing the quality of these products to meet hunger needs. Likewise, given our existing priorities in areas such as nutrition education, food development [in particular soy foods], and production efficiency, the College of Agricultural, Consumer and Environmental Sciences is well-positioned to provide solutions that will make meaningful improvements in the lives of food-insecure populations locally, nationally, and globally.

While continuing growth has been seen in the Illinois local food sector, much room for improvement still exists. According to Wes King, the executive director of the Illinois Stewardship Alliance in 2015, "Local food production and sales continue to grow in Illinois, but not enough to match the significant level of

demand from major urban centers like Chicago for local Illinois products". Priority will be given to meeting the educational needs of local food-insecure households through research and Extension educational support for the recruitment and development of producers of fresh produce and local food systems that can expand production and access to adequate and healthier foods such as fresh fruits and vegetables for these households and the growing interest in locally-grown food by other population segments.

Food safety is also an issue for all individuals and families regardless of household resource level and affects food producers, processors, establishments serving food to the public, and consumers. A food production or food service contamination outbreak causing serious foodborne illnesses can also have widespread effects on innocent food producers, distributors, and retailers resulting in serious economic impacts for those in the food production and service chain and higher prices for the consumer. The misuse of animal health products can also result in the presence of residues of the medication in meat which has consequences for consumers and for the Illinois pork industry. Education to ensure certification by those who serve food to the public will also remain a priority for University of Illinois Extension, as well as the safe production and handling of fresh produce.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That even in the difficult economic climate facing our state and our nation that the importance of this issue will insure that resources are available to continue to conduct research and outreach programs addressing food safety and food security, that knowledge developed and disseminated will have a reach far beyond the borders of Illinois, that adaptation to increased production of food can occur without consequences to the environment, that Extension programs will provide food handlers with the skills to insure that food is handled and prepared correctly, and that economical transportation will be available to deliver food to the areas characterized by hunger. We also assume that new methods of food product development will be able to balance the competing needs of improving food safety, improving processing efficiency, lowering costs, making products more widely available, and maintaining a high level of consumer acceptance.

2. Ultimate goal(s) of this Program

Our ultimate goal with respect to food security is to use ACES expertise across the entire food security chain from production [in areas such as plant and animal health] to marketing and distribution [in areas such as agricultural and consumer economics] to consumption [in areas such as nutrition education and diet adequacy] to improving the quantity and quality of food and drinking water available to at-risk populations.

Our ultimate goals with respect to food safety are to develop safe food products and processing techniques for use by the food processing industry, and to increase the use of safe food handling practices by producers, distributors, retailers, households, consumers [adults and youth], and establishments that prepare food for public consumption.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	6.0	0.0
2018	0.0	0.0	6.0	0.0
2019	0.0	0.0	6.0	0.0
2020	0.0	0.0	6.0	0.0
2021	0.0	0.0	6.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include research focusing on the material conditions that reduce or reproduce household food insecurity and what are specific interventions that affect transitions in and out of household food insecurity, the development of strategies to make Hispanic-style fresh cheeses safer to help meet market demand and prevent Listeria outbreaks, a project with the goal of implementing a strategy toward healthy, safe, and secure fresh and processed pork products by considering production and processing practices using a three-tiered approach [the use of high pressure processing, ractopamine hydrochloride, and immunological castration], efforts to improve the microbial safety of fresh produce, work toward providing an effective labeling system for consumers who have health concerns related to sodium and fat to aid in making healthy food choices, and a project that will develop and employ effective methods for the investigation of potent odorants [aroma-active compounds] in foods, food ingredients, and various other complex materials.

Activities will also include a study to determine the relationship between the degree of hydrolysis of the proteins in the formulation and the physical and sensory characteristics of a high protein snack product [which will further demonstrate the potential for commercialization of high protein extruded snacks and increase utilization of whey and soy protein ingredients in a novel product concept], an exploration of the use of power ultrasound to enhance the microbial safety and minimize the food safety risk of fresh produce, an effort to attract more customers to the farm by helping growers identify rootstocks that will reduce tree height without compromising fruit quality [and also to give direct market customers more selection of fruits that are tree ripened and of superior quality], the identification of methods that extend the shelf life, improve the nutritional quality, and enhance the safety of fresh cut produce [resulting in a significant positive impact on consumers' acceptance of these products and improved financial returns to producers], research that will contribute to our fundamental understanding of the domestication of the apple along its historical and evolutionary paths by profiling the genomic structure, the use of dynamic infrared imaging to provide a relatively simple yet robust means of ensuring seal, bond, and weld integrity in a range of materials and applications [this can provide a means for improving food system safety in packaging, distribution and storage], and a project with the long-term goal of describing transport

mechanisms and thermomechanical behavior of food biopolymers using a general mathematical model solved with numerical simulations [this would allow the description of a diverse range of processes such as drying, frying, sorption, fluid, and species transport in biological tissues, controlled release applications, and heat-flavor interactions using predictive modeling].

Extension activities in this area will focus primarily on corn and soybean crop production and management, as well as fruit and vegetable production. Activities will include the **Illinois Ag Masters Conference**, regional **Crop Management Conferences**, and multi-state and state conferences that focus on production of fruit, vegetable, other specialty crops, and organic production that include Extension faculty specialists and educators highlighting the latest research. Other educational methods that will be used include field days at research stations, pesticide safety application training, webinars, web-based newsletters, and distance diagnostics of corn, soybean, and other food crop pests. In addition, education and support will be provided to those interested and involved in local food systems and Master Gardener volunteer assistance to youth and families interested in growing fresh produce.

Extension activities that addressed hunger within Illinois are delivered by **Expanded Food and Nutrition Education Program** [EFNEP] staff and **Supplemental Nutrition Supplemental Assistance Program Education** [SNAP-Ed] staff members who conduct hands-on activities with children and their parents and other adults who have limited incomes. These activities include proper hand-washing, using food stamps, meal planning, wise shopping, and use of food pantries. Additional Extension activities will focus on safe food handling during production, distribution, retailing, preparation, storage, and service to the public. These activities will include workshops, website postings, and presentations both in-person and via distance education. Extension Educators will continue to teach workshops for: [1] Volunteers who serve or sell food to the public [**Serve It Safely**]; [2] Certification of food service handlers and food service managers involved in commercial food service establishments that sell food for public consumption; [3] School food service professionals; and [4] Individuals who are in engaged in cottage food operations. Programs that address safe food preservation will also be offered. Training on good agricultural processes for producers of fresh produce will focus on water usage and water quality testing, worker health and hygiene, facilities and equipment sanitation, manure handling and field application, and record-keeping. Classes and online certification training addressing proper use of animal health medications to ensure pork product safety will also be delivered [the Animal Health and Production planned program also addresses food security production efforts].

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (Webinars)	● Newsletters ● TV Media Programs ● eXtension web sites ● Web sites other than eXtension

3. Description of targeted audience

Members of the target audience will include researchers in the fields of economics, public health, and nutrition, policymakers charged with improving the well-being of low-income Americans, program administrators overseeing food assistance programs, the dairy industry, academic, industry and

government food professionals, graduate and undergraduate students, food industry professionals who work to reduce sodium in their products and are interested in learning how labels impacts consumer perception, U.S. food producers, processors, ingredient manufacturers and flavor companies, food industry professionals who work with extruded snack and cereal products, the horseradish and the fresh cut industries in Illinois and beyond, the culinary and herb industries, apple, peach and pear growers, the tree fruit nursery industry in the U.S. and internationally, scientists, postdocs, horticulturists, graduate students, producers, supply chain personnel, and farmers' market managers.

Extension's primary audience includes over 1,500 certified crop advisers who consult with producers involved in raising 26 million acres of field crops, fruits, and vegetables [at least 64 vegetables and 15 fruit crops are produced commercially in Illinois], as well as working directly with these producers and their employees. Other audiences targeted by Extension include distributors and retailers of fresh produce, individuals and entities interested in developing or participating in local food systems, small farmers, consumers [especially those who are from food-insecure households], employers and employees of establishments that prepare food for public consumption, volunteers who serve or distribute food for public consumption or teach others how to safely prepare and serve food, cottage food operators, school kitchen personnel, regulatory agencies, and youth who prepare food or who raise meat animals.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Research Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number Increasing Knowledge Of New Corn And Soybean Crop Management Techniques
2	Number Of Pounds Of Food Produced Or Donated For Consumption By Vulnerable Populations
3	Number Of Food Preparers Reporting Using Proper Time And Temperature Controls
4	Number Of Growers, Producers, And Employees Completing GAPS, GMPs, HACCP, Food Safety Certification, And Onfarm BMP Programs To Increase Food Safety
5	Development Of Fortification Technologies For Developing Countries
6	Enhancement Of Microbial Safety In Fresh Produce
7	Development Of Effective Methods For The Investigation Of Potent Odorants In Foods
8	Incorporating Protein Into Extruded Or Puffed Snack Foods
9	Developing New Varieties Attractive To U-Pick Produce Consumers
10	Increased Knowledge Of Fresh Fruit And Vegetable Production Practices
11	Increased Knowledge Of Small Farm Production Options

Outcome # 1

1. Outcome Target

Number Increasing Knowledge Of New Corn And Soybean Crop Management Techniques

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number Of Pounds Of Food Produced Or Donated For Consumption By Vulnerable Populations

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 111 - Conservation and Efficient Use of Water
- 701 - Nutrient Composition of Food
- 704 - Nutrition and Hunger in the Population

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number Of Food Preparers Reporting Using Proper Time And Temperature Controls

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

Occurring Toxins
- 806 - Youth Development
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number Of Growers, Producers, And Employees Completing GAPS, GMPs, HACCP, Food Safety Certification, And Onfarm BMP Programs To Increase Food Safety

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 111 - Conservation and Efficient Use of Water
- 504 - Home and Commercial Food Service
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 501 - New and Improved Food Processing Technologies

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Development Of Fortification Technologies For Developing Countries

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 502 - New and Improved Food Products
- 703 - Nutrition Education and Behavior
- 702 - Requirements and Function of Nutrients and Other Food Components
- 701 - Nutrient Composition of Food
- 704 - Nutrition and Hunger in the Population
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 6

1. Outcome Target

Enhancement Of Microbial Safety In Fresh Produce

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 704 - Nutrition and Hunger in the Population
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Development Of Effective Methods For The Investigation Of Potent Odorants In Foods

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components
- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Incorporating Protein Into Extruded Or Puffed Snack Foods

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 701 - Nutrient Composition of Food
- 502 - New and Improved Food Products
- 702 - Requirements and Function of Nutrients and Other Food Components
- 501 - New and Improved Food Processing Technologies

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

1. Outcome Target

Developing New Varieties Attractive To U-Pick Produce Consumers

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 701 - Nutrient Composition of Food
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 703 - Nutrition Education and Behavior
- 501 - New and Improved Food Processing Technologies
- 504 - Home and Commercial Food Service
- 603 - Market Economics
- 704 - Nutrition and Hunger in the Population
- 502 - New and Improved Food Products
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 10

1. Outcome Target

Increased Knowledge Of Fresh Fruit And Vegetable Production Practices

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 503 - Quality Maintenance in Storing and Marketing Food Products
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 11

1. Outcome Target

Increased Knowledge Of Small Farm Production Options

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 503 - Quality Maintenance in Storing and Marketing Food Products

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Description

Economic difficulties ensure that food safety and food security will be top global priorities for many years to come. Natural disasters continue to influence the availability of facilities for safely developing, storing, distributing, and using food products. The changes in the economy and appropriation changes also continue to influence the resources available for research and Extension programs. Government regulations may influence food product development and processing. The economic sustainability of retailers who can provide fresh produce in communities of residents with limited incomes can affect access to adequate food. Competing priorities [public and programmatic] may influence the level of programmatic effort from Extension staff.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

1. An evaluation has been developed to identify knowledge change with producers of fresh produce who participate in training targeted at preventing contamination that causes foodborne illness [local food systems participants]. Fresh produce growers who participate in **Good Agriculture Practices** [GAPs] workshops will complete end-of-meeting surveys.

2. Evaluations will also be used to determine knowledge and practice changes of participants who serve food to the public and attend food safety certification programs.

3. Exams will be administered to participants in youth pork assurance training and quality assurance and ethics training. Passage of exams after completing **Quality Assurance and Ethics Training** required for youth exhibiting 4-H livestock projects will be tallied.

4. An evaluation will be administered to participants with small acreages at the end and in follow-up to programs that identify knowledge and confidence gained at the end of the programs and new or improved production practices implemented for their acreages.

5. Evaluations have been developed to identify commercial fresh produce growers' knowledge and intended practice changes at the end of various state vegetable and fruit schools/conferences and the practices taught and implemented by previous school returnees.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Human Health And Human Development

2. Brief summary about Planned Program

Within the Department of Human Development and Family Studies [the Department of Human and Community Development prior to 2015] in the College of ACES is the **Family Resiliency Program** [www.familyresiliency.illinois.edu]. Established in 2000, the program is dedicated to enriching child, individual, and family wellbeing in the context of communities. The program supports innovative research, education, and public engagement outreach activities that hold the potential for strengthening families' ability to be resilient in the face of life stressors and to successfully navigate the competing demands of work and family. The center focuses activities around three themes: [1] Positive human development; [2] Family wellness; and [3] Strengthening family and community connections.

Leadership for nutrition and obesity research and education efforts rests primarily with the Department of Food Science and Human Nutrition, the Department of Human Development and Family Studies, the Division of Nutritional Sciences, and University of Illinois Extension. One example of the multidisciplinary efforts being made to combat childhood obesity is the **STRONG Kids** project. This project takes a comprehensive approach with the overarching vision to discover and document salient predictors of and mechanisms through which individuals develop health-related behaviors and beliefs and to develop tailored prevention and intervention programs for families and children that promote healthy development, that are evidence-based, and that are grounded in developmental theory. Another project, **Abriendo Caminos**, aims to involve the whole family in culturally-sensitive activities that promote healthy eating, positive family interactions, and active living for immigrant families with school-age children through the development of a new set of materials in an after-school program. The **BackPack Program** is a partnership between food banks and schools to distribute child-friendly easy-to-prepare food to children who are at risk for hunger. **Up-Amigos** involves self-reports by college applicants to a Mexican university to explore associations between genetic predisposition, environmental factors, and obesity and related outcomes.

Ongoing University of Illinois Extension interdisciplinary programs address family issues at all stages of the life cycle from infancy through issues of aging and care of dependent adults. In addition, human development and family wellbeing is dependent on financial stability and good health. Due to the interdisciplinary focus of Extension programs, multi-county Extension educators with assignments in nutrition and wellness, consumer economics, and family life will work together and will draw on research and expertise through the Department of Food Science and Human Nutrition, the Department of Agricultural and Consumer Economics, the Department of Human Development and Family Studies, and the Division of Nutritional Sciences in the College of ACES, as well as from the College of Applied Health Sciences, other campus colleges and institutes, and from other states' Extension programs to deliver educational programming focused on enhancing physical, financial, and emotional health of individuals and families. Extension activities that address healthy food choices will be delivered by **Expanded Food and Nutrition Education Program** [EFNEP] staff and **Supplemental Nutrition Assistance Program - Education** [SNAP-Ed] staff who conduct hands-on activities with children and their parents and other adults who have limited incomes. Curriculum and training will be provided for elementary teachers to encourage healthy eating and physical activity. The **4-H Youth Development** staff has also committed to conducting programs that enhance youth health and development.

Programs that address financial wellness include train-the-trainer discussion guides and handouts [**All My Money** and **Healthy Living Throughout the Lifespan**] will be provided for agencies and organizations to enable them to work with limited resource audiences. Volunteers will be recruited and trained to be **Master Money Mentors**.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	35%		15%	
704	Nutrition and Hunger in the Population	0%		10%	
724	Healthy Lifestyle	5%		20%	
801	Individual and Family Resource Management	10%		10%	
802	Human Development and Family Well-Being	30%		15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		10%	
805	Community Institutions and Social Services	5%		5%	
806	Youth Development	10%		15%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Ongoing research is focusing on how family resiliency can be enhanced. Aging Americans and their families are faced with shifting roles in care-giving and relationships within the family. Balancing work and family often brings increased stress, fatigue, illness, and strained relationships. Parenting can become overwhelming, often resulting in child abuse or an environment that is not supportive of the healthy development of youth because parents lack knowledge and skills regarding best parenting practices. In addition, over 110,000 Illinois children [according to the 2010 census] live in homes with grandparents who are responsible for them and are struggling to cope with complex changes that affect lifestyles, employment, and family relations.

Poor nutrition, the lack of physical activity, obesity, and the burden of chronic diseases such as diabetes and heart disease continue to negatively impact the physical health of both individuals and families.

Overweight children are at risk of remaining overweight into adulthood, with being overweight by age eight predicting the most severe adult obesity. While heart disease ranks as the leading cause of death in Illinois, diabetes ranks as the seventh leading cause with more than 969,000 adults [9.2%] in the state having been diagnosed with diabetes. In addition, financial insecurity can lead to increased anxiety that can result in chronic psychological stress that contributes to a variety of health problems such as heart disease, depression, and obesity.

According to Census Bureau estimates, all baby boomers will have reached age 65 or older by 2029. Consequently in that year, one-in five Americans would be 65 or older, up from one in seven in 2015. The 2010 census reports that 13.9 percent of Illinois' population is age 65 or older. With continuing growth in this country's aging populations, concerns about maintaining one's memory, as well as recognizing and managing brain diseases, are issues of great interest to the aging and their families.

Extension will give priority to providing education for caregivers of children from ages birth to five, coping with risks associated with financial wellness and security, maintaining adult cognitive health, and managing physical health including chronic diseases.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That resource levels will remain sufficient for family resiliency, nutrition, and health research and educational programming and that our current understanding of the complex relationships involved among family members is sufficient to provide research-based educational programming. We believe that increasing public attention on obesity and the importance of healthy eating and exercise will result in an increase in resources devoted to not only the obvious causes such as a lack of nutrition research and education but also other, often less-recognized causes such as media exposure, family stability, and peer networks.

2. Ultimate goal(s) of this Program

Researchers are studying the factors that enhance or hinder resilience in families in order to create programs and policies that will foster healthy families. Researchers are also studying the processes of positive social and emotional development in children and adolescents in order to develop ways in which parents, teachers, and other adults can foster healthy development. Work under this planned program also strives to provide research in areas such as human nutrition and family development that will help to identify the key causes of obesity.

Through Extension programs, families will thrive by managing work-life challenges, understanding children's development and how to foster it, coping with the challenges of aging and

intergenerational issues, and addressing childhood obesity and chronic diseases through diet, exercise, and social support that are relatively easy to incorporate into pre-existing lifestyle routines.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.2	0.0	10.0	0.0
2018	0.2	0.0	10.0	0.0
2019	0.2	0.0	10.0	0.0
2020	0.2	0.0	10.0	0.0
2021	0.2	0.0	10.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include research to identify and better understand the protective factors that maintain relationship quality during the transitions to marriage and parenthood, research to prevent the burden of adult obesity among women [the specific purpose of this research project is to identify determinants of weight gain prevention as guided by Social Cognitive Theory], an investigation into the ideological assumptions behind and the practices that constitute the promotion of youth participation and empowerment, a project that will generate information about how immigrant Latino parents living in rural and non-metropolitan communities negotiate the challenges of parenting adolescents in the U.S., and a study that will allow us to identify the best ways to communicate nutrition information to consumers and determine which formats are most likely to influence consumers to make healthier food selections.

Activities will also include an investigation into the ability of tomato powder, broccoli powder and soy germ, alone and in selected combinations, to reduce the progression of prostate cancer in a mouse model, work to produce, extract, purify, and analyze peptides in soybean and determine the regulatory effects of these peptides on pathogenic tissues induced by inflammation, a study to improve our understanding of the mechanisms by which the dietary flavonoids apigenin and luteolin can inhibit pancreatic cancer using in vitro and in vivo models, a research project studying family and child outcomes of stay-at-home father families, and the establishment of an evidence-based and school-friendly intervention to prevent overweight and diabetes in adolescence and to provide teacher support at a time when school resources are being dramatically cut.

Activities will also include ongoing work under the **GET-UP KIDS** project [the project seeks to understand how the individual genetic material interacts with the environment to promote or delay metabolic effects that result in excessive weight gain or related diseases], an investigation that will develop and test an evidence-based set of resources for parents who aim to improve sibling relationship quality among their 4- to 8-year-old children, ongoing implementation of the **Child Development Laboratory [CDL] Research Database Project**, a project offering a 23 week afterschool physical activity program to low income primarily Latino elementary age school children to promote better physical health and reduce the risk for obesity, and an exploration of the integration between attachment security, child temperament, and two

obesity-related outcomes: obesogenic family routines and unhealthful food consumption.

Activities will also include work to generate new knowledge about multiple cultural identities in the daily lives of youth in non-metropolitan communities in the Midwest, a study that seeks to improve the quality of programs for high-school-aged youth by identifying and better understanding the strategies used by effective program leaders, a project that seeks to investigate the interaction of diet and genetics that influence arachidonic acid production and subsequent inflammatory reaction, and work that seeks to enrich our current understanding of mechanisms of soy foods in colon cancer prevention [results will provide information on practical application of soy products for daily food consumption in terms of healthier living].

Activities will also include a study to improve our understanding of the mechanisms of soy products that reduce colon cancer risk and facilitate the identification of molecular markers [especially epigenetic markers] associated with colon cancer development, the designing, testing, and implementation of new alternatives to delivering micronutrients at the point of use to children using raw food materials present in country or provided through Food for Peace and other USAID/WFP managed programs, an evaluation of the impact of dietary botanical estrogens on breast cancer growth and progression using preclinical animal models, work conducted by an interdisciplinary research team to design, formulate, characterize, and assess efficacy of novel nanoemulsion systems created from ultrasonication of common and underutilized legume protein sources, the modification of phytochemical profiles in Brassica oleracea vegetables to enhance their health promoting properties, and a project that is designed to enhance our understanding of the mechanisms of healthy foods in chronic disease prevention and provide new knowledge for understanding how nutrition early in life shapes physiology and susceptibility to childhood obesity.

Extension activities will focus on multi-disciplinary areas that include: [1] Education for childcare providers; [2] Reducing the risk of and managing chronic diseases with an emphasis on proper nutrition; [3] Maintaining cognitive health; [4] Fostering financial wellness; and [5] Planning ahead for retirement. Delivery methods will primarily include webinars, live and taped video training, informational websites, electronic newsletters, blogs, podcasts, and social media networking communities. These efforts will include maintenance of the **Parenting 24/7** and **Plan Well, Retire Well** websites and newsletters and local and regional workshops related to healthy aging [**Powerful Tools for Caregiving** and **Caregiving Relationships**], preventing and managing chronic diseases [**I on Diabetes**, **Meals for a Healthy Heart**, and **Live Well-Be Well**], and managing the challenges of contemporary working life [**Intentional Harmony** and **Putting Wellness to Work** curricula].

Programs that address financial wellness will include train-the-trainer discussion guides and handouts [**All My Money** and **Healthy Living Throughout the Lifespan**] provided for agencies and organizations to enable them to work with limited resource audiences and providing training for volunteers interested in becoming a **Master Money Mentors**. Other human development activities focus on bullying prevention through a simulation for middle school youth and an alcohol, drug, and tobacco prevention program delivered by 4-H Youth Development educators and teens.

Extension activities that address healthy food choices will be delivered by **Expanded Food and Nutrition Education Program** [EFNEP] staff and **Supplemental Nutrition Assistance Program Education** [SNAP-Ed] staff who conduct hands-on activities with children and their parents and other adults who have limited incomes. Education regarding healthy snacks, good nutrition, and the importance of physical activity is stressed in preschool, in elementary school classrooms, and in summer day camps and cooking schools. In addition, websites in English and Spanish will be available that provide information on diabetes, a potential consequence of obesity, and one that provides games for middle-school youth on health education via the internet. Anticipated continuing partnerships among **EFNEP**, **SNAP-Ed**, and **4-H** will engage teens in teaching youth about healthy food choices and physical activity. Extension staff will also be joining faculty to integrate research and Extension through the **Abriendo Caminos** project to conduct

culturally-sensitive activities to promote healthy eating in after-school programs. With support from a three-year grant from the Illinois State Board of Education, Extension will provide statewide in-person and web-based training and education to school food service professionals that addresses child nutrition standards, promotes a more appealing cafeteria environment, and reduces food waste.

An initiative to educate individuals on the proper use, storage, and disposal of **Pharmaceuticals and Personal Care Products: Extending Knowledge and Mitigation Strategies** will hopefully be continued after the two-year allocation of funding is discontinued, as well as implementation of the results of a second initiative [**Health and the Built Environment**] involving university students majoring in design and community leaders and residents to improve the health of built environments [places where people live, learn, work, and play].

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (DVD's) ● Other 2 (Webinars)	● Newsletters ● Web sites other than eXtension ● Other 1 (Train The Trainer) ● Other 2 (Podcasts)

3. Description of targeted audience

Members of the target audience will include academic, medical, veterinary, industrial and professional scientists and clinicians, young adults and midlife women, nutrition and dietetics professionals, governmental organizations, commodity groups, families in Champaign-Urbana and in rural areas, gestating women and those breastfeeding newborns, students and researchers in the areas of human obesity and animal production, nutrition Extension specialists, product developers who are interested in improving the health benefits of their products through microencapsulation technology, parents of toddlers and young children, educators, mental health counselors and other professionals who work with families, research scientists interested in obesity prevention, early childhood educators, youth program administrators and front line practitioners, nutritionists, scientists and graduate students specializing in the fields of child development, family studies, linguistics, and psychology, food industry scientists, and the international food and nutrition scientific community.

Individuals at risk for or coping with diabetes, obesity, or heart disease will be a priority recipient of Extension programming, as will families living in low-income and high-risk neighborhoods where programming will be adapted to reach racially, ethnically, and culturally diverse audiences and youth. Other target audiences include parents and childcare providers, grandparents responsible for young children, caregivers of aging adults, college students, adolescent youth, and agencies and organizations working with limited resource audiences.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number Of Research Projects Utilizing The Child Development Laboratory Research Database
2	Increased Knowledge Of Children's Behavior At A Given Stage Of Development And Parenting And Childcare Providers Practices To Foster That Behavior
3	Numbers Of Individuals Taking Recommended Actions To Manage Heart Disease And Diabetes
4	Number Of Children/Youth Who Reported Eating Healthier Foods [Those Low In Fat And High In Fiber]
5	Number Of Families/Caregivers That Gained Knowledge About Eating Healthier Foods [Those Low In Fat And High In Fiber]
6	Number Of Adults That Apply Skills As They Age In Maintaining Brain Fitness And Cognitive Health
7	Extension Of A Successful, Evidence-Based Approach For Strengthening Prosocial Sibling Relationships
8	Evaluating The Effect Of Dietary Botanical Estrogens On Breast Cancer Growth And Progression
9	Identifying The Determinants Of Weight Gain Prevention As Guided By Social Cognitive Theory
10	Translating Scientific Energy Balance Evidence And Parenting Styles Into Practical Recommendations For Training Extension Educators
11	Investigating The Ability Of Dietary Tomato Powder To Reduce The Progression Of Prostate Cancer
12	Determining How Prenatal Choline Alters Neurodevelopment
13	Improving Our Understanding Of The Strategies Used By Effective Program Leaders
14	Reducing Obesity Through Improved Utilization Of Nutrition Information
15	Improving Our Understanding Of Social-Emotional Development Among Children From Rural And Suburban Communities
16	Number Of Youth That Increased Knowledge Of Bullying And Actions To Take In Dealing With A Bullying Situation

Outcome # 1

1. Outcome Target

Number Of Research Projects Utilizing The Child Development Laboratory Research Database

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 805 - Community Institutions and Social Services
- 802 - Human Development and Family Well-Being
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Increased Knowledge Of Children's Behavior At A Given Stage Of Development And Parenting And Childcare Providers Practices To Foster That Behavior

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Numbers Of Individuals Taking Recommended Actions To Manage Heart Disease And Diabetes

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number Of Children/Youth Who Reported Eating Healthier Foods [Those Low In Fat And High In Fiber]

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 805 - Community Institutions and Social Services
- 704 - Nutrition and Hunger in the Population
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 806 - Youth Development
- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Number Of Families/Caregivers That Gained Knowledge About Eating Healthier Foods [Those Low In Fat And High In Fiber]

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 703 - Nutrition Education and Behavior
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Number Of Adults That Apply Skills As They Age In Maintaining Brain Fitness And Cognitive Health

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

Extension Of A Successful, Evidence-Based Approach For Strengthening Prosocial Sibling Relationships

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 8

1. Outcome Target

Evaluating The Effect Of Dietary Botanical Estrogens On Breast Cancer Growth And Progression

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

1. Outcome Target

Identifying The Determinants Of Weight Gain Prevention As Guided By Social Cognitive Theory

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 704 - Nutrition and Hunger in the Population

4. Associated Institute Type(s)

- 1862 Research

Outcome # 10

1. Outcome Target

Translating Scientific Energy Balance Evidence And Parenting Styles Into Practical Recommendations For Training Extension Educators

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development
- 704 - Nutrition and Hunger in the Population
- 801 - Individual and Family Resource Management
- 724 - Healthy Lifestyle
- 703 - Nutrition Education and Behavior
- 802 - Human Development and Family Well-Being
- 805 - Community Institutions and Social Services

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 11

1. Outcome Target

Investigating The Ability Of Dietary Tomato Powder To Reduce The Progression Of Prostate Cancer

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 704 - Nutrition and Hunger in the Population
- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1862 Research

Outcome # 12

1. Outcome Target

Determining How Prenatal Choline Alters Neurodevelopment

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population
- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Research

Outcome # 13

1. Outcome Target

Improving Our Understanding Of The Strategies Used By Effective Program Leaders

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 805 - Community Institutions and Social Services
- 806 - Youth Development

- 802 - Human Development and Family Well-Being
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 14

1. Outcome Target

Reducing Obesity Through Improved Utilization Of Nutrition Information

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 806 - Youth Development
- 802 - Human Development and Family Well-Being
- 805 - Community Institutions and Social Services

4. Associated Institute Type(s)

- 1862 Research

Outcome # 15

1. Outcome Target

Improving Our Understanding Of Social-Emotional Development Among Children From Rural And Suburban Communities

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Research

Outcome # 16

1. Outcome Target

Number Of Youth That Increased Knowledge Of Bullying And Actions To Take In Dealing With A Bullying Situation

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development
- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Description

Any significant trend that affects the family, including changes in divorce rates, parents delaying having children until later in life [or on the opposite side an increase in teen pregnancy], a downturn in the economy [or other forms of economic hardships], and continued migration from rural to urban areas.

External factors also include anything that could encourage or impede the ability of children and their parents to make smart food choices. These include obvious factors such as access to foods that are high both in nutritional quality and in child acceptance and access to information provided by Extension educators in selecting foods that are both affordable and healthy. Also included is almost any factor that significantly impacts the life of a family, whether it be economic [such as a parent losing their job and feeling much more limited in the food choices they can make] or interpersonal. For example, a stable family is much more likely to engage in activities with their child, such as going for walks, that encourage physical fitness.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

1. For the **Meals for a Healthy Heart** two-part program, evaluations will be collected from all participants to assess practice changes regarding regular meal planning, checking of blood pressure and cholesterol, reducing consumption of high fat foods and sodium, increasing use of food labels in food-purchasing decisions, and increasing physical activity. Following the **Meals for a Healthy Heart Program**, an evaluation will be mailed or emailed to all participants one month following the program to

determine practice changes.

2. The **I on Diabetes** series of four 2 ½ -3 hour sessions provides information on treatment goals and self-monitoring, managing carbohydrates, sodium, cholesterol , and fat portions, planning meals, reading food labels, and using artificial sweeteners, low-fat products, and herbs and spices. Practice changes will be measured at the beginning and at the end of the series or session. Pre-and post-tests will be distributed and collected at the first and last sessions of **I on Diabetes** to identify reductions in fat intake, sodium intake, use of meal plan, increased use of food labels to plan meals, and increased physical activity.

3. **Breaking the Code** is a program provided by Extension staff or conducted by teachers for middle-school youth to recognize and change behaviors related to bullying using a series of simulations. The evaluation will focus on increased self-awareness changes, changes in managing and expressing emotions, and preventing and managing interpersonal conflicts. Pre-and post-tests will be administered by an educator to assess the knowledge changes of middle school youth participants in Breaking the Code.

4. A **4-H Healthy Living** survey that primarily draws on 4-H National Common Measures will be distributed to a sample of youth participants in nutrition and health projects, programs, and activities.

5. **4-H Health Rocks!** youth participants will complete an evaluation at the end of their program designed to reduce tobacco, alcohol, and drug abuse.

6. An evaluation of **Money Mentors** and their mentees will be developed to identify impacts of the program on Mentors and/or mentees.

7. **All My Money** is a hands-on train-the-trainer program designed by staff and delivered by volunteers in community agencies and social service organizations who work directly with limited-resource clientele. The lessons cover all the basics of money management and consumer skills. An evaluation of **All My Money** has been conducted through periodic reports collected from the teachers who have been trained drawing on their observations of the limited resource audience members use of financial management practice changes.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Natural Resources And The Environment

2. Brief summary about Planned Program

Leadership at the University of Illinois for the Natural Resources and the Environment planned program is provided through a multidisciplinary approach as exemplified by the College of ACES Department of Natural Resources and Environmental Sciences [NRES].

Research topics of NRES faculty and affiliates explore subjects ranging from aphids to zebra mussels, and everything from individual genes to the ecosystem of the planet earth. Hatch-sponsored projects range from researching the relationship between how humans experience being part of nature and how that in turn influences environmentally-responsible behavior to how chemical inputs from atmospheric deposition influence good nutrient management in both crop and forest systems. Of critical interest to both agriculture and ecosystem management is how fertilizer application affects nutrient management under various management scenarios.

Extension Educators with assignments in environment and energy stewardship, local food/small farms, and 4-H youth development along with campus horticulture, forestry, and agricultural engineering faculty and staff will have primary responsibility for conducting programs that address reduced tillage techniques, soil and water quality management, and environmental sustainability and stewardship in a state that is undergoing increasing urbanization, changing demographics, shifting land use, and a decline in outdoor recreational and educational activity use. Educational delivery methods for addressing these areas include online courses, conservation field days and activities, workshops, websites, forums, conferences, and volunteer training.

The efforts of the University of Illinois to address climate change span multiple departments and units, including the Department of Natural Resources and Environmental Sciences, the Department of Crop Sciences, the Department of Agricultural and Biological Engineering, and the Prairie Research Institute and are on local [such as scientists working to identify the impact of agricultural chemicals and Extension specialists working to educate farmers on how to minimize agricultural impacts without sacrificing yields], regional [such as working to determine the impact of climate change on animal habitats], and global [such as the **National Atmospheric Deposition Program** monitoring data, which is used to measure the rate and geographic distribution of air pollutant deposition] scales.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	30%		15%	
111	Conservation and Efficient Use of Water	5%		0%	
112	Watershed Protection and Management	15%		10%	
123	Management and Sustainability of Forest Resources	5%		10%	
132	Weather and Climate	10%		10%	
133	Pollution Prevention and Mitigation	5%		10%	
134	Outdoor Recreation	0%		10%	
135	Aquatic and Terrestrial Wildlife	0%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		10%	
405	Drainage and Irrigation Systems and Facilities	5%		5%	
605	Natural Resource and Environmental Economics	5%		10%	
806	Youth Development	20%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

It is more apparent than ever that being a wise steward of our natural resources not only makes for good citizenship but also makes good sense. Ensuring a safe and adequate water supply is an issue in both urban and rural areas of Illinois. Water quality was by far the topic of most interest under this issue area. Chemical use by agricultural producers and homeowners and soil erosion are viewed as serious contaminants of the environment. In addition, chemical use has been identified as affecting air quality and destroying beneficial plant life. Forestry management for timber, wildlife, or recreation is a high priority for landowners. Wildlife management concerns range from habitat enhancement to nuisance management. This program seeks to balance the needs and demands of resource utilization with environmental quality and sustainability. Extension priority programming will also target protecting and maintaining natural recreation areas and invasive species control.

Scientists are certain that human activities are changing the composition of the atmosphere through increasing the concentration of greenhouse gasses, which will change the planet's climate by trapping heat on the earth's surface. Human health can be affected directly and indirectly by climate change through extreme periods of heat and cold, storms, climate-sensitive diseases such as malaria, and smog episodes. Reduction of energy-related activities is a priority because three-quarters of our human-generated greenhouse gas emissions are carbon dioxide from burning fossil fuels. Extension can educate farm and forest landowners about the wide variety of potential carbon emission reduction methods and

enhancing carbon removal from the atmosphere and storage through returning biomass to the soil [sequestration of carbon]. Other educational priorities will focus on protecting existing forests/trees [which store carbon in their biomass] and helping individuals and businesses discover ways to decrease greenhouse gas emissions and increase the nation's energy independence while also saving money.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That researchers and Extension educators will seek to optimize the rates of fertilizers and pesticides to ensure economic and environmental sustainability, that Illinois researchers and educators will continue to make significant contributions toward identifying causes and developing solutions with regard to climate change, that rapidly-growing niche markets such as organic farming are in need of science-based information in areas such as sustainability, and that even in an ever-increasingly competitive environment, stakeholders will continue to see the importance of protecting and best utilizing our natural resources.

2. Ultimate goal(s) of this Program

To balance human needs for energy, agricultural products, living space, and economic productivity with wise stewardship of our natural resources and to ensure environmental friendliness and resource utilization efficiency, best utilization of insect management in agricultural cropping systems, and minimizing agricultural impacts on the environment and to enable citizen involvement in the preservation of natural resources through forest, prairie, watershed, and wildlife management by applying research-based knowledge.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	7.0	0.0
2018	0.0	0.0	7.0	0.0
2019	0.0	0.0	7.0	0.0
2020	0.0	0.0	7.0	0.0
2021	0.0	0.0	7.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include a reexamination of current measurements of the impact of climate change on agriculture by relying on more complex, yet relevant, econometric methods and more recent and finer data, research to assess the impact of land use change on soil organic carbon [SOC] dynamics and greenhouse gas emissions on the sloping, nearly level, and pothole landscapes subjected to clearing, drainage, soil erosion, cultivation, or grazing [as a result of our findings, we would then recommend land use and agricultural management practices that would increase SOC sequestration and storage and decrease greenhouse gas emissions while sustaining or improving agricultural production, maintaining soil productivity, and reducing soil erosion under changing climate conditions], a project with the overall goal of documenting phosphorus input and output budgets in constructed wetlands receiving tile flow from adjacent corn and soybean farm fields in central Illinois, efforts to improve our understanding of the chemical inputs resulting from atmospheric deposition [this is critical to understanding nutrient cycling in both crop and forest systems], and a long-term study and life-cycle assessment accounting for the inputs, outputs, and associated benefits of various soil management systems that will provide critical scientific information about the feasibility of urban plant agriculture.

Activities will also include a project that will explore the mechanisms through which climate change affects agriculture and civil conflict, a research project that will demonstrate the usefulness of sub-lethal, physiological metrics in assessments of habitat quality and restoration success, a study to test the feasibility of deploying techniques of designing messages and news reports to more accurately and persuasively inform the general public about controversial agricultural topics, work to improve our understanding of the influence of environmental conditions and time since invasion on forests ecosystem structure and function, the development of estimates of the values of natural resources and environmental amenities that are critical for guiding resource management decisions, designing environmental policy, and evaluating the costs and benefits of policies that are proposed, a project with the goal of developing practical and easy-to-implement strategies that help to address nitrogen leaching and N2O emission concerns in Illinois [through Extension and education efforts, the primary benefactors of this research will be crop producers, agricultural consultants, and state agricultural and environmental agencies who will be able to implement [or encourage the implementation of] N management practices that reduce the economic and environmental costs of N inputs while maintaining productive and profitable farming systems], and a project that will use the best instruments currently available to manipulate the charge of iron in clay minerals and to analyze the consequences with respect to soil fertility and environmental remediation.

Activities will also include research to better understand the factors that influence colonization of new habitats by I. scapularis and the pathogens that it transmits [by quantifying habitat use of woodlands by migrating birds we can assess the degree to which they serve as hosts that introduce infected ticks to a given area], research that is intended to show which gypsy moth proteins might be important targets for new generation control methods, ongoing work under the **National Atmospheric Deposition Program** [NADP] to monitor the nation's precipitation for a range of chemical constituents, including mercury, to determine whether spatial and temporal trends in concentration and wet deposition are present, a study with the overall goal of evaluating best management practices for water quality improvement at various scales [areas of focus will include investigating the effectiveness of erosion and sediment control practices, identifying best management practices to control nutrients, sediments and microbial pathogens, and developing water quality models for both field and watershed scales], efforts to improve our understanding of denitrifying bioreactors and their influence on toxic elements such as Hg, the combination of field and laboratory studies to develop and calibrate a process-based model of Hg methylation in bioreactors that can be used optimize the tradeoff between complete NO3 removal and MeHg production when designing best management practices, and efforts to better understand the ecology of landscapes with significant

commitments to agricultural production [restoration and "set aside" programs are crucial to the conservation of wildlife, so understanding the ecology of these sites is essential].

Information related to handling climate stresses and the sequestration of carbon though reduced crop land tillage and pasture management will be incorporated into Extension conferences and website postings. In addition, Extension will continue work with the campus-based Natural History Survey and the Illinois State Departments of Agriculture and Natural Resources to offer programs related to harmful invasive species that can destroy valuable commercial and urban forests that can counteract carbon build-up in the atmosphere. Proper pesticide applicator training to prevent contamination of natural resources and online courses addressing invasive species will be available to adults associated with horticulture and agriculture production. Working with the Illinois-Indiana Sea Grant faculty and staff Extension will help disseminate information regarding improper use, storage, and disposal of pharmaceuticals and personal care products in order to keep them from affecting water quality.

Other Extension activities will include volunteer Weather Observers, Master Gardener, and Master Naturalist training offering science-based educational opportunities that connect people with nature and help them become engaged environmental stewards. Forestry workshops will be offered in select locations in the state and multi-state forestry conferences will be conducted to address various related topics. Camping, conservation days, and the **I Think Green**, **Nature Detective**, and **4-H Citizen Scientist** initiatives will engage youth in investigating how living things interact with each other and their environment.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations ● Other 1 (Online Course) ● Other 2 (Webinars)	● Newsletters ● TV Media Programs ● Web sites other than eXtension ● Other 1 (Podcasts)

3. Description of targeted audience

Members of the target audience included ranchers and farmers, land managers, policy makers, scientists, landscape practitioners, designers, college students, professional insect taxonomists, Extension specialists, amateur naturalists, insect ecologists, conservation practitioners and managers, communication practitioners, journalists and reporters, environmental NGOs, water and land management agencies, agricultural producers with an interest in cover cropping, scientists studying the physical and chemical properties of soils, academic ecologists, restoration practitioners, government agency personnel involved in planning, implementing, and regulating wetland restoration programs, Illinois and Corn Belt corn producers, crop consultants, seed technology and biotechnology professionals, natural resource professionals, scientists interested in avian ecology and the spread of infectious diseases, apiculturists, private land owners interested in managing their land for wildlife, low income residents receiving urban gardening assistance designated for low income populations, low income and minority communities experiencing environmental remediation in nearby rivers, individuals with an interest in soil management and conservation, and scientists and regulators working in the area of agricultural non-point pollution control. Extension is also targeting livestock and crop producers, woodland owners, citizens who have a strong interest and desire to volunteer to preserve and showcase natural resources, crop consultants,

greenhouse managers, organic growers and growers interested in sustainable farming practices, land improvement contractors, certified crop advisers, drainage contractors, pesticide applicators, and youth.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number Of Individuals That Increased Knowledge Of Human Actions That Negatively Affect The Environment
2	Dissemination Of Air Quality And Atmospheric Data Through Web Hits On The National Atmospheric Deposition Program Website
3	Improved Development Of Conservation Strategies Through An Improved Understanding Of How The Presence Of Social Cues Affects The Occupancy And Density Of Grassland Birds
4	Estimating The Value Of Natural Resources And Environmental Amenities To Guide Resource Management Decisions
5	Number Of Pesticide Applicators Making A Decision To Avoid Harming The Environment
6	Actions Taken By Program Participants To Protect The Environment [Water Quality, Air Quality, Soil Loss, Wildlife, Natural Vegetation]
7	The Design And Evaluation Of Resource Management Policies That Are Cost-Effective And Maintain Or Improve Environmental Conditions
8	Exploring The Mechanisms Through Which Climate Change Affects Agriculture
9	Evaluating Habitat Quality Restoration And Success

Outcome # 1

1. Outcome Target

Number Of Individuals That Increased Knowledge Of Human Actions That Negatively Affect The Environment

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation
- 102 - Soil, Plant, Water, Nutrient Relationships
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Dissemination Of Air Quality And Atmospheric Data Through Web Hits On The National Atmospheric Deposition Program Website

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Improved Development Of Conservation Strategies Through An Improved Understanding Of How The Presence Of Social Cues Affects The Occupancy And Density Of Grassland Birds

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 123 - Management and Sustainability of Forest Resources

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Estimating The Value Of Natural Resources And Environmental Amenities To Guide Resource Management Decisions

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 605 - Natural Resource and Environmental Economics
- 133 - Pollution Prevention and Mitigation
- 112 - Watershed Protection and Management
- 134 - Outdoor Recreation

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 5

1. Outcome Target

Number Of Pesticide Applicators Making A Decision To Avoid Harming The Environment

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Actions Taken By Program Participants To Protect The Environment [Water Quality, Air Quality, Soil Loss, Wildlife, Natural Vegetation]

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 111 - Conservation and Efficient Use of Water
- 133 - Pollution Prevention and Mitigation
- 806 - Youth Development
- 112 - Watershed Protection and Management
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

The Design And Evaluation Of Resource Management Policies That Are Cost-Effective And Maintain Or Improve Environmental Conditions

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 134 - Outdoor Recreation
- 133 - Pollution Prevention and Mitigation
- 111 - Conservation and Efficient Use of Water
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

- 605 - Natural Resource and Environmental Economics
- 102 - Soil, Plant, Water, Nutrient Relationships
- 135 - Aquatic and Terrestrial Wildlife
- 405 - Drainage and Irrigation Systems and Facilities
- 112 - Watershed Protection and Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Exploring The Mechanisms Through Which Climate Change Affects Agriculture

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 102 - Soil, Plant, Water, Nutrient Relationships
- 132 - Weather and Climate
- 112 - Watershed Protection and Management
- 605 - Natural Resource and Environmental Economics
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

1. Outcome Target

Evaluating Habitat Quality Restoration And Success

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 134 - Outdoor Recreation
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

Description

External factors include concerns at the global level [events that have an impact on the environment as a whole such as current concerns about greenhouse gas emissions], federal and state level [most importantly revolving around governmental policy decisions and the availability of resources], and at the local level [that owners of natural resources are wise stewards not only of their own resources but are aware of the impact their actions have on the community]. With regard to work focusing on climate change, external factors include the potential for demand for information and research to increase based on issuance of any government regulations of fossil fuel emission levels, discovery of viable alternative renewable energy sources, and reduced use of non-renewable resources.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

1. **I Think Green** engages youth in investigating how living things interact with each other and with their environment focusing on worms, butterflies, and insects. Pre- and post-evaluations will be used to survey knowledge gained by youth participants.

2. End of the 4-H year evaluation of the **4-H Citizen Scientist** to determine the knowledge changes and actions taken by youth in formal leader-led groups that participate and focus on experiences associated with natural resources.

3. **Master Gardener** program impact evaluations will include retrospective evaluations sent to participants to determine knowledge and attitude changes and to follow up on volunteer activities undertaken.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Plant Health, Systems And Production

2. Brief summary about Planned Program

Research at the University of Illinois and its partners covers the gamut of approaches from basic plant research to applied research, all leading to improving production both commercially and for the home grower. Illinois continues to partner with others to strengthen the agriculture and food sectors of the American Midwest while seeking to improve food quality and safety.

As a contributing partner to the **North Central States Integrated Pest Management Program** [IPM], Illinois research and Extension supports the combination of research/Extension implementation projects, the development of individual pest control tactics, as well as Extension education and training. Funded research addresses emerging concerns such as the control of exotic, invasive weeds and pest management for the production of organic vegetable crops and the management of other commodity food crops and ornamental plants [See Food Safety and Food Security planned program].

Multi-county Extension Educators and state Extension Specialists [who focus on horticulture] work to assist the ornamental horticulture industry [also known as the green industry] which is comprised of a variety of businesses involved in production, distribution and services associated with ornamental plants, landscape and garden supplies, and equipment. This planned program also encompasses education for the homeowner regarding environmentally-safe practices in maintaining lawns and landscaping.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		0%	
205	Plant Management Systems	30%		10%	
206	Basic Plant Biology	10%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		10%	
212	Diseases and Nematodes Affecting Plants	5%		10%	
213	Weeds Affecting Plants	5%		10%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	20%		10%	
402	Engineering Systems and Equipment	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Illinois producers strive to produce a wide variety of crops that are affordable to consumers, while at the same time produced in a manner that is environmentally responsible. College of ACES researchers are working with producers to advance and document the frontiers of plant science and applicable disciplines to improve the quality and quantity of plants and their products, including food, feed, fuel, and fiber production while at the same time developing and enhancing plant production systems that integrate pest and other management practices while protecting the environment.

Extension priorities include addressing the threat of new invasive or exotic pests affecting the quality and economics of plants that enhance human environments both public and private, as well as management practices that ensure healthy plants and meet new and existing laws and regulations. Homeowners have been and will likely continue to be a priority audience. Although 16 of the 27 multi-county Extension Educator positions with responsibility for horticulture education exist, **Master Gardener** volunteer recruitment and training will be vital to meeting the needs of homeowners with respect to lawn care. Extension campus faculty and staff will share research findings with commercial entities and with officials responsible for maintaining plants [shade trees and ornamentals] on private and public property.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

While a safe and affordable food supply will always be a top priority, we expect that other areas of plant production will continue to play an important role in driving this planned program [such as the demand for biofuel inputs and maintaining healthy human environments]. In addition, as urban growth continues, demand for ornamental horticulture by public and private property owners to enhance those properties will increase. Final assumptions are that interest will also grow with respect to maintaining those plants in a way that ensures healthy human environments and that recognition and interest in the restoration of natural areas will be economically viable.

2. Ultimate goal(s) of this Program

To maximize the benefits from specialty crop production systems, to conduct cutting edge research that will increase crop production with minimal energy input and minimal negative impact on the environment and translate the results to producers and their advisers, to identify techniques that will obviate crop production factors that result in degradation of the environment, and to increase the number of Ph.D. graduates in plant breeding and expand research in plant breeding. Extension staff will extend the achievement of these research goals so that individuals responsible for commercial ornamental horticulture production and home yard and garden care will gain knowledge and apply that knowledge through the most economically-viable management practices while using safe and recommended pest control measures and conservation of water to ensure the preservation of natural resources.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	10.0	0.0
2018	0.0	0.0	10.0	0.0
2019	0.0	0.0	10.0	0.0
2020	0.0	0.0	10.0	0.0
2021	0.0	0.0	10.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include the development of new knowledge that will improve our fundamental understanding of how E. amylovora infects hosts and causes disease and will allow us to develop strategies for disease control and reduce economic losses, the development of additional methods for controlling H. glycines, work to characterize the origin, evolution, and structure of complete repertoires of proteins [proteomes] of organisms in the cellular and viral worlds, a project that seeks to clarify the core flower signaling mechanisms by antagonistic regulators FT and TFL1 [a major florigen and anti-florigen] in a model plant Arabidopsis thaliana and in soybeans and the identification of novel flowering loci in soybean, research to improve our understanding of the intrinsic structural, chemical, and biological changes in the corn kernel and soybean seed during storage and processing, and a project that seeks to quantify and document the occurrence and distribution of herbicide-resistant weed populations in Illinois.

Activities will also include an effort to improve our understanding of the impact of disease suppressiveness on soil microbial populations and root system development [characterization of microbial communities may lead to the discovery of specific disease suppressive agents and to a better understanding of microbial community profiles associated with disease suppressive conditions], research with the overall goal of better understand the biology of X. cucurbitae and determining the etiology and epidemiology of bacterial spot for developing effective strategies for management of the disease, work that will contribute to the development of more sustainable weed management strategies [by understanding how weeds adapt to existing strategies], the implementation of genomic selection into Illinois breeding programs to significantly bolster productivity, and the development of improved winter wheat varieties adapted to Illinois [development of disease resistant, higher yielding, high-quality, lodging resistant varieties decreases the farmer's per unit cost of production by increasing the yield and quality of his product without increased costs].

Activities will also include a project with the goal of characterizing the suite of weed associated microbial taxa that respond in the short and long term to cover crop and green manure management, the monitoring of seasonal and year-to-year patterns of pest abundance [regular insect collections from soybean and adjacent crop fields not only provide material to monitor established pest abundance and ecology, but can also be used to detect the local arrival of invasive species and to document significant changes in secondary pest abundance], the use of metagenomic approaches to analyzing nematode communities that will allow for the identification of new microbial pathogens of plant parasitic nematodes important in Illinois, work to provide decision support both for prioritizing corn and soybean planting sequences and also to suggest when inputs such as foliar fungicide [which is commonly used on both corn and soybeans] might be of value, a study to determine if combinations of HPPD inhibitors and other herbicides [such as PS II inhibitors or PPO inhibitors] lead to synergistic activity on broadleaf weeds in soybean, a collaborative study between the University of Illinois, the Yunnan Academy of Agricultural Sciences, and the International Rice Research Institute to improve domesticated Asian rice [O. sativa] with genes from its wild relatives [O. longistaminata and O. rufipogon], and a project to determine the effect of root structure on biomass production and its partitioning in plants experiencing drought stress.

Extension activities in this program area will address invasive and/or exotic pest diagnosis and management such as Viburnum Leaf Beetle and Japanese Stiltgrass and integrated pest management, selection and plant management practices for maintaining healthy lawns and commercial and public properties. Master Gardener volunteers will be recruited and trained using a statewide curriculum via online or webinar/on-site sessions and will in turn answer questions, make presentations, distribute materials, and promote an extensive set of websites that address a variety of horticulture topics. A distance diagnostic system and campus plant clinic will be staffed to identify and respond to concerns related to pests and diseases. Extension Specialists and Extension Educators will provide statewide webinars, podcasts, and use social media to share information on a timely basis with homeowners and public officials. Extension will also provide leadership for pesticide safety education and

networking/partnering with commercial horticulture associations to explore educational needs and workforce training for current and future employees.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations ● Other 1 (Digital Diagnostics System) ● Other 2 (Webinars/Audio Conferences)	● Newsletters ● TV Media Programs ● Web sites other than eXtension ● Other 1 (Online Courses) ● Other 2 (Podcasts)

3. Description of targeted audience

Members of the target audience will include nematologists, plant pathologists, growers, crop consultants, members of general public, scientists in the fire blight research community and related enterobacterial areas, general microbiologists, apple growers, animal biologists, graduate students in food engineering, researchers and practitioners in the grain harvest, handling, transportation and storage industries, weed management practitioners, agronomic crop producers, agrichemical retail applicators, certified crop advisors, agronomic commodity organizations, professional weed science societies, agricultural media organizations, Extension personnel, crop production professionals, soybean breeders, vegetable industry personnel, chemical industry personnel, scientists engaged in studies of plant evolution, genetics, and breeding, farmers producing wheat in the Midwestern United States, researchers working in the areas of soil ecology, microbial ecology, weed science, and agroecology, commercial entomology and crop protection/pest management professionals, agricultural biotechnology company representatives, crop producers who make decisions on cropping systems and tillage practices, and plant breeders who wish to improve rice productivity. Extension's target audiences will also include landowners, horticulturalists, industry representatives including pesticide applicators, owners, managers, and retail employees of green industries, homeowners, and Master Gardener volunteers.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Research Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	More Informed User Of Pesticides
2	Improved Control Of Waterhemp
3	Development Of New Soybean Breeding Lines
4	Evaluating The Effectiveness Of Cover Crops In Reducing Disease Severity
5	Improved Resistance To Western Corn Rootworm
6	Development Of Improved Winter Wheat Varieties Adapted To Illinois
7	Documenting The Occurrence And Distribution Of Herbicide-Resistant Weed Populations In Illinois
8	Development Of Alternative Soybean Disease Management Strategies
9	Identification Of New Microbial Pathogens Of Plant Parasitic Nematodes Important In Illinois
10	Number Of Individuals Increasing Knowledge Related To Detecting And Managing Invasive Pests and Plants
11	Number Of Individuals Implementing Practices Related To Lawn And Garden Plant Systems

Outcome # 1

1. Outcome Target

More Informed User Of Pesticides

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Diseases and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Improved Control Of Waterhemp

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 206 - Basic Plant Biology

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Development Of New Soybean Breeding Lines

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants
- 102 - Soil, Plant, Water, Nutrient Relationships
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 206 - Basic Plant Biology
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Evaluating The Effectiveness Of Cover Crops In Reducing Disease Severity

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 216 - Integrated Pest Management Systems
- 102 - Soil, Plant, Water, Nutrient Relationships
- 206 - Basic Plant Biology
- 212 - Diseases and Nematodes Affecting Plants
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 5

1. Outcome Target

Improved Resistance To Western Corn Rootworm

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 206 - Basic Plant Biology
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Development Of Improved Winter Wheat Varieties Adapted To Illinois

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 216 - Integrated Pest Management Systems
- 206 - Basic Plant Biology
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Documenting The Occurrence And Distribution Of Herbicide-Resistant Weed Populations In Illinois

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 206 - Basic Plant Biology

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Development Of Alternative Soybean Disease Management Strategies

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 205 - Plant Management Systems
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

1. Outcome Target

Identification Of New Microbial Pathogens Of Plant Parasitic Nematodes Important In Illinois

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 212 - Diseases and Nematodes Affecting Plants
- 206 - Basic Plant Biology
- 102 - Soil, Plant, Water, Nutrient Relationships
- 216 - Integrated Pest Management Systems
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 10

1. Outcome Target

Number Of Individuals Increasing Knowledge Related To Detecting And Managing Invasive Pests and Plants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 213 - Weeds Affecting Plants
- 212 - Diseases and Nematodes Affecting Plants
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 11

1. Outcome Target

Number Of Individuals Implementing Practices Related To Lawn And Garden Plant Systems

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 102 - Soil, Plant, Water, Nutrient Relationships
- 212 - Diseases and Nematodes Affecting Plants
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

- Appropriations changes

Description

Since a great deal of plant research is done in the field rather than the laboratory, it is much more difficult to control for confounding variables, any one of which can make results more difficult to interpret. Examples include unusually harsh [or unusually mild] growing seasons, unforeseen invading pests, and contamination from outside pollutants. These are especially important given the long time horizon of many plant studies. These same factors affect decisions that producers, green industry businesses, and homeowners make with respect to their crop, lawn, and garden management of plants that enhance human environments.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Master Gardener training regarding knowledge changes will be assessed using a retrospective evaluation collected via an online survey during certain years to determine changes in Master Gardener gardening practices, personal improvement skills, and experience in teaching horticulture topics.

A sample of calls to Extension "hotlines" will be made to callers to determine use of the information provided to the caller.

Although not conducted annually, a follow-up evaluation will be used to identify practice changes of commercial pesticide applicators who participate in Extension training.

First Detector training, webinars or **IPM modules** related to invasive plant species, pathogens, or pests will include an end-of-program survey.

Research data collection methods include field studies, transition trials, evaluations from research greenhouse studies, and harvesting of yield plots.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

The United States is the largest user of energy in the world accounting for over 20% of total consumption. Thus, any change in global energy use will require a change in production and consumption of energy in the U.S. The major renewable energy systems include solar, wind, biomass, hydroelectric, and geothermal. Biofuels have been gaining ground since the 1980's, but several limitations need to be overcome before plant/crop based resources and processes become a viable alternative to petrochemical-based systems for chemicals and energy. These include improvements in the efficiency of bioconversion of plant fibers such as perennial grasses to value-added products and extraction of high value products.

The University of Illinois is home to the **Integrated Bioprocessing Research Laboratory** [formerly the Center for Advanced BioEnergy Research [CABER]]. IBRL works closely with the nine UIUC colleges, multiple disciplinary and professional units, and faculty and students to provide a facilitative structure for campus outreach, teaching, and research in areas related to bioenergy systems. IBRL facilitates the development of cross-disciplinary research and development, education, and outreach programs that promote the greater and more efficient use of biorenewable resources, and more specifically, support the emergence of advanced biofuels and chemicals. IBRL focuses on sustainable bioenergy systems including plant, microbial, downstream processing, and economics and policy issues as they relate to biobased products.

Extension educational efforts will be provided primarily by faculty in the Department of Agricultural and Biological Engineering and the Department of Crop Science and by multi-county Extension Educators with responsibility for environmental and energy stewardship programing that addresses biomass energy crop production and utilization, forestry biomass use, biomass supply chain development challenges, solar energy decision-making, and home and business energy use reductions.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation	20%		15%	
136	Conservation of Biological Diversity	0%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
206	Basic Plant Biology	15%		15%	
402	Engineering Systems and Equipment	25%		20%	
601	Economics of Agricultural Production and Farm Management	20%		10%	
603	Market Economics	0%		10%	
801	Individual and Family Resource Management	5%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		5%	
806	Youth Development	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

World energy consumption is expected to increase 56 percent by 2040 according to the U.S. Energy Information Administration. Biobased renewable resources can be obtained from a wide range of agricultural crops, forestry products, and processing industries. The U.S. has access to significant amounts of bio-based resources, including those of the highly productive corn/soybean cropping system in the central U.S. [arguably the largest man-made ecosystem on the planet]. This agro-ecosystem is still largely focused on providing raw materials for the food, feed, and fiber industries and not on chemicals and fuels. Current research is focused on growing biomass energy feedstocks as bio-based sources of energy for heat and electricity.

A resurgence of interest in solar power is related to advances in technology and associated affordability. Illinois forestry biomass, primarily located on private land, has been increasing since 1985. Leftover biomass from timber management and/or harvesting can amount up to 27 percent of the total biomass and has potential use for bioenergy production.

Extension will continue to give priority to providing information on solar energy and home energy efficiencies as well as to dissemination of findings for a Department of Energy grant recently awarded for continued investigation of biomass energy feedstocks and their capacity to serve as building blocks for transportation fuel feedstock materials and for a U.S. Forest Service grant to address and disseminate information on the potential for fuel switching to wood.

Over 8,400 [90%] of 9,349 respondents to the 2009 Extension online survey of the public's educational interests wanted to know more about high energy costs, particularly about managing home energy costs, energy efficiency, and alternative energy sources. Extension will continue to give priority to these areas as well as providing support for biobased energy research projects and dissemination of research findings.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Renewable energy continues to make strides [according to "Energy Infrastructure Update" published by the Federal Energy Regulatory Commission's Office of Energy 50% of all new electrical generation deployed in 2014 came from renewable resources]. We assume that this trend will continue and that funding will be available to allow us to take advantage of this trend. Interactions with other entities on campus for research-based information on other alternative energy sources and energy efficiency will ensure Extension's ability to provide assistance to consumers on reducing energy costs. We assume that economies of production will emerge to encourage producers to invest in growing bio-energy crops and the development of viable supply chain systems to deliver biobased energy to various energy users.

2. Ultimate goal(s) of this Program

According to the official White House website "Leading the world in clean energy is critical to strengthening the American economy and winning the future. We can get there by creating markets for innovative clean technologies that are ready to deploy, and by funding cutting-edge research to produce the next generation of technologies". The University of Illinois is committed to working to improve on our current progress toward meeting this goal. Specific goals include providing fuel and materials for sustainability, improving biofuel production and carbon sequestration, and developing a research base that will allow for the development of management systems that efficiently and economically produce bioenergy crops. Identification and reliance on sustainable energy sources will keep energy costs reasonable and prevent adverse effects on the environment. Likewise, consumers of energy will accept responsibility for reducing their energy use leading to protection of our natural resources.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	3.0	0.0
2018	0.0	0.0	3.0	0.0

2019	0.0	0.0	3.0	0.0
2020	0.0	0.0	3.0	0.0
2021	0.0	0.0	3.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

We will combine and focus the specialized research abilities of faculty members from several disciplines to generate chemicals and biofuels from renewable biomass sources using a comparative and functional genomics approach. Future economic development aspects include technology transfer, biotech startups, attracting national talents including faculty, students and postdoctoral associates, and training of a first-class workforce.

Activities will include an investigation of the technical and economic potential for sugarcane ethanol production in Brazil and its land use implications, an examination of the optimal biofuel policy in the presence of learning by doing in cellulosic biofuel production and the effectiveness of alternative policies in promoting cost reducing innovations in the biofuel sector, an examination of the effects of riskiness of energy crops compared to conventional crops and its implications for crops, contracts, and location choices for refineries, the development of a computational and experimental pipeline for measuring metabolites from various model systems, work to develop higher values for coproduct solids in process streams through new process designs, improved efficiency, and incorporation of new technology, research applying systems thinking to develop an efficient, cost effective system for converting biomass into biofuels, the growing of Miscanthus x giganteus in a variety of settings to identify where it is best adapted to achieve maximum yields with the least amount of inputs, the manipulation of flowering time in grasses to develop breeding lines adapted to different growing areas and different end uses, an evaluation of the impact of sustainable modern maize crop production practices on maize plants grown for grain yield or high-biomass varieties for renewable bioenergy and biofuels, and research that will provide viable plant genetic resources, information, and expertise that foster the development of new crops and new uses for existing crops.

Activities will also include research to acquire information about genes and their expression for traits important to both economic and environmental sustainability in crop systems, a study designed to quantify the contribution of nitrogen-fixing bacteria to Miscanthus plant nitrogen and to identify plant and microbial traits and environmental factors that influence diazotroph colonization and activity, a study designed to improve our understanding of how wildlife communities in North America will respond to plantings of Miscanthus and how biofuel crops might affect habitat connectivity [understanding the effects of bioenergy production on connectivity is necessary for spatial modeling of future landscape conditions], work based on the new paradigm **Environment-Enhancing Energy** [such as the establishment of a demonstration laboratory-scale system that has the capacity to develop two gallons per day of biocrude oil from manure and algae grown in a manure water treatment system], the breeding of Miscanthus cultivars with improved winterhardiness and high yield potential in the central and northern Midwest, and the development of near-infrared [NIR] spectroscopy as an inexpensive and high-throughput method for evaluating quality characteristics of Miscanthus genotypes.

Extension activities will include narrated tours at the Dudley Smith field research plot, heating system conversion demonstrations using perennial grass pellets, presentations related to producing biomass energy crops through crop management conferences, forestry conferences, workshops, and podcasts, and the distribution of research reports related to costs, efficiencies, and by-products of biofuel production. In addition, Extension staff will also support the existing working groups of representatives from industry

biomass end-users, agricultural producers, government agencies, not-for-profit organizations, and University faculty and staff to advance successful and profitable use of commercialized biomass-based heat and electric energy. Extension staff will also tap into and disseminate research on other alternative energy resources such as wind through webinars, Energy Education Council web-based information, and presentations to help individuals, families, businesses, and public officials reduce the use of non-renewable energy sources as well as lowering their energy bill. Hands-on experiences and 4-H projects will continue as energy-related learning opportunities for youth.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Tours) ● Other 2 (Webinars)	● Web sites other than eXtension

3. Description of targeted audience

Members of the target audience will include policy makers, producers, academic audiences, scientists and graduate students in the field of industrial microbiology and biotechnology, fuel ethanol production facilities, researchers working on improving the efficiency of fuel ethanol production, the corn wet milling and corn dry grind industries, providers of equipment, cleaning chemicals, and enzymes, dry grind and cellulosic ethanol producers, energy crop scientists, commercial energy crop producers, government officials, biomass conversion specialists, undergraduate and graduate students, sorghum breeders, plant physiologists, crop modelers, agricultural scientists, corn, soybean, and cattle farmers, scientists engaged in studying the structure and function of genomes for C4 grasses used for bioenergy, scientists conducting research on plant responses to extreme environmental stress, conservation biologists, wildlife ecologists, agronomists, and land managers. Extension target audiences will also include landowners [including forest owners and managers], home and business owners, power suppliers and industry segments providing supply chain components, technologies, and marketing expertise, government entity officials, and youth.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number Of Completed Hatch Projects

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Understanding The Causes Of Evaporator Fouling In Maize And Ethanol Production Systems
2	Economic Analysis Of The Implications Of Cellulosic Biofuel Production
3	Toward An Improved Understanding Of How Biofuel Crops Will Impact Habitat Connectivity
4	Breeding Miscanthus Cultivars With High Yield Potential In The Midwest
5	Increased Knowledge Of Biomass Energy Production And Use

Outcome # 1

1. Outcome Target

Understanding The Causes Of Evaporator Fouling In Maize And Ethanol Production Systems

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 402 - Engineering Systems and Equipment
- 133 - Pollution Prevention and Mitigation
- 206 - Basic Plant Biology
- 601 - Economics of Agricultural Production and Farm Management
- 136 - Conservation of Biological Diversity

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Economic Analysis Of The Implications Of Cellulosic Biofuel Production

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 133 - Pollution Prevention and Mitigation
- 603 - Market Economics
- 402 - Engineering Systems and Equipment
- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Toward An Improved Understanding Of How Biofuel Crops Will Impact Habitat Connectivity

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Breeding Miscanthus Cultivars With High Yield Potential In The Midwest

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 206 - Basic Plant Biology
- 201 - Plant Genome, Genetics, and Genetic Mechanisms

4. Associated Institute Type(s)

- 1862 Research

Outcome # 5

1. Outcome Target

Increased Knowledge Of Biomass Energy Production And Use

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 601 - Economics of Agricultural Production and Farm Management
- 206 - Basic Plant Biology
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

Description

Concerns, both environmental [global warming] and economic [high energy prices], will drive the demand for biofuels research. Improvements in crop productivity and the utilization of bioenergy will also continue to be important external factors. High prices of current crops may inhibit growth of other bio-based fuel products.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Visitors to the Dudley Smith biomass research plot will be asked to evaluate the knowledge change using a simple response form that is completed following the tour/demonstration or sent to them following the tour/demonstration.

We will also attempt to evaluate knowledge gained and planned implementation of practices to increase energy efficiency.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

4-H Youth Development

2. Brief summary about Planned Program

Youth development programs are designed to allow youth and adults to work together in family and community environments to create real life learning laboratories that help youth practice skills they need today and will continue to need for the rest of their lives, to reach youth in their own neighborhoods and communities with unique, hands-on learning strategies suited to their needs, to address current youth issues through positive prevention programs, and to promote positive youth/adult partnerships involving them in significant decision-making and encouraging their participation in community roles. These investments in youth through informal education are expected to continue to return significant benefits to the public while addressing important issues focused on: [1] College and career readiness; [2] Food access; [3] Environmental stewardship; [4] Leadership; and [5] Health.

National research continues to indicate that positive youth development involves creating opportunities to experience belonging, independence, generosity, and mastery--the focus of **4-H Youth Development Program** delivery. 4-H program opportunities will continue to draw on research conducted in the College of ACES in nutrition and health, leadership, and youth involvement in groups, as well as the expertise of faculty in the Colleges of Engineering, Pharmacy, Dentistry, Medicine, National Center for Rural Health, and the Graduate School of Library and Information Science.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
806	Youth Development	100%		0%	
	Total	100%		0%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The Search Institute reports that less than 30% of youth are experiencing developmental assets such as positive family communication, a community that values youth and views them as a resource, access to adult role models, creative activities, and the opportunity to plan and make decisions. The Illinois state fiscal crisis which at the time of this POW submission involves the withholding of FY 2016 state funding for the University of Illinois and Extension and other important and essential societal supports for children and family programs and services threatens to erode Extension's capacity for reaching youth while the need for the University of Illinois **Positive Youth Development** [PYD] 4-H program grows. Illinois 4-H staff will continue to reach out to youth through efforts that encompass the following features of an effective PYD program: [1] Positive and sustained relationships between youth and adults; [2] Activities that build important life skills; and [3] Opportunities for young people to use these life skills as both participants and as leaders in valued community activities.

Priority will continue to be given to expanding the **4-H** program in Illinois to engage more youth in a sustained PYD experience through new and ongoing clubs and groups. This effort will include a focus on expansion that involves the growing metropolitan audience and those of Hispanic ethnicity. The 4-H program will also respond to the needs expressed by respondents to a public survey conducted by Extension which indicated that 48% wanted more information on expanding youth interest in science, math, and technology education, 41% on job search skills, 38% on planning for a college education, and 34% on workplace ethics. Two and four-year college graduates will be hired in increasingly larger numbers than high school graduates making it imperative for young people to seek higher education. Occupations drawing on science, technology, engineering, and mathematics [STEM] fields play an important role in the competitiveness and economic growth of our nation's economy and are projected to grow by 17% by the year 2018 compared to 9.8% growth for non-STEM occupations. Priority will be given to building awareness of and preparation for careers, including the development of skills to prepare youth for the workforce in these STEM occupations as well as other occupations.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That funding is restored and maintained, that staff and volunteers can be located to expand programs, and that faculty expertise from outside the College of ACES, as well as corporate and community partners, can be recruited to support the development of 4-H materials and programs.

2. Ultimate goal(s) of this Program

Youth who gain a sense of belonging within their group, independence through decision-making and responsibility, a spirit of generosity toward others, and mastery through project completion, presentations, and exhibitions, and who develop in positive ways required of adults who can contribute to society. In addition, 4-H will develop youth who are prepared and interested in: [1] Pursuing careers especially in science, engineering, and technology; [2] Assuming leadership roles; and [3] Developing lasting habits related to caring for the environment, maintaining health through proper nutrition, and facilitating food access for under-served youth and their families. In addition, youth involved in 4-H activities will develop good character and exhibit the social and emotional development required of adults who can contribute to society.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0
2020	0.0	0.0	0.0	0.0
2021	0.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Each local program unit has identified specific program enhancements for their 4-H program related to ways youth experience: [1] Belonging; [2] Independence; [3] Generosity; and [4] Mastery, particularly in metropolitan areas and Hispanic communities. New 4-H clubs and groups will be formed and activities will be conducted that promote involvement of **4-H Teen Teachers.** In addition, teens will be supported in serving through the following leadership categories: [1] Planning; [2] Advising; [3] Promoting; [4] Mentoring; and [5] Advocating. Through **Speaking for Illinois 4-H** teens will be able to develop important communication leadership skills. Building career awareness and skills to prepare youth for the workforce will be emphasized in programs such as **Welcome to the Real World**, **Skills to Pay the Bills**, and **Illinois Summer Academies.**

Use of Mobile Digital Design Labs through the **Illinois Digital Innovation Leadership Program** that engages youth in computer-aided design, audio/video production, and data visualizations, and **An Artifact Speaks** lessons and materials to share artifacts that broaden youth understanding of other cultures are two new educational projects that will hopefully be continued after the end of a two-year funded pilot project with the goal of supporting the enhancement of youth interest in STEM careers. Depending on the

state fiscal crisis resolution, a third two-year pilot project will continue through conducting informal computer-science activities for elementary and middle-school youth from diverse cultures and backgrounds and those who are at risk for academic failure to experience computational thinking, computer programming, and fundamental computer science concepts.

Other 4-H activities for youth are included in the following planned programs: [1] Natural Resources and the Environment; [2] Food Safety and Food Security; [3] Human Health and Human Development; and [4] Community Resource Planning and Development. In addition, online modules and training that addresses youth-adult partnerships will provide opportunities for volunteers to ensure that youth experiences include the essential elements of Positive Youth Development.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● Demonstrations ● Other 1 (Camps) ● Other 2 (Webinars)	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

All youth, including special targeting to reach urban youth, youth of Hispanic ethnicity, military family youth, youth leaders [paid and volunteer], teachers, adult leaders of 4-H clubs and other youth-serving organizations, parents, and community members.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Youth Will Demonstrate Leadership Efficacy [Citizenship Common Measure Indicator]
2	Cumulative Effect Of 4-H Participation Through The Development Of Skills And Competencies In Making Choices, Forming Connections, Effectively Communicating, And Applying Content Results In Citizens Who Contribute To Their Community And To The World [Universal Common Measure Indicator]
3	Youth Will Demonstrate The Ability To Communicate Through Multiple Methods And Media [Universal Common Measure Indicator]
4	Youth Will Express Interest And Be Engaged In Science Related Activities [Science Common Measure Indicator]
5	Youth Participate In Community Service And Volunteer [Civic Engagement Common Measure Indicator]

Outcome # 1

1. Outcome Target

Youth Will Demonstrate Leadership Efficacy [Citizenship Common Measure Indicator]

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Cumulative Effect Of 4-H Participation Through The Development Of Skills And Competencies In Making Choices, Forming Connections, Effectively Communicating, And Applying Content Results In Citizens Who Contribute To Their Community And To The World [Universal Common Measure Indicator]

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Youth Will Demonstrate The Ability To Communicate Through Multiple Methods And Media [Universal Common Measure Indicator]

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Youth Will Express Interest And Be Engaged In Science Related Activities [Science Common Measure Indicator]

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Youth Participate In Community Service And Volunteer [Civic Engagement Common Measure Indicator]

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Additional loss of state funding for professional positions and subsequent reduction of Extension Educators will likely significantly affect the level of programming and youth involvement. The rising costs of a college education may affect enrollment and preparation of scientists. A number of other youth-serving organizations and activities compete for time youth have for discretionary out-of-school activities.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Please note that the results of the findings may be reported in other planned program sections.

A 4-H Science Survey that primarily draws on 4-H National Common Measures will be distributed to a sample of youth participants in science-based projects, programs, and activities.

A 4-H Service Learning/Civic Engagement Experiences survey that primarily draws on 4-H National Common Measures will be distributed to a sample of youth participants in related learning opportunities.

A 4-H Teens as Teachers Experiences survey that primarily draws on 4-H National Universal Positive Youth Development Common Measures will be distributed to a sample of youth in clubs and groups that have an intentional PYD focus.

A 4-H Workforce Preparation Experiences survey that primarily draws on the College and Career Readiness 4-H National Common Measures will be distributed to a sample of youth participants in related career and workforce learning opportunities.

A 4-H Healthy Living Experiences survey that primarily draws on the Healthy Living 4-H National Common Measures will be distributed to a sample of youth participants in related nutrition and wellness learning opportunities.

Surveys of high school level 4-H youth regarding their 4-H experiences will be conducted periodically.

Teachers who conduct the **Incubation and Embryology** project in their classrooms will be asked to assess science skills and life skills they observe in their students who participate in the program. Teacher training will include instruction on how to access, conduct, and enter data online regarding increases in a series of science skills and life skills that they are to observe and rate while implementing the Incubation and Embryology program in their classrooms.