# 2017 Ohio State University Combined Research and Extension Plan of Work

**Status: Accepted**

**Date Accepted: 05/16/2016**

## I. Plan Overview

### 1. Brief Summary about Plan Of Work

Ohio State University Extension (OSU Extension or OSUE) and the Ohio Agricultural Research and Development Center (OARDC) work collaboratively within the College of Food, Agricultural, and Environmental Sciences (CFAES) at The Ohio State University (OSU) to engage with stakeholders, and to deliver impacts that make a difference. Our goal over the next five-year period is to continue to "bring knowledge to life," while also addressing OSU and CFAES' strategic priorities.

Scientific advancements in agbioscience will continue to provide unprecedented opportunities for global economic food, environmental, and social progress. OARDC is the singular research and development hub for agbioscience research in Ohio, and OSU Extension is the center for associated education and human capital development. Collectively, this capacity is targeted to realize new discoveries and advance knowledge acquisition by our clientele for the purpose of achieving job growth and economic prosperity that is sustainable over time.

OSU is part of a statewide initiative linking all Ohio State higher education programs under a "One University" concept. Each college, department, and program within OSU is also expected to view and conduct itself as part of that whole. This concept, irrespective of the terminology or internal structure of each member institution, is dedicated to the discovery of new knowledge and the transmission of that knowledge in the classroom, laboratory, and outreach settings in order to help meet society's needs and aspirations.

OARDC and OSU Extension are administered through the office of the Vice President for Agricultural Administration and Dean of CFAES. Both functions are central to accomplishing the land-grant mission of The Ohio State University and fulfilling its academic plan. That mission is inclusive of an active state government agenda to grow Ohio's economic sectors through research, development, and Extension investments. Throughout this 2017-2021 planning period, the primary focus will be on research and Extension activities that generate and extend new knowledge resulting in job growth and economic recovery. Both are foundational for advancing social, economic, and environmental well-being. Likewise, the mission is inclusive of the National Institute of Food and Agriculture's (NIFA) agenda and priority areas.

Several notable leadership changes occurred in 2015, and additional transitions are expected in 2016. Dr. Bruce McPheron, Vice President for Agricultural Administration and Dean of CFAES, became Interim Executive Vice President and Provost of OSU effective December 2, 2015. At that time, Dr. Ron Hendrick was named the Interim VP and Dean of CFAES and will serve in that capacity until July 1, 2016 when he will become Dean of Michigan State University's College of Agricultural and Natural Resources.

On January 4, 2016, Dr. Roger Rennekamp began his tenure as the 12$^{th}$ leader of Ohio State University Extension, succeeding Dr. Keith Smith. Dr. Steve Slack retired at the end of 2015 after 16 years as Associate Vice President and Director of OARDC and Associate Dean of Research for CFAES. His position has been re-structured to focus on the research enterprise of CFAES, including graduate education and technology commercialization, and a national/international search is currently underway. Dr.

Jerry Bigham will serve as Interim Associate Dean for Research and Graduate Education until that search is completed. Dr. David Benfield, formerly Associate Director of OARDC, now serves as Associate Vice President of Agricultural Administration and Director of the Wooster Campus. Dr. Benfield will have oversight responsibility for all CFAES/OARDC research facilities, including outlying research stations.

Certainly, OSU Extension and OARDC may anticipate changes to the organizational structure and focus of programming efforts as these new leaders begin to implement their visions for the future of our organizations.

The food and agriculture bio-economy in Ohio is an enterprise generating over 100 billion dollars annually, employing over one million people. The sustainability of the agbioeconomy is dependent on the infusion of new knowledge from OSU's research, Extension, and development programs. The leadership provided by CFAES during the planning period of 2017-2021 will be based on its active participation in the OSU Discovery Themes Initiative, which is intended to guide and advance program integration within the broader university to address global problems. Three of the four Discovery Themes are especially relevant to CFAES and include: (1) Health and Wellness; (2) Energy and Environment; and (3) Food Production and Security. The Discovery Themes will focus internal resources on critical societal needs and grand challenges to reflect OSU's character as a public, urban, land-grant university with very high research and outreach activities.

OARDC and OSU Extension have already been working in parallel with the OSU Discovery Themes, integrating cutting-edge research, teaching excellence, and innovative outreach programs in three "signature areas" defined by CFAES as: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and bio-based products. Thus, the integration of CFAES' lines of research and Extension into the aforementioned Discovery Themes is being expedited by their commonality with the CFAES "signature areas."

CFAES is involved in either a leadership role or has major research capacity in six of the seven Discovery Themes focus areas for investment, as identified by Ohio State. The following represent priority areas for research and investment in the 2017-2021 planning period:

- Emerging and Re-emerging Infectious Disease Detection, Treatment and Prevention
- Materials and Manufacturing for Sustainability
- Personalized Food and Nutrition Metabolic Profiling to Improve Health
- Resilient, Sustainable and Global Food Security for Health
- Sustainable and Resilient Economy--Focus on Materials Innovation
- Translational Data Analytics

Leveraging existing strengths in these areas, Discovery Themes investments are making it possible to expand our tenured and tenure-track faculty ranks and thereby accelerate innovation while shining new light on Ohio State and CFAES research and innovation, teaching and learning, and Extension and engagement.

OSU Extension will continue to manage program priorities throughout the 2017-2021 period via its "VP Conversations on the Future of Extension" project. The first part of this project was conducted in 2014 ("futuring"), and the second portion of the project, "visioning," will continue into 2015, and beyond. The visioning portion of the project is "an aspirational exercise in leveraging internal culture, capabilities, resources, goals, and mission to offer successful products and services to customers and stakeholders in the future." The intent of the futuring/visioning process is to formally re-engage this line of thinking every 2-3 years. Informally, OSU Extension will continuously engage in evaluating needs as they arise.

This Plan of Work, CFAES' current and future strategic plans, and NIFA's national priorities all reflect

common themes. To address these themes, our planned programs for 2017-2021 are designed to foster knowledge acquisition, dissemination, and scientific advancements to help mitigate the many financial, social, and environmental problems facing society today. Issues of economy, climate change, sustainable energy supplies, global food safety and security, human health issues such as hunger, obesity, nutrition, and disease can all be positively influenced by our planned research and Extension programs.

OARDC will make significant investments that are critical to anticipated outcomes and impacts for this planning period. Highlights are:

- OARDC will rebuild its faculty ranks with much of the growth related to the OSU Discovery Themes (Health and Wellness; Energy and Environment; Food Production and Security). New Discovery Themes faculty will be tenured or tenure-eligible. Hiring will be informed by significant faculty input and will involve a leveraged investment of central, local and capacity funds. The college has committed funding for 17 new Discovery Themes faculty members who will be tenured or tenure-track, and will provide a focused and significant opportunity to enhance the diversity of Ohio State's faculty. This number is expected to increase to 23 new faculty members within the next two years.
- CFAES completed a Master Plan for all college locations and a re-envisioning process for animal facilities. These two plans are the roadmap for renovation of current facilities and construction of new facilities in the college. Many of the academic, animal and farm facilities managed by the college have not been upgraded for several years and are outdated. In 2015, planning activities were initiated for the construction of new beef research and teaching facilities in both Wooster and Columbus. A planning committee was formed to discuss the construction of new swine facilities at Wooster and a new multispecies facility for teaching animal agriculture at the Waterman Farm in Columbus. Plans at the Waterman Farm also include a new Franklin County Extension Office and new research and production greenhouses. Specific details on the facilities will be available in 2016 as planning continues. The construction of these new facilities represents a nearly $100 million commitment to continuing our research programs in animal agriculture and horticulture.
- CFAES has also been renovating academic buildings with a $20 million renovation of Kottman Hall for the Plant Pathology, Horticulture and Crop Sciences, and School of Environment and Natural Resources. Additional laboratory renovations are planned on both the Columbus and Wooster campuses to provide space for new Discovery Theme faculty hires.
- OARDC will continue to emphasize programs that develop new markets, discover new opportunities for producers, diversify crop production and participate in markets for high value crops. These programs include organic and local food systems, as well as traditional food production systems across Ohio.
- OARDC will continue research to support CFAES' wide-ranging water quality initiative "Field to Faucet," which seeks end-to-end for reducing agricultural contributions to hazardous algal blooms and other water quality issues in Ohio lakes and waterways. Initiatives targeting Lake Erie and the Great Lakes system will be based on regional partnerships.
- OARDC will continue to develop and integrate programs for food systems data analytics in order to collect large, real-time data sets and create educational programs based on these findings to help producers make informed business decisions. It is anticipated that this effort will also involve the integration of environmental and natural resource data as it applies to food systems and land use.

These investments support multi- and cross-disciplinary collaborations leading to impacts that truly reflect the capacity of agbioscience research to address complex problems. These collaborations also are central to CFAES' commitment to the One University concept.

OSU Extension will continue to focus on the following programming topics:

- shale gas leasing and extraction;
- renewable energy sources (wind, solar);
- local foods;

- healthy finances, relationships and people;
- science / technology / engineering / mathematics (STEM) programming;
- youth development;
- nutrient management and water quality;
- assuring quality care for animals;
- plant systems management.

OARDC and OSU Extension will continue to engage in research and Extension work that addresses known/traditional areas where established needs exist, but we will also connect with our stakeholders to determine new areas of need throughout the planning period.

Note: The FTEs shown in this Plan of Work are based on programmatic assessments, and may not reflect actual FTEs expended.

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

| Year | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| 2017 | 562.0 | 0.0 | 306.0 | 0.0 |
| 2018 | 565.0 | 0.0 | 306.0 | 0.0 |
| 2019 | 567.0 | 0.0 | 306.0 | 0.0 |
| 2020 | 570.0 | 0.0 | 306.0 | 0.0 |
| 2021 | 570.0 | 0.0 | 306.0 | 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 University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

### 2. Brief Explanation

OARDC and OSU Extension will continue throughout 2017-2021 to place strong emphasis on merit review, with particular attention to stakeholder feedback to better meet research and programmatic needs. Research and Extension efforts require both internal and external input, and review is essential at all levels.

Both OARDC and OSUE will continue to utilize various advisory committees at differing levels commensurate with the review and input required. Small internal competitive grants are peer reviewed by an internal panel of faculty and administrators representing all academic departments within the College. Panels of faculty, administrators, and leading stakeholders who have expertise in the area of the award review other larger, competitive grants. When needed, faculty members from outside of the college are used as reviewers. Combined panels of academics and non-academics are being used more extensively as OARDC and OSUE seek to move more research into Ohio communities.

Publications by OARDC and OSUE personnel are either blind peer-reviewed or peer reviewed/juried before publication either in print or via electronic media. OARDC encourages publishing in higher-tier, peer-reviewed journals and the tracking of citations of research publications. All research publications are peer reviewed by journal editors and scientific peers before acceptance for publication. Scholarly findings are also expected to appear in trade journals, Extension media, and in public media, including social media. OSU Extension will continue to require all publications (whether electronic or print) that are intended for statewide (or broader) distribution to be submitted for blind peer review by a minimum of three people.

OSU Extension will continue to implement several levels of advisory committees including: the state Extension advisory committee (which will continue to provide feedback on statewide programmatic issues); county-level advisory committees (which will advise on local/county-level programmatic needs); and program area advisory committees (which will help identify needs within the OSUE program areas of agriculture and natural resources, family and consumer sciences, 4-H youth development, and community development). Extension also will continue to have local, specialized/topical committees (for example, goat committee, sheep committee, etc).

Both internal and external reviews are central to this organization's assessment of the merits of its planned programs. Merit review will continue to be a strong emphasis throughout this planning period with the ultimate aim of assessing impacts on science and society.

## 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?**

To be relevant, the planned programs of CFAES, directed by OARDC and OSUE, must address our stakeholders' most pressing needs, as well as those that are articulated in local, state, and national planning documents. The issues of our stakeholders are largely addressed in the current CFAES strategic plan and in NIFA's priority areas. Throughout the 2017-2021 planning period, our organization will continue to use a stakeholder-based approach involving individual and collective strategic planning exercises and needs assessments.

OARDC and OSUE will maintain multiple levels of advisory committees, which act as partners with county, regional, and statewide groups to garner input and guidance. Each group is charged with identifying additional stakeholders, committee members, and others who may have a vested interest in the organization.

In OSU Extension, signature programs will continue to be evaluated annually to ensure they are addressing critical needs or issues relevant to a significant number of Ohioans. Signature programs will be reviewed by a committee and measured against pre-determined criteria (i.e., addresses a critical need for programming, has formal or informal curriculum materials, has impact data and evaluation tools to continue to evaluate program effectiveness, and is

replicable across the state). As signature programs are "graduated" (i.e., when they are proven successful and sustainable), new program proposals will be reviewed by a committee and the administrative cabinet to determine how well they meet signature program criteria.

Other signature programs, while uniquely developed in Ohio, certainly have the ability to impact worldwide issues. 'Nutrient Stewardship for Cleaner Water' focuses on reducing phosphorus runoff from entering fresh water and creating harmful algal blooms, and 'Energize Ohio,' educates individuals on renewable energy sources and Marcellus shale gas. The 'Energize Ohio' program has been developed in cooperation with a number of Extension organizations at other universities, including (but not limited to): Michigan State University; Purdue University; Penn State University; West Virginia University; Colorado State University; and Cornell University.

OARDC research and OSUE programming reaches across the country and the world through websites, podcasts, webinars, and other forms of online media.

**2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?**
The needs of under-served and under-represented stakeholders will continue to be addressed at all levels of administration at this institution throughout the 2017-2021 planning period. Affirmation of success will be reflected in future documents. OARDC and OSUE have sought, and will continue to build linkages with a number of under-served groups.

Examples of under-served groups that have been recently engaged include: inner-city populations and communities in regions with limited access to healthy, affordable food, i.e., "food deserts"; Somali communities (fresh goat meat initiative); the Amish; and native Spanish-speakers through a number of publications in Spanish. Websites will expand Spanish language sections. OSUE and OARDC jointly manage a research, development, and Extension center in southern Ohio (South Centers) that assists the economically depressed Appalachian region of Ohio.

Additionally, the Summer Research Opportunities Program (SROP) serves as a gateway for underrepresented students to enter graduate school at any of several CIC (Committee on Institutional Cooperation) universities. In this program, students are exposed to all stages of the research process, from research design to research presentation, by working one-on-one with a faculty mentor. Students have the opportunity to present their research on at least three occasions to their SROP peers, faculty members and other student researchers working within their discipline at Ohio State and other institutions. All expenses are paid with housing, transportation and a stipend included.

OSU Extension has been increasingly using technology-based platforms, including eXtension, webinars, and social media (such as Twitter and Facebook). Extension hopes to reach youth and other new audiences via technology. While Extension plans to maintain programming in "the traditional method" of face-to-face educational sessions, we also realize that the lifestyles of individuals are changing; therefore, we are diverting attention to new delivery modalities. Extension will likely implement more asynchronous delivery methods, to allow for wider audience participation, and to meet schedules of many individuals. In early 2015, OSUE created an Educational Technology Unit after a successful two-year pilot project. The Educational Technology Unit will focus on pilot testing new educational technologies and strategies, as well as develop training to help integrate new delivery methods into the knowledge base of OSU Extension educators. The unit will continue well into the future, as technology is constantly evolving.

Research and Extension faculty and staff will continue to be involved in programs such as food networks, urban gardening, local fresh foods to local schools or food banks, and farm markets in urban areas as a means to make fresh food more available to urban populations, many who are underserved.

OARDC and OSUE have an active, well-supported, college-wide diversity committee that works to ensure that all faculty, staff, and students within our college understand, appreciate, and respect diversity. CFAES recognizes that the first step in addressing the needs of the under-served and under-represented is to address these matters internally, thereby building a culture of acceptance and appreciation of diversity within our own ranks. Recently, the college has supported a program focusing on supporting female faculty, staff, and students with professional development opportunities and resources on careers within and outside of academia. The Gender Initiative has a faculty lead and is part of the College's Office of Equity and Inclusion. The mission of the Gender Initiative is to identify and create a support structure that will lead to retention and advancement of women's careers in the agricultural and natural sciences.

**3. How will the planned programs describe the expected outcomes and impacts?**
OSU Extension and OARDC will continue to evaluate programs based on outcomes and impacts by assessing newly generated scientific knowledge, knowledge and behavioral changes of clientele, and economic/social/environmental or policy changes that occur as a result of research and programming efforts. The outcomes are expected to have major impacts in Ohio, nationally, and worldwide, especially as we seek to grow the economy, create jobs, improve food security, reduce world hunger, move toward energy independence, and mitigate the impacts of climate change and other environmental problems.

OARDC requests impact statements annually as part of each department's merit review process. Impact statements are reviewed and ranked by OARDC's administrative cabinet members for strength in scientific discipline, CFAES/OARDC mission and interdisciplinary work. These impact statements are then used in annual reports, federal-level communications pieces, and some are submitted to the Land-Grant National Impact Database.

OSU Extension educators will continue to implement the logic model when planning programs, as well as for determining evaluation tools to assess program effectiveness. Evaluation results from programming will be compared to the program's goals and expected outputs and outcomes. Opportunities for curriculum or delivery methods will be determined from both formal, assessment-based data, as well as informal data (such as changes in program attendance or verbal feedback from program participants). Many evaluation tools used by OSU Extension professionals ask questions regarding potential changes in the programming, as well as what participants liked best and least. This type of feedback helps drive the identification of changes in programming, which ultimately results in the updating of curriculum to most effectively meet the needs of our clientele.

OSU Extension will continue to use evaluation tools (e.g., pre-post, retrospective) in conjunction with programming efforts to assist in documenting program impact against pre-determined/expected program outcomes. Assessment tools typically employ both quantitative and qualitative questions.

**4. How will the planned programs result in improved program effectiveness and/or**
For the 2017-2021 planning period and into the future, effectiveness and efficiency will continue to be assessed at all levels of the organization. OSUE and OARDC will continue to

have finite resources and will depend heavily upon state and competitive grant funding from extramural sources, in addition to federal base funds. OSUE and OARDC will continue to dedicate, at minimum, 25% of our formula funds to programming and research that serves multi-state and integrated activities. Continued and enhanced focus on assessing stakeholder needs while assessing the institution's capabilities to meet those needs that fall within the scope of our mission is a first step to ensuring program effectiveness.

Efficiencies are also gained by predetermining where scare resources are to be targeted and what impacts are expected based on the inputs allocated. We are highly dependent on stakeholders, from businesses that help frame and commercialize product and service concepts, to the consumer. Our strategic plans and external program reviews will continue to provide additional insights into addressing the most pressing needs of our clientele. Maximizing effectiveness and efficiency throughout this planning period is critical to the success of this reporting institution and perhaps to the long-term well-being of agriculture experiment stations and state Extension programs nationwide.

OSUE also gains efficiencies using volunteers. 4-H advisors are adult volunteers who serve a critical role in Ohio 4-H programming; they collectively dedicate tens of thousands of hours to help make our youth development programming a success. Master Gardener Volunteers and Certified Crop Advisors (CCAs) are examples of Extension-trained volunteers and consultants (respectively) who carry the Extension message into communities and farm businesses in Ohio. In 2015, Ohio had a reported 16,317 adult volunteers helping to administer 4-H programming, and another 5,259 teen volunteers assisting with 4-H events like camping. There were 525 CCAs operating in Ohio in 2015, and 3,241 master gardeners. Volunteers effectively magnify the reach of OSU Extension programming efforts, by carrying the Extension message to Ohio citizens. OSU Extension's volunteers and Extension-trained consultants will continue to aid Extension in efficiently delivering our message and magnifying our reach.

## 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 traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (focus groups, public information booths at local gatherings)

**Brief explanation.**

Stakeholder input is central to our 2017-2021 planning effort. While our organization is guided by the strategic plans created by CFAES, OSUE, OARDC and the university as a whole, we continually seek stakeholder input. Each of these three entities have stakeholder advisory committees. In addition, OARDC has advisory committees of producers, processors and faculty that serve at each of our eight agricultural research stations in Ohio. These committees meet at least twice annually with administration to discuss research, outreach and educational needs within the industries they represent.

Extension will continue to implement multiple layers of advisory committees, seeking input for program planning, implementation, and evaluation. Additionally, Extension will conduct periodic needs assessments, soliciting feedback from clientele, stakeholders, and other Ohio citizens who may not have familiarity with Extension. At the end of 2015, Extension filled a Market Analyst position, which will help increase the capacity to analyze clientele needs. OSUE and OARDC involve stakeholders in meetings with state legislators to discuss programmatic priorities and budgetary needs to ensure that we are focusing on the critical needs of Ohioans.

OSU Extension will continue to create stakeholder-based strategic plans to identify statewide priority programs. The process involves collaboration with local advisory committees; reviewing data about demographic, economic, and social trends in Ohio; and prioritization based on need and availability of resources. This is a proven process that will enable the creation of focused teams composed of campus, center and field specialists, as well as county educators, who will develop curriculum and evaluation strategies for statewide programs. These teams will identify specific target audiences whom they will regularly involve in evaluating programs and educational materials and engage in planning. Some teams may include members from external organizations (statewide agencies, organizations, commodity groups) who are excellent partners for enhancing program outreach and delivery.

Meaningful stakeholder input will continue to be central to this institution's success.

**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
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys
- Other (one on one interactions with existing and new stakeholders)

**Brief explanation.**

Throughout the 2017-2021 planning period, we will continue to build on a history of successfully identifying and linking with stakeholders. The institution will continue to utilize faculty and staff, associates from support organizations, and political leaders to help identify individuals and groups with whom we should be interacting. These contacts will be logged and maintained. As new contacts are made, they will be asked to identify others who need to be included. Formal needs assessments and targeted surveys will be used to help identify

individuals, groups, issues, and needs. Often, it is at our Extension programs, where active participation by faculty and staff in the community expands our institution's clientele list, knowledge of needs is gained, and feedback is obtained.

OARDC and OSU Extension are actively involved in planning and economic development at the county, regional, and statewide levels and will continue to be so throughout the 2017-2021 planning period. Local committees are expected to have a constitution and bylaws that identify the makeup of the committee. The membership of committees is reviewed during annual on-site, self-study diversity reviews to ensure that involvement is sought from a representative group of local citizens. Educators are encouraged to reach out to new and under-served target audiences to identify specific needs to be addressed. This occurs at the campus level as well, and will continue to occur.

CFAES has a large research arboretum on each of its two main agriculture campuses, Columbus and Wooster. These sites serve as teaching and research laboratories, but they also attract large numbers of visitors and volunteers annually and are used to open channels of communications with new clientele and stakeholders.

**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
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey 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
- Survey of selected individuals from the general public
- Other (focus group interviews, unobtrusive observation, qualitative data collection)

**Brief explanation.**

In order to collect adequate stakeholder input, multiple methods will be used in this planning period. Faculty and staff members all have stakeholders that they seek out for feedback, usually informally. The traditional stakeholders tend to be business and industrial partners, fellow research and Extension institutions, and support organizations. We seek input in the initial planning and execution phases of our programs from federal, state, regional, and local governments and agencies, as well as advisory committees and friends groups, commodity groups, and special interest groups.

Informal, one-on-one, or small group interactions with research and Extension personnel will be the dominant means of garnering input. This personal, face-to-face time provides high quality input. Stakeholder input is also gathered at large events, such as our annual Farm

Science Review, and at state and county fairs. OSU Extension faculty and staff have the opportunity to interact with large, diverse groups of people at these venues. Such events are ideal to introduce our organization to those previously unaware of us, and to gather information and feedback from participants (whether established clientele or those just learning about Extension). At many large events, data, such as email addresses, are collected from event participants and the individuals are invited to join an Extension mailing list (which helps to expand our clientele list and maintain contact with individuals across the state).

OSU Extension also employs surveys (primarily electronic) to gather needs assessment data. Other methods of collecting stakeholder input may include telephone interviews, US Mail surveys, and focus groups.

**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
- Other (Business management practices, culture of organization)

**Brief explanation.**

OARDC and OSU Extension are customer-centered; thus, stakeholder input will continue to be sought throughout the 2017-2021 planning period. This strategy is clearly articulated in the CFAES strategic plan that guides research and Extension programs. That plan explicitly calls for stakeholder input at all levels. Formal and informal inputs are required to meet client needs, as well as in fulfilling the land-grant mission. Client needs and their input are critical in the state-level budget process and the Plan of Work for federal base funding.

Input from stakeholders will continue to help build research and Extension programs that are impact oriented, fulfill society's needs, and contribute to national well-being. State, federal, and extramural supporters need to see constituency benefits in order to continue to justify funding decisions. Field-level interactions with stakeholders, in conjunction with sound theory and practice standards, will help to identify the majority of emerging issues. While strong, theoretical academic insight is important, issues related to food, agriculture, and environment most often manifest themselves in field/business locales and in our clients' daily work and social lives. Clients will continue to be true partners with faculty and staff in identifying emerging issues.

Issues and needs originating from producers, processors/manufacturers, distributors, and consumers will continue to direct and redirect both our Extension and research programs. Such issues will provide our scientists with their study questions. Once answered, their responses are framed for clients and other interested parties by OSU Extension in the form of educational programming. The programming will include intervention to effect change (knowledge, behavior, and/or economic/social/environmental/policy) and drive assessments of impact. Impacts will

be periodically reviewed and measured against past program performance. Past performance, in conjunction with factors like program participation rates, will be used to determine the necessity of programming efforts.

Stakeholder input continues to influence how our institution positions itself in the marketplace and conducts business. As a public institution, it is imperative for society to see that our organizational activities reflect their aspirations and meet their needs.

Input will be considered at many levels of the organization. The administrative cabinet of OSU Extension will review input from surveys and strategic planning processes to determine funding and staffing needs. The state Extension advisory committee will continue to meet 3-4 times a year to provide input on programmatic needs and proposed priorities. Extension administrators (Director, Associate Director) and others with statewide program leadership responsibility will continue utilizing a departmental accountability process with all CFAES departments receiving Extension funding. This process involves meetings to discuss shared priorities, surveys of internal and external stakeholders about their satisfaction with the content and expertise delivered from that unit, and review of documented impacts. This process is directly linked to annual funding for the CFAES departments. Locally, Extension advisory committees and other programmatic committees will continue to assist educators in prioritizing programs annually. They will review information about local needs, evaluate the capacity of Extension to deliver programs, and guide the overall local programmatic vision. The OARDC advisory committee also meets 3-4 times annually and is equally as engaged in all aspects of our operation from budgeting to agenda setting. Meaningful stakeholder engagement will continue to be a key to our success in fulfilling our mission.

# V. Planned Program Table of Content

## V(A). Planned Program (Summary)

**Program # 1**

**1. Name of the Planned Program**

Climate Change

**2. Brief summary about Planned Program**

An understanding of the current and potential impacts of climate change is a basic requirement for delivering to society a secure supply of food, fiber, and other associated products and related services. Anthropogenic and naturally occurring effects on the climate have the potential to threaten that secure supply chain. Climate change will also continue to threaten sustainable ecosystems well beyond the 2017-2021 planning period.

CFAES has climate-related centers within academic departments, such as the Carbon Management and Sequestration Center in the School of Environment and Natural Resources, which is focused on the role of carbon sequestration as a means to enhance soil quality and reduce atmospheric carbon. Related programs are involved with collecting data on carbon, nitrogen, and water movement, as well as evaluating the impact of cover crops on nitrogen fertilization requirements in corn rotations.

Finally, Ohio State, along with Michigan State University, is a participant in the USDA-Agricultural Research Service (ARS) Midwest Climate Hub discussion on priorities impacting specialty crop production. The Climate Hub program was established in 2014 to assemble research on climate changes in different areas of the U.S., Midwest production systems, and soil and water resource vulnerabilities. This science-based information provides the foundation for development of decision support tools and information resources to assist farmers, crop advisors and other land managers. The Midwest Climate Hub is also engaged in building collaborative public and private partnerships to increase climate resilient systems for agriculture.

OSU Extension will provide parallel programs in this planned program to advance knowledge, promote adoption and change, and develop human capital. OARDC and OSU Extension faculty and staff will engage in appropriate levels of outreach and consultation, with both internal and external stakeholders.

**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 |
|---|---|---|---|---|---|
| 132 | Weather and Climate | 70% | | 25% | |
| 133 | Pollution Prevention and Mitigation | 20% | | 65% | |
| 605 | Natural Resource and Environmental Economics | 10% | | 10% | |
| | **Total** | 100% | | 100% | |

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

### 1. Situation and priorities

Climate change is a global problem, but a specific subset of its challenges are already affecting the Great Lakes Region, and will likely continue to affect the region for some time. For example, excessive winter and spring moisture increases runoff into tributaries of Lake Erie resulting in accumulations of additional silt, phosphorus and other nutrients. Climate change can affect the safety of drinking water; increase the number and/or severity of droughts and floods; cause a decrease in crop and timber yield over time, and impact the migration of both native and invasive species.

The research by agricultural experiment stations and companion Extension programs are mandatory to meet domestic demands to reduce and/or mitigate the impacts of climate change. Such research directly supports OARDC and OSU Extension's broader goals of production efficiency, economic viability, environmental stewardship, and social acceptability of technologies and products introduced. OARDC and OSU Extension address direct needs of all their constituency groups by regularly interacting with them, and by understanding and assessing their needs. The results of assessments and interactions with constituency groups inform future priorities, goals, and program direction.

### 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

Climate change research is a client-oriented program designed to meet society's needs for information and solutions. Given the political nature of this topic and, at times, the conflicting results from multiple

predictive models, an unbiased research and Extension program is essential. As we address problems and needs within our stakeholder communities, the organization becomes better prepared to take advantage of emerging opportunities and more rapidly address problems within these areas.

Other key assumptions are:

- The issues within this program have been identified by our stakeholder business partners, and/or via a growing body of scientific literature;
- The identified issues reflect the priorities of stakeholders, and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on the associated research is key to present and future decision-making in the face of climate change;
- All citizens directly benefit from this program;
- The effort is supported by an advanced research and Extension program;
- Research and Extension education in this program are demanded by society and required to meet current and future needs of society.

It is further assumed that base federal funding will continue to be available to support climate change research and the scientific staff members who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be leveraged to attract state and extramural funds.

**2. Ultimate goal(s) of this Program**

OSU Extension and OARDC's ultimate goal for this program is to develop an agricultural system that maintains high productivity in the face of climate change. This planned program is designed to contribute to biological, chemical, physical, engineering, economic, and social research that will inform the process to build a sustainable production system that is resilient to the risks created by climate change. OSU Extension and OARDC, through the creation of partnership networks that involve stakeholders, will continue to meet society's growing demand for science based answers to climate change related to food, agricultural, and environmental sciences enterprises.

## 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 | 2.0 | 0.0 | 1.0 | 0.0 |
| 2018 | 2.0 | 0.0 | 1.0 | 0.0 |
| 2019 | 2.0 | 0.0 | 1.0 | 0.0 |
| 2020 | 2.0 | 0.0 | 1.0 | 0.0 |
| 2021 | 2.0 | 0.0 | 1.0 | 0.0 |

## V(F). Planned Program (Activity)

**1. Activity for the Program**

• Translational/applied climate change research;
• Laboratories, pilot plants, a feedstock processing plant, greenhouses, and research plots and stations will all be used for relevant experiments;
• Infrastructure and facilities will be improved over time as program needs warrant;
• Educational programming offered;
• One-on-one consultations;
• Webinars.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Other 1 (webinar) | ● Web sites other than eXtension<br>● Other 1 (webinar archives) |

**3. Description of targeted audience**

Targeted audiences in the Climate Change planned program include, but are not limited to:

• Businesses and industries that have expressed a need for climate change information that resulted from new research, extracted from on-going research, or mined from the scientific literature;
• Fellow academic units that partner with program scientists to create systems and processes needed to support research and the adoption of the research findings by industrial partners;
• Ag producers and farmers;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers for embedding it into other groups to encourage change;
• Populations who have not requested the information but will likely benefit from that information;
• Other scientists and scientific groups;
• Political entities;
• Other education, outreach, and extension personnel;
• Students from elementary school to post doctorate studies;
• News organizations.

## 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 participants attending educational programs
- number of webinars / online educational and research sessions
- number of acres impacted as a result of educational events on the management of natural resources
- number of individuals receiving one-on-one consultation or assistance
- number of people completing non-formal educational events on water quality and quality of surface water and groundwater supplies (OSUE)

☑ 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 | Create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change (OARDC) |
| 2 | Proportion of climate webinar participants who indicate they have learned new information and would share their new knowledge with others (OSUE) |
| 3 | Advance knowledge of how climate change affects crops, including wildlife (OARDC) |

**Outcome #** 1

**1. Outcome Target**

Create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change (OARDC)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Proportion of climate webinar participants who indicate they have learned new information and would share their new knowledge with others (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 132 - Weather and Climate

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 3

**1. Outcome Target**

Advance knowledge of how climate change affects crops, including wildlife (OARDC)

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 132 - Weather and Climate

**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 Public priorities
- Competing Programmatic Challenges
- Other (Social Acceptance of the issue)

**Description**

Climate change is a multi-dimensional, political, and socially debated topic; thus, a shift in any or all of these factors can affect outcomes. Climatic extremes, coupled with the migration of pests and diseases that are often climate related, can impact outcomes. As the food, fiber, and environmental economies adjust to global climate change, including flood and weather patterns that are highly inconsistent with the norm, there will be other confounding changes in public policy, environmental regulations, demand for action/inaction, new predictive models, and a lack of worldwide consensus on how to respond/react/lead. Evaluation can lessen the burden of these uncertainties by seeking feedback throughout the life of the program. Internal factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, availability of competitive funds, and programmatic demands that often exceed resources, all may affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC has developed and incorporated protocols for documenting success in achieving goals as an integral part of the approval and funding process for this planned program. Each department, center, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC advisory committee that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support

we receive from other federal agencies;
• Accountability measures required by extramural grants and contracts and our level of attainment of those required metrics;
• Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty member's impact statements;

For this planned program, OSUE will use the following evaluation methods:

- Pre-post;
- Retrospective;
- Exit slips;
- Case studies;
- Electronic and mail surveys;

## V(A). Planned Program (Summary)

**Program # 2**

**1. Name of the Planned Program**

Sustainable Energy

**2. Brief summary about Planned Program**

Non-renewable energy is still a primary factor affecting the United States economy, and consumers remain highly dependent on fluctuating crude oil imports to supplement domestic sources for the creation of energy and other petroleum-based products. OARDC, OSU Extension, and multiple partners are exploring new opportunities for adding value to bio-based products beyond traditional food and fiber markets. These efforts include the development of sustainable energy alternatives, as well as the commercialization of new products and advanced materials. Educating the public on renewable energy alternatives and the value of bio-based products is also a critical activity.

With OSU's focus on three University-wide Discovery Themes (Health and Wellness; Energy and Environment; and Food Production and Security), OARDC's research priorities will expand in these areas for the 2017-2021 planning period. One such project that addresses multiple issues of sustainability within these themes is OARDC's bioenergy crop research. A variety of grasses, shrubs and trees, known as "bioenergy crops" are being grown and analyzed for their adaptability to different regions of the state, their biomass yield, and their potential to become value-added crops for farmers.

The sustainable energy plan of work for Extension is centered on the 'Energize Ohio' renewable energy curriculum. 'Energize Ohio,' an Ohio State University Extension signature program, provides non-biased, research-based information to address critical energy issues impacting Ohioans. The program is designed to enhance community leaders' and local residents' knowledge of energy drivers in order to promote best practices and informed decision-making on the implementation of sustainable energy strategies in Ohio's communities, businesses, and farms. Renewable energy topics currently addressed include large-scale renewable energy development, youth renewable energy education, on-farm renewable energy, and distributed renewable energy development.

**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 |
|---|---|---|---|---|---|
| 511 | New and Improved Non-Food Products and Processes | 30% | | 90% | |
| 608 | Community Resource Planning and Development | 70% | | 10% | |
| | **Total** | 100% | | 100% | |

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

### 1. Situation and priorities

Renewable energy accounted for 6.2% of U.S. electricity generation in 2013. Since 2000, total renewable energy consumption in the United States has increased by 58%. Between 2014 and 2016, the Energy Information Administration (EIA) expects continued growth in both utility-scale wind and solar power generation. Utility-scale solar capacity is expected to increase by more than 60% or 6 gigawatts, and utility-scale wind capacity is expected to increase by 16%, representing 15 gigawatts of new capacity. Homeowners, farm owners/operators, and business owners are increasingly seeking out safe, economic energy generation alternatives. This 2017-2021 planning period will also see the growth of research and Extension programs related to Ohio generated shale oil and gas.

OARDC and OSU Extension's role is to inform the process. This line of research by agricultural experiment stations and companion Extension programs nationwide is mandatory to meet domestic demand for new and innovative sources of sustainable energy. Such research directly supports OARDC and OSU Extension's broader goals of production efficiency, economic viability, environmental stewardship, and social acceptability of technologies and products introduced. OSU Extension and OARDC address direct needs of all their constituency groups by regularly interacting with them and understanding their needs.

Bio-based substitutes for petroleum products are increasingly in demand as consumers become more conscious of the environmental consequences of fossil fuel consumption. Scientists working in bio-based (advanced materials) products have formed strong partnerships with industry to ensure that research results are translated into the development of commercial products and processes that are in demand by consumer groups. Job growth is also very important. Without a growing body of knowledge in this area to create plentiful supplies of sustainable energy and advanced materials while creating jobs and new industries, opportunities will be missed and society will not be well served.

With a growing body of literature and a well-developed network of industrial partners, clientele, supporters, and companion agencies and organizations, OSU Extension and OARDC are well positioned to continue to lead positive change in adding sustainable energy and advanced bio-materials research and education.

### 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

Sustainable energy and advanced materials research is a client-oriented program designed to meet society's needs for alternative (advanced) energy and bio-based products in a sustainable manner. As we address problems and needs within our stakeholder communities, the organization becomes better prepared to take advantage of emerging opportunities and to more rapidly address problems within these areas.

The emerging development of shale oil and gas in Ohio will presumably create new demands on OARDC and OSU Extension. Other key assumptions are:

- The issues within this program have been identified by our stakeholders/business partners and other clientele, and/or via a growing body of scientific literature;
- Priorities among stakeholders are important and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on associated research is key to present and future decision-making in developing alternatives for some petroleum-based products;
- All citizens directly benefit from a secure and plentiful supply of non-petroleum based products and processes that this program will generate;
- The program is supported by an advanced research and Extension program and is required for commercialized products to emerge;
- These lines of inquiry are necessary to inform human enterprises;
- Research and Extension education in this program are demanded by society and required to meet current and future needs of society, especially as we move towards energy independence.

It is further assumed that base federal funding will continue to be available and leveraged to support this planned program and the scientific staff who carry out the lines of inquiry noted within the knowledge area for this program. Likewise, it is assumed that federal base funding will be leveraged to attract state and extramural funds.

### 2. Ultimate goal(s) of this Program

Goals for this planned program include:

- Building a system for sustainable energy and advanced materials;
- The creation of partnership networks that involve all stakeholders at appropriate points in the process (value chain);
- Meeting society's growing demand for alternatives to petroleum based products where economic and technological realities warrant;
- Meeting as yet undetermined needs of society as crude oil supplies decline;
- Effectively utilizing the plentiful supply of biomass in Ohio and the region, including waste stream

materials that have conversion potential;
• Effectively utilizing Ohio agriculture's capacity to produce plants that have the desired attributes required by new bio-based industries for manufacturing alternative products.

## 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 | 1.5 | 0.0 | 2.0 | 0.0 |
| 2018 | 1.5 | 0.0 | 2.0 | 0.0 |
| 2019 | 2.0 | 0.0 | 2.0 | 0.0 |
| 2020 | 2.0 | 0.0 | 2.0 | 0.0 |
| 2021 | 2.5 | 0.0 | 1.5 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

Throughout the planning period, research and Extension activities will inform sustainable energy programs. Laboratories for experiments, pilot plants, a feedstock processing plant, greenhouses, and research plots and stations throughout the state will support this program. All functional laboratories and sites will be improved over time as program needs warrant. OSU Extension will provide renewable energy programs to advance knowledge, promote adoption and change, develop human capital, support economic development, and create sustainable energy planning activities. The outreach from community-scale renewable energy education is planned to continue into the future, while new program development is underway for on-farm solar energy applications. OARDC and OSU Extension faculty and staff will engage in appropriate levels of outreach and consultation, with both internal and external stakeholders, to ensure the research has the greatest chance of effecting change within society.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Demonstrations | ● Web sites other than eXtension<br>● Other 1 (Factsheets)<br>● Other 2 (Social media) |

### 3. Description of targeted audience

Targeted audiences include, but are not limited to:

• Businesses, industries, and residents that have expressed a need for sustainable energy and advanced materials information that resulted from new and on-going research, or mined from the scientific literature;
• Other stakeholders, with particular focus on consumers;
• Fellow academic units that partner with program scientists to create systems and processes needed to support research and the adoption of research findings by industrial partners;
• Federal, state and local agencies or support organizations who will not only use the information but will also be brokers for embedding it into other groups to encourage change;
• Populations who have not requested the information but will likely benefit from the knowledge, e.g. community leaders, general public;
• Other scientists and scientific groups;
• Political entities;
• Other education, outreach, and Extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations.

## 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 educational workshops / seminars on "Sustainable Energy" topics (OSUE)
- number of visitor sessions to the "Energize Ohio" website (OSUE)
- number of educational programs focusing on the topic of renewable energy
- number of educational programs focusing on the topic of shale energy

☑ 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 | Annually the program will report, in conjunction with industrial partners, non-proprietary research gains made to the consuming public to garner interest in adoption of new products and processes when released. |
| 2 | By 2018, the program will contribute at least two alternatives to a petroleum-based product or process that meets client needs with an acceptable point of purchase price. |
| 3 | increased understanding of energy alternatives, resources and project support (OSUE) |
| 4 | implement change in energy behavior by workshop participants (OSUE) |
| 5 | complete installation of alternative energy activity (OSUE) |
| 6 | complete plan for community, business, or farm energy activity (OSUE) |
| 7 | The program will build scientist/stakeholder cores to guide/provide biological, chemical, physical, engineering, and social research necessary to create new and improved processes and products commensurate with demand. (OARDC) |

**Outcome #** 1

**1. Outcome Target**

Annually the program will report, in conjunction with industrial partners, non-proprietary research gains made to the consuming public to garner interest in adoption of new products and processes when released.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

By 2018, the program will contribute at least two alternatives to a petroleum-based product or process that meets client needs with an acceptable point of purchase price.

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

increased understanding of energy alternatives, resources and project support (OSUE)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 4

**1. Outcome Target**

implement change in energy behavior by workshop participants (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 5

**1. Outcome Target**

complete installation of alternative energy activity (OSUE)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 6

**1. Outcome Target**

complete plan for community, business, or farm energy activity (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes
- 608 - Community Resource Planning and Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 7

**1. Outcome Target**

The program will build scientist/stakeholder cores to guide/provide biological, chemical, physical, engineering, and social research necessary to create new and improved processes and products commensurate with demand. (OARDC)

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 511 - New and Improved Non-Food Products and Processes
- 608 - Community Resource Planning and Development

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Supply and cost of crude oil)

**Description**

Supply and demand for petroleum products, refining costs, transportation costs/impacts, and shifting projections of world reserves of crude oil and natural gas, as well as U.S. access to these, will likely continue to be critical external factors. New sources of oil and gas from Ohio's oil shales will also continue to be an external factor. Economic shifts, such as the costs of processing equipment or production costs, public policy shifts, new regulations, and changes in demand will impact outcomes.

Product trends, advertising agendas, and public perceptions about regional petroleum reserves, are also external factors that may affect outcomes. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources may affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

### Description of Planned Evaluation Studies

OARDC has developed and incorporated protocols for documenting success in achieving goals as an integral part of the approval and funding process for this planned program. Each department, center, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

- Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
- Feedback from the OARDC advisory committee that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product;
- Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty member's impact statements.

For this planned program, OSUE will use the following evaluation methods:

- Pre-post;
- Retrospective;
- Exit slips;
- Case studies;
- Electronic and mail surveys.

## V(A). Planned Program (Summary)

**Program # 3**

**1. Name of the Planned Program**

Childhood Obesity

**2. Brief summary about Planned Program**

Obesity is a major health concern nationwide, with approximately one third of adults and 17% of children in the U.S. classified as obese (CDC, 2011 data). The health-related costs of obesity in the U.S. are approximately $190 billion annually (2012 data). The food plants and animals we grow, process, and provide for consumption have human health issues associated with them.

While not all the following activities are explicitly reported in this planned program, OSU Extension is addressing the topic of childhood obesity through programs such as 'Choose It! Use It!', 'Simple Suppers', and 'Farm to School.' These programs all have similar aims--teaching children how to make balanced, proportionate, and nutritious choices when eating, and to exercise to help maintain a healthy weight.

This planned program is focused, through research and Extension programming, on reducing threats to human health from obesity. While the program is not large, it is of importance to both the research and Extension portfolios, and is funded by both OARDC and OSU Extension in two colleges. Given that obesity is linked to multiple areas reported throughout this POW, outcomes and impacts affecting obesity will also occur in planned programs other than this one.

**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 |
|---|---|---|---|---|---|
| 702 | Requirements and Function of Nutrients and Other Food Components | 10% | | 90% | |
| 703 | Nutrition Education and Behavior | 60% | | 5% | |
| 724 | Healthy Lifestyle | 30% | | 5% | |
| | **Total** | 100% | | 100% | |

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

**1. Situation and priorities**

Obesity rates for adults have doubled and rates for children have tripled in the last three decades. American society is characterized by environments that promote increased food intake of non-healthful

foods and of physical inactivity according to the U.S. Center for Disease Control (CDC). More than one third of U.S. adults and 17% of U.S. children, or over 72 million people, are obese. Obesity rates among all groups in society, irrespective of age, sex, race, ethnicity, socioeconomic status, education level, or geographic region, have increased markedly according to the CDC.

While obesity affects all populations in the U.S., according to the CDC, the under-served are most impacted, with African-Americans having 51% higher prevalence of obesity when compared to Caucasians, and Hispanics had 21% higher obesity prevalence than non-Hispanic Caucasians. Obesity has physical, psychological, and social consequences in both adults and children. Obesity is related to diabetes and psychological problems such as poor self-esteem. Children and adolescents are developing obesity-related diseases, such as type 2 diabetes, that were once seen only in adults. Obese children are more likely to have risk factors for cardiovascular disease, including high cholesterol levels, high blood pressure, and abnormal glucose tolerance according to the CDC. One study of 5 to 17 year olds found that 70% of obese children had at least one risk factor for cardiovascular disease and 39% of obese children had at least two risk factors.

Obesity is a major economic burden on the U.S. health care system. In 2012, obesity-related health care costs, reported in the Journal of Health Economics, totaled an estimated $190 billion, or 21% of annual medical spending in the United States.

OSU Extension will continue to offer programs such as 'Choose It! Use It!' and 'Simple Suppers,' which teach children how to make wise food choices, or how to help prepare healthy meals at home with family. Additionally, OSU Extension will continue to be involved in the Farm to School initiative, which aims to bring healthy, locally grown food to school cafeterias. There are currently slightly more than a quarter of Ohio school districts participating in the initiative; OSUE aspires to increase that value during the 2017-2021 planning period.

OARDC and OSUE will continue to monitor research on childhood obesity rates and causes, as well as obtain feedback from stakeholders, the community, and advisory groups for defining local needs related to 'childhood obesity' programming.

Research can provide science-based solutions for healthier foods and lifestyles, and Extension education can help individuals adopt healthy eating and physical activity behaviors that are the keys to preventing obesity.

### 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

Throughout this planning period, OSU Extension and OARDC will continue to support client-oriented research and Extension activities related to obesity. As we address problems and needs within our stakeholder communities, the organization becomes better prepared to take advantage of emerging opportunities or to more rapidly address problems related to obesity. Key assumptions are:

- The issues within this program that have been identified by our stakeholder communities, and/or via the scientific literature, reflect society's more important issues, and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on the associated research and Extension programs is key to present and future decision-making regarding obesity;
- All citizens directly benefit from a healthy lifestyle supported by an advanced research and Extension program;
- Obesity-related research and Extension education are demands by society to meet current and future needs.

Likewise, it is assumed that federal base funding will be leveraged for continuing to attract state and extramural funds.

**2. Ultimate goal(s) of this Program**

The ultimate goal of 'Childhood Obesity' related programming is to conduct research, which can be translated into public education programming. The end product of the research and programming will be well-informed individuals who can make sound decisions about their health and well-being.

## 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 | 9.0 | 0.0 | 0.5 | 0.0 |
| 2018 | 9.0 | 0.0 | 0.5 | 0.0 |
| 2019 | 9.0 | 0.0 | 0.5 | 0.0 |
| 2020 | 10.0 | 0.0 | 0.5 | 0.0 |
| 2021 | 10.0 | 0.0 | 0.5 | 0.0 |

## V(F). Planned Program (Activity)

**1. Activity for the Program**

Obesity research includes food science, plant sciences, and consumer research related to human health and obesity. Parallel Extension programs that address health and wellness, life styles, and consumer choice are included in this planned program as well. Given the complex nature of obesity as a subject, the area is broadly supported in scientific areas ranging from genetics for breeding plants and animals that can be processed into healthier food products, to education of school children about eating healthy. Thus, not all impacts relating to obesity are found in this planned program. OARDC and OSU Extension advance programs that ensure nutritious foods are affordable and available, and provide guidance so that individuals and families are able to make informed, science-based decisions about their health and well-

being.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters<br>● Web sites other than eXtension |

**3. Description of targeted audience**

Related research and Extension information will be derived through new and on-going research or will be extracted from the scientific literature. Within the 'Childhood Obesity' planned program, such research will be shared with targeted audiences including, but not limited to:

• Business, industry, and residents that have expressed a need for information that resulted from new research, extracted from on-going research, or mined from scientific literature;
• Other stakeholders, with particular focus on consumers;
• Fellow academic units that partner with program scientists to create systems and processes needed to support research and the adoption of research findings by industrial partners;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers for embedding it into other groups to encourage change;
• Populations who have not requested the information but will likely benefit from the knowledge, e.g. community leaders, general public;
• Other scientists and scientific groups;
• Political entities;
• Other education, outreach, and Extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations;
• Businesses concerned about obesity in their workforce;
• Industry groups or producers of foods and food additives that can help reduce obesity and its side effects.

## 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 educational sessions held

- number of participants attending educational events related to 'Childhood Obesity' that can be defined as under-served (i.e. individuals whose needs have not been addressed in past events)

☑ 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 | To better understand human decision making; specifically with reference to how individuals make food consumption decisions. |
| 2 | Apply new knowledge to programs at the field level with a goal of significant long term weight loss and overall improvement of health in those who participate. |
| 3 | To identify research activities such as new data sources, improved techniques for data analysis, and improved hypotheses for obesity research questions. |
| 4 | Number of participants who learned new information from this program. (OSUE) |
| 5 | Number of participants who plan to increase their level of daily physical activity. (OSUE) |
| 6 | Number of participants who plan to increase their consumption of fruits and vegetables (OSUE) |
| 7 | number of participants in this event / project who actually adopted one or more recommended nutritional practices that reduce the risk of chronic disease (OSUE) |

**Outcome #** 1

**1. Outcome Target**

To better understand human decision making; specifically with reference to how individuals make food consumption decisions.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Apply new knowledge to programs at the field level with  a goal of significant long term weight loss and overall improvement of health in those who participate.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

**Outcome #** 3

**1. Outcome Target**

To identify research activities such as new data sources, improved techniques for data analysis, and improved hypotheses for obesity research questions.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Number of participants who learned new information from this program. (OSUE)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 5

**1. Outcome Target**

Number of participants who plan to increase their level of daily physical activity. (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 6

**1. Outcome Target**

Number of participants who plan to increase their consumption of fruits and vegetables (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 7

**1. Outcome Target**

number of participants in this event / project who actually adopted one or more recommended nutritional practices that reduce the risk of chronic disease (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**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
- Government Regulations
- Competing Public priorities

- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Support in schools for programs )

**Description**

Obesity is a complex topic to address in that it encompasses a range of variables, including food quality, socio-emotional elements, access to healthy foods, economics, and the decisions of individuals in food choice. Shifts in these variables impact all aspects of people's lives--psychologically, socially, and physically.

Within this program area, public monies and fluctuations in appropriations have dramatic (both positive and negative) effects on human well-being, as do levels of government support for obesity education. Likewise, public policy and the public's priorities and perceptions, as influenced by popular culture and trends, are major external factors impacting this program, as well as food and lifestyle choices made by individuals. The level of importance placed on social science research impacts our ability to compete for limited dollars, and thus impacts the extent to which research can be carried out. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources can affect outcomes.

Other factors such as population changes, including migrant and immigrant populations entering the community and workforce, may result in groups that are ill-prepared to sustain themselves to the extent they can purchase healthy foods and/or have access to public education/assistance programs that promote healthy eating and lifestyle choices.

Learning styles and disabilities, background education, social status, and cultural variables affect individual and family eating habits and lifestyle choices. These variables can affect how one learns and adapts, often making change a slow process.

OSU Extension and OARDC are committed to working in this complex program throughout 2017-2021.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC has developed and incorporated protocols for documenting success in achieving goals as an integral part of the approval and funding process for this planned program. Each department, center, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC advisory committee that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
• Accountability measures required by extramural grants and contracts and our level of attainment of

those required metrics;
• Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty member's impact statements.

For this planned program, OSUE will use the following evaluation methods:

- Pre-post;
- Retrospective;
- Exit slips;
- Case studies;
- Electronic and mail surveys.

## V(A). Planned Program (Summary)

**Program # 4**

**1. Name of the Planned Program**

Food Safety

**2. Brief summary about Planned Program**

Most research and nearly all education about foodborne illnesses focus on bacteria, such as Salmonella, E. coli, Listeria and Campylobacter. However, viruses (including human norovirus, hepatitis A virus, and rotavirus) account for more than two of three foodborne illnesses worldwide Studies on the role of viruses in foodborne diseases is a new focus of OARDC grants and parallel Extension work reflected in this planning period.

OARDC and OSU Extension lead programs that advance food preservation and protect against pathogens, and will continue to do so throughout this planning period. Food safety is of major concern locally, nationally, and throughout the world. Due to the complexity of food systems, a robust research and Extension program is required to meet societal needs for a safe food supply.

Building upon CFAES' cutting edge capabilities in agricultural and health sciences the Food Industry Center, among other programs, connects a network of research experts with innovative ways to protect the safety of foods here and abroad. This collaborative, multi-disciplinary approach between plant and animal scientists provides a holistic look at food safety. The Center addresses key issues such as food pathogens, effective pasteurization and packaging, and ozone fresh eggs that are free of Salmonella.

OSU Extension has long-standing programs in place to educate the public based on findings from new research, including ServSafe courses (for educating those in the food service industry about safe food handling), home food preservation (canning and freezing), and 'Occasional Quantity Cooks' (to educate those who occasionally need to cook for very large groups of people). As we enter this 2017-2021 planning period, Food Safety is, and will continue to be, a high priority of CFAES research and Extension programming at OSU.

**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 |
|---|---|---|---|---|---|
| 502 | New and Improved Food Products | 0% | | 15% | |
| 703 | Nutrition Education and Behavior | 90% | | 5% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 10% | | 80% | |
| | **Total** | 100% | | 100% | |

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

### 1. Situation and priorities

Food safety programs work to reduce the incidence of foodborne pathogens and to provide a safer food supply by addressing and eliminating the causes of illness. Development of methods to control or eliminate viruses and bacteria that cause foodborne illnesses pre- and post-harvest will result in a safer food supply and maintain consumer confidence in our food production and processing capabilities. A safe food supply is central to the security of all nations and is central to advancing world peace. Without a safe food supply, individual rights, sound governments, and economic stability and security will be threatened worldwide, as will be the natural environment that provides for sustainable food systems.

Throughout the planning period, OARDC and OSU Extension will continue to evaluate current programming and research endeavors via assessments, feedback from advisory committees, and other stakeholders.

### 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

A client-oriented research and development program in food safety is critical to meeting society's needs. As we address food safety problems and needs within our stakeholder communities, our organization becomes better prepared to take advantage of emerging opportunities and to more rapidly address problems within these areas.

The issues within this program have been identified by our stakeholder communities, and/or via the scientific literature. The understanding of this planned program and how society utilizes and depends on the associated research is key to present and future decision-making related to providing safe food domestically and worldwide. All citizens directly benefit from a safe, secure, and plentiful food supply supported by an advanced research and Extension program. We assume that base federal funding will continue to be available, as well as extramural grants to support this planned program and the scientific staff who carry out the lines of inquiry. Likewise, it is assumed that federal base funding will continue to be leveraged to secure state funds.

**2. Ultimate goal(s) of this Program**

The ultimate goal of OARDC and OSU Extension in supporting food safety programming and research is to reduce the incidence of foodborne illness and provide a safer food supply.

## 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 | 4.0 | 0.0 | 1.5 | 0.0 |
| 2018 | 4.0 | 0.0 | 1.5 | 0.0 |
| 2019 | 4.5 | 0.0 | 1.5 | 0.0 |
| 2020 | 4.5 | 0.0 | 1.5 | 0.0 |
| 2021 | 5.0 | 0.0 | 2.0 | 0.0 |

## V(F). Planned Program (Activity)

**1. Activity for the Program**

OARDC's food safety research for advancing broad food safety goals will include both basic and applied research. Research will range from microbial studies to food processing to packaging for food safety and preservation. Laboratories, pilot plants, farms, and multiple business sites will all be available throughout Ohio to permit data gathering and to continue long-term experiments. All functional laboratories and sites will be improved over time as program needs warrant.

Parallel OSU Extension food safety programs will be developed based on client demand and food safety standards set by both the industry and regulators. Food safety programs to reduce the incidence of foodborne illness and provide a safer food supply by addressing and eliminating causes of contamination will continue to be a primary program goal of OSU Extension and OARDC.

Specific activities of food safety education for consumers will include:

- Conducting food safety education classes;
- Conducting ServSafe classes with food establishment managers and employees;
- Conducting Safe Food Handling for Occasional Quantity Cooks classes with volunteer food preparers;
- Providing research-based information to consumers through various forms of media, including phone

calls, fact sheets, social media, news releases, and web pages.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters<br>● Web sites other than eXtension<br>● Other 1 (webinars)<br>● Other 2 (YouTube videos) |

**3. Description of targeted audience**

Targeted audiences within our food safety program will include, but are not limited to:

• Individuals or groups who have expressed a need for food safety research and Extension information that resulted from new research, extracted from on-going research, or mined from scientific literature;
• Fellow academic units that partner with food scientists to create systems and processes needed to support research and the adoption of research findings by stakeholders;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers for embedding it into other groups to encourage change;
• Populations who have not requested the information but will likely benefit from that information, e.g. persons who engage in home canning of food;
• Other scientists and scientific groups;
• Political entities;
• Students from pre-school to post-doctorate studies;
• News organizations;
• Businesses and industrial groups;
• Food establishment managers (ServSafe manager training; food service employees ServeSafe training);
• Volunteer food preparers (general population) (Occasional Quantity Cook program);
• General consumers (via both formal or informal education).

## 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 educational sessions held
- Individual instruction on food safety through phone calls

☑ 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 | Contribute to the advancement of knowledge about food packaging technologies, e.g. ultrasonic sealing, controlled environment packaging, to the extent that, annually, the risk of contamination due to packaging is reduced measurably. |
| 2 | Expand the knowledge base for contamination detection within packaged foods by developing or refining technologies such as magnetic resonance or infrared spectroscopy that will, within ten years, eliminate the problem. |
| 3 | Reduce food borne pathogens in the food supply chain. |
| 4 | Number of participants who learned new information from this program. (OSUE) |
| 5 | Number of participants who plan to adopt one or more recommended practices. (OSUE) |
| 6 | Reduce health risk by releasing at least one major study every five years demonstrating nutritional health benefits, e.g. carotenoids and cataracts, anthocyanins and colon cancer or as a substitute for artificial dyes (OARDC). |
| 7 | number of ServSafe® Level 1 attendees who indicated they plan to use the information learned in the educational program (OSUE) |
| 8 | Number of ServSafe® Level 2 attendees that answered "Agree" or "Strongly Agree" when presented with the statement, "I am comfortable talking with coworkers about increasing the safety of food in my establishment." (OSUE) |
| 9 | number of 'Food Preservation' participants who indicated that they will follow current OSUE and USDA canning and freezing recommendations after attending an educational event (OSUE) |
| 10 | number of participants who gained knowledge from Good Agricultural Practices educational events |

**Outcome #** 1

**1. Outcome Target**

Contribute to the advancement of knowledge about food packaging technologies, e.g. ultrasonic sealing, controlled environment packaging, to the extent that, annually, the risk of contamination due to packaging is reduced measurably.

**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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Expand the knowledge base for contamination detection within packaged foods by developing or refining technologies such as magnetic resonance or infrared spectroscopy that will, within ten years, eliminate the problem.

**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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Reduce food borne pathogens in the food supply chain.

**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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Number of participants who learned new information from this program. (OSUE)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 5

**1. Outcome Target**

Number of participants who plan to adopt one or more recommended practices. (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 6

**1. Outcome Target**

Reduce health risk by releasing at least one major study every five years demonstrating nutritional health benefits, e.g. carotenoids and cataracts, anthocyanins and colon cancer or as a substitute for artificial dyes (OARDC).

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 502 - New and Improved Food Products

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 7

**1. Outcome Target**

number of ServSafe® Level 1 attendees who indicated they plan to use the information learned in the educational program (OSUE)

**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

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 8

**1. Outcome Target**

Number of ServSafe® Level 2 attendees that answered "Agree" or "Strongly Agree" when presented with the statement, "I am comfortable talking with coworkers about increasing the safety of food in my establishment." (OSUE)

**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

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 9

**1. Outcome Target**

number of 'Food Preservation' participants who indicated that they will follow current OSUE and USDA canning and freezing recommendations after attending an educational event (OSUE)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 10

**1. Outcome Target**

number of participants who gained knowledge from Good Agricultural Practices educational events

**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

**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
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

- Populations changes (immigration, new cultural groupings, etc.)
- Other (National Security Threats )

**Description**

Food safety can be impacted by physical, chemical, biological, social, economic, and environmental factors. Weather extremes, for example, can affect food safety to the extent that the growth and dispersion of pests and pathogens are often weather related. Climatic changes may also impact the quantity and quality of food supplied as well as the timely distribution of food before contamination becomes an issue. Economics related to the cost of production and processing, public policy shifts, regulatory factors, and changes in demand may impact outcomes. Food trends, food advertising agendas, new biological and chemical threats, and public health-related issues are also external factors that may affect outcomes. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources may also affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC has developed and incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process for this planned program. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC advisory committee that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
• Accountability measures required by extramural grants and contracts and our level of attainment of those required metrics;
• Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty member's impact statements.

For this planned program, OSUE will use the following evaluation methods:

- Pre-post;
- Retrospective;
- Exit slips;
- Case studies;
- Electronic and mail surveys.

## V(A). Planned Program (Summary)

**Program # 5**

### 1. Name of the Planned Program

Global Food Security and Hunger

### 2. Brief summary about Planned Program

Global food security will continue to be a high priority item across our nation and the world. With a world population of 6.7 billion--projected to grow to more than 9 billion by 2040--sustaining growth in food production is of singular importance. Every day more than 860 million people go hungry worldwide. In Ohio alone, about 16% of households are experiencing low food security--that's about one in seven of our neighbors who are, on a regular basis, wondering where their next meal is coming from.

This global problem demands collective action. The Ohio State University President Dr. Michael V. Drake has established a "2020 Vision" plan for the next four years. A major goal of this plan is to re-envision our land-grant role in the modern light of the 21st century. OSU is prioritizing $15 million in new faculty hiring across the university to address food security, bringing Ohio State's commitment to this issue to almost $125 million in the next decade. In addition, the inaugural "Buckeye Summit" will convene in April 2016 and focus on food security - engaging hundreds of alumni, community leaders, faculty, staff and students for change.

Changing this trajectory will require a broad set of solutions, and Ohio's agricultural community stands ready to play a key role. There are opportunities to develop new markets, discover new opportunities for producers, diversify crop production, and participate in markets for high value crops. Food deserts are not limited to inner cities, but are also found in Ohio's most rural areas. The benefits of finding solutions to the food insecurity problem are extensive--from improved health and nutrition to job creation and economic advancement.

Due to the complexity of food systems, a robust research and Extension program is required to meet societal needs for a secure food supply and reduce hunger worldwide. OARDC and OSU Extension recognize that global food security is also a local issue, as reflected by specialists who study maximizing fruit and vegetable production in limited spaces; that is, comparing methods of urban farming in empty, abandoned parking lots, in giant-sized pots, in raised beds on top of blacktop, and in trenches cut right through pavement. Findings from such studies will serve as foundations for improved human nutrition and health in urban environments and such environments will continue to be a major focal area for OARDC and OSU Extension.

Additionally, it is important that the college not only have the ability to interpret large data sets, but also understand how to use the findings in educational programs that benefit producers and consumers. Farmers rely on data to make decisions-we know, for example, that there are significant data that can help them solve the water quality problems in Ohio; we know that there are data that will help everyone understand food deserts; and we know that there are data to help inform how young people best learn. The challenge is to have the means not only to collect these data, but also to interpret them to make informed decisions and develop educational programs based on the findings.

As cancer and heart concerns grow, and as obesity continues as a national problem, each incremental improvement we make in nutrition will have a major impact on society. OARDC research and OSU Extension programs will continue to address how to make food safer by providing expertise to medical researchers and food companies on how to protect food from pathogens, more functional by including or eliminating components that impact human health, and more available by lengthening shelf life. OARDC

and OSU Extension staff will continue to work diligently throughout this planning period to move this new knowledge into businesses, industries, and homes, both in the U.S. and abroad.

**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 |
|---|---|---|---|---|---|
| 501 | New and Improved Food Processing Technologies | 0% | | 20% | |
| 503 | Quality Maintenance in Storing and Marketing Food Products | 20% | | 10% | |
| 701 | Nutrient Composition of Food | 0% | | 10% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 20% | | 15% | |
| 703 | Nutrition Education and Behavior | 20% | | 5% | |
| 704 | Nutrition and Hunger in the Population | 0% | | 15% | |
| 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 | 40% | | 15% | |
| | **Total** | 100% | | 100% | |

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

### 1. Situation and priorities

As world population continues to increase, demand for quality food products will likewise increase. Advanced studies in systems related to food security are critical to providing a sustained and secure flow of food in the producer - processor - distributor - consumer chain. Assuring that all interests are informed by the best food science available is an expectation of OARDC and OSU Extension. Research by agricultural experiment stations and companion Extension programs is essential to meet domestic and global food demands. This planned program directly supports OARDC and OSU Extension's broader goals of production efficiency, economic viability, environmental stewardship, and social acceptability of technologies and products introduced.

OARDC and OSU Extension address the direct needs of all their constituency groups by regularly interacting with them to understand their requirements. OSU scientists also network with other research and extension units, and with organized groups of producers, processors, distributors, and consumers. Demand for their expertise, methods, and products is high. Without a growing body of knowledge in this

area to create plentiful, high quality, and secure global food systems, opportunities will be missed and society will not be well served. With a sound body of literature, and a well-developed network of industrial partners, clientele, supporters, and companion agencies and organizations, OSU Extension and OARDC are well positioned to create positive change in the science and services essential to sustained food security.

Effective research in food security requires modern laboratories, access to the facilities of industrial partners, and interactions with consumers who are the ultimate evaluators of proposed outcomes. Faculty and staff in this program must provide the knowledge and technologies needed by stakeholders to inform production, processing, distribution, and consumer choices. OSU Extension has the capacity and expertise to promote knowledge acquisition, advance the adoption of new techniques, support new approaches for achieving global food security, and assist with the development of required skills and human capital.

### 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

A client-oriented research, Extension, and development program in food security and hunger is critical to meeting society's demands in this area.  As we continue to address problems and needs within our stakeholder communities, the organization will become better prepared to take advantage of emerging opportunities and to more rapidly address problems within these areas.

Other key assumptions are:

- World hunger is expected to increase with global population;
- The issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on associated research is key to present and future decision-making for the provisioning of food both domestically and worldwide;
- All citizens directly benefit from a safe, secure, and plentiful food supply supported by an advanced research and Extension program;
- Lines of inquiry will provide necessary knowledge to inform human enterprises;
- Food systems research and education are demanded by society and are necessary to meet current and future needs.

It is further assumed that base federal funding will continue to be available and successfully leveraged for extramural grants to support this planned program and the scientific staff who carry out its lines of inquiry.

Likewise, it is assumed that federal base funding will be leveraged to attract state funds.

### 2. Ultimate goal(s) of this Program

Food security research and Extension programs will, in cooperation with other parallel areas:

- Advance the study and improvement of the quality, functionality, and preparation/preservation of food, (including relevant methodologies, techniques, and processes);
- Provide the necessary research and Extension programs to improve and develop new foods, advance research frontiers in food quality, and contribute to the understanding and development of functional foods, including pharmaceutical-grade nutrients.

Research and Extension will grow fundamental knowledge about human nutritional requirements to foster human health, fight hunger, and better understand the relationship between foods consumed and physical and psychological impacts.

## 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 | 5.0 | 0.0 | 4.0 | 0.0 |
| 2018 | 5.0 | 0.0 | 4.0 | 0.0 |
| 2019 | 5.5 | 0.0 | 4.0 | 0.0 |
| 2020 | 5.5 | 0.0 | 4.0 | 0.0 |
| 2021 | 6.0 | 0.0 | 4.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

This planned program will advance broad global food security goals and will include both basic and applied research with associated outreach and Extension programs. Research will include microbial studies, packaging and shelf life, food taste tests, and analyses of consumer preferences and behavior. Laboratories, pilot plants, farms, and multiple business sites will be available throughout Ohio to permit data gathering and to continue long-term experiments. All functional laboratories and sites will be improved over time as program needs warrant. Extension will continue to have the capacity to advance knowledge acquisition, promote adoption strategies, and help build human capital to promote global food security and reduce hunger worldwide. OARDC and OSU Extension faculty and staff will engage in appropriate levels of outreach, engagement, and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Demonstrations<br>● Other 1 (field days)<br>● Other 2 (conferences) | ● Newsletters<br>● TV Media Programs<br>● Web sites other than eXtension<br>● Other 1 (newspaper articles)<br>● Other 2 (trade and commodity magazines) |

**3. Description of targeted audience**

Targeted audiences for global food security research and extension include, but are not limited to:

• Individuals or groups who have expressed a need for food-related information that resulted from new research, extracted from on-going research, or mined from scientific literature;
• Fellow academic units that partner with food scientists to create systems and processes needed to support research and the adoption of research findings by stakeholders;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers for embedding the information into other groups to encourage change;
• Populations who have not requested the information but will likely benefit from that information, e.g. persons who engage in home canning of food;
• Other scientists and scientific groups;
• Political entities;
• Other extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations;
• Business and industrial groups.

## 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**

- total number of participants attending educational programs of one teaching hour or more on food security (Quality Assurance, Plant / Animal Healthy System Management, Local Foods, Farm to School, Marketing, etc) (OSUE)
- Total number of workshops offered to producers and agribusiness leaders on topics related to global food security and hunger (OSUE)
- Total number of volunteers and participants in the planning and implementation of events related to global food security and hunger (OSUE)
- number of food animal producers that completed 'Livestock Mortality Composting' training (OSUE)
- number of participants in 'Local Foods' related events (OSUE)
- number of new garden sites (OSUE)
- number of youth participating in 'Assuring Quality Care for Animals' educational programming (OSUE)
- number of Local Foods-related educational events (OSUE)

☑ 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 | Advance processing techniques, e.g. electrostatic coating, to achieve the desired traits requested by industrial partners, that are manifested in consumer demand studies, or that are novel technologies that may meet latent needs. |
| 2 | Processing technology research will improve and optimize equipment and processing of food in such manner as meet consumer demand as or before that demand emerges. |
| 3 | Advance and document improvements in quality and quantity of food stocks to meet global food security and hunger goals. |
| 4 | Participate in the creation of a standardized model and protocols for studying functional foods for the purpose of providing consumers with more informed functional choices that are currently available (OARDC). |
| 5 | Reduce through research and development the negative processing impacts on physio-chemical or molecular properties of food within varying parameters to make foods more acceptable and higher quality commensurate with demand. (OARDC) |
| 6 | number of individuals who received certification to conduct livestock mortality composting on their farm |
| 7 | number of youth participants who increased their knowledge of producing quality and safe animal products for consumers through responsible animal handling, care, and welfare (OSUE: Assuring Quality Care for Animals) |
| 8 | number of teens trained to be leaders in Local Foods awareness with their peers |
| 9 | number of individuals experiencing increased awareness of local foods issues |

**Outcome #** 1

**1. Outcome Target**

Advance processing techniques, e.g. electrostatic coating, to achieve the desired traits requested by industrial partners, that are manifested in consumer demand studies, or that are novel technologies that may meet latent needs.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 501 - New and Improved Food Processing Technologies
- 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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Processing technology research will improve and optimize equipment and processing of food in such manner as meet consumer demand as or before that demand emerges.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 501 - New and Improved Food Processing Technologies
- 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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Advance and document improvements in quality and quantity of food stocks to meet global food security and hunger goals.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 501 - New and Improved Food Processing Technologies
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 701 - Nutrient Composition of Food
- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior

**4. Associated Institute Type(s)**

- 1862 Extension
- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Participate in the creation of a standardized model and protocols for studying functional foods for the purpose of providing consumers with more informed functional choices that are currently available (OARDC).

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

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

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Reduce through research and development the negative processing impacts on physio-chemical or molecular properties of food within varying parameters to make foods more acceptable and higher quality commensurate with demand. (OARDC)

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 501 - New and Improved Food Processing Technologies

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 6

**1. Outcome Target**

number of individuals who received certification to conduct livestock mortality composting on their farm

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

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

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 7

**1. Outcome Target**

number of youth participants who increased their knowledge of producing quality and safe animal products for consumers through responsible animal handling, care, and welfare (OSUE: Assuring Quality Care for Animals)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 503 - Quality Maintenance in Storing and Marketing Food Products
- 702 - Requirements and Function of Nutrients and Other Food Components

- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 8

**1. Outcome Target**

number of teens trained to be leaders in Local Foods awareness with their peers

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 9

**1. Outcome Target**

number of individuals experiencing increased awareness of local foods issues

**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

**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
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (World conflict and terrorism)

**Description**

Major limitations possibly affecting outcomes include global political conflicts and the costs of supply, distribution, and storage of raw and processed foodstuffs. Production and processing costs, public policy shifts, new and revised regulations, and shifts in demand will also impact outcomes. Food trends, food advertising agendas, new biological and chemical threats, and health-related issues are also external factors that may affect outcomes. In developing countries, the availability of basic technologies and inputs, such as seeds or livestock, fertilizers, irrigation water, labor, and a secure farming environment may be limiting factors. Evaluation can lessen the burden of uncertainty by seeking feedback throughout the life of the program. Factors such as the availability of base funding to ensure a core faculty and staff, the availability of extramural funds, and programmatic demands that often exceed resources could affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC has developed and incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process for this planned program. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC advisory committee that ranges from helping to determine needs of our constituencies to feedback on commercialization of new patented products;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
• Accountability measures required by extramural grants and contracts and our level of attainment of those required metrics;
• Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty member's impact statements.

For this planned program, OSUE will use the following evaluation methods:

- Pre-post;
- Retrospective;
- Exit slips;
- Case studies;
- Electronic and mail surveys.

## V(A). Planned Program (Summary)

**Program # 6**

**1. Name of the Planned Program**

Soil, Air and Water (OARDC Led)

**2. Brief summary about Planned Program**

During this planning period, CFAES and OARDC will continue to support its Field to Faucet (F2F) program to find sustainable solutions for protecting Ohio's water resources from Lake Erie to the Ohio River. Mid- to long-term research programs are needed to provide the science that identifies best nutrient management practices. Our scientists will examine distressed watersheds statewide to discover differences and commonalities among them that provide cause and effect explanations, and we will use those results to develop science-based education through OSU Extension. Another essential investment for long-term success in sustaining a safe water supply is supporting Ohio's youth via 4-H, FFA and other school and community-based programs. Successful educational programs targeting new ideas and practices are essential to establishing an expectation of conscious efforts and best practices to assure safe water for the future.

Understanding the processes and mechanisms by which carbon can be accumulated and stored in soils, wetlands and living plants, is a continuing area of importance to a fuller comprehension of how soil, water and air systems are integrated in the phenomenon of climate change. With such knowledge, it should be possible to proactively develop management systems to better deal with the risks associated with climate change.

Mitigation of negative effects from odors, carbon loading and other related air quality issues is critical to lines of inquiry that are being pursued. Knowledge from these inquiries provides a basis for extending information to help address rural-urban interface conflicts.

**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 |
|---|---|---|---|---|---|
| 101 | Appraisal of Soil Resources | 0% | | 10% | |
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | | 25% | |
| 103 | Management of Saline and Sodic Soils and Salinity | 0% | | 5% | |
| 104 | Protect Soil from Harmful Effects of Natural Elements | 0% | | 10% | |
| 111 | Conservation and Efficient Use of Water | 0% | | 15% | |
| 112 | Watershed Protection and Management | 0% | | 10% | |
| 132 | Weather and Climate | 0% | | 5% | |
| 133 | Pollution Prevention and Mitigation | 0% | | 10% | |
| 141 | Air Resource Protection and Management | 0% | | 10% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

As demand increases for natural resources, greater understanding of conservation and wise use of soil, water, and air resources are crucial. Environmental shifts, such as climate change, can have dramatic effects on these resources. These shifts can lead to unresolved conflicts, all having social, economic, and environmental consequences.

Rural and urban communities use this information to protect their natural resource bases and to address rural-urban interface needs and conflicts. The research and extension education initiatives resulting from this program ensure that resource conflicts are avoided or managed, and that growth and development can occur within reasonable social and environmental bounds. The challenges lie in applying established research to new and emerging issues, such as energy independence. While a number of areas, such as soil microbial ecology and plant nutrition still require extensive laboratory experiments, it is the on-farm and watershed fieldwork, where stakeholders live and work, that provides some of the richest opportunities for researchers and Extension specialists to engage in situational analyses and priority setting.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

This planned program will continue to be a primary focus for OARDC throughout this planning period. The program assumes that by understanding the scientific underpinnings (both basic and applied) of soil, water, and air sciences, independently and collectively, we can address existing and emerging problems and needs within our stakeholder communities.

Key assumptions are:

- The issues within this program that have been identified within our stakeholder communities and/or within the scientific literature reflect the most important societal needs and warrant allocation of resources;
- An understanding of soils, soil-water-air systems, and how society utilizes and depends on soil resources is key to present and future decision-making in managing our food and fiber systems, sustaining environmental services, and mitigating the impacts of global climate change;
- Commodity groups, processors, and consumers depend on a relatively stable climate, and on soil, water, air and associated nutrient research for plant and animal production;
- Research related to water and accessibility of water for plant and animal nutrition, human enterprises, and environmental services is important to society and will be utilized for enhanced decision-making by stakeholders and all citizens;
- Research and education related to conservation of water, and landscape-scale best management practices in water projects, is demanded by society to meet current and future needs;
- Air-related research--as well as air resources (including sequestration of airborne carbon) for plant and animal production, human health, and mitigation of climate change--is a high priority among all sectors within our industry.

It is further assumed that base federal funding will continue to be available to support this planned program and the scientific staff members who carry out the lines of inquiry noted within relevant knowledge. Likewise, it is assumed that federal base funding will continue to be leveraged to attract state and extramural funds.

### 2. Ultimate goal(s) of this Program

- OARDC will extend its Field to Faucet (F2F) initiative to find sustainable solutions that protect Ohio's water resources from Lake Erie to the Ohio River;
- Our scientists will examine distressed watersheds statewide to discover differences and commonalities among them that provide cause and effect explanations, and we will use those results to provide science-based education through OSU Extension;
- We will support Ohio's youth via 4-H, FFA and other school and community-based programs, to engage them in educational programs to learn new ideas and practices, and to establish an expectation of conscious efforts and best practices to assure safe water for their future.

## 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

On-going OARDC research activities in this program area encompass a full range of basic and applied agbioscience. Both laboratory and multiple field sites/research stations are available throughout the state to permit data gathering and to continue long-term experiments, such as the Triplett-van Doren no-till plots established in 1962. On-farm research takes place, including current studies to evaluate the effect of field-scale management practices on phosphorus loss to surface runoff and tile drainage in the Western Lake Erie Basin. National and international studies are also conducted through programs such as OARDC's Carbon Management and Sequestration Center. All functional laboratories and sites controlled by OARDC will continue to be improved over time as program needs and resources warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Group Discussion<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters<br>● Web sites other than eXtension |

### 3. Description of targeted audience

OARDC's targeted audiences for this Planned Program include, but are not limited to:

• Individuals or groups who have expressed a need for certain information that resulted from new or on-going research, or is extracted from the scientific literature. Often these requests are communicated to OARDC by an intermediary such as a staffer at the Ohio Department of Agriculture or a county Extension agent;
• Federal, state or local agencies or support organizations that will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change;
• Populations who have not requested the information but will likely benefit from access, e.g. immigrant populations;
• Other scientists and scientific groups;
• Political entities;

- Extension personnel;
- Students from pre-school to post doctorate studies;
- News organizations;
- Business groups such as chambers of commerce and community coalitions.

## 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 graduate students completed

☑ 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 | Expand watershed and ecosystem level modeling to the extent that scientific data and watershed management protocols can bring all streams effected by agriculture and natural resource runoff into compliance with Ohio EPA standards. |
| 2 | Through the provisioning of watershed specific data, support the creation of and conservation action of community-based watershed networks in each major watershed in Ohio. |
| 3 | Advance the basic knowledge contribution so that Ohio continues to be viewed as a center of excellence in terms of soils and water sciences, and associated Extension programming. |
| 4 | Provide the necessary soil, air, weather/climate, and water research, in conjunction with actions in other planned programs KA (e.g. IPM), to permit continued adoption of conservation tillage practices in the face of problems such as climatic changes, pest, etc. |
| 5 | Provide the necessary research finding (scientific knowledge and techniques) to support stakeholder compliance with Ohio and federal EPA regulations, and future regulations, regarding odors and other air quality issues in ag production and processing. |

**Outcome #** 1

**1. Outcome Target**

Expand watershed and ecosystem level modeling to the extent that scientific data and watershed management protocols can bring all streams effected by agriculture and natural resource runoff into compliance with Ohio EPA standards.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Through the provisioning of watershed specific data, support the creation of and conservation action of community-based watershed networks in each major watershed in Ohio.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Advance the basic knowledge contribution so that Ohio continues to be viewed as a center of

excellence in terms of soils and water sciences, and associated Extension programming.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Provide the necessary soil, air, weather/climate, and water research, in conjunction with actions in other planned programs KA (e.g. IPM), to permit continued adoption of conservation tillage practices in the face of problems such as climatic changes, pest, etc.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 132 - Weather and Climate
- 141 - Air Resource Protection and Management

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Provide the necessary research finding (scientific knowledge and techniques) to support stakeholder compliance with Ohio and federal EPA regulations, and future regulations, regarding odors and other air quality issues in ag production and processing.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (extramural funding)

**Description**

Weather extremes, coupled with the introduction of pests and diseases that are often related outcomes, can impact production systems. As the soil-dependent food, fiber, and environmental economies adjust to the global marketplace, in conjunction with public policy shifts, regulations, and shifts in demand, outcomes are impacted. Evaluation can lessen the burden of uncertainty by seeking feedback

throughout the life of the program. Factors such as the availability of base funding to ensure a core faculty and staff, extramural funding, competitive funding, and programmatic demands exceeding resources, may impact outcomes. Throughout the 2017-2021 period, external factors will continue to expand, such as the recent shale oil and gas-drilling program that could have environmental implications for soil, air, and water resources in Ohio.

## V(K). Planned Program - Planned Evaluation Studies

### Description of Planned Evaluation Studies

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

- Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;

- Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
- Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 7**

**1. Name of the Planned Program**

Natural Resources and Environmental Systems (OARDC Led)

**2. Brief summary about Planned Program**

The natural resources and environmental systems program will continue to be central to the OARDC research mission, with support from OSU Extension, throughout this 2017-2021 planning period. Faculty members working within this planned program create science-based knowledge and foster environmental sustainability by promoting discovery and leadership through a comprehensive approach to better understand and address environmental and natural resource challenges locally, regionally and globally. This program delivers expertise in various aspects of aquatic and water resources, environmental social sciences, forestry, rural sociology, soil science, and wildlife ecology.

Research programs in this planned program focus both on individual components as defined in the selected knowledge areas, and collective community and landscape scale functions. Ohio's landscapes are managed primarily in small tracts under intense population or production pressures. Thus, a continued understanding of the science of managing in such complex landscapes is critical to providing a sound resource base to meet human and wildlife needs, while seeking to protect Ohio's biological diversity, some of which has regional and national importance, e.g. migratory routes for songbirds, hawks, ducks, and geese. The latter two are important to the hunting industry, while songbirds and hawks are important non-game species and contribute to Ohio's tourism industry.

One-third of Ohio's land area is forested. Thus, forest sustainability is an important research area and requires an understanding of biology, silviculture, forest management and modeling, and forest products, both from forest science and horticultural science perspectives. These activities include the conservation of biological diversity through on-site efforts to protect resources, as well as seed bank and germplasm programs.

In partnership with the Ohio Department of Natural Resources and the USDA, and other partners at the federal, state and local levels, OARDC will continue to advance studies in traditional fisheries and wildlife programs for game and non-game programs, as well as conservation biology programs for the protection and restoration of natural systems. Human-wildlife interactions will also be studied. An ever-growing area of advanced/sustainable energy and bio-based products will continue to be highly dependent on the success of this program, especially as a producer of biomass.

**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 |
|---|---|---|---|---|---|
| 121 | Management of Range Resources | 0% | | 5% | |
| 122 | Management and Control of Forest and Range Fires | 0% | | 5% | |
| 123 | Management and Sustainability of Forest Resources | 0% | | 5% | |
| 124 | Urban Forestry | 0% | | 10% | |
| 125 | Agroforestry | 0% | | 10% | |
| 131 | Alternative Uses of Land | 0% | | 10% | |
| 134 | Outdoor Recreation | 0% | | 10% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | | 35% | |
| 136 | Conservation of Biological Diversity | 0% | | 10% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

Society demands sustainable, natural resources-based commodities and environmental services, particularly in terms of forest-related goods and services, and especially in the area of fish and wildlife resources. As transportation costs remain high, the demand for local resource utilization is expected to increase demand for research in this area and companion Extension programming. In a highly urbanized state such as Ohio, OARDC has a heightened obligation to meet this demand and to aid in conserving resources, as well as generating economic return and creating jobs that are directly or indirectly dependent on sustainable resource management practices.

The research generated from this program is important to Ohio citizens and public organizations, especially environmental organizations, hunters, fishers, birdwatchers and hikers. Rural and urban communities use this knowledge to wisely protect and use their natural resource base. All environmental resources are issues of concern from both regulatory and aesthetic points of view.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

Within the planning period, OARDC lines of inquiry will provide necessary information to inform human enterprises while protecting environmental services. This is an important area of study for society, and the outcomes will be utilized for enhanced decision-making by industry, stakeholder agencies, and all citizens. Research and education related to conservation of natural resources, and landscape-scale best management practices, are demanded by society to meet current and future needs.

It is assumed that base federal funding will continue to be available to support work and the scientific staff who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will be leveraged to attract additional state and extramural funds.

### 2. Ultimate goal(s) of this Program

OARDC's goals for this planned program are:

- Advance understanding of forest biology and ecology, knowledge of silvicultural techniques, horticultural techniques, forest systems modeling, outdoor recreation management, and wood manufacturing;
- Expand knowledge of how to use the forest resource base while conserving diversity and expanding environmental services such as clean air and water from forests;
- Support federal, state, and local agendas in seeking to conserve and utilize aquatic and terrestrial wildlife resources in a sustainable manner while managing associated conflicts, such as removal of longstanding dams and the resulting impact on aquatic and land ecosystems;
- Engage in scientific inquiries at the genetic, species, community, and landscape scale levels to investigate biological and physical components, including the influences of human enterprises, for the purpose of meeting wildlife needs in Ohio and the region;
- Study conflicts leading to negative interactions at the human-wildlife interface for the purpose of mitigating negative effects on wildlife populations and on human enterprises, e.g. wildlife depredation and urban-wildlife conflicts;
- Understand the system in such a manner as to inform both on-site (e.g. community, watershed) and landscape scale decisions necessary to meet individual, stakeholder group, and societal needs;
- Support international, national, state and local agendas for advancing natural resources and environmental systems research to insure a sustained flow of goods and services that will meet intergenerational demands.

## 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 | 1.5 | 0.0 |
| 2018 | 0.0 | 0.0 | 1.5 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 2019 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2020 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2021 | 0.0 | 0.0 | 1.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

The natural resources and environmental systems program includes both basic and applied research. Both laboratories and multiple field sites are available throughout the state to permit data gathering and to continue long-term experiments, such as human-wildlife interaction studies. Extensive, in-state research takes place, as do national and international studies, such as those conducted through OARDC's Terrestrial Wildlife Ecology Program. Close working relationships with organizations such as the Ohio Department of Natural Resources and the USDA will continue to greatly enhance program capacity and impacts. For example, cooperative studies have identified small numbers of native ash trees that are resistant to the invasive emerald ash borer, and these trees are now being evaluated as a source of native germplasm for use in breeding programs. All functional laboratories and sites are improved over time as program needs and available resources warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Group Discussion<br>● Demonstrations | ● Newsletters<br>● Web sites other than eXtension |

### 3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to:

• Individuals or groups who have expressed a need for natural resources and environmental research knowledge that resulted from new or on-going research, or is extracted from the scientific literature. Often these requests are communicated to OARDC by an intermediary such as a staffer at USDA, the Ohio Department of Natural Resources, or a county Extension agent;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change, e.g. fish and wildlife clubs;
• Populations who have not requested the information but will likely benefit from access; e.g. people who fish for recreation;
• Other scientists and scientific groups;
• Political entities;
• Extension personnel;
• Students from pre-school to post doctorate studies;

- News organizations;
- Business groups such as Ohio Farm Bureau;
- Community groups such as watershed coalitions.

## 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 graduate students completed

☑ 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 | Increase the scientific understanding necessary to maintain flow of environmental goods and services through conservation actions commensurate with regional demand, i.e. Buffer zones in forest riparian zones, reforestation, CREP, carbon sequestration in forests and grassland biomass, outdoor recreation opportunities, urban forest zones. |
| 2 | Advance research knowledge, both basic and applied, in the areas of silviculture and horticulture to existing and emerging industry and consumer demand regarding forest genetics, forest biology, seed production, nutrition, and related topics. |
| 3 | Meet ODNR, USDA, USDI, local, commodity groups, community, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in aquatic and terrestrial wildlife including human wildlife use/conflicts, and human to human conflicts related to wildlife and use. |
| 4 | To contribute to the theoretical knowledge base within this planned program to ensure that where possible all applied research can be grounded in the best science and evaluation available in all knowledge areas selected. |
| 5 | Improve the biodiversity and utilization of land use in rural and urban environments. |

**Outcome #** 1

**1. Outcome Target**

Increase the scientific understanding necessary to maintain flow of environmental goods and services through conservation actions commensurate with regional demand, i.e. Buffer zones in forest riparian zones, reforestation, CREP, carbon sequestration in forests and grassland biomass, outdoor recreation opportunities, urban forest zones.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Advance research knowledge, both basic and applied, in the areas of silviculture and horticulture to existing and emerging industry and consumer demand regarding forest genetics, forest biology, seed production, nutrition, and related topics.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Meet ODNR, USDA, USDI, local, commodity groups, community, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in aquatic and terrestrial wildlife including human wildlife use/conflicts, and human to human conflicts related to wildlife and use.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 134 - Outdoor Recreation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

To contribute to the theoretical knowledge base within this planned program to ensure that where possible all applied research can be grounded in the best science and evaluation available in all knowledge areas selected.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Improve the biodiversity and utilization of land use in rural and urban environments.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 131 - Alternative Uses of Land
- 136 - Conservation of Biological Diversity

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

External factors affecting outcomes include the following: public policy shifts; new regulations and laws; shifts in demand; weather extremes; pests and diseases; and exotic species, such as the Emerald Ash Borer and Asian long-horned beetle.

Factors such as the availability of state and federal base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources may also affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

- Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
- Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
- Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 8**

**1. Name of the Planned Program**

Plants Systems (OARDC Led)

**2. Brief summary about Planned Program**

Faculty members working within the Plant Systems program educate students, professionals and other stakeholders in all aspects of plant disease, plant health management, and entomology, and communicate unbiased information to urban and rural citizens. Part of the unique mission of this planned program is the scientific investigation of environmental and biotic agents that cause plant diseases. In addition, insects are used as model systems to further fundamental understanding of molecular biology, physiology, genetics, ecology and evolution. The knowledge obtained in the pursuit of this mission provides the means to discover, develop, and apply innovative strategies for the environmentally sound and economically viable management of plant diseases and pests.

Plant diseases represent a significant threat to the economic stability of agricultural industries and to quality of life issues for the citizens of Ohio and for people worldwide. Plant diseases are a significant threat to human and animal life, resulting in malnutrition, famine, unsafe food and economic hardships. Programs on plant-microbe interactions, integrated pest management, and plant health management are means of responding to these threats.

OARDC manages six outlying research stations dedicated to production agriculture for field crops, fruits and vegetables. For example, the Northwest Agricultural Research Station is a key site for row-crop production research in Ohio. The station is located in Wood County, which ranks number one in Ohio for soybean and wheat production and number two for corn production. Nearby counties also rank highly; therefore, its location makes it a logical choice for studying the challenges facing producers of these valuable commodities. The Northwest Station serves as a key location for the development of soybean and wheat varieties, with many breeding and screening nurseries located on-site.

**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 |
|---|---|---|---|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | | 10% | |
| 202 | Plant Genetic Resources | 0% | | 15% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | | 5% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 0% | | 20% | |
| 205 | Plant Management Systems | 0% | | 10% | |
| 206 | Basic Plant Biology | 0% | | 5% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 0% | | 5% | |
| 212 | Diseases and Nematodes Affecting Plants | 0% | | 5% | |
| 213 | Weeds Affecting Plants | 0% | | 5% | |
| 214 | Vertebrates, Mollusks, and Other Pests Affecting Plants | 0% | | 5% | |
| 216 | Integrated Pest Management Systems | 0% | | 15% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

OARDC provides the best science available on plant-based food systems when informing producers, processors, distributors and consumers. The science behind the systems is not only critical for the provisioning of food worldwide, but it is also a major economic driver. Soybeans add $5.3 billion, and corn adds $4.8 billion to Ohio's economy each year. As prices increase worldwide for food and alternatives to petroleum products, the return on investment will be strong.

Much of OARDC's interactions are with organized groups of producers, processors, and consumers. Without a growing body of knowledge to create efficiency and security in plant-based food systems, opportunities will be missed and society will be underserved. With more than 100 years of research history, a robust body of literature, and a well-developed network of clientele, supporters, and companion agencies and organizations--including OSU Extension--OARDC is well positioned to continue to create positive change in this planned program.

Effective research requires a mixture of laboratories, greenhouses, controlled study fields, a statewide network of research stations, and on-farm research sites to maximize knowledge. Emerging diseases, the need for a stronger and more secure food and fiber supply, as well as an international demand to reduce world hunger, now requires facilities that are more advanced. One such example is OARDC's Plant and Animal Agrosecurity Research (PAAR) Facility. This facility is a highly secure biocontainment building. It is required by federal law for conducting research with organisms that cause diseases in animals classified at

biosafety level 3 (BSL-3 and/or BSL-3 Ag). It is also needed for working with plant diseases that could cause undue economic hardship on agriculture if released into the environment. PAAR is the only facility in Ohio and one of only two nationally with capacity for both plant and animal research at the BSL-3 and BSL-3 Ag safety levels.

**2. Scope of the Program**

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

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

**1. Assumptions made for the Program**

Within the planning period, OARDC lines of inquiry will provide necessary information to inform human enterprises related to plant systems science. This is an important area of study for society and will be utilized for enhanced decision-making by stakeholders and all citizens. Research and education related to plant systems and landscape-scale best management practices are demanded by society to meet current and future food and fiber needs. These issues are often manifested at the community level, and those stakeholders who are most vested will become heavily involved. The direct involvement of others may be limited, but they will still reap benefits from sound basic and applied research programs.

It is assumed that base federal funding will continue to be available to support planned activities and the scientific staff members who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be leveraged to attract additional state and extramural funds.

**2. Ultimate goal(s) of this Program**

OARDC's goals for this planned program are to:

• Generate new knowledge related to plant genomes, markers, structures, and related areas of study consistent with the demands of other scientists and stakeholders who will apply this knowledge to their areas of plant breeding, growth, and development;
• Advance the science of germplasm preservation, acquisition, and information systems to the extent that the genetic resources targeted for acquisition are preserved and that targeted plant systems in Ohio and the region can be considered secure;
• Enrich the crop gene pool and gene pool knowledge to the extent that breeding programs have materials with the desired traits on-demand to move forward with releasing new varieties, etc.;
• Provide the necessary data, including cultural practices, seed quality assurance, breeding, and other biological and physical investigations necessary to support pre-harvest practices that achieve the requisite yield, disease resistance, and other characteristics needed to retain Ohio's status as a top soybean and corn producer;
• Participate in modeling and sampling of crop data, including remote sensing, for the purpose of deriving systems that are cost effective for producers;
• Evaluate production management systems, including organics, sustainable agriculture initiatives, small-scale farming/niche market systems for the purpose of increasing efficiency and effectiveness, thus

making innovative farming systems more attractive to stakeholders;
• Support OSU Extension's Master Gardening program by providing the green industry the necessary research to advance the development of materials, and field trails required to keep the program viable;
• Employ an integrated approach to protecting plants from harmful insects and other invertebrates, pathogens, vertebrates, and weeds to the extent that the research is required to mitigate impacts that have significant negative economic or environmental consequences.

## 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 | 22.5 | 0.0 |
| 2018 | 0.0 | 0.0 | 22.5 | 0.0 |
| 2019 | 0.0 | 0.0 | 22.5 | 0.0 |
| 2020 | 0.0 | 0.0 | 22.5 | 0.0 |
| 2021 | 0.0 | 0.0 | 23.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

The goals of OARDC's on-going research activities to advance plant systems include both basic and applied research. Both laboratory and multiple field sites/research stations are available throughout Ohio to permit data gathering and to continue long-term experiments, such as commodity yield trials and public breeding programs. Computational science and information technology are being used in a complementary fashion to improve our ability to analyze and utilize giant sets of molecular and genomic data. Bioemergent materials research is focused on the discovery, manipulation, and utilization of unique crops as alternatives to synthetic materials. On-farm research takes place, as do national and international studies. All functional laboratories and field sites are improved over time as program needs and available resources warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation, with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters |

**3. Description of targeted audience**

OARDC's targeted audiences include, but are not limited to:

• Individuals or groups who have expressed a need for plant systems information that resulted from new or on-going research, or is extracted from the scientific literature. Often, these requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, the Ohio Department of Agriculture, or a county Extension agent;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change;
• Populations who have not requested the information but will likely benefit from access, e.g. home gardeners;
• Other scientists and scientific groups;
• Political entities;
• Extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations.

## 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 graduate students completed

☑ 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 | Meet or exceed the demand of fellow scientists and stakeholders within the next ten years for materials relating to plant genetics and plant breeding technologies, including identification of molecular markers for elite germplasms. |
| 2 | Enrich the gene pool and knowledge thereof in disease/pest resistance, and gene recombination and interaction studies |
| 3 | Enrich the gene pool and knowledge thereof in the areas of molecular studies to better understand how immune systems in plants inhibit diseases and how bacteria perturb the immune system. |
| 4 | Develop cultivars and crop management strategies that limit the potential negative impacts of weather variations on crop yields. |

**Outcome #** 1

**1. Outcome Target**

Meet or exceed the demand of fellow scientists and stakeholders within the next ten years for materials relating to plant genetics and plant breeding technologies, including identification of molecular markers for elite germplasms.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Enrich the gene pool and knowledge thereof in disease/pest resistance, and gene recombination and interaction studies

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Diseases and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants
- 216 - Integrated Pest Management Systems

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Enrich the gene pool and knowledge thereof in the areas of molecular studies to better understand how immune systems in plants inhibit diseases and how bacteria perturb the immune system.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Diseases and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants
- 216 - Integrated Pest Management Systems

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Develop cultivars and crop management strategies that limit the potential negative impacts of weather variations on crop yields.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Pests, pathogens, weeds, and climate change, among other factors, can impact outcomes within plant systems. As the food, fiber, and environmental economies adjust to the global marketplace in conjunction with public policy changes, new regulations, and shifts in demand, outcomes will be impacted. Production agriculture is most sensitive to these shifts. Research that is conducted well before its outcomes are needed may be critical to avoid future crop failures, and formative evaluations to identify opportunities and problems can yield returns throughout the life of a program.

Factors such as the availability of base funding to ensure a core faculty and staff, the availability of extramural funds, and programmatic demands exceeding resources may affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with stakeholders;

- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 9**

**1. Name of the Planned Program**

Animals Systems (OARDC Led)

**2. Brief summary about Planned Program**

The food animal industry is a key contributor to the food, agricultural, and environmental economies in Ohio. OARDC research is central to this industry. Through research efforts detailed in this planned program, OARDC helps position CFAES and OSU as leaders in developing and disseminating new knowledge in the biological sciences for producing food, companion and service animals. We are interdisciplinary in our approach and responsive to current societal issues such as animal health, food safety, biomass utilization, and environmental sustainability.

OARDC is heavily invested in programs, facilities, and stakeholder networks at the local, state, regional and national levels that support this planned program. The program consists of multiple levels of research ranging from investigations at the genetic level to studying all aspects of food animal production, including aquaculture. The program positions Ohio as a major contributor to both basic and applied animal sciences, and substantially contributes to food security at national and global levels.

CFAES completed an internal assessment of all animal facilities in May 2014 and made recommendations to administration as to where improvements were needed. The College is now engaged in a plan to develop new facilities for equine, swine, beef cattle and dairy within the next five to seven years. A new approach to utilizing public-private partnerships to finance these new facilities is being considered.

Genetic research provides a foundation for the program with inquiries from the genome-level through gene pool studies. Nutrition and reproduction are major areas of emphasis demanded by stakeholders and by the state of academic understanding of the food animal system. Emphasis will continue to be placed on pre-harvest programs to reduce risks to producers, processors, and consumers, and to ensure high yields of quality products. New hires will place an added emphasis on animal welfare and nutrient management programs. Improved and new facilities are being planned to enhance these program areas of emphasis.

Producers, processors, and distributors in this program are well organized and heavily reliant on OARDC for scientific information. The organization will continue to be actively engaged in the process of research from needs identification to summative assessments to outcomes and impacts. OARDC research is widely disseminated by OSU Extension, ensuring that timely research is distributed in a way that leads to meaningful impacts for targeted stakeholder groups.

**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 | 0% | | 15% | |
| 302 | Nutrient Utilization in Animals | 0% | | 15% | |
| 303 | Genetic Improvement of Animals | 0% | | 10% | |
| 304 | Animal Genome | 0% | | 5% | |
| 305 | Animal Physiological Processes | 0% | | 15% | |
| 306 | Environmental Stress in Animals | 0% | | 5% | |
| 307 | Animal Management Systems | 0% | | 10% | |
| 308 | Improved Animal Products (Before Harvest) | 0% | | 15% | |
| 311 | Animal Diseases | 0% | | 10% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

OARDC provides the best science available on animal-based food systems when informing producers, processors, distributors and consumers. The science behind the system is not only critical for maintaining the global supply of food animals; it is also a major economic driver in Ohio. OARDC addresses the direct needs of all our food animal constituency groups by interacting with them to understand their needs.

OARDC's interactions are mostly with organized groups of producers, processors, distributors, and consumers. Without a growing body of knowledge to create efficiency and security in the animal-based food systems, opportunities will be missed and society will be underserved. With more than 100 years of research history in the U.S., a robust body of literature, and a well-developed network of clientele, supporters and companion agencies and organizations, including OSU Extension, OARDC is well-positioned to continue to affect positive change in this planned program.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

By understanding the basic and applied science related to how animal systems are maintained and managed, and how food and the associated economies function, OARDC seeks to meet society's demands for a secure supply of food animals. As we address problems and needs within our stakeholder communities, OARDC becomes better prepared to take advantage of emerging opportunities and to rapidly address problems within these areas.

Other key assumptions are:

- The topics within this program that have been identified within our stakeholder communities and/or within the scientific literature reflect the most important issues and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on the associated research is key to present and future decision-making in provisioning of food animals;
- All citizens directly or indirectly benefit from a safe, secure, and plentiful animal based food system. These lines of inquiry will provide necessary data to inform human enterprises;
- Research and education related to food-animal systems is a demand by society that is required to meet current and future needs.

It is further assumed that base federal funding will continue to be available to support planned work and the scientific staff members who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be successfully leveraged to attract additional state and extramural funds.

### 2. Ultimate goal(s) of this Program

OARDC's goals for this planned program are to:

- Provide the necessary research to enhance nutrient utilization for the purpose of production efficiency, economic viability, competitiveness, and animal health within the industry and provide consumers with greater value and quality of products at reduced environmental costs;
- Focus on improving management systems--including modeling, decision-making, and humane care of animals--for multiple farm types;
- Continue to address demand from stakeholders for information to aid in improving the quantity and quality of animal products in a cost effective, humane, environmentally friend manner that is socially acceptable;
- Continue focused research on animal diseases to ensure that society has a safe and secure animal-based food supply, and that human and animal health, business enterprises, and environmental and food security are not compromised, locally or globally.

## 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 | 9.5 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 2018 | 0.0 | 0.0 | 9.5 | 0.0 |
| 2019 | 0.0 | 0.0 | 9.5 | 0.0 |
| 2020 | 0.0 | 0.0 | 9.5 | 0.0 |
| 2021 | 0.0 | 0.0 | 10.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

OARDC researchers seek to advance global food security by integrating animal agriculture into food production systems. Both basic and applied agbioscience research is conducted throughout Ohio to permit data gathering and to continue long-term experiments, such as fish genetic improvement research in the aquaculture facilities at South Centers in Piketon, OH. Ohio on-farm research is conducted as part of this program as are national and international studies. Effective research requires a mixture of laboratory, animal enclosure, and on-farm research to maximize knowledge. Emerging disease threats now require more advanced facilities, such as OARDC's bio-security lab, which is particularly useful for studies of infectious animal diseases, such as the recent outbreak of avian flu that has seriously impacted the nation's poultry industry. OARDC's biosecurity lab has been fully functional throughout this planning period. All functional laboratories and sites are improved over time, as program needs and available resources warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Group Discussion<br>● Demonstrations | ● Newsletters<br>● Web sites other than eXtension |

### 3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to:

• Individuals or groups who have expressed a need for food animal systems information that resulted from new and on-going research, or extracted from the scientific literature. Often, these requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, the Ohio Department of Agriculture, or a county Extension agent;
• Federal, state or local agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change;
• Populations who have not requested the information but will likely benefit from access, e.g. small or recreational farmers;
• Other scientists and scientific groups;
• Political entities;
• Extension personnel;
• Students from pre-school to post doctorate studies;

- News organizations;
- Business groups such as the Ohio Farm Bureau or commodity groups.

## 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 graduate students completed

☑ 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 | Improve reproduction efficiency and enhanced application of new technologies over the next five years to fully meet the competitive demands faced by OARDC's stakeholders in areas such as early maturation, estrus, fertility, and ovulation |
| 2 | Increase dietary research and nutrition utilization for the purpose of increased growth and quality of products commensurate with consumer demand. |
| 3 | Meet the demand of fellow scientists and stakeholders within ten years for materials relating to genetics and breeding, including id of molecular markers for improved animal health and reproductively, and increased quality and quantity of products |
| 4 | Improve management for multiple animal farm types, including organics, that will produce higher yields for and lower costs to the producer and consumer |
| 5 | Animal disease researchers will provide the necessary research to inform producers in a timely manner how to protect against known and present diseases, e.g. bovine mastitis |
| 6 | Animal disease researchers will advance the research frontiers in emerging disease investigations to the extent that OARDC continues to serve as a center for excellence. |

**Outcome #** 1

**1. Outcome Target**

Improve reproduction efficiency and enhanced application of new technologies over the next five years to fully meet the competitive demands faced by OARDC's stakeholders in areas such as early maturation, estrus, fertility, and ovulation

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Increase dietary research and nutrition utilization for the purpose of increased growth and quality of products commensurate with consumer demand.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Meet the demand of fellow scientists and stakeholders within ten years for materials relating to genetics and breeding, including id of molecular markers for improved animal health and reproductively, and increased quality and quantity of products

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Improve management for multiple animal farm types, including organics, that will produce higher yields for and lower costs to the producer and consumer

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes

- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Animal disease researchers will provide the necessary research to inform producers in a timely manner how to protect against known and present diseases, e.g. bovine mastitis

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 305 - Animal Physiological Processes
- 307 - Animal Management Systems
- 311 - Animal Diseases

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 6

**1. Outcome Target**

Animal disease researchers will advance the research frontiers in emerging disease investigations to the extent that OARDC continues to serve as a center for excellence.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems

- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Animal diseases coupled with abnormal weather patterns often impact outcomes. Public policy shifts, new regulations, and shifts in demand for product continue to impact outcomes. Human values and environmental sensitivities of the population to animal production and processing are also external factors that influence results. Formative evaluations relating to animal care norms and protocols can be effective in informing the process; however, uncertainty is a constant factor in the animal industry.

Factors such as the availability of state and federal base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources may also affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of

our constituencies to feedback on the commercialization of a new patented product;

- Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 10**

**1. Name of the Planned Program**

Food, Agricultural, and Biological Engineering Systems (OARDC Led)

**2. Brief summary about Planned Program**

Research activities within the Food, Agricultural, and Biological Engineering planned program will continue to contribute to all units within CFAES. The OARDC fostered technologies and engineering solutions from this planned program support food safety and food security research, climate change initiatives, and sustainable energy efforts, as well as research programs that are seeking to advance human health and advance safety in agricultural work places. For the 2017-2021 period, this planned program will continue to support other CFAES activities and advance the collective mission of the organization.

The faculty group working in this planned program advances science, teaches principles and applications, and disseminates knowledge of engineering needed to efficiently produce, distribute and process biological products (food, feed, fiber and fuel) while conserving natural resources, preserving environmental quality, and ensuring the health and safety of people and domestic food animals.

Specific research emphasis in this program will be placed on the following:

- Bio-products and bio-engineering, including the development of bio-refinery processes for the production of fuels, chemicals, polymers, and materials from lingo-cellulosic biomass, research into renewable energy systems, and food and bioprocess engineering;
- Air quality and bioenvironmental engineering control, including the measurement, modeling, and mitigation of indoor production environments, as well as air quality and emissions of Concentrated Animal Feeding Operations (CAFOs);
- Precision agriculture, including the development of nutrient management strategies and technologies to improve the efficiency of fertilizer placement and enable on-farm evaluations of success.

**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 |
|---|---|---|---|---|---|
| 401 | Structures, Facilities, and General Purpose Farm Supplies | 0% | | 20% | |
| 402 | Engineering Systems and Equipment | 0% | | 25% | |
| 403 | Waste Disposal, Recycling, and Reuse | 0% | | 25% | |
| 404 | Instrumentation and Control Systems | 0% | | 10% | |
| 405 | Drainage and Irrigation Systems and Facilities | 0% | | 15% | |
| 723 | Hazards to Human Health and Safety | 0% | | 5% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

OARDC will provide the best available engineering science to support the sustained and secure flow of food and fiber to/from producers, processors, distributors, and consumers while assuring that their interests are informed, in Ohio and beyond. The engineering science behind food and fiber systems is critical for provisioning of food worldwide, and it is a central component of agbioscience. Engineering directly supports OARDC goals of production efficiency, economic viability, environmental stewardship, and social acceptability of practices introduced.

Effective research requires a mixture of laboratories, animal enclosures, plant support facilities, statewide research stations, on-farm/in-factory support facilities, and engineered processes to advance knowledge. Faculty and staff in this program provide research that leads to state-of-the-art systems and facilities. Likewise, they provide the knowledge and technologies needed by stakeholders to make decisions regarding adoption of state-of-the-art facilities and processes. Emerging threats now demand advanced facilities such as the new OARDC biosecurity laboratory that has been constructed on our Wooster campus; systems and facilities engineers will continue to be critical to such planning efforts.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

A client oriented research and development program by food, agricultural and biological engineers is critical to meeting society's demands in this area. As we address problems and needs within our stakeholder communities, our organization builds capacity and becomes better prepared to serve, to take advantage of emerging opportunities, and to rapidly address stakeholder problems.

Other key assumptions are:

- The topics and goals of this program that have been identified within our stakeholder communities and/or within the scientific literature reflect the most important issues and warrant allocation of resources;
- The understanding of this planned program and how society utilizes and depends on the associated research is key to present and future decision-making for providing food, fiber, and environmental services;
- All citizens directly or indirectly benefit from a safe, secure, and plentiful food system supply supported by state of the art engineering;
- These lines of inquiry will provide information necessary to inform human enterprises;
- Engineering research and education are demanded by society and are needed to meet current and future needs.

It is further assumed that base federal funding will continue to be available to support planned activities and the scientific staff members who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be successfully leveraged to attract state and extramural funds.

**2. Ultimate goal(s) of this Program**

OARDC's goals for this planned program are to:

- Help develop unique systems for converting bio-based products into sustainable energy and advanced materials;
- Develop enhanced technologies to support integrated plant growth systems, e.g. fertigation, monitoring, control;
- Improve systems to aid small farmers in taking advantage of alternatives to traditional commodity crops, e.g. hydroponics for vegetables and flowers;
- Improve mechanical devices and instrumentation needed by stakeholders such as improved pesticide applicators, including biological pesticides;
- Develop improved systems to aid in meeting new, yet to emerge, or novel needs such as bioreactors to treat landfill waste biologically or the reduction of axle loads of farm equipment to prevent compaction of agricultural soils;
- Inform the process of collecting, storing, processing, and distributing waste products from plant and animal agriculture;
- Join with ecological engineers to determine improved strategies for ecological based engineered systems for waste management, e.g. constructed wetlands, multistage farm ditches;
- Carry out studies to determine and aid rural residents, businesses, and industries in utilizing effective on-site waste disposal systems;
- Provide college-wide leadership in waste-to-energy research and Extension programming;
- Increase the understanding and mitigation of hazards to human health related to accidents and exposure to safety risks within the agriculture and natural resource sectors.

## 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 | 1.5 | 0.0 |
| 2018 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2019 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2020 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2021 | 0.0 | 0.0 | 1.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

Engineering research activities to advance OARDC goals includes both basic and applied research. For example, OARDC scientists are working with farmers, industry groups, and government agencies to improve access to field data gathered from new-generation farm machinery and remote-sensing tools to better support real-time management decisions by producers. Laboratories, construction sites, farms, and multiple field sites/research stations are also available throughout Ohio to permit data gathering and to continue long-term activities. All functional laboratories and field sites are improved over time, as program needs warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Workshop<br>● One-on-One Intervention<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters |

### 3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to:

• Individuals or groups who have expressed a need for engineering information that resulted from new and on-going research, or is extracted from the scientific literature. Often these requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, the Ohio Department of Agriculture, Soil and Water Conservation Districts, or a county Extension agent;
• Fellow academic units that rely on engineers to create systems and processes needed to support

their research and the adoption of research findings by stakeholders;
• Federal, state or local agencies or support groups who not only use information but broker that information by embedding it into clientele groups supportive of change;
• Populations who have not requested the information but will likely benefit from access, e.g. recreational animal owners;
• Other scientists and scientific groups;
• Political entities;
• Extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations;
• Business groups such as small town administrators, county commissioners, or commodity groups.

## 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 graduate students completed

☑ 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 | Provide appropriate facilities design and engineering processes commensurate with stakeholders demand, including fellow research units demands, to the extent that they have all the information necessary for making adoption decisions |
| 2 | Develop enhanced systems to support integrated plant growth systems that will annually result in increased productivity at reduced costs for the industry |
| 3 | Improve mechanical devices and instrumentation needed by stakeholders |
| 4 | Advance development of state of the art integrated waste management systems to the extent that OARDC and Ohio are viewed as one of the top ten programs/states in this area nationally |
| 5 | Advance the knowledge of ecological based engineered systems for waste management to the extent that, where cost effective and appropriate, they will be adopted over mechanical systems |
| 6 | Develop improved systems to aid in meeting new or yet to emerge or novel needs |

**Outcome #** 1

**1. Outcome Target**

Provide appropriate facilities design and engineering processes commensurate with stakeholders demand, including fellow research units demands, to the extent that they have all the information necessary for making adoption decisions

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 405 - Drainage and Irrigation Systems and Facilities

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Develop enhanced systems to support integrated plant growth systems that will annually result in increased productivity at reduced costs for the industry

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 405 - Drainage and Irrigation Systems and Facilities

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Improve mechanical devices and instrumentation needed by stakeholders

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 405 - Drainage and Irrigation Systems and Facilities

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Advance development of state of the art integrated waste management systems to the extent that OARDC and Ohio are viewed as one of the top ten programs/states in this area nationally

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 405 - Drainage and Irrigation Systems and Facilities

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Advance the knowledge of ecological based engineered systems for waste management to the extent that, where cost effective and appropriate, they will be adopted over mechanical systems

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 401 - Structures, Facilities, and General Purpose Farm Supplies

- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 405 - Drainage and Irrigation Systems and Facilities

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 6

**1. Outcome Target**

Develop improved systems to aid in meeting new or yet to emerge or novel needs

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 404 - Instrumentation and Control Systems

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Economic shifts such as interest rates to borrow money for facilities, public policy shifts, new regulations, changes in demand, and issues such as climate change may impact outcomes. Human values and conflicts, e.g. urban-rural interface issues and environmental sensitivities to agriculture processes and facilities, are also external factors that affect outcomes. Climate change may dictate new and different types of structures, equipment, and processes.

Factors such as the availability of state and federal base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources will also affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

### Description of Planned Evaluation Studies

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

- Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
- Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
- Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
- Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;
- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 11**

### 1. Name of the Planned Program

Economics and Social Dimensions (OARDC Led)

### 2. Brief summary about Planned Program

The Economics and Social Dimensions planned program will continue to support OARDC and OSU Extension's ability to meet the needs of our stakeholders throughout this 2017-2021 planning period. The broad goals of this program are to generate knowledge and distribute impartial information through the application of social, economic, educational, and business principles to the challenges of agriculture, the food system, the environment, and economic development. This program will continue to contribute to both basic and translational/applied understandings within CFAES' four-element paradigm of production efficiency, economic viability through value added, social acceptably of our contributions, and environmental compatibility of products and practices emanating from our planned programs. Stakeholder demand is strong for knowledge regarding production economics, management strategies, and associated business related information, as well as social and education findings relevant to clientele in a state with a $100-billion agricultural sector.

Without a sound research and Extension program to inform social and financial issues, Ohio's food, natural resource, and agricultural industry would be at risk. An understanding of market economics--because of both traditional market forces and the new global economy--is more critical than ever as producers, processors, and distributors factor into the multiple forces that govern the business risks they take and the decisions they make. Programs that advance the understanding of how rural individuals and communities utilize their resources to effectively participate in the agriculture economy are central to understanding the phenomena of human capital. Rapid changes in sociological parameters and in technologies influence how individuals, families, and communities organize and behave.

The new global economy has added emphasis to this program's long history of international trade and development research. Ohio has both strong export and import markets for agriculture products, thus the need to allocate resources to advance the understanding of and practices within international efforts. Generating sound applied knowledge, and providing our stakeholders the best social and economic information available, requires that these sciences be rooted in strong theory and methodology.

To that end, this program devotes a portion of its effort to advancing theoretical understandings and improved research methodologies. Advances in areas such as experimental economics and decision theory continue to support research that helps reduce risk, promote sustainability, and improve profitability. Understanding the economics and social impacts of domestic programs and polices emanating from the government is necessary to aid stakeholders in their decision making, and to inform policymakers about how best to achieve the desired impacts. Decision theory research and other social dimensions research helps to ensure that the people side of the equation is well informed. Economic and social inquiry, whether focused on profitability, on human capital, or on maintaining environmental services and associated amenity values, have a long history of supporting the science behind agriculture and natural resource management and will continue to have impacts well beyond this planning period.

**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 |
|---|---|---|---|---|---|
| 601 | Economics of Agricultural Production and Farm Management | 0% | | 10% | |
| 602 | Business Management, Finance, and Taxation | 0% | | 10% | |
| 603 | Market Economics | 0% | | 10% | |
| 604 | Marketing and Distribution Practices | 0% | | 5% | |
| 605 | Natural Resource and Environmental Economics | 0% | | 5% | |
| 606 | International Trade and Development Economics | 0% | | 5% | |
| 607 | Consumer Economics | 0% | | 5% | |
| 608 | Community Resource Planning and Development | 0% | | 5% | |
| 609 | Economic Theory and Methods | 0% | | 10% | |
| 610 | Domestic Policy Analysis | 0% | | 5% | |
| 611 | Foreign Policy and Programs | 0% | | 5% | |
| 801 | Individual and Family Resource Management | 0% | | 5% | |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 0% | | 5% | |
| 805 | Community Institutions and Social Services | 0% | | 5% | |
| 901 | Program and Project Design, and Statistics | 0% | | 5% | |
| 903 | Communication, Education, and Information Delivery | 0% | | 5% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

Research related to sociological and economic theory, policy and practice, and associated Extension programs--especially in human capital development--is critical to maintaining and growing an effective and

efficient food, agriculture, and natural resources industry. More than 11 million people live in Ohio, which has high rates of agriculture sector activity, from production to processing to consumption, and has major land use/rural-urban interface issues. This situation makes for a complex social and business climate within the agbioscience sector. As these are coupled with shifting market forces, shifting populations, and new economies, the research output and associated impacts from this program are pivotal to success. How well we understand the use of capital, human capital, and other social and economic resources will greatly influence the long-term outcomes and impacts of all programs within this Plan of Work.

Agriculture experiment stations and Extension programs have a heightened obligation to understand the multiple dimensions of social and economic issues to increase both quality and quantity of products and services that are important to the citizens they serve. Individuals, families, and communities, as well as businesses, agencies, etc. involved in the food and fiber industries need the research information that is generated through this program. Programs regarding how people sustain their enterprises within the rural landscape, as well as how they learn, make decisions, and organize for these enterprises, both personal and corporate, are important from an applied perspective. OSU Extension is charged with communicating this knowledge.

Work in these knowledge areas is well grounded theoretically with an extensive peer-reviewed literature base. The challenges lie in applying what is known to new and emerging issues and generating lines of research as needed to ensure that the needs of Ohio's citizens are met and that any lack of knowledge does not become an impediment to food and fiber production.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

Understanding agbioscience related social and economic factors from both basic and applied perspectives of how agriculture-related human enterprises function and are maintained is important. Knowledge of these areas is prerequisite to maintaining the human enterprise of agriculture. As the social and economic problems within these stakeholder communities are addressed, the organization grows and becomes better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas.

Key assumptions for this program are:

- Social and economic topics within this program have been identified by our stakeholder communities, and/or via the scientific literature, and reflect the most important issues, thus warranting allocation of resources;
- The understanding of this planned program and how society utilizes and depends on the associated research is key to present and future decision-making in provisioning of food, fiber, and environmental services;
- All citizens directly benefit from this area of inquiry;

• These lines of inquiry will provide necessary information to inform human enterprises while protecting both the individual and corporate estate;
• This is an important area of study for society and will be utilized for enhanced decision-making by stakeholders and all citizens;
• Research and education related to the multiple facets of economics are demanded by society to meet current and future needs.

It is further assumed that base federal funding will continue to be available to support planned activities and the scientific staff members who carry out the lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be successfully leveraged to attract additional state and extramural funds.

### 2. Ultimate goal(s) of this Program

OARDC's goals for this planned program are to:

• Advance knowledge regarding social and economic choices related to protection, management, size/scale/growth factors, and overall sustainability required to support Ohio's agriculture industry and to meet stakeholder demand;
• Grow the understanding of agribusiness management and associated systems necessary to support Ohio's agriculture industry and meet stakeholder demand;
• Expand the knowledge base of market economics, including but not limited to domestic trade, regulation, supply and demand, and market performance and analyses;
• Develop and expand applicable knowledge of the social and economic dimensions of natural resources and environmental-systems commensurate with demand from multiple stakeholders for multiple outcomes, e.g. profit, preservation, esthetics;
• Explore and advance theoretical and applied economics of international trade and development as it relates to Ohio and national needs;
• Enhance understanding of domestic economic policy analysis, and related sociological concerns, in terms of government policy impact on agriculture and natural resources;
• Grow and extend knowledge related to individuals, families, groups, and organizations as it relates to all aspects of human systems and associated capital.

## 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 | 5.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

To fulfill the goals of the Economics and Social Dimensions Program, OARDC supports both basic and applied research initiatives. Extensive in-state research occurs, as well as national and international cooperative studies. For example, the OARDC's Agro-ecosystems Management Program is working with colleagues in many other states to harness the power of social media to help agricultural entrepreneurs map assets, find potential supply chain connections, and launch cooperative networks of businesses supplying food, energy, and bio-based products. Close working relationships with multiple industries and organizations will continue to provide real-world settings and data, greatly enhancing the program's capacity and its impacts. OARDC faculty and staff supporting this program engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters |

### 3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to:

- Individuals or groups who have expressed a need for social, educational, and economic findings related to some aspect of human capital that resulted from new or on-going research, or is extracted from the scientific literature;
- Fellow academic units that depend on scientists in this program for support information and for the approaches/measures they generate;
- Federal, state or local agencies or support organizations who will not only use the economic information but will also extend that information;
- Populations who have not requested the information but will likely benefit from access;
- Other scientists and scientific groups;
- Political entities;
- Extension personnel;
- Students from junior high school to post doctorate studies;
- News organizations;
- Business and industry groups.

## 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 graduate students completed

☑ 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 | Business management knowledge, including policy analysis, in targeted areas, e.g. risk management, weather insurance, impacts of land use shifts, grant management that are necessary for and result in increased profitability for stakeholders. |
| 2 | Market economies and efficiencies studies relating to factors such as pricing, finance, supply and demand, exchange rates, trade policies, etc. ensuring that stakeholders are informed and their identified needs. |
| 3 | Advance basic and theoretical knowledge in sociological, educational, and human capital dimensions related to food, agriculture and environment topics |
| 4 | Advance human capital and sociological studies that will inform strategies for expanding and strengthening individual and family well-being, community stability, and agricultural workforce leading to improved quality and quantity of life. |
| 5 | Study rural education systems relative to educational resources, curriculum, instructional delivery, and student learning to the extent necessary to inform decision-makers how to improve rural education systems as requested. |
| 6 | New knowledge of production variations in markets, including vertical markets, that help producers, processors, and distributors have requisite information for enhanced decision making leading to decreased costs of inputs and an increase in profits/outputs. |

**Outcome #** 1

**1. Outcome Target**

Business management knowledge, including policy analysis, in targeted areas, e.g. risk management, weather insurance, impacts of land use shifts, grant management that are necessary for and result in increased profitability for stakeholders.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 605 - Natural Resource and Environmental Economics
- 606 - International Trade and Development Economics
- 607 - Consumer Economics
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Market economies and efficiencies studies relating to factors such as pricing, finance, supply and demand, exchange rates, trade policies, etc. ensuring that stakeholders are informed and their identified needs.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 604 - Marketing and Distribution Practices
- 605 - Natural Resource and Environmental Economics
- 606 - International Trade and Development Economics
- 607 - Consumer Economics
- 608 - Community Resource Planning and Development
- 609 - Economic Theory and Methods

- 610 - Domestic Policy Analysis
- 611 - Foreign Policy and Programs

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Advance basic and theoretical knowledge in sociological, educational, and human capital dimensions related to food, agriculture and environment topics

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 605 - Natural Resource and Environmental Economics
- 801 - Individual and Family Resource Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions and Social Services
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Advance human capital and sociological studies that will inform strategies for expanding and strengthening individual and family well-being, community stability, and agricultural workforce leading to improved quality and quantity of life.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions and Social Services
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Study rural education systems relative to educational resources, curriculum, instructional delivery, and student learning to the extent necessary to inform decision-makers how to improve rural education systems as requested.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions and Social Services
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 6

**1. Outcome Target**

New knowledge of production variations in markets, including vertical markets, that help producers, processors, and distributors have requisite information for enhanced decision making leading to decreased costs of inputs and an increase in profits/outputs.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 608 - Community Resource Planning and Development

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Shifts in social and economic dimensions impact all aspects of people's lives. Within this program area, public monies, and the fluctuations in appropriations of such, can have dramatic (both positive and negative) effects on human well-being, as do levels of government regulation. Likewise, public policies, societal priorities and perceptions, popular culture, education, and family norms are major external factors impacting this program in its research and Extension efforts. Priority of economic research for limited dollars, and the resulting competition, affects the extent to which research can be carried out. Other factors such as economic conditions and the needs of migrant populations entering the community and workforce are also impacts. Additionally, how society is organized, makes decisions, is educated, moves from locale to locale, etc. all affect the food, agricultural, and environmental matrix. Weather related factors impact the conditions and attributes that are being studied by creating uncertainty that cannot be controlled.

Factors such as the availability of state and federal base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources may also affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;

- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 12**

**1. Name of the Planned Program**

Human Health (OARDC Led)

**2. Brief summary about Planned Program**

Human health, as it relates to food and the environment, is a major concern from both a research and cooperative Extension perspective. Agricultural crops (both plant and animal), their residues, renewable natural resources, and the related manufacturing processes and food products, are all associated with human health and safety risks.

The goal of this planned program is to reduce threats to human health and improve societal well-being within OARDC's and OSU Extension's sphere of influence. OARDC faculty members working in this program focus their efforts on emerging pathogens, zoonoses, and microbial contamination of food and the environment as they often threaten agricultural productivity, sustainability, and public health worldwide. Our mission is to protect and enhance animal and public health through research, education and outreach; and to support the animal industries in economically producing safe, wholesome food in an environmentally and socially responsible manner. Emerging and re-emerging zoonotic diseases, for example, are considered an important threat to public health.

One group of scientists, in conjunction with a number of other OSU colleges, studies the diagnosis, epidemiology, pathogenesis, and control of zoonotic diseases in the animal reservoir and the environment. Development of new sensitive tests for astroviruses facilitates the diagnosis of the disease, epidemiology of the infection, and a variety of other studies. Studies are also being initiated on emerging animal and plant diseases such as avian influenza viruses, soybean rust, and sudden oak death. While these are emerging diseases that threaten American agriculture, they may also harbor a possible threat to public health.

**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 |
|---|---|---|---|---|---|
| 502 | New and Improved Food Products | 0% | | 5% | |
| 703 | Nutrition Education and Behavior | 0% | | 5% | |
| 721 | Insects and Other Pests Affecting Humans | 0% | | 20% | |
| 722 | Zoonotic Diseases and Parasites Affecting Humans | 0% | | 50% | |
| 723 | Hazards to Human Health and Safety | 0% | | 10% | |
| 724 | Healthy Lifestyle | 0% | | 10% | |
| | **Total** | 0% | | 100% | |

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

### 1. Situation and priorities

The science behind advancing human health, including healthy lifestyles, has immediate consequence and importance for insuring a safe, stable society, and for protecting the U.S. economy from unnecessary losses. OARDC and OSU Extension address direct requirements of their constituency groups by regularly interacting with them to understand their needs. Without a growing body of knowledge to help protect society, opportunities will be missed for social and economic security, and society will be underserved. OARDC and OSU Extension are well positioned to continue to create positive change in this planned program. To meet growing demand for better human health, scientists must continue to make advances in techniques and processes that are associated with food systems. Due to the complexity of the problems, research and Extension programs are integrated in multiple academic departments across multiple colleges at The Ohio State University.

### 2. Scope of the Program

- In-State Research
- Integrated Research and Extension

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

### 1. Assumptions made for the Program

A client oriented research, development, and outreach program in the human health and well-being sector is critical to meeting society's needs in this area. As we address problems and needs within our stakeholder communities, the organization will become better prepared to take advantage of emerging opportunities and more rapidly address associated problems.

Other key assumptions are:

• The topics and goals within this program have been identified by our stakeholder communities and/or via the scientific literature, reflect the most important issues, and warrant allocation of resources;
• The understanding of this planned program and how society utilizes and depends on safety research and associated Extension programs is key to present and future decision-making, both domestically and worldwide;
• All citizens directly benefit from advanced human health research and Extension programs;
• These lines of inquiry are necessary to inform human enterprises.

It is further assumed that base federal funding will continue to be available to support planned activities and the scientific staff members who carry out lines of inquiry noted within the knowledge areas for this program. Likewise, it is assumed that federal base funding will continue to be successfully leveraged to attract additional state and extramural funds.

### 2. Ultimate goal(s) of this Program

OARDC's goals for this planned program are to:

• Advance the study of insects, ticks and mites to protect human health, including methods of control;
• Better understand the means and methods related to the transmission of zoonotic diseases to humans, including prevention;
• Grow fundamental and applied knowledge as to animal reservoirs for zoonotics.

## 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 | 1.5 | 0.0 |
| 2018 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2019 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2020 | 0.0 | 0.0 | 1.5 | 0.0 |
| 2021 | 0.0 | 0.0 | 1.5 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

On-going research activities to advance human health and societal well-being include both basic and applied research, such as that conducted through OARDC's Center for Advanced Functional Foods Research and Entrepreneurship (CAFFRE). Examples include the identification, extraction and commercialization of natural, cancer-fighting food dyes from berries. Effective food science research requires a mixture of laboratory and gathering places for human subjects to undergo sensory evaluations of experimental food products. Emerging health threats now require more advanced facilities--such as bio-

security labs--particularly needed in the study of infectious animal, plant and insect-vectored diseases that may directly impact humans. All functional laboratories and sites are improved over time, as program needs warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Demonstrations | ● Newsletters<br>● Web sites other than eXtension |

**3. Description of targeted audience**

OARDC's targeted audiences include, but are not limited to:

• Individuals or groups who have expressed a need for health, obesity, and safety information that resulted from new or on-going research, or is extracted from the scientific literature;
• Fellow academic units that depend on scientists in this program for support information and for new health and safety technologies and approaches;
• Federal, state or local agencies or support organizations who will not only use the information, but will also extend that information;
• Populations who have not requested the information but will likely benefit from access;
• Other scientists and scientific groups;
• Health workers/organizations;
• Political entities;
• Extension personnel;
• Students from pre-school to post doctorate studies;
• News organizations;
• Business and industrial groups.

## 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 graduate students completed

☑ 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 | Release studies on insects, ticks, and mites to protect human health that will provide a set of alternatives leading to health gains with lowered risks, and within economic realities, for the affected populations. |
| 2 | Advance the understanding of means and methods related to transmission of zoonotic diseases to humans, including prevention, that meets consumer demand/health threat, as or before such emerges. |
| 3 | Reduce through research, development, and outreach the exposure to biohazards, pathogens, and similar to the extent that annually such are reduced per capita with an overall time and economic savings to those who may be affected. |
| 4 | Create a growing base of knowledge that supports improving human health as it relates to food, environment, and lifestyle |
| 5 | Expand utilization of products with known functionality or nutraceutical value and give consumers greater informed choices, including the bioavailability of the desired substance in food, than they presently have. |

**Outcome #** 1

**1. Outcome Target**

Release studies on insects, ticks, and mites to protect human health that will provide a set of alternatives leading to health gains with lowered risks, and within economic realities, for the affected populations.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 721 - Insects and Other Pests Affecting Humans
- 722 - Zoonotic Diseases and Parasites Affecting Humans

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 2

**1. Outcome Target**

Advance the understanding of means and methods related to transmission of zoonotic diseases to humans, including prevention, that meets consumer demand/health threat, as or before such emerges.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 721 - Insects and Other Pests Affecting Humans
- 722 - Zoonotic Diseases and Parasites Affecting Humans

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 3

**1. Outcome Target**

Reduce through research, development, and outreach the exposure to biohazards, pathogens, and similar to the extent that annually such are reduced per capita with an overall time and economic savings to those who may be affected.

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 723 - Hazards to Human Health and Safety

- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 4

**1. Outcome Target**

Create a growing base of knowledge that supports improving human health as it relates to food, environment, and lifestyle

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 721 - Insects and Other Pests Affecting Humans
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Research

**Outcome #** 5

**1. Outcome Target**

Expand utilization of products with known functionality or nutraceutical value and give consumers greater informed choices, including the bioavailability of the desired substance in food, than they presently have.

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 502 - New and Improved Food Products
- 724 - Healthy Lifestyle

**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 Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Multiple factors, including climate change and weather conditions, play a major role in encouraging the growth and spread of pests and diseases that can be transmitted to humans. Shifts in economy can impact the government's ability to address human health concerns. Access to healthcare and education regarding healthy lifestyles also affects outcomes. Within this program area public monies, and fluctuations in the appropriations of such, can have dramatic effects on human health, as do the levels of regulation. Likewise, public policy and the public's priorities and perceptions, especially regarding risks, are major external factors impacting this program.

Research priorities, limited research dollars, and the resulting competition impact the extent of research that can be carried out. Items such as potential levels of public exposure to certain zoonotic diseases are major external factors. Likewise, public willingness to learn safety procedures to contain pests and mitigate zoonotic disease threats may impact research outcomes. Willingness of consumers to pay for additional food safety is also an external factor.

Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that exceed available resources may affect outcomes.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

OARDC's planned programs have incorporated protocols for documenting success in achieving program goals as an integral part of the approval and funding process. Each department, center, program, lab group, and individual faculty member has techniques for garnering feedback and ascribing value to their processes and products. Given that much of the research work of OARDC faculty and staff does not focus on group-level dynamics, many of the more formalized evaluation techniques are not appropriate. The techniques that OARDC continues to use, most of them being qualitative surrogate measures, are:

• Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for OARDC, ease of participation/inclusion, willingness to support, and overall level of satisfaction with OARDC processes and products;
• Feedback from the OARDC Advisory Committee that ranges from helping to determine the needs of our constituencies to feedback on the commercialization of a new patented product;
• Elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, and their willingness to help us link with new stakeholders;
• Support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies;

- Accountability measures required by extramural grants and contracts, and our level of attainment of those required metrics;
- Impacts reported by individual CFAES departments in their OARDC budget requests as part of our differential funding model, as well as individual faculty members' impact statements.

## V(A). Planned Program (Summary)

**Program # 13**

**1. Name of the Planned Program**

Advancing Employment and Income Opportunities (Extension)

**2. Brief summary about Planned Program**

Innovation, entrepreneurship, and an understanding of local and regional economics are keys to sustainable economic growth in Ohio. Formal and informal educational efforts involving individuals and groups of all sizes will focus on community economics, small businesses, job development, and wealth creation throughout the state. In many cases, the efforts aim to engage community stakeholders in local applied research designed to create knowledge that empowers local development officials and the community at large to act on development issues of strategic economic importance.

**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 :** No

## V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 602 | Business Management, Finance, and Taxation | 20% | | 0% | |
| 608 | Community Resource Planning and Development | 75% | | 0% | |
| 902 | Administration of Projects and Programs | 5% | | 0% | |
| | **Total** | 100% | | 0% | |

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

**1. Situation and priorities**

Innovation, entrepreneurship, and an understanding of local and regional economics are keys to sustainable economic growth in Ohio. Communities, individuals and families must find ways to thrive in the rapidly changing economic environment. OSU Extension will continue to help communities enhance their well-being through a wide range of community development programming. 'Advancing Employment and Income Opportunities' programming will focus on the following development topics: community economics, organizational, community leadership, and participatory community planning. Therefore, community leaders and residents need to develop new strategies for addressing these changes. OSU Extension will continue to help analyze local economies and identify economic trends and opportunities for change and growth.

**2. Scope of the Program**

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

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

### 1. Assumptions made for the Program

- Individuals and communities desire to learn and apply new strategies for capitalizing on opportunities
- OSU Extension faculty and staff possess great expertise
- OSUE faculty and staff will teach community leaders and citizens
- OSUE instruction will include integrated activities based on research
- Additional services provided by OSUE will include: providing technical assistance, coaching, facilitating and forming coalitions
- Communities and leaders will be able to implement new strategies as a result of skills and knowledge gained through the programming efforts of OSUE professionals

### 2. Ultimate goal(s) of this Program

The goal of all OSU Extension programming related to 'Advancing Employment and Income Opportunities' is to empower communities, individuals and families to create, expand, and retain economic opportunities.

## 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 | 5.5 | 0.0 | 0.0 | 0.0 |
| 2018 | 6.0 | 0.0 | 0.0 | 0.0 |
| 2019 | 6.5 | 0.0 | 0.0 | 0.0 |
| 2020 | 6.5 | 0.0 | 0.0 | 0.0 |
| 2021 | 7.0 | 0.0 | 0.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

- On-site workshops
- Meetings
- Curriculum development and maintenance
- Educational programming
- Development and maintenance of online resources

- Establishment of collaborative partnerships
- One-on-one client consultations
- Volunteer organizational efforts
- Conduct tax education workshops for practitioners, attorneys, CPAs, CFPs

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Demonstrations | ● Newsletters<br>● Web sites other than eXtension |

**3. Description of targeted audience**

- Community leaders
- Economic development professionals
- Community residents (families and individuals
- Business owners/operators
- Professional economic developers
- Extension partners
- Attorneys
- Certified public attorneys
- Certified financial planners
- Enrolled agents with the Internal Revenue Service
- Tax return preparers

## 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 people participating in 'Business Retention and Expansion' programming
- number of formal 'Business Retention and Expansion' presentations of findings to communities
- number of multi-state partnerships for 'Business Retention and Expansion' programming efforts
- number of formal training workshops
- number of program planning and implementation volunteer hours donated
- number of companies visited (to discuss opportunities for growth or possible hindrances to growth)
- number of in-person, two-day OSU Income Tax School events offered
- number of participants in OSU Income Tax school in-person events (single day)
- number of two-hour "Ethics" webinars offered through the OSU Income Tax School program
- number of participants in "Ethics" webinars offered through the OSU Income Tax School program
- number of five-hour "Agriculture and Natural Resource Tax Issues" webinars offered
- number of participants in "Agriculture and Natural Resources Tax Issues" webinars offered through the OSU Income Tax School program

☑ 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 community plans developed and adopted |
| 2 | number of local leaders and community residents that have indicated they are using knowledge gained from 'Business Retention and Expansion' programming to make better informed community decisions |
| 3 | number of participants in OSU Income Tax School educational sessions who experienced an increase in knowledge on at least one subject as a result of attending an educational program |
| 4 | number of local government leaders reporting a gain in knowledge as a result of OSUE leadership training |

**Outcome #** 1

**1. Outcome Target**

number of community plans developed and adopted

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 902 - Administration of Projects and Programs

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 2

**1. Outcome Target**

number of local leaders and community residents that have indicated they are using knowledge gained from 'Business Retention and Expansion' programming to make better informed community decisions

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 902 - Administration of Projects and Programs

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 3

**1. Outcome Target**

number of participants in OSU Income Tax School educational sessions who experienced an increase in knowledge on at least one subject as a result of attending an educational program

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 602 - Business Management, Finance, and Taxation

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 4

**1. Outcome Target**

number of local government leaders reporting a gain in knowledge as a result of OSUE leadership training

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 608 - Community Resource Planning and Development
- 902 - Administration of Projects and Programs

**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
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Limited resources and / or other competing programmatic emphases may limit the extent to which planned program efforts in this area can be undertaken. Changes in the economy and population changes (immigration, emigration) will affect local economies. The success of a local economy is strongly dependent upon its citizens having enough personal wealth to continue to participate in and drive the economy.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

The following are planned evaluation types for the 'Advancing Employment and Income Opportunities' program:

- After only (post-program)
- Retrospective (post-program)

- During (during program)
- Case study

The following are planned data collection methods for the 'Advancing Employment and Income Opportunities' program:

- Sampling
- Whole population
- On-site surveys
- Unstructured interviews
- Case study
- Observation

## V(A). Planned Program (Summary)

**Program # 14**

### 1. Name of the Planned Program

Enhancing Agriculture and the Environment (Extension)

### 2. Brief summary about Planned Program

Ohio's diverse agricultural, horticultural, and forestry industries contribute more than $100 billion to the state's economy every year. OSU Extension (OSUE) will assist a variety of clients with technology, marketing, and educational support. The efforts of OSUE professionals will advance Ohio's position in the global marketplace. OSUE also will work to enhance and sustain the environment and natural areas in the state, balancing economic advancement with environmental sustainability. Several examples of the services OSUE provides to clients follow:

- help farmers strengthen their businesses, adopt new technology, and improve efficiency while protecting the environment;
- work closely with the Ohio Department of Agriculture and other state agencies to serve as the educational branch of 4R Nutrient Stewardship programming in efforts to help control nutrient runoff and decrease the harmful algae blooms in Ohio's waterways and watershed;
- work to educate farmers, landowners and homeowners to identify, control, and / or eradicate invasive species attacking our crops, landscapes and natural resources;
- help to grow Ohio's important green industry by creating jobs, improving workforce skills, and enriching the knowledge of professionals in turfgrass management, landscaping, and nursery companies;
- protect Ohio's natural environment through by working with landowners in managing woodlands and preserving streams and other water resources, such as Lake Erie;
- works with homeowners and individuals to enhance the value of their homes and communities by applying and sharing research-based yard and garden information, through the consultation of Master Gardener volunteers;
- work with Ohio's citizens and business owners impacted by bed bugs through education on preventing, identifying, and eliminating bed bugs in the home and business environment through educations publications/resources, presentations, and programs.

Ohio State University Extension will continue to evolve with the economy and needs of our clients and stakeholders. OSUE currently has several signature programs related to 'Enhancing Agriculture and the Environment': 'Local Foods' and 'Nutrient Stewardship for Cleaner Water'. 'Local Foods' is designed to strategically build food literacy and skills around four themes: Food Production, Food & Family, Food and Business, and Food and Community. 'Nutrient Stewardship for Cleaner Water' will help advance crop yields while minimizing the offsite loss of nutrients which can lead to the degradation of water quality. 'Nutrient Stewardship for Cleaner Water' will continue to teach ways of increasing nutrient utilization efficiency via in-field and edge-of-field best management practices that limit off-site movement of nutrients while increasing crop yields through small plot, on-farm research and education. Both the 'Local Foods' and 'Nutrient Stewardship for Cleaner Water' signature programs will continue into the foreseeable future.

**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 | 5% | | 0% | |
| 112 | Watershed Protection and Management | 15% | | 0% | |
| 123 | Management and Sustainability of Forest Resources | 5% | | 0% | |
| 133 | Pollution Prevention and Mitigation | 10% | | 0% | |
| 205 | Plant Management Systems | 15% | | 0% | |
| 216 | Integrated Pest Management Systems | 15% | | 0% | |
| 307 | Animal Management Systems | 10% | | 0% | |
| 601 | Economics of Agricultural Production and Farm Management | 5% | | 0% | |
| 602 | Business Management, Finance, and Taxation | 5% | | 0% | |
| 723 | Hazards to Human Health and Safety | 15% | | 0% | |
| | **Total** | 100% | | 0% | |

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

### 1. Situation and priorities

Collectively, Ohio's diverse commercial agricultural, horticultural, and forestry industries contribute more than $100 billion annually to Ohio's economy. Global economic forces, competition for land use, and urban / suburban sprawl will continue to challenge the aforementioned industries to strategically position their businesses to remain sustainable into the future. Transitional agriculture commodity production will continue its bi-modal distribution in farm size and scale with a very small percentage of farm production units contributing an increasing share of total gross production. Small / mid-size farms will continually need to become more entrepreneurial by differentiating their commodities and evaluating direct and other marketing alternatives. Continued growth and evolution of Ohio's "green industry" (nursery / landscape, turfgrass, and floriculture) will present unique opportunities for new university investments in research and Extension personnel at the state, regional and county levels to provide timely research-based information.

Ohio is a densely populated state with many metropolitan areas, as well as a rural landscape increasingly occupied by homeowners seeking the amenities of country living. Growing metropolitan areas and division

of land into small plots for home construction places heavy demands on the state's fixed land base and other elements of the natural environment, especially water. These factors of growth lead to increased competition among individuals and interest groups regarding the multiple alternative uses of the state's natural resources. Ohioans will continue to be concerned with overarching issues, including global climate change, invasive species, and farm-land preservation.

Programming in this area has a documented history of strong learning and behavior outcomes and impacts. Evaluation has been, and will continue to be, a regular component of 'Enhancing Agriculture and the Environment' programming. Evaluation results will continue to inform educators, advisory groups, and the organization about both the successes and areas for improvement in relation to 'Enhancing Agriculture and the Environment' programming. Future programming priorities will be identified and set by reviewing evaluation data as well as stakeholder feedback.

**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**

OSU Extension has a sector of professionals focused on the area of Agriculture and Natural Resources. Within this program area, multi-disciplinary teams will continue to conduct applied research and identify the most efficient means to disseminate research-based information. OSUE professionals will utilize electronic newsletters, face-to-face programs, field days and satellite series as means of reaching our clientele with educational information. Newly identified teams and working groups will be developed as needs and issues are identified by clientele groups.

OSU Extension works in collaboration with others having a stake in the natural environment, including individuals, volunteer groups, community leaders, business leaders, elected and appointed officials, and non-government organizations to identify, develop, and deliver educational programs that target the many natural resource use and restoration issues faced by communities and regions. Extension and its partners provide the educational basis for maintaining and improving the natural resource base while simultaneously striking a balance with sustainable yields from our land, water, forest, and mineral resources.

**2. Ultimate goal(s) of this Program**

The ultimate goal of 'Enhancing Agriculture and the Environment' programming is to ensure the sustainable management of Ohio's farm, forest, and water resources, to provide a long-term, quality supply of water, food and forest products.

## 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 | 60.0 | 0.0 | 0.0 | 0.0 |
| 2018 | 60.0 | 0.0 | 0.0 | 0.0 |
| 2019 | 62.0 | 0.0 | 0.0 | 0.0 |
| 2020 | 63.0 | 0.0 | 0.0 | 0.0 |
| 2021 | 64.0 | 0.0 | 0.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

• Maintain educational websites on related topics (e.g., Crop Observation and Recommendation Network; PestEd and Nutrient Stewardship for Cleaner Water websites);
• Create and distribute educational materials / information (via fact sheets, field guides, manuals, webinars, tv spots, radio broadcasts, conference presentations, etc);
• Enhance the adaptation of production techniques through utilization of on-farm research to work directly with producers to evaluate practices to enhance productivity and profitability;
• Organize and conduct workshops and educational activities targeting 4R Nutrient Management ("Nutrient Stewardship for Cleaner Water") and Ohio's waterways in response to phosphorus water quality concerns
• Organize and conduct 'Women in Agriculture' / 'Annie's Project' seminars;
• Extend the reach of OSUE programming by organize and conduct educational workshops, training sessions, and seminars for Master Gardener Volunteers;
• Conduct education on fertilizer and for private and commercial pesticide application best practices (including potential certification);
• Organize / host / present at conferences, such as Farm Science Review, the Conservation Tillage Conference, Small Farm Conference, Women in Agriculture Conference, etc;
• Educate Ohioans on forestry stewardship best management practices;
• Provide agricultural emergency management training for first responders and farm operators;
• Promote independence for Ohio farm families who have family members with disabilities that impact their ability to function in farm operations;
• Organize and conduct 'Transitioning Your Farm Business to the Next Generation' workshops;
• Organize and conduct meetings, seminars, conferences, programs and activities for the 'Local Foods' signature program (this program will continue to address the critical need for outreach education around the broad topic of local food systems).

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|

| | |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Demonstrations<br>● Other 1 (Conferences) | ● Public Service Announcement<br>● Newsletters<br>● TV Media Programs<br>● Web sites other than eXtension |

**3. Description of targeted audience**

The target audience for efforts under the 'Enhancing Agriculture and the Environment' programs include:

- Ohio farm families;
- Commercial green-industry companies;
- Consumer horticulture advocates;
- Commodity/farm advocacy groups;
- Federal / state and agricultural / environmental agencies;
- State-wide consumer groups;
- Volunteer groups;
- Community leaders;
- Business leaders;
- Elected and appointed officials;
- Non-government organizations;
- Female agricultural or agricultural-related business owners / partners;
- Pesticide application license holders.

Included in the reporting of the NIFA planned program, 'Enhancing Agriculture and the Environment', OSU Extension has a number of programs that have more specific audiences, which are detailed separately below.

The target audience for programs which seek to increase profitable crop yields:

- Grain producers
- Fertilizer chemical retailers
- Input company representatives
- Crop advisory, agency and soil water conservation districts
- Natural Resources Conservation Service
- Ohio Department of Agriculture
- Environmental Protection Agency

The OSU Extension 'Ohio Volunteer Master Gardener Program' targets the following audiences:

- Ohio citizens;
- Community leaders and officials;
- Master gardeners.

"Ask a Master Gardener" targets the following audiences:

- New and beginning gardeners;
- Gardeners with distressed gardens, plants, new / unusual problems with plants and / or diseases.

The 'Ohio Certified Volunteer Naturalist' program targets the following individuals:

- Ohio citizens
- Community leaders and officials
- Certified naturalists

## 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 volunteers involved in delivery and implementation of the 'Ohio Master Gardeners' and 'Certified Volunteer Natural Program' programming
- number of multi-state partnerships in agriculture, horticulture, and natural resources
- number of subscribers to the 'Crop Observation and Recommendation Network' (CORN)
- number of people completing the 'Transitioning Your Farm / Agricultural Business to the Next Generation' workshops
- number of hits to the "Crop Observation and Recommendation Network" (CORN) website
- number of people attending 'New and Small Farm College' events
- number of people attending the 'Small Farm Conference and Trade Show'
- number of new Master Gardener Volunteers
- number of people attending the 'Farm Science Review' event
- number of Certified Crop Advisers (CCAs) certified to provide consulting in Ohio
- number of attendees at the 'Conservation Tillage and Technology Conference'
- number of individuals participating in nutrient stewardship educational programming

☑ 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 | total number of people indicating an increased knowledge of current practices and emerging technology in conservation tillage as a result of attending the Conservation Tillage Conference |
| 2 | number of female farm operators or partners completing the Annie's Project course, where they gained knowledge about issues related to women in agriculture |
| 3 | number of attendees at Ohio Women in Agriculture conferences who indicated the intent to implement at least one skill learned during the conference |
| 4 | number of Ohioans who learned new information about forestry / woodland stewardship |
| 5 | number of individuals attending commercial pesticide applicator training (PAT) who learned new information |
| 6 | number of participants in 'Nutrient Stewardship for Cleaner Water' programming who indicated they have improved their knowledge about nutrient management as a result of attending an OSUE educational event on fertilizer application |
| 7 | number of participants in Agricultural Emergency Management programming who experienced knowledge gains as a result of educational programming |
| 8 | number of Ohio youth and adults gaining knowledge on topics related to agricultural safety and health |
| 9 | number of individuals gaining information on assistive technology and other disability services to aid in farm operations |
| 10 | number of individuals gaining knowledge of farm processes and practices |
| 11 | number of individuals gaining knowledge on best management practices to treat nonpoint source pollution before it reaches Ohio's waterways |
| 12 | number of participants in private pesticide applicator training (PAT) programming who indicated they have improved practices to protect the environment as a result of attending an OSUE educational event |
| 13 | number of new or small farmer operators receiving education that can help improve their: production practices, land use choices, assessment of personal and natural resources, or identification of marketing alternative |

**Outcome #** 1

**1. Outcome Target**

total number of people indicating an increased knowledge of current practices and emerging technology in conservation tillage as a result of attending the Conservation Tillage Conference

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 102 - Soil, Plant, Water, Nutrient Relationships
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems
- 601 - Economics of Agricultural Production and Farm Management

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 2

**1. Outcome Target**

number of female farm operators or partners completing the Annie's Project course, where they gained knowledge about issues related to women in agriculture

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 205 - Plant Management Systems
- 307 - Animal Management Systems
- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 3

**1. Outcome Target**

number of attendees at Ohio Women in Agriculture conferences who indicated the intent to implement at least one skill learned during the conference

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 4

**1. Outcome Target**

number of Ohioans who learned new information about forestry / woodland stewardship

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 123 - Management and Sustainability of Forest Resources
- 216 - Integrated Pest Management Systems

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 5

**1. Outcome Target**

number of individuals attending commercial pesticide applicator training (PAT) who learned new information

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems

- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 6

**1. Outcome Target**

number of participants in 'Nutrient Stewardship for Cleaner Water' programming who indicated they have improved their knowledge about nutrient management as a result of attending an OSUE educational event on fertilizer application

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 102 - Soil, Plant, Water, Nutrient Relationships
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation
- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 7

**1. Outcome Target**

number of participants in Agricultural Emergency Management programming who experienced knowledge gains as a result of educational programming

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 8

**1. Outcome Target**

number of Ohio youth and adults gaining knowledge on topics related to agricultural safety and health

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 9

**1. Outcome Target**

number of individuals gaining information on assistive technology and other disability services to aid in farm operations

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 10

**1. Outcome Target**

number of individuals gaining knowledge of farm processes and practices

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 205 - Plant Management Systems
- 307 - Animal Management Systems
- 601 - Economics of Agricultural Production and Farm Management

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 11

**1. Outcome Target**

number of individuals gaining knowledge on best management practices to treat nonpoint source pollution before it reaches Ohio's waterways

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation
- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 12

**1. Outcome Target**

number of participants in private pesticide applicator training (PAT) programming who indicated they have improved practices to protect the environment as a result of attending an OSUE educational event

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems
- 216 - Integrated Pest Management Systems
- 723 - Hazards to Human Health and Safety

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 13

**1. Outcome Target**

number of new or small farmer operators receiving education that can help improve their: production practices, land use choices, assessment of personal and natural resources, or identification of marketing alternative

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 102 - Soil, Plant, Water, Nutrient Relationships
- 205 - Plant Management Systems
- 307 - Animal Management Systems
- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation

**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
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

Extension has historically been very responsive to extreme climatic events. In Ohio, these events include flooding, drought, tornadoes, ice storms, and extreme cold. We will be responsive to our clientele and all partners to provide programming to help alleviate the impacts of these events.

Changes in the economy also affect Extension programming in that we help producers remain financially solvent and help them adapt to changes in economic conditions. OSUE remains flexible in finding multiple funding sources so that appropriations changes do not have as dramatic an affect as they may otherwise have.

Public policy and government regulations are constantly changing. OSUE provides information and works with partner agencies to ensure that producers understand the changes in regulations and can manage their business affairs appropriately.

The population of Ohio is changing. As Ohio becomes an increasingly urban state, OSUE is creating

new programs, and adapting old ones to help meet the needs of this ever changing and growing clientele base.

## V(K). Planned Program - Planned Evaluation Studies

### Description of Planned Evaluation Studies

The following are planned evaluation study types for the 'Enhancing Agriculture and the Environment' program:

- After only (post program)
- Retrospective (post program)
- Pre-post

The following are planned data collection methods for the 'Enhancing Agriculture and the Environment' program:

- Sampling
- Mail survey
- On-site survey
- Case study
- On-line survey

## V(A). Planned Program (Summary)

**Program # 15**

**1. Name of the Planned Program**

Preparing Youth for Success (Extension)

**2. Brief summary about Planned Program**

As Ohio's economy continues the shift from an industrial to a knowledge base, its young people and volunteers supporting them will need advanced skills to be successful. OSU Extension, through 4-H and other programming efforts, will continue to provide resources and support for volunteers who deliver educational programs focused on critical issues affecting youth.

Programming in the 'Preparing Youth for Success' planned program will continue to include activities such as:

- workshops
- face-to-face events
- curriculum development, as needs arise
- media and website creation and updating
- hosting county and state fair
- day and overnight camping events
- educational youth programming
- in-school and after-school enrichment programs, with heavy emphasis on science, technology, engineering, and math

The goal of 'Preparing Youth for Success' (and 4-H related programming) will continue to be the same as it was in 1902, when 4-H first took root: "the development of youth as individuals and as responsible, productive members of the community in which they live."

**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 |
|---|---|---|---|---|---|
| 801 | Individual and Family Resource Management | 25% | | 0% | |
| 806 | Youth Development | 75% | | 0% | |
| | **Total** | 100% | | 0% | |

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

### 1. Situation and priorities

It is the mission of 4-H to empower youth to reach their full potential by working and learning in partnership with caring adults. The Ohio 4-H program seeks to promote positive youth development, facilitate learning, and engage youth in educational programs in order to enhance their quality of life. 'Preparing Youth for Success' programming has the potential to benefit individuals, households, communities, and society. The educational priorities are: (1) science, technology, engineering and mathematics tied to scientific learning, inquiry, and discovery; and (2) citizenship tied to the activities of people within institutions, government and communities.

There is opportunity to build human and social capital in individual neighborhoods and communities by creating sustainable volunteer-led groups that promote youth contribution. 'Preparing Youth for Success' programs will continue to use multiple modalities for delivering programming, including (but not limited to): face-to-face events (both with peers and adults), large group events (such as club meetings, camping, and fair), and individual work time (preparing for projects at fair through workbook activities).

Programming in this area has a documented history of strong learning and behavior outcomes and impacts. Evaluation has been, and will continue to be, a regular component of 'Preparing Youth for Success' programming. Evaluation results will continue to inform educators, advisory groups, and the organization about both the successes and areas for improvement in relation to 'Preparing Youth for Success' programming. Future programming priorities will be identified and set by reviewing evaluation data as well as stakeholder feedback.

### 2. Scope of the Program

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

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

### 1. Assumptions made for the Program

1. Young people will need to be involved in meaningful learning experiences, with peer groups and strong adult role models.
2. Research will continue to support positive youth development practices; 'Preparing Youth for

Success' programming will continue to incorporate the most up-to-date research in the most effective way for reaching youth.

3. Demands on family time will continue to be a factor in the programs youth choose or in which they are able to participate; program delivery methods will be altered as needed to help accommodate youth participation in consideration of family obligations.

4. There will continue to be external risk factors that influence youth and the need for programs that address those factors.

5. Youth will face an increasing amount of choices and opportunities in all facets of their lives

6. 'Preparing Youth for Success' programming will continue to need a caring, dedicated base of volunteers willing to help implement youth programming (club advisors / leaders, camp counselors, fair judges, etc)

It is expected that the program will continue to have strong outputs and outcomes. Delivery methods will likely change or be modified, as technology and the ways in which youth engage with the world around them change.

**2. Ultimate goal(s) of this Program**

Extension youth-oriented educational programs foster a practical understanding and application of science, technology, engineering, math and other life skills that will lead to a more prepared young person pursuing a post-secondary education, entering the workforce, and becoming productive citizens of their 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 | 87.0 | 0.0 | 0.0 | 0.0 |
| 2018 | 87.0 | 0.0 | 0.0 | 0.0 |
| 2019 | 89.0 | 0.0 | 0.0 | 0.0 |
| 2020 | 89.0 | 0.0 | 0.0 | 0.0 |
| 2021 | 90.0 | 0.0 | 0.0 | 0.0 |

## V(F). Planned Program (Activity)

**1. Activity for the Program**

- Conduct workshops
- Face to face and virtual meetings
- Develop curriculum
- Provide training to professionals, volunteers and youth
- Media and web site creations
- Partnering with businesses and other organizations
- Fair (county and state)
- Camping

- Conduct educational programs with youth
- Conduct in-school and after-school enrichment

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class<br>● Workshop<br>● Group Discussion<br>● One-on-One Intervention<br>● Demonstrations | ● Public Service Announcement<br>● Newsletters<br>● TV Media Programs<br>● eXtension web sites<br>● Web sites other than eXtension<br>● Other 1 (Pod Casts)<br>● Other 2 (Emerging social media technology) |

**3. Description of targeted audience**

- Youth: infants through 18 years of age (with a special focus on new and underserved audiences)
- Parents of youth
- Volunteers working with youth audiences
- Teachers / educators working with youth audiences
- Families
- Youth development professional staff
- Community leaders involved in subject specific areas
- Youth (8-18 years), parents of youth, and volunteers working with youth; all with association with animal projects
- General public who have interest in 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 youth enrolled/engaged in organized community 4-H clubs
- number of youth enrolled/engaged in after school 4-H programs
- number of youth participating in special interest and short-term programs
- number of youth participating in school enrichment programs
- number of youth participating in 4-H overnight camping programs
- number of youth participating in 4-H day camping programs
- number of adult volunteers contributing to 4-H programming and events
- number of teen volunteers contributing to 4-H programming and events
- number of adult volunteers contributing to the planning and implementation of the 'Real Money. Real World.' financial literacy program
- Number of youth participating in the "STEM Pathways" signature program
- number of youth participating in 'Real Money Real World' youth financial literacy programming
- number of youth participating in the 4-H CARTEENS ("Caution and Responsibility" teen safe driving) research project

☐ 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 youth indicating an increase in understanding of decision making processes |
| 2 | number of youth who have indicated an increased knowledge of the educational topic being presented |
| 3 | number of youth who have demonstrated decision making and problem solving skills |
| 4 | number of youth who have indicated the intention to practice improved basic life skills |
| 5 | number of youth who have participated in 4-H programs and indicated that they now possess transferable workforce skills |
| 6 | number of participants who increased awareness about what it costs to maintain a household (RMRW) |
| 7 | number of participants who increased feeling of importance about waiting to have children until financially ready (RMRW) |
| 8 | number of participants who indicated their likeliness to make changes relative to getting more education or training after high school (RMRW) |
| 9 | number of participants who indicated they will think through how every spending decision affects other spending opportunities and choices (RMRW) |
| 10 | number of participants who increased awareness about how the type of job they have affects how much money they will make / their earning potential (RMRW) |
| 11 | number of participants who indicated their likeliness that they have a plan for spending that includes both wants and needs (RMRW) |
| 12 | number of youth participants who indicated the likelihood of considering how their spending decisions affect / impact other people (RMRW) |
| 13 | number of youth participating in the 4-H CARTEENS ("Caution and Responsibility" Teens safe driving program) research project who increased their knowledge, attitudes, and / or skills relative to safe automobile driving habits |
| 14 | number of Ohio youth who increased their STEM knowledge / skills |

**Outcome #** 1

**1. Outcome Target**

number of youth indicating an increase in understanding of decision making processes

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 2

**1. Outcome Target**

number of youth who have indicated an increased knowledge of the educational topic being presented

**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**

number of youth who have demonstrated decision making and problem solving skills

**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**

number of youth who have indicated the intention to practice improved basic life skills

**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**

number of youth who have participated in 4-H programs and indicated that they now possess transferable workforce skills

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 6

**1. Outcome Target**

number of participants who increased awareness about what it costs to maintain a household (RMRW)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 7

**1. Outcome Target**

number of participants who increased feeling of importance about waiting to have children until financially ready (RMRW)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 8

**1. Outcome Target**

number of participants who indicated their likeliness to make changes relative to getting more education or training after high school (RMRW)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 9

**1. Outcome Target**

number of participants who indicated they will think through how every spending decision affects other spending opportunities and choices (RMRW)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 10

**1. Outcome Target**

number of participants who increased awareness about how the type of job they have affects how much money they will make / their earning potential (RMRW)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 11

**1. Outcome Target**

number of participants who indicated their likeliness that they have a plan for spending that includes both wants and needs (RMRW)

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 12

**1. Outcome Target**

number of youth participants who indicated the likelihood of considering how their spending decisions affect / impact other people (RMRW)

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management
- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 13

**1. Outcome Target**

number of youth participating in the 4-H CARTEENS ("Caution and Responsibility" Teens safe driving program) research project who increased their knowledge, attitudes, and / or skills relative to safe automobile driving habits

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 806 - Youth Development

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 14

**1. Outcome Target**

number of Ohio youth who increased their STEM knowledge / skills

**2. Outcome Type :** Change in Knowledge 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 Public priorities
- Competing Programmatic Challenges

**Description**

Economy and changes in appropriations may change the number of Extension staff which are employed in Ohio, which will ultimately effect the level of programming available within this planned program. Competing (external) programs may also detract from our current clientele base.

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

The following are planned evaluation studies for the 'Preparing Youth for Success' program:

- After only (post program)
- Retrospective (post program)

The following are planned data collection methods for the evaluation studies of the 'Preparing Youth for Success' program:

- Sampling
- Mail survey
- Observation
- Web-based surveys
- End-of-event exit slips

## V(A). Planned Program (Summary)

**Program # 16**

**1. Name of the Planned Program**

Strengthening Families & Communities (Extension)

**2. Brief summary about Planned Program**

Individuals and families face a wide range of challenges in their daily lives. OSU Extension research and programming will bring solutions to targeted statewide issues through signature programs and other educational events that deliver the latest research-based information in creative and innovative ways. 'Strengthening Families & Communities' programming will focus on a full range of topics designed to teach people how to apply practical information to their daily lives in order to make informed choices about family financial management, healthy lifestyles, nutrition, and family relationships.

**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 | 20% | | 0% | |
| 724 | Healthy Lifestyle | 20% | | 0% | |
| 801 | Individual and Family Resource Management | 30% | | 0% | |
| 802 | Human Development and Family Well-Being | 30% | | 0% | |
| | **Total** | 100% | | 0% | |

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

**1. Situation and priorities**

As determined through the use of statewide clientele surveys and focus groups, three key issues for residents of Ohio and the nation are economic stability, healthy lifestyles, and educational success. The nature of these complex key issues requires programming that is holistic and multidisciplinary. OSU Extension will focus teaching and outreach programming to engage with stakeholders to address these critical issues. Based upon local success, we will replicate programming across the state and advance the progress achieved in initial programming implementation. We will build upon our experience and success to further address the needs of Ohioans.

OSU Extension will focus the skills and abilities of personnel in nine multi-county Extension Education and

Research Areas to deliver the latest knowledge, while maintaining an emphasis on local programming needs. The research and educational technologies we support empower people and communities to solve problems and improve their lives. Specifically, Extension works to improve the quality of life for all Ohio citizens. Strengthening the lives and communities of Ohio through research-based educational programming (activities at the core of OSU Extension's mission) are keys to the long-term competitive sustainability of Ohio's high standard of living.

OSUE will continue to monitor research on topics related to 'Strengthening Families and Communities' as well as obtain feedback from stakeholders, the community, and advisory groups for local and state programming needs.

**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**

OSU Extension has a strong history of helping to identify and meet community needs. Our team of campus- and field-based faculty and staff work collaboratively to design and implement research-based, non-biased educational curricula and programming. We have several fully developed programs that target a range of clientele. Each is tailored to meet the larger environmental and developmental needs of the target audience. Particular attention is given to ensuring that the program materials are immediately relevant, contextually grounded, and based on sound pedagogical theories. The Conceptual Programming Model (CPM) guides the development of our programming. The CPM specifies that organizational and social conditions be assessed to determine programming opportunities, focusing attention on the importance of understanding audience needs, delineating outcomes to be achieved, designing appropriate, audience-responsive learning activities to achieve those outcomes, and specifying evaluation methods to document impact. Further, it assumes that program planners will draw upon necessary principles and tenants from relevant theories (e.g., Behavioral, Cognitive, Affective, Communications, Human Development, Economic, Psychological, Social, etc). Social Learning and Stages of Change theories are also foundational to our program development. Many of our programs are developing or have developed evidence that they work to increase awareness, knowledge, skills and improve behavior, largely via quasi-experimental designs (e.g., pre/post testing).

**2. Ultimate goal(s) of this Program**

The ultimate goal of the 'Strengthening Families and Communities' planned program is to provide the citizens of Ohio with practical information which they can apply to their daily lives in order to make informed choices about family financial management, healthy lifestyles, nutrition, and family relationships, resulting in reduced health care expenditures, financial security at all life stages, improved quality of life, and more resilient families and 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 | 32.0 | 0.0 | 0.0 | 0.0 |
| 2018 | 32.0 | 0.0 | 0.0 | 0.0 |
| 2019 | 33.0 | 0.0 | 0.0 | 0.0 |
| 2020 | 34.0 | 0.0 | 0.0 | 0.0 |
| 2021 | 35.0 | 0.0 | 0.0 | 0.0 |

## V(F). Planned Program (Activity)

### 1. Activity for the Program

- Conduct formal and informal needs assessments
- Develop programming materials and curricula
- Conduct meetings, workshops and educational sessions
- Conduct program evaluation and applied research
- Form and sustain community partnerships
- Train volunteers, paraprofessionals, and other community agency/organization professionals

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

**Extension**

| Direct Methods | Indirect Methods |
|---|---|
| ● Education Class | ● Public Service Announcement |
| ● Workshop | ● Newsletters |
| ● Group Discussion | ● TV Media Programs |
| ● One-on-One Intervention | ● Web sites other than eXtension |
| ● Demonstrations | ● Other 1 (social media) |

### 3. Description of targeted audience

'Strengthening Families and Communities' programming is tailored to meet the needs of each audience we engage. School programming is age appropriate, whereas programs at Senior Centers are targeted to inform on safe food preparation for individuals living alone or with one other person. The end result is a program that has the potential to encompass all residents of the state. Below is a listing of the specific groups we intend to reach with targeted awareness, educational and skills-development programming:

- Parents of children ages birth to 18, including, but not limited to: teen, step, adoptive, foster, single, divorcing, incarcerated, fathers who have not yet established paternity, and grandparents;
- Adults in, or thinking about entering, intimate relationships;
- Young adults;
- Older adults and those who care for them;
- Baby boomers, especially women;

- Limited resource families, including mothers with young children and food stamp recipients;
- New employees;
- Bankruptcy filers;
- Debt burdened individuals and couples;
- First time homebuyers;
- Individuals with diabetes and their caregivers/family support members;
- Food establishment managers and food service employees;
- Volunteer food preparers;
- Child care providers;
- Teachers;
- Social service professionals;
- General consumers (other formal or informal education).

## 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

- Educational sessions held with two or more participants
- number of volunteer hours given
- number of Dining with Diabetes classes taught
- total number of volunteers participating in the planning and / or implementation of 'Strengthening Families and Communities' programming
- number of visits to the blog for the OSUE signature program, "Live Healthy Live Well"
- number of individuals participating in the 'Live Healthy Live Well' program
- number of 'Likes' on posts to the "Live Healthy Live Well" OSUE signature program Facebook page
- number of individuals who participated in a 'Strengthening Families and Communities' event / project that are defined as under-represented individuals (i.e., individuals who may not have participated fully - e.g., women, minorities, persons with disabilities, small farm owners, etc).
- number of participants in 'Live Healthy Live Well' email challenges

☑ 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 participants who increased their financial literacy |
| 2 | number of participants who have developed an integrated plan for achieving financial security |
| 3 | number of 'Successful Co-Parenting' participants who plan on using information learned in the educational event they attended |
| 4 | number of 'Live Healthy Live Well' participants who reported using the information they learned during the email challenge, which may help reduce the risk of chronic disease |
| 5 | percentage of 'Dining with Diabetes' (DWD) participants that report engaging in cooking activities to help take control of their diabetes - using healthy oils in cooking, substituting herbs and spices for salt and using nutrition labels |

**Outcome #** 1

**1. Outcome Target**

number of participants who increased their financial literacy

**2. Outcome Type :** Change in Knowledge Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 2

**1. Outcome Target**

number of participants who have developed an integrated plan for achieving financial security

**2. Outcome Type :** Change in Condition Outcome Measure

**3. Associated Knowledge Area(s)**

- 801 - Individual and Family Resource Management

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 3

**1. Outcome Target**

number of 'Successful Co-Parenting' participants who plan on using information learned in the educational event they attended

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 802 - Human Development and Family Well-Being

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 4

**1. Outcome Target**

number of 'Live Healthy Live Well' participants who reported using the information they learned during the email challenge, which may help reduce the risk of chronic disease

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

**4. Associated Institute Type(s)**

- 1862 Extension

**Outcome #** 5

**1. Outcome Target**

percentage of 'Dining with Diabetes' (DWD) participants that report engaging in cooking activities to help take control of their diabetes - using healthy oils in cooking, substituting herbs and spices for salt and using nutrition labels

**2. Outcome Type :** Change in Action Outcome Measure

**3. Associated Knowledge Area(s)**

- 703 - Nutrition Education and Behavior
- 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

- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Description**

{NO DATA ENTERED}

## V(K). Planned Program - Planned Evaluation Studies

**Description of Planned Evaluation Studies**

The following are planned evaluation study types for the 'Strengthening Families & Communities' program area:

- After only
- Retrospective
- Before-after
- During
- Case study

The following are planned methods of data collection for the 'Strengthening Families and Communities' program area:

- Sampling
- Mail survey
- On-site survey
- Structured interview
- Unstructured interview
- Case study
- Observation