2013 Ohio State University Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

While Ohio State University Extension (OSUE) and Ohio Agricultural Research and Development Center (OARDC) will continue with their rebuilding emphasis noted in the POW 2012 -2016, all parties to this 2013 - 2017 rolling plan of work recognize that to rebuild is not enough. This five-year plan recognizes that the only way to grow the future is to engage in transformational leadership. As economic conditions improve and our competitive advantage grows with new hires, we will rebuild infrastructure, faculty and staff ranks, and programs. At the same time, to be transformational, our leaders are rebuilding and re-growing for the future...a future that will probably dramatically different than the past. Thus our physical footprint, programs, and portfolios are envisioned to be adaptive, able to respond to and lead within the context of changing needs and new opportunities, and to be more stakeholder-centered, and responsive than ever before.

Like research and Extension stations nationwide, budget fluctuations have not impacted mission. On the other hand, availability of base resource support, both federal and state, will continue to impact the scope and robustness of science and services that can be delivered to stakeholders. In last year's update of this plan, we referenced a 2010/2011 paper, 'Investing in a Better Future through Public Agricultural Research', coauthored by an OSU College of Food, Agricultural, and Environmental Sciences' (CFAES) faculty member, Luther Tweeten. That paper continues its relevancy by providing an excellent presentation of data related to the value of investments in agricultural experiment stations and their mission. The same rationale holds true for investments in Extension programs, nationwide.

As to mission, OARDC and OSUE, administered through the office of The Ohio State University Vice President, Agriculture, 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 economic sectors through research, development, and Extension investments. Throughout this planning period, the primary focus will be on Extension and research activities that result in job growth and economic recovery. Likewise the mission is inclusive of the National Institute of Food and Agriculture's (NIFA) national agenda and its five national priority areas. The food and agriculture bioeconomy in Ohio is an enterprise worth over 100 billion dollars, employing over one million people, and depends in great part on the OSU research, Extension, and development program planning reported herein. On an annual basis, external reviewers (e.g., Battelle) reported that OARDC annually (in 2008 dollars) directly generates: $156.3 million in total Ohio economic output; 1,609 jobs in Ohio; $59.2 million in personal income for Ohio residents; and $5.5 million in annual state tax revenues. Battelle calculated OSUE's state impact as $159 million in total Ohio economic output; 1,918 jobs in Ohio; $64 million in personal income for Ohio residents; and $4.8 million in annual state tax revenues.

A major goal for 2013-2017 program is to help grow the Ohio economy by making incremental improvements in the food, agricultural, and environmental economies. Growing of jobs and the economy will require impact-directed research supported by Extension activities that leverage our human capital and foster knowledge and skill acquisition among our state citizenry.

CFAES, and in turn OARDC and OSUE, will bring closure to CFAES' 2008 Five Year Strategic Plan prior to the end of this Plan of Work 2013-2017. Meta-analysis of accomplishments within our strategic

plan framework will provide a basis for both CFAES's new strategic plan and upcoming NIFA Plans of Work. Work within these plans will be guided by a new OSU Vice President (VP), of Agriculture, as our current VP is retiring.

All CFAES planning has been and will continue to be guided by our long standing paradigm calling for consideration of four elements: production efficiency, economic viability through value added, social acceptability of our contributions, and environmental compatibility of products and practices. This Plan of Work, as well as the current CFAES strategic plan reflects the goals of Ohio State University and the Ohio Board of Regents. Additionally, the APLU/ESCOP Science Roadmap for Food and Agriculture will continue to inform OARDC and OSUE's programs throughout this planning period. That Roadmap identifies the following areas, all central to the collective mission of this reporting institution: (1) an interdependent global economy, (2) climate variability, (3) demands on the environment and the natural resource base, (4) renewable bioenergy sources and energy security, (5) health care costs, (6) trends toward obesity, (7) hunger and food security for the world's population, and (8) challenges to individual, family, and community well-being. While terminology will change by 2017, these problems will still be present and germane to the land grant program nationwide.

This Plan of Work, the CFAES Strategic Plan, NIFA's national priorities, and the Roadmap all reflect a common purpose. Planned Programs for 2013-2017 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 climate change, global food safety and security, health issues related to diet such as hunger, obesity, nutrition, and disease, and securing sustainable energy supplies, all, can be positively influenced by the research and Extension programs planned for herein. The CFAES Strategic Plan explicitly focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. OSUE and OARDC will continue to address these signature areas under the moniker of 'agbioscience' throughout much of this Plan of Work period. There exists a revolution in the integration of agricultural and bioscience knowledge, thus the origin of the term 'agbioscience'. Agbioscience is defined as the physical, biological, environmental, chemical, engineering, social, and economic sciences utilized, independently or in combination, in food, agricultural, and environmental research and Extension programming. Economic development and job growth within agbioscience are dependent on the wise use of the social, environmental, and human capital found throughout Ohio and the nation. OSU's agbioscience program underpins Ohio's $100 plus billion agricultural industry.

Scientific advancements in agbioscience are and will continue to provide unprecedented opportunities for global economic and societal achievements. OARDC is the singular research and development hub for agbioscience research in Ohio and OSUE is the center for associated education and human capital development according to a series of Battelle reports (2004-2009). Battelle reported that our institution is ideally positioned to lead Ohio in realizing progress in all significant aspects of the bioeconomy and contribute to a broad national agenda. Collectively, this capacity is targeted to new discoveries, advancement of new knowledge and acquisition thereof within our clientele, and associated human capital development. This should result in job growth and economic prosperity that are sustainable over time. To address the problems we face requires us to build new capacity to respond to demand. OSUE and OARDC, with partners such as the Ohio Farm Bureau, will continue to lead in such manner as to transform from within and assist our stakeholders in making the transformations needed to be viable in the decades to come.

To leverage our capacity, the three signature areas identified in the CFAES 2008 Strategic Plan continue to align the state's highest needs with this institution's greatest strengths. These three areas have substantial overlap with NIFA's five national priority areas. Likewise these needs are found throughout the nation and world. The OSU institutional perspective will continue to be from the local stakeholder to the

global marketplace. As we plan for the 2013-2017 period, globalization will continue to provide windows of opportunity for positioning our university, state, and nation to leverage and contribute to economies driven by new knowledge and new technology/materials platforms. While OARDC and OSUE provide leadership in many new economies, we also continue to focus on traditional areas where needs exist. Both are accomplished by leveraging federal and state base funding through competitive processes and the utilization of stakeholder input into planning processes, scientific peer review, and stakeholder review of processes, inputs, outputs, and impacts.

Base funding from federal and state sources provide the foundation of our research and Extension programs and are used as leverage in seeking extramural funding. The stability of these base funds is critical to delivering research, Extension, development activities, and related impacts that are commensurate with demand. If research and Extension stations nationwide are to contribute to the extent they are capable, program scope and robustness cannot be further eroded. OSUE and OARDC, like their counterparts nationwide, have the capacity to continue to provide transformational leadership in re-growing the economy and putting people back to work, while building sustainable economies and protecting the environment.

The approach to harnessing this capacity has changed to one where advances in agbioscience are less dependent on only making and growing things and more dependent on applying ideas and innovation to both new and existing products and practices. Knowledge has replaced raw materials and physical labor as the source of value, wealth, and economic prosperity. Our programs are positioning the agbioscience foci within knowledge-based industry clusters. Advances in agbioscience have shifted, and will shift even more in this planning period, beyond food and fiber production, alone, toward goals of also improving employment opportunities, public health, social well-being, energy independence, global food supply and security, and environmental well-being. Battelle (2009) reported the following: Agbioscience innovations are driving new, high visibility economic opportunities for American states, and the State of Ohio has been an early mover in recognizing the economic development potential of biobased resources. For Ohio, the foremost in-state driver of agbioscience R&D is OARDC, partnering with OSUE to build the human capital necessary to capitalize on the R&D activities.

A system for research, Extension, and development has been put in place that provides a continuum of support including: support for early stage basic science investigations in areas with potential signature platform linkages; development of applied R&D programs focused on translating basic science discoveries into practical innovations; and the testing of applied R&D discoveries for true market potential through scale-up and piloting projects, demonstration projects, and market feasibility assessment. This is resulting in technology transfer, cluster business attraction, new enterprise development, advancements in existing businesses clusters, and Ohio agbioscience business cluster growth and expansion. The knowledge gained is further extended to stakeholders with the ultimate aim of advancing the Ohio economy and growing jobs.

OARDC and OSUE will continue to build on and grow the strengths recognized by Battelle well beyond this 2013 -2017 timeframe. OSUE and OARDC will continue to work collaboratively throughout this planning period to advance their land grant mission and accomplish specific objectives such as advancing the Ohio economy and growing jobs. Much centrality exists because both organizations work within the College of Food, Agricultural, and Environmental Sciences' Strategic Plan with primary focus on three aforementioned signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products.

Eighty eight faculty members who work in these areas hold a joint appointment in both OARDC and OSUE. Almost all commodity and industry support programs will continue to have teams of researchers and Extension faculty and staff working collaboratively with stakeholders in these respective programs. OARDC and OSUE faculty will continue to partner with multiple colleges at OSU, with colleagues

worldwide, and with business, industry, public interest groups, and multiple other stakeholders in a collaborative manner.

Planning calls for OARDC and OSUE to be fully engaged with each other and with partners at all levels of an agbioscience product-service value chain, from idea inception to the impact on society, often referred to as the 'gate to plate' or 'cell to sell' concept. One example of this collaborative effort is the BioHio Research Park, located on the OSU Wooster campus. That park will continue to support commercializing ideas and products from food, agricultural, and environmental research laboratories and moving them to the marketplace. OARDC and OSUE will continue to be fully engaged as the Park serves as a catalyst for local and regional development by supporting the creation of an agbioscience industry cluster in northeast Ohio and propelling an economic shift for Ohio. Exemplary of the outputs and impacts that will be built upon is the efforts of one new business in the park to supply up to 25% of the Wooster campus' energy needs with bioenergy generated from food processing waste streams. By 2013, that bioenergy will also be fueling OARDC vehicles. Each year that Park, now a fully sanctioned and functioning partnership, is receiving recognition and funding from various agbioscience entities, both on and off the Park proper. In great part because the Park was established to help transform a way of doing business, northeastern Ohio has rapidly expanded its private agbioscience portfolio. The Park is expected to continue in this role throughout the decade.

This Park is complimented by an existing food, agricultural, and environmental research, Extension, and development center (South Centers) in southern Ohio that serves the economically depressed Appalachian region of the state. Economic development is the primary theme at this Center. Programs that will continue to grow at South Centers are those that seek to find crops to replace tobacco, new industry development such as aquaculture, and an Extension program for enterprise development. That Center's focus on underserved populations is critical to the collective mission of OARDC and OSUE. Each year South Centers receives strong support from local stakeholders, elected leaders, and business and industry.

OARDC and OSUE are playing new and different transformational roles aimed at assisting Ohio and the nation in turning around the economy, growing jobs, and creating sustainable agbioscience growth and development, at the same time as they advance scholarship and service within the academy. A comprehensive view of the value chain will continue to drive the research and Extension agenda throughout this planning period. That value chain is from agricultural and natural resource commodities to end products such as foods, fuels, fibers, polymers, etc. Included in the value chains are environmental and social services benefits. In addition, major economic shifts/recessional trends, climate change, rising energy costs, trade globalization, changing consumer preferences, public concern about food, environment, and energy security, and changes in the relationship between agriculture and neighboring communities, collectively, have and will continue to alter the context in which the OSUE and OARDC agenda is formulated and implemented. More so than ever, a functional public-private framework is demanded.

Emerging areas such as biotechnology, genomics, health, nutrition, advanced energy/materials, and ecosystem science are transforming the practices and products of agriculture. OSUE and OARDC will continue to partner with each other, with other OSU colleges, and with multiple external partners worldwide to accelerate these transformations. New institutional arrangements will continue to be developed that will foster transformational approaches in agbioscience. OARDC and OSUE will continue to find ways to lead and train others to lead. OARDC's role is providing the science for economic drivers while OSUE provides the leadership and training to engage and transform economies and lives. The overall emphasis is on creating jobs, adding value to products, advancing energy independency, and strengthening Ohio and national competitiveness, while leveraging human capital and enhancing the quality of life and quantity and quality of food, goods, and services for individuals and communities in Ohio and around the world, as environmental systems and natural resources are protected.

OSUE and OARDC, individually and collectively, will continue to focus extensively on the three aforementioned CFAES signature areas, the NIFA national priority areas, and the recommendations found in the APLU/ESCOP Science Roadmap for Food and Agriculture. In 2004, a targeted effort was launched to expand the economic impact of Ohio's agbioscience economy. That successful venture contributed to the 2010 designation of The Ohio State University as the Ohio Center of Excellence in Agriculture, Food Production, and Bioproducts by the Ohio Board of Regents and the University System of Ohio. It is the only such designated center to be housed solely within a single university. That designation will be important throughout this planning period as we seek to contribute to the state's economic recovery and advance our business competiveness worldwide.

To be more competitive in moving our discoveries into the marketplace, and to transform how we do business, CFAES has joined with law, engineering, business, and health sciences at OSU creating a strategy for more rapidly commercializing university research that is determined to have great promise. A Proof of Concept Center has been established to build a business case and invest to prove the concept, as well as attract external capital, increase start-up companies, and attract partners and collaborators. Additionally CFAES has hired a new Industrial Liaison Officer (ILO) to work with other ILOs hired in other OSU colleges to advance university - corporate relations. These are complimented by an existing in-college commercialization team, ATECH. Collectively these three entities are intended to build on CFAES' history of an extensive array of invention reports and patents awarded over the years. This collective initiative has potential to dramatically expand our role in delivering our discoveries to the marketplace and improving the lives of our stakeholders.

OSUE and OARDC recognize that all future gains are based in great part on our existing strengths and past achievements, as well as in the capacity to lead. OARDC, OSUE, and CFAES, in collaboration with stakeholders and partners, are committed to: (1) focusing on improving agricultural production; enhancing the quality of food and feed; ensuring an adequate, affordable, and safe food supply; and maintaining agrosecurity to ensure food security and the basics of nutritional health for a growing global population; (2) working to understand, protect, and remediate impacts to the environment and ecosystems to ensure long-term sustainability; and (3) to developing biomass-based advanced energy technologies and value-added biobased products such as fuels, specialty chemicals, and fiber products. OSUE and OARDC will continue to be characterized by: (1) recognizing and exploiting the continuum from fundamental to applied science; (2) generating knowledge and solving problems that span multiple economic, social, and ecological systems; (3) enhancing discovery, learning, engagement, and impact through partnerships; and (4) considering and integrating physical, chemical, economic, social, and ecological variables into sustainable systems that meet societal needs.

OARDC and OSUE have demonstrated a willingness to adapt to and lead within the context of new societal demands, new markets, and new financial and organizational realities. That commitment continues with the recognition that realities will continue to change. Both organizations have a record of being highly productive, responsive to stakeholders, and a collaborator within and external to OSU. Each planned program within this report is targeted to meeting stakeholder needs, supporting local, state, and national agendas within the agbiosciences, and advancing the land grant mission.

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
2013	200.0	0.0	84.5	0.0
2014	195.0	0.0	84.5	0.0
2015	195.0	0.0	84.5	0.0
2016	190.0	0.0	84.5	0.0
2017	190.0	0.0	84.5	0.0

II. Merit Review Process

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

- Internal University Panel
- External Non-University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The economic stresses of the past number of years have brought greater demand than ever for the expertise of OSU Extension and OARDC. Throughout this 2013 -2017 we will continue to expand our breath and depth of stakeholder contact to better meet these demands. While this is appropriate, it is also more important than ever as we seek to advance science and service that will provide timely impacts. Most of the demands relate to research, extension, and development activities that help to grow the economy of Ohio and create jobs. To this end the merits of research and extension efforts need both internal and external input, and review at all levels.

OARDC and OSU Extension 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. Other larger competitive grants are reviewed by panels of faculty and administrators and leading stakeholders who have expertise in the area of the award, e.g. agbioscience grants. When needed, faculty from outside the College are used a reviewers. Combined panels of academics and non- academics are being used more extensively as OARDC and OSU Extension seek to move research into the marketplace more quickly to respond to the new economic realities of the global economy and needs such as global food security.

All OARDC and OSU Extension publications 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. Those scholarly findings are also expected to appear in trade journals, extension media, and in public media, including all the newer social media. OSU Extension develops long range program plans through a process involving Extension personnel from throughout the system, input of lay leaders in communities, incorporating data about Ohio's population, and through collaboration with other agencies, institutions and organizations.

Each of OSU Extension program areas conducts long range strategic planning to prioritize programming. Specialists from academic disciplines provide insight from research trends while county Extension personnel provide insight from local communities. Systematic prioritization processes, such as Delphi, are used. Program area personnel work together to identify key issues that cut across disciplines. Special task forces or teams then collaborate to identify priority program efforts to address these issues. Funding is then allocated to support program priorities. Programmatic resources such as personnel and materials reflect the program priorities. In addition, these priorities direct from what sources grant funds are sought. Once strategic plans are in place, there is continual review of plans to include the ability to be responsive to unanticipated issues. The system provides flexibility for extension educators to address these issues. In situations where grant monies are obtained, staff with specific, short-term employment contracts are hired to assist in meeting priority needs. Educator specialization is a way for the system to provide subject matter expertise close to local communities. Educators determine a subject matter specialization that relates to needs in their geographical area of the state. They receive additional training to remain on the cutting edge of their field. They are encouraged to work with other educators in their region to address local needs in a timely manner. In addition, educators are linked to state specialists in the same discipline to enable the rapid dissemination of new information or the development of appropriate programming to address critical needs.

Review by both internal and external bodies is central to this organization's assessment of the merits of the program. That will continue to be a strong emphasis throughout this 2013 - 2017 planning period with the ultimate aim of assessing impacts on science, service, 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 the College of Food, Agricultural, and Environmental Sciences (CFAES), OARDC, and OSU Extension must address our stakeholders' most important issues as well as those that are articulated in local, state, and national planning documents. The issues of our stakeholders, to a great extent, are addressed in the CFAES Strategic Plan, NIFA's priority areas, and the aforementioned Roadmap. Throughout this 2013 -2017 planning period our organization will continue to use a stakeholder - based approach in their individual and collective strategic planning exercises and assessments.

OARDC and OSU Extension both will maintain advisory committees as well as linkages with county, regional, and statewide groups with whom they liaison for input and guidance. The Vice President, Agriculture also has a variety of advisory committees, as well as interactions with major supporters and commodity, processing, and distribution groups such as the Ohio Farm Bureau and Soybean Council, who provide valuable identification of critical issues. Each group and subgroup is charged with identifying additional stakeholders, committee members,

and others who may have a vested interest. To encourage stakeholder input into advancing education, scholarship, knowledge acquisition, and information diffusion into the institution's three signature areas of (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products, multiple methods are employed.

Both OARDC and OSU Extension rely on a layered approach to identifying critical issues and stakeholders. An established strategy within the institution that includes stakeholder input has identified the long-term critical issues related to our joint mission, those of NIFA, and the needs at state, national, and international levels. Faculty and staff have been hired within those areas. Each academic unit has subgroups of stakeholders based on needs for their research and extension programs. These units are also charged with continuing to identify new and emerging needs and associated stakeholder groups.

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

Throughout this 2013 -2017 planning period, under-served and under-represented stakeholder needs will continue to be addressed at all levels of administration at this institution. This has been reaffirmed in the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan, as well as in OSU Extension's 2008 Strategic Plan and OARDC's operational plans. OARDC and OSU Extension have sought and will continue to build linkages with a number of under-served groups such as communities in regions with limited access to healthy, affordable food, i.e. 'food deserts', Somali community through a fresh goat meat initiative, the Amish through multiple community - based programs, and now provide a number of publications in Spanish. Websites will expand Spanish language sections. OSU Extension and OARDC jointly manage a research, development, and extension center in southern Ohio (South Centers) that assists the economically depressed Appalachia region of Ohio. Faculty members also participate in the SROP that serves as a gateway for underrepresented students to enter graduate school.

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, local fresh foods to food banks, and farm markets in urban areas as a means to make fresh food more available to urban populations, many who are underserved. Likewise OARDC and OSU Extension are growing a relationship with a processor of ethnic foods in central Ohio as a means of better servicing the need for ethnic foods. A senior administrator of that group serves on OSU Extension's advisory committee. To address the needs of the underserved and under represented, stakeholders are first identified either by: (a) an overt request for research data or extension publications and /or programs such as a request to aid in enhancing the supply of fresh goat meat for a new immigrant populations; (b) a latent need identified by faculty and staff who work with these populations such as the effectiveness in terms of social stability, economic stability, and preparation for career advancement of daycare provided by grandparents of a rural single working parent; (c) from the literature; (d) a combination of a, b, and c. Based on the needs identified, the institution responds based on its academic and financial capacity to address the need. Priority of the need in relation to other needs of the under-represented and underserved are continually assessed internally. New windows of opportunity continue to open and will be serviced with culturally - relevant, culturally - sensitive products and programs.

OARDC and OSU Extension 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. OARDC and OSU Extension recognize that the

first step in addressing the needs of the under - served and under - represented is to address these matters internally, in turn building a culture of acceptance and appreciation of diversity within our own ranks. OSU has a strong commitment to diversity and strong track record of related performance from the University President's office to faculty and staff ranks. That commitment and related actions are seen as critical to mission success.

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

OSU Extension and OARDC, for this 2013 - 2017 period, will continue to evaluate all programs based on outcomes and impacts by assessing new scientific knowledge gained, behavioral changes of clientele, and change actions in practices and resultant products. Programs will describe their expected outcomes as the result of research and extension in terms of scientific breakthroughs, both basic and applied, economic activity generated, jobs created, new or more commodities and advanced materials, enhanced efficiencies and effectiveness in processing, economic gains/value added, and environmental enhancements or surrogate measures where environmental impacts may take decades to be manifested. Results will also be documented in terms of social gains, improvements in health and wellness, food and environmental security programs, as well as other improvements needed within our stakeholders' domain. 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 more towards energy independence, and mitigate of the impacts of climate change and other environmental problems.

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

Effectiveness and efficiency will continue to be assessed at all levels of the organization. OSU Extension and OARDC will continue to have limited resources and depend heavily on leveraging their base federal funding to attract state funding and competitive grants from extramural sources. In addition to the needs identified by our stakeholders, OARDC and OSU Extension are also focusing on NIFA's national priority areas and the aforementioned Roadmap as a means of helping the institution to target resources for greater efficiency. Continued and enhanced focus on assessing stakeholder needs while assessing the institution's capabilities within mission to meet those needs using base funding, extramural funds, or a combination of both is the first step for program effectiveness.

Efficiencies are also gained by predetermining where scarce resources are to be targeted and what impacts are expected based on the inputs allocated. We are highly dependent on stakeholders, ranging from those businesses that help frame and will commercialize the product and service concepts, to the human capital side of the equation, to the consumer. Recently completed strategic plans and external program reviews will continue to provide additional insight into the need - funding- program development- impact model. As economic recovery continues ever so slowly, maximizing effectiveness and efficiency throughout this planning period are critical to success of this reporting institution and perhaps to the long-term well being of agriculture experiment stations and state extension programs nationwide.

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 will continue to be a key theme throughout this 2013 - 2017 planning period. We are guided by a strategic plan that the College of FAES, OSU Extension, and OARDC, jointly, completed that is most comprehensive in scope and is heavily vested in stakeholder input. That Strategic Plan will continue to guide program emphasis for the first half of this planning period. As a new Strategic Plan is developed for the latter part of this planning period, the emphasis on stakeholders will be no less. In addition, OSU Extension completed an independent strategic plan over the 2007 - 2008 period that extensively engaged stakeholders at all levels. The Ohio Agricultural Research and Development Center, OSU Extension, and most academic departments/schools within the College of Food, Agricultural and Environmental Sciences have external advisory committees that meet 2-3 times a year to discuss current programs and provide input for future direction. These activities will continue.

All county Extension offices will continue to have an overall advisory committee, as well as focused committees, providing input for program planning, implementation, and evaluation. OSU Extension and OARDC involve stakeholders in meeting with state legislators to discuss programmatic priorities and budgetary needs to insure that we are focusing on critical needs of Ohioans.

In 2004, 2005, 2007 and 2008, OARDC and/or OSU Extension commissioned Battelle, a private research and development firm, to conduct studies of the economic and social impact of our programs. A Battelle study team interviewed hundreds of stakeholders about the effectiveness of the institution's research and extension programs. The recommendations from the reviews will continue to influence how OARDC and OSU Extension collaborate, and reinforce that identified priority efforts must continue to be based in great part on 21st century needs of Ohio citizens. In addition to the series of Battelle studies, each program area within OSU Extension conducted strategic plans to identify statewide priority programs. The process involves educators meeting with local advisory committees, reviewing data about demographic, economic, and social trends in Ohio, and prioritization processes. As a result, each program area has focused teams composed of campus and center specialists, as well as county educators, who will develop curriculum and evaluation strategies for statewide programs. In many cases, these teams have identified specific target audiences who they regularly involve in evaluating programs and educational materials and engage in planning. Some of the program teams include members from external organizations (statewide agencies, organizations, commodity groups) who are excellent partners for enhancing program outreach and delivery. OSU Extension administration also identified several issues of critical interest to Ohioans based on existing information.

The aforementioned items are and will continue to be the focus for interdisciplinary and

multidisciplinary programs. Based on funding availability, competitive funding for new programmatic initiatives and partnerships will be made available. County Extension Advisory Committees, as well as the State Extension Advisory Committee, will continue to be engaged in reviewing these proposed programs and prioritizing them as they relate to resources available and community needs. Meaningful stakeholder input is 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.

Stakeholder relations are part of OARDC and OSU Extension's culture. We have and will continue to build on a history of successfully identifying and linking with stakeholders. The institution will continue to utilize faculty and staff, and associates from support organizations, as well as political leaders, to help identify individuals and groups with whom we should be interacting. These contacts are logged and maintained. As new contacts are made, they are asked as to others who need to be included. Formal needs assessments and targeted surveys, as well as an annual statewide telephone survey, help to identify individuals, groups, issues, and needs. More often though it is at our extension programs, in one - on - one sessions at the state fair, local fairs, and special events, and active participation by faculty and staff in community group processes and in business/professional partnerships that expand our institution's clientele list, knowledge of needs, and feedback.

OARDC and OSU Extension are actively involved in planning and economic development at the county, regional, and statewide levels and will continue to do so throughout this 2013 -2017 planning period. Engagement involves local committee members being identified by the Extension personnel in that county. 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 and self-study diversity reviews to insure that involvement is sought from a representative group of local citizens. Educators are encouraged to reach out to new and underserved target audiences to identify specific needs to be addressed. This occurs at the campus level as well and will continue.

We have a large research arboretum on each to the two main agriculture campuses, Columbus and Wooster, attracting large numbers of visitors and volunteers annually. These sites are used to help open channels of communications as well as teaching and research laboratories. Following the 2010 tornado that struck the Wooster campus, doing substantial damage to that campus' arboretum, public support for helping to restore that arboretum was and continues to be exceptional. This illustrates the value placed on these facilities by stakeholders.

Several statewide program teams, such as the Agronomic Crops team, annually

conduct program evaluation and needs assessment directly with users of their web - based resources to determine what information they need during the growing season and how they want to receive that information. Program evaluations have determined for example that the information delivered in a timely manner from the Crop Observation Reporting Network (CORN) has resulted in an average savings of approximately $10 plus million annually in pesticide use. Such feedback in now leading OARDC and Extension to grow their presence on social media. This planning period will see a marked advancement in the use of these and other new stakeholder relations tools such as blogs and more time saving communication tools such as webinars and videoconferencing.

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 dat)

Brief explanation.

Multiple methods will be used in this planning period (2013 -2017) for collecting stakeholder input due to the multiple units and programs engaged in research, extension, and development. Faculty and staff members, departments and schools, and various other research and extension groups/centers/programs within the institution all have stakeholder that they seek out for feedback, usually informally. There are business and industrial partners, fellow research and extension institutions, and support organizations who are part of the list. These are updated regularly. Federal, state, regional, and local governments and agencies, as well as advisory committees and friends groups, commodity groups, and special interest groups add to the list of stakeholders from whom we seek input in the initial planning and execution phases of our programs and who provide both formative and summative assessments of outputs and impacts. Informal, one - 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. Also these personal contacts provide an opening for us to continue to return to these same individuals and groups for input ranging from early stage formative input through summative assessment.

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 advance both basic and applied research and build and test advanced models for extension programming for meeting their clients' needs. OARDC and OSU Extension are customer centered and stakeholder input will continue to be sought throughout this 2013 -2017 planning period. This is clearly articulated in the CFAES Strategic Plan that guides OARDC and OSU Extension. That plan explicitly calls for stakeholder input at all levels. Formal and informal inputs are required to meet client needs and 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.

Stakeholder input is critical in building research and extension programs that are impact oriented, that fulfill society's needs, and contribute to national well being. This input is most critical as we work to grow jobs and strengthen the economy. State, federal, and extramural supporters need to see constituency benefits in order to justify funding decisions. It is the field level interactions with stakeholders, in conjunction with sound theory and practice standards, that identify the majority of emerging issues. While strong theoretical academic insight is critical, food, agriculture, and environmental issues 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 have and will continue to direct and redirect both extension and research programs. It is such issues that provide the scientists with their study questions. Once answered, the response is framed for the clients and other interested parties by OSU Extension. The response includes intervention to effect change and assessment of impact. Sharing of new knowledge and adoption techniques using electronic media, including social media, is enhancing utilization of our organization's outputs. These have and will continue to influence faculty and staff hiring, shifts in priorities, resource allocation, and strategic/ action planning.

Likewise stakeholder input has and continues to influence how our institution positions itself in the marketplace and conducts business. Stakeholder input has transformed our corporate culture in that as a public institution, it is imperative for society to see our organization reflecting their aspirations and meeting their needs. As economies continue to struggle, this will be more imperative than ever.

Input is considered at many levels of the organization. The Administrative Cabinet of OSU Extension reviews input from surveys and strategic planning processes to

determine funding and staffing needs. The State Extension Advisory Committee meets 3-4 times a year and provides input on programmatic needs and proposed priorities. Cooperative Extension administrators (Director, Associate Director) and others with statewide program leadership responsibility have initiated a departmental accountability process with all campus units 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 campus departments. Locally, Extension Advisory Committees and other programmatic committees assist educators in prioritizing programs annually. They review information about local needs, capacity of Extension to deliver programs and guide the overall local programmatic vision. The OARDC Advisory Committee is equally as engaged in all aspects from budgeting to agenda setting. Meaningful stakeholder engagement is 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

With the possible impacts from climate change such as the 2011 Texas drought and resulting fires, and projected droughts in the Midwest in 2012, climate change threatens sustainable ecosystems and will continue to do so well beyond this 2013 -2017 planning period. Climate change is one of NIFA's five priority areas as well as a priority in the APLU/ESCOP Science Roadmap for Food and Agriculture. Sustainability in the face of climate change is problematic.

Sustainability is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Climate change impacts each of these areas and all of the Planned Programs reported herein. Achievements within all Planned Programs are dependent to a greater or lesser extent upon stable functioning ecosystems. An understanding the current and potential impacts of climate change Is basic for delivering to society a secure supply of food, fiber, other associated products, and related services. Anthropogenic effects, as well as naturally occurring effects on the climate, have potential to threaten that secure supply chain. Likewise these activities provide a basis for extending such knowledge to stakeholders who have participated in defining the need.

Scarcity of land and water resources, and the potential threat to both from climate change, demands the investigation of alternative uses and efficiency. This scarcity has major potential to negatively harm global food security, world peace, and stable societies. OARDC's participation in a $20 million grant to 11 universities from USDA-NIFA that aims to keep Midwest corn-based cropping systems resilient in the face of future climate uncertainties is but one example of this institution's efforts in this area. We were awarded a university supported targeted initiative enhancement grant on climate change that will continue into this planning period. Likewise we have climate related centers within academic departments such as the Carbon Sequestration Center that is focused on the role of carbon sequestration as a means to enhance soil quality and reduce atmospheric carbon. OSU Extension is serving as university wide leader in helping to generate and deliver fact-based information on Ohio's new oil shale initiative, a program that can have both positive and negative effects in terms of climate change.

OARDC and OSUE Extension will continue to use both internal funds and extramurally obtained funds to advance the research, extension, and development programs that contribute to this planned program.

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
132	Weather and Climate	50%		25%	
133	Pollution Prevention and Mitigation	40%		65%	
605	Natural Resource and Environmental Economics	10%		10%	
	Total	100%		100%	

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

1. Situation and priorities

OSU Extension and OARDC generate extension and research programs to inform an agriculture system that maintains high productivity in the face of climate change. Likewise the programs support parallel natural resource and environmental programs. These programs will help producers to plan for and make decisions to adapt to changing environments and sustain economic vitality, and can take advantage of emerging economic opportunities offered by climate change mitigation technologies. OARDC and OSU Extension's role, in partnership with other research and outreach organizations such as Battelle, is to inform the process. This line of research by agricultural experiment stations and companion extension programs are mandatory to meet domestic demand to reduce and/or mitigate the impacts from the anthropogenic effects 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 understanding their needs.

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 overt and latent needs for information and solutions. Given the political nature of this topic and the multiple predictive models, an unbiased science research and extension program is required. As we address problems and needs within our stakeholder communities, the organization (OARDC and OSU Extension) 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, reflect the more important issues in terms of priorities of stakeholders, and warrants 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 alternatives in the face of climate change; all citizens directly benefit from this program; the effort is supported by an advanced research and extension program; 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; and 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 areas for this program. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OSU Extension and OARDC's ultimate goal for this Program for the 2013 -2017 Planning Period is to generate programs to develop an agriculture and allied system that maintains high productivity in the face of climate change. This Planned Program is designed to contribute to the biological, chemical, physical, engineering, economic, and social research necessary to build a system for sustainable in the face of climate change. If the climate continues to shift in Ohio, then new varieties will need to be developed to not only cope with overall warming but also with greater temperature and moisture extremes as some models predict. 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
2013	4.0	0.0	1.0	0.0
2014	4.0	0.0	1.0	0.0
2015	4.0	0.0	1.0	0.0
2016	4.0	0.0	1.0	0.0
2017	4.0	0.0	1.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

On -going research activities related to climate change include both basic and applied research. This research takes place in all academic departments/schools within the College of Food, Agricultural, and Environmental Sciences. Laboratories for experiments, pilot plants, a feedstock processing plant, greenhouses, and research plots and stations support this program. All functional laboratories and sites are improved over time as program need warrants. OSU Extension provides parallel programs in this Planned Program to advance knowledge, promote adoption and change, and develop human capital. OARDC and OSU Extension faculty and staff 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 ● Workshop ● Group Discussion ● Demonstrations	● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites other than eXtension ● Other 1 (Factsheets) ● Other 2 (Webinars)

3. Description of targeted audience

In the Climate Change Planned Program, targeted audiences include, but are not limited to: business and industry that have expressed a need for climate change information that is derived through new research, extracted from on-going research, or is derived from scientific literature; other stakeholders; fellow academic units that partner with program scientists to create systems and processes needed to support not only the research, but also the adoption of the research findings by industrial partners; ag producers and farmers; fellow 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 that information, e.g. general public; other scientists and scientific groups; political entities; other education, outreach, and extension personnel; students from elementary school to post doctorate studies; and news organizations. As initiative expand such as oil shale development in Ohio, an expanded relationship between OSU and Iceland to collaborate on among other topics, climate change, and additional work in carbon sequestration, our targeted audience will continue to grow.

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
- Number of participants attending educational programs of one teaching hour or more.
- number of webinars / online educational and research sessions

☑ 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 the understanding of soil carbon sequestration research to the point that Ohio farmers can enter the carbon trading market.
2	number of producers using no-till techniques
3	number of workshops and training issues on toxic algae blooms
4	create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change

Outcome # 1

1. Outcome Target

Advance the understanding of soil carbon sequestration research to the point that Ohio farmers can enter the carbon trading market.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

number of producers using no-till techniques

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

number of workshops and training issues on toxic algae blooms

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change

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

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 the shift in any or all of these affect outcomes. Climatic extremes, coupled with pest and diseases that are often climate related, can impact outcomes. As the food, fiber, and environmental economy adjust to the global climate change, including droughts such as seen in Texas in 2011, flooding 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. Formative evaluation though can lessen the burden 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

Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving program goals. OARDC and OSU Extension use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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. Each formal extension program does collect feedback from participants. The techniques that continue to be employed, most of them being qualitative surrogate measures, are: (1) Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for the institution, ease of participation/inclusion, willingness to support, willingness to bring their other colleagues into our discussions, and overall level of satisfaction with research and extension processes and products; (2) feedback from advisory committees that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product; (3) elected state and federal officials' support for the institution in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that were contracted for with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from our faculty, staff, and students.

Specifically for the planned program in climate change research indicators to be reported will be, but not limited to:

1.Number of current year citations of climate related publications.
2. Number of current year climate relevant research programs.
3. Number of new crop varieties and genotypes with climate adaptive traits.

4. Number of new animal breeds and genotypes with climate adaptive traits.

5.Number of new assessment and management tools developed, including models and measurements of greenhouse gas emissions.

6.Number of new genotypes and varieties for climate adaptation in production agriculture and forestry.

Impacts, the number of peer reviewed publications, graduated degrees granted, and patents awarded, all within this planned program, are listed elsewhere in the report.

Collectively the quantitative and qualitative measures inform across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence our programs, services, processes, and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

War, the threat of shipping lane closure, market speculation, soaring demand worldwide, etc. create dramatic fluctuations in the crude oil markets .....and this has been the case since early oil crisis of the 1970s. The United States is highly dependent on these fluctuating crude oil imports to supplement its domestic sources for the creation of energy and other petroleum- based products. Even as our percentage of demand to meet our nation needs for imported oil has declined in the last few years, our dependency is an economic drain. This dependency is projected well beyond the end of this 2013 - 2017 planning period. Energy independence continues to be a primary national concern. NIFA now lists this area as one of its five priority areas as does the APLU/ESCOP Science Roadmap for Food and Agriculture. This Planned Program is also one of three signature areas identified in the College of Food, Agricultural and Environmental Science 2008 Strategic Plan; these are (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. OARDC and OSU Extension can contribute to this priority area as the nation's move towards greater energy independence.

Our nation has become one of the most prosperous in the world in great part because of its ability to utilize its natural resource base to build the economy as the nation expanded from east to west. As the nation grew, so did the quantity, quality, and efficiency of agricultural output, feeding the domestic population and then the world. Food, agriculture, and natural resources continue to underpin national well-being. At the same time though, food and traditional fiber crops alone do not take full advantage of the economic and social good opportunities that are available to agriculture and natural resource stakeholders. To that end, OARDC and OSU Extension, and multiple partners, are exploring new opportunities for adding value to biobased products, beyond traditional food and fiber markets, through commercialization of new products in the form of sustainable energy and advanced materials.

Due to the rising costs of crude oil and the eventuality of declining supplies of crude oil, biobased substitutes for petroleum based energy and other products are in demand, as are other forms of sustainable energy. Two major thrust areas are now being advanced- -biobased fuels and biopolymer type products. Ohio's bio - stream, rich in agricultural, plant fiber, and food- processing wastes, is capable of producing a large part of Ohio's residential electricity needs. In an effort to harness the power of the state's abundant biomass and provide alternatives to record-high energy prices, OARDC is establishing a pioneering bio-energy research facility on its Wooster, Ohio campus. Funded by public and private monies, the facility's aim is to optimize different technologies, such as anaerobic digestion and fuel cells, for the biological conversion of biomass into scalable energy systems. The facility will also offer an industrial testing platform to verify the energy potential of various wastes from different industries. One bioenergy company is now located in OARDC's BioHio research Park on the OARDC Wooster Ohio campus. That company is beginning to supply a portion of the campus' energy needs, including biogas for vehicles as well as electricity generated from food processing waste streams. That line of pilot plant testing and scaling up will continue throughout this planning period.

OARDC and OSU Extension efforts also inform ethanol development programs. Additionally, OARDC, OSU Extension, and their external partners continue to advance the Ohio BioProducts Innovation Center (OBIC). OBIC is developing/identifying bio-resource materials and chemical conversion technologies to generate industrial products such as lubricants and adhesives from raw materials grown in

the state, including corn and soybeans. Combining development of unique germplasms with novel chemical-synthesis technologies, oils, carbohydrates, and proteins will produce specialty chemicals targeted for use in a range of advanced bioproduct applications. Ultimately, OBIC's 'cell-to-sell' management plan links Ohio's research and commercial partners to focus academic research on market-based problems identified by business partners, which in turn lead to the commercialization of high-value industrial bioproducts and manufacturing solutions. Given that the global petrochemical industry is approximately $2 trillion annually, and biobased products will continue to fill the gaps in this market, as well as create new markets. Also given the demand by producers and consumers, and the breadth of partnerships already established, biobased research to generate sustainable energy and advanced materials is expected to be a major long-term research and outreach foci in Ohio and at OSU. Combining Ohio's largest industry, food and agriculture, with Ohio's second largest industry, polymers, to take advantage of new industrial platforms in biobased research and manufacturing will yield substantial economic activity and job creation, as well as contribute to a lessen dependency on foreign crude oil.

This program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that seeks on advance education, scholarship, knowledge acquisition, and information diffusion in the three aforementioned agbioscience signature areas.

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
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

Demand for alternative and value-added uses for Ohio's renewable bio-based resources and organic waste streams is strong. OARDC and OSU Extension's role, in partnership with other research and outreach organizations such as Battelle, is to inform the process. This line of research by agricultural experiment stations and companion extension programs nationwide are 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.

Scientists working in bio-based (advanced materials) products have formed strong partnerships with

industry to ensure that research informs development of commercialized products and processes that are in demand by consumer groups. Job growth is also most important. Without a growing body of knowledge in this area to create plentiful supply of sustainable energy and advanced materials while creating jobs and new industries, opportunities will be missed and society will not be well served. This 2013 -2017 planning period will see the introduction of research and extension programs related to Ohio generated shale oil and gas.

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 affect positive change in adding value through these well-planned research and extension programs.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Extension
- 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 overt and latent needs for alternative (advanced) energy and biobased products in a sustainable manner. As we address problems and needs within our stakeholder communities, the organization (OARDC and OSU Extension) becomes better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas.

The emerging development of shale oil and gas in Ohio is assumed to create new demands on OARDC and OSU Extension. Other key assumptions are: the issues within this program have been identified by our stakeholder/business partners and other clientele, and/or via a growing body of scientific literature; these reflect the more important issues in terms of priorities among stakeholders, and warrants 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 alternatives for some petroleum-based products; all citizens directly benefit from a secure and plentiful supply of non-petroleum based products and processes 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 and as crude oil reserves decline; and 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 the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

Goals in this planned program are oriented to providing the biological, chemical, physical, engineering, and social research and extension programming necessary to build a system for sustainable energy and advanced materials. Primary research and extension programs primarily focus on, but are not

limited to, biobased natural resources and from organic waste streams. Goals are: (1) the creation of partnership networks that involve all stakeholders at the appropriate point in the process (value chain) necessary to make these research and extension efforts true partnerships with fully vested partners; (2) to meet society's growing demand for alternatives to petroleum based products where demand, and economic and technological realities warrant; (3) to meet yet undetermined needs of society as crude oil and natural gas supplies decline; (4) to effectively utilize Ohio and the region's plentiful supply of biomass, including waste stream materials that has conversion potential; (5) effectively utilize Ohio agriculture's production capacity to produce plants that have the desired attributes required by new biobased industries for manufacturing alternative products. Research and extension impacts towards the goal of energy independence are reported in this Planned Program with an emphasis on developing biomass use for biofuels, designing optimum forestry and crops for bioenergy production, other advanced energy initiatives, and to produce value-added biobased/advanced industrial 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
2013	2.0	0.0	5.0	0.0
2014	2.0	0.0	5.0	0.0
2015	3.0	0.0	5.0	0.0
2016	4.0	0.0	5.0	0.0
2017	4.0	0.0	5.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Throughout the 2013 - 2017 planning period, research and extension activities will inform sustainable energy and advanced materials programs, through both basic and applied research, and with the full range of extension activities. The research takes place in all academic departments/schools within the College of Food, Agricultural, and Environmental Sciences. Laboratories for experiments, pilot plants, a feedstock processing plant, greenhouses, and research plots and stations throughout the state support this program. All functional laboratories and sites are improved over time as program need warrants. OSU Extension provides parallel programs in this Planned Program to advance knowledge, promote adoption and change, develop human capital, and support economic development activities. OARDC and OSU Extension faculty and staff engage in appropriate levels of outreach, engagement, 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	● Public Service Announcement
● Workshop	● Newsletters
● Group Discussion	● Web sites other than eXtension
● Demonstrations	● Other 1 (Factsheets)

3. Description of targeted audience

Targeted audiences include, but are not limited to: business, industry, and residents that have expressed a need for sustainable energy and advanced materials information that is derived through new research, extracted from on-going research, or is derived 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 not only the research, but also the adoption of the research findings by industrial partners; fellow 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 that information, e.g. community leaders, general public; other scientists and scientific groups; political entities; other education, outreach, and extension personnel; students from elementary school to post doctorate studies; and 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.
- Educational workshops and seminars
- Research based assessments of energy project sites
- Community energy project assistance & planning

☑ 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	Programs in this area will develop strategies to engage producers, industrial partners, and consumers groups over a 5-year period resulting in effective leadership-oriented partnerships.
2	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.
3	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.
4	Maintain an ongoing needs assessment program to identify yet to be determined needs of society for bio-based products as crude oil and natural gas supplies decline, as well as assessing impacts from other external factors.
5	By 2017, 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.
6	Support, though research, the building of biobased development that annually, beginning in 2013, utilizes Ohio and the region's plentiful supply of biomass, including waste steam materials in such manner as to improve the economy.
7	Support the building of biobased development that, beginning in 2013, effectively utilizes agriculture's production capacity to produce plants that have the desired attributes for manufacturing.
8	Increased understanding of energy alternatives, resources and project support
9	Implement change in energy usage by workshop participants
10	Complete installation of alternative energy activity
11	Complete plan for community or business energy activity

Outcome # 1

1. Outcome Target

Programs in this area will develop strategies to engage producers, industrial partners, and consumers groups over a 5-year period resulting in effective leadership-oriented partnerships.

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 # 2

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.

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 # 3

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 # 4

1. Outcome Target

Maintain an ongoing needs assessment program to identify yet to be determined needs of society for bio-based products as crude oil and natural gas supplies decline, as well as assessing impacts from other external factors.

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 # 5

1. Outcome Target

By 2017, 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 # 6

1. Outcome Target

Support, though research, the building of biobased development that annually, beginning in 2013, utilizes Ohio and the region's plentiful supply of biomass, including waste steam materials in such manner as to improve the economy.

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 # 7

1. Outcome Target

Support the building of biobased development that, beginning in 2013, effectively utilizes agriculture's production capacity to produce plants that have the desired attributes for manufacturing.

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
- 1862 Research

Outcome # 8

1. Outcome Target

Increased understanding of energy alternatives, resources and project support

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

Implement change in energy usage by workshop participants

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 10

1. Outcome Target

Complete installation of alternative energy activity

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 11

1. Outcome Target

Complete plan for community or business energy activity

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 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 (Supply and cost of crude oil)

Description

Supply, costs, transportation costs/impacts, and demand for petroleum products, and shifting projections of world reserves of crude oil and natural gas, as well as U.S. access to these, are critical external factors. New sources of oil and gas from Ohio's oil shale is an external factor. Availability of biobased raw products in Ohio, and regionally, and at what costs, economic, social and environmental costs, are external factors. Economic shifts such as cost of processing equipment or production costs, public policy shifts, regulations, and shifts in demand will be impact outcomes. Product trends/fades, advertising agendas, and public perceptions, to areas such as to petroleum reserves, are also external factors that effect 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, all will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving program goals. OARDC and OSU Extension use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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. Each formal extension program does collect feedback from participants. The techniques that continue to be employed, most of them being qualitative surrogate measures, are: (1) Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for the institution, ease of participation/inclusion, willingness to support, willingness to bring their other colleagues into our discussions, and overall level of satisfaction with research and extension processes and products; (2) feedback from advisory committees that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product; (3) elected state and federal officials' support for the institution in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11)

commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that were contracted for with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from our faculty, staff, and students.

Specifically for the planned program in sustainable energy research indicators to be reported will be, but not limited to:

1. Number of new technologies developed;.
2. Number of new varieties or other new feedstock sources developed.

Impacts, the number of peer reviewed publications, graduated degrees granted, and patents awarded, all within this planned program, are listed elsewhere in the report.

Collectively the quantitative and qualitative measures inform across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence our programs, services, processes, and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

Obesity is of major health concern nationwide, with approximately one third of adults and 17% of children in the US classified as obese (2011 data). Obesity health-related costs in the US are approximately $147 billion annually. Obesity is a concern from both society's perspective and from a research - extension perspective. NIFA lists this as one of its five priority areas as does the APLU/ESCOP Science Roadmap for Food and Agriculture. Obesity will remain a priority for OARDC and OSU Extension for this 2013 -2017 planning period and more than likely well beyond, given the societal and personal costs/impacts of obesity. The food plants and animals we grow, process, and provide for consumption have human health issues associated with them.

This Planned Program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan and is encompassed in the first signature area of that plan. That plan focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. 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 important 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 occur in Planned Programs other than this one.

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
702	Requirements and Function of Nutrients and Other Food Components	10%		80%	
703	Nutrition Education and Behavior	60%		10%	
724	Healthy Lifestyle	30%		10%	
	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 US Center for Disease Control (CDC). More than one third of U.S. adults, 72 + million people including 17% of U.S. children 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 US, according to the CDC, the underserved are most impacted with blacks having 51 percent higher prevalence of obesity when compared to whites, and Hispanics had 21 percent higher obesity prevalence. Obesity has physical, psychological, and social consequences in adults and children. Obesity is related to diabetes and 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 US health care system. Currently (2011), obesity-related health care costs totaled an estimated $147 billion. Between 1987 and 2001, diseases associated with obesity accounted for 27% of the increases in medical costs. Medical expenditures for obese workers, depending on severity of obesity and sex, are between 29% and 117% greater than expenditures for workers with normal weight. From 1979 to 1999, annual hospital costs related to obesity among children and adolescents increased, rising from $35 million to $127 million (data from CDC). 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. To that end OARDC and OSU Extension are dedicated.

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 and OARDC will continue to support a client oriented research and extension activities related to obesity throughout this 2013 -2017 planning period. As we address problems and needs within our stakeholder communities, the organization (OARDC and OSU Extension) become 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 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 are 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; these lines of inquiry will provide necessary knowledge to inform human enterprises; obesity - related research and extension education are demands by society to meet current and future needs; and base federal funding will continue to be available and leverage for extramural grants to support this Planned Program and the scientific staff who carry out these lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OARDC and OSU Extension's ultimate goal is to conduct research that informs programs that reduce obesity by providing science - based information so that individuals and families are able to make informed 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
2013	20.0	0.0	1.0	0.0
2014	19.0	0.0	1.0	0.0
2015	20.0	0.0	1.0	0.0
2016	14.0	0.0	1.0	0.0
2017	13.0	0.0	1.0	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 areas 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, per se, are found in this Planned Program. OARDC and OSU Extension advance programs that ensures 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 ● Workshop ● Group Discussion ● Demonstrations ● Other 1 (One-on-one Education)	● Public Service Announcement ● Newsletters

3. Description of targeted audience

Within the Childhood Obesity Planned Program targeted audiences include, but not limited to: specific individuals, families, and groups who have an expressed a need, or where there are latent needs, for related research and extension information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that partner with OARDC and OSU Extension to support not only the research, but also the adoption of the research findings by stakeholders; fellow 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 that information, e.g. obese children; other scientists and scientific groups; political entities; school administrators; students from pre-school to post doctorate studies; news organizations; and business and industrial groups concerned about obesity in their workforce or who are 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 graduate students competed
- number of educational sessions held

☑ 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	Advance extension activities ranging from how to provide policymakers better insight about how to help individuals overcome their inability to adhere to weight-loss plans to impacts on individual and groups' lives, both in terms of weight loss and in overall improvements in health.
5	Number of participants who learned new information from this program. (OSUE)
6	Number of participants who plan to increase their level of daily physical activity. (OSUE)
7	Number of participants who plan to increase their consumption of fruits and vegetables. (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

Advance extension activities ranging from how to provide policymakers better insight about how to help individuals overcome their inability to adhere to weight-loss plans to impacts on individual and groups' lives, both in terms of weight loss and in overall improvements in health.

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 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 # 6

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 # 7

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

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 are range of variables from food quality, to socio-emotional elements, to access to healthy foods, to economics such as the down turns we are currently experiencing in 2011, to individual's decisions in food choice. These shifts in economy further impact all aspects of people's lives, psychologically, socially, and physically, including obesity. Within this program area public monies, and the fluctuations in appropriations of such, having dramatic (both positive and negative) affect on human well-being, as do levels of government support for obesity education. Likewise public policy and the publics' priorities and perceptions, including popular culture and trends/fads, are major external factors impacting this program, as well as people's food and lifestyle choices. Priority of social science research for limited dollars, and the resulting competition, impact the extent that research can be carried out. Other factors such as migrant populations entering the community and workforce, or new populations who have recently immigrated into the area, and 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, disabilities, one's background/ education, social status, and similar affect individual's eating habits and lifestyle choices. These can also affect how one learns and how they will use any new knowledge gained. Often, individual traits are well inculcated into that individuals psyche and behavior and change is slow. 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, will affect outcomes. OSU Extension and OARDC are committed to working in this complex area throughout 2013 -2017.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving program goals. OARDC and OSU Extension use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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. Each formal extension program does collect feedback from participants. The techniques that continue to be employed, most of them being qualitative surrogate measures, are: (1) Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for the institution, ease of participation/inclusion, willingness to support, willingness to bring their other colleagues into our discussions, and overall level of satisfaction with research and extension processes and products; (2) feedback from advisory committees that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product; (3) elected state and federal officials' support for the institution in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by

extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that were contracted for with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from our faculty, staff, and students.

Speciffically for the planned program in obesity research indicators to be reported will be, but not limited to:

1.Number of active research projects on families' ability to access healthy and affordable foods in personal and socially acceptable ways.

2. Number of new and improved technologies and processes to enhance the nutritional value and marketability of foods and food products (excluding patents).

3.Number of active research projects on the development or adoption of healthy eating guidelines and childhood obesity.

4. Number of active research projects on the development or adoption of physical activity recommendations and childhood obesity.

Impacts, the number of peer reviewed publications, graduated degrees granted, and patents awarded, all within this planned program, are listed elsewhere in the report.

Collectively the quantitative and qualitative measures inform across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence our programs, services, processes, and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

OARDC and OSU Extension lead programs that advance food preservation and protect against pathogens and will continue to do so for the 2013 - 2017 planning period. Food safety, one of NIFA's five priority areas, is a major concern locally, nationally, and throughout the world. Likewise food safety is embedded in the APLU/ESCOP Science Roadmap for Food and Agriculture array of priorities. Due to the complexity of food systems, a robust research and extension program is required to meet societal needs for a safe food supply. OARDC has multiple on-going grants within its $100 million plus research portfolio that will continue well into this planning period. OSU Extension has long-standing programs in place that will advance the science-based information from that research.

Viruses, including human norovirus, hepatitis A virus and rotavirus, account for more than two out of three foodborne illnesses worldwide. Yet most research and nearly all education about foodborne illness focuses on bacteria, such as Salmonella, E. coli, Listeria and Campylobacter. Impacts from new OARDC grants and parallel extension work will be reflected in this planning period. As we enter this planning period, Food Safety is and will continue to be a high priority research and extension program at OSU. This is reflected in and is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Out of integrated research and extension programs in CFAES signature area one --food security, production, and human health -- come science-based findings and extension strategies to inform national and global food safety programs.

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	90%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		90%	
	Total	100%		100%	

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

1. Situation and priorities

Food safety programs work to reduce the incidence of foodborne illness and provide a safer food supply by addressing and the eliminating causes. These are primary programs within OSU Extension and OARDC. A safe food supply is central to all nations' security and is central to advancing world peace. Without a safe food supply, individual rights, sound governments, and economic stability and security, nationally and worldwide, will be threatened, as will be the natural environment that provides for sustainable food systems.

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 the food safety is critical to meeting society's needs. As we address food safety problems and needs within our stakeholder communities, our organization (OARDC and OSU Extension) become better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas. Other key assumptions are: the issues within this program 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 is key to present and future decision-making in provisioning of 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; these lines of inquiry will provide necessary knowledge to inform human enterprises; food safety research and extension education are demands by society needed to meet current and future needs; and base federal funding will continue to be available and leverage for extramural grants to support this

Planned Program and the scientific staff who carry out the lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state funds

2. Ultimate goal(s) of this Program

The ultimate goal of OARDC and OSU Extension is to reduce the incidence of foodborne illness and provide a safer food supply by addressing and eliminating causes.

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
2013	15.0	0.0	1.5	0.0
2014	15.0	0.0	1.5	0.0
2015	15.0	0.0	1.5	0.0
2016	15.0	0.0	1.5	0.0
2017	15.0	0.0	1.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

OARDC's food safety research to advance broad food safety goals include both basic and applied research. Research ranges from microbial studies to packaging. Laboratories, pilot plants, farms, and multiple business sites are available throughout state to permit data gathering and to continue long - term experiments. All functional laboratories and sites are improved over time as program need warrants. Parallel OSU Extension food safety programs are 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 is a primary program goal of OSU Extension and OARDC. Specific activities for the food safety education for consumers include: (1) Conduct food safety education classes with participants in the FNP and EFNEP program; (2) Conduct ServSafe classes with food establishment managers and employees; (3) Conduct Safe Food Handling for Occasional Quantity Cooks classes with volunteer food preparers; and (4) Provide research-based information to consumers through various forms of media, phone calls, fact sheets, and web pages.

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations	● Public Service Announcement ● Newsletters

3. Description of targeted audience

Targeted audiences within our food safety programs (2013 - 2017) include, but are not limited to: specific individuals or groups who have expressed a need for food safety research and extension information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that partner with food scientists to create systems and processes needed to support not only the research, but also the adoption of the research findings by stakeholders; fellow 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 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; business and industrial groups; food stamp or food stamp eligible families (FNP); Low income families with young children (EFNEP); food establishment managers (ServSafe manager training; food service employees (ServSafe employee training); volunteer food preparers (general population) (OQC); and 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 Graduate Students Completed
- Number of educational sessions held

☑ 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)

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

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 is impacted by all sectors of agbioscience ....physical, chemical, biological, social, economics, and environmental. Climatic extremes, for example, impact food safety to the extent they impact supply or foster growth and dispersion of pest and pathogens. Climatic extremes impact the quantity and quality of food supplied as well as the timely distribution of food before contamination is an issue. Economic shifts such as to cost of processing equipment or production costs, public policy shifts, regulations, and shifts in demand will be impact outcomes. Food trends/fades, problem acceptance by individuals and groups, food advertising agendas, new biological and chemical threats, and public nutritional health - related issues are also external factors that effect outcomes. Formative evaluation though can lessen the burden by seeking feedback throughout the life of the program. 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, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving program goals. OARDC and OSU Extension use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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. Each formal extension program does collect feedback from participants. The techniques that continue to be employed, most of them being qualitative surrogate measures, are: (1) Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for the institution, ease of participation/inclusion, willingness to support, willingness to bring their other colleagues into our discussions, and overall level of satisfaction with research and extension processes and products; (2) feedback from advisory committees that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product; (3) elected state and federal officials' support for the institution in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11)

commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that were contracted for with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from our faculty, staff, and students.

Specifically for the planned program in food safety research indicators to be reported will be, but not limited to:

1.Number of viable technologies developed or modified for the detection and characterization of food supply contamination from foodborne threats.

2.Number of viable prevention, control and intervention strategies for all food production scales for foodborne threats along the food production continuum.

3.Number of improved prevention, detection, and control and intervention technologies adopted.

4. Amount of potential economic losses from reduced productivity, increased medical expenses, and food industry losses.

5. Number of projects focused on increased understanding of the ecology of fecal indicators and pathogens.

6. Number of projects focused on increased safety of all inputs into the food chain.

7.Number of projects focused on increased understanding of the roles of humans, plants and animals as vectors.

8. Number of projects focused on increased understanding of pre-harvest and postharvest process impacts on microbial and chemical threats.

9. Number of projects characterizing social, economic, and/or cultural practices attributed to foodborne illness.

Impacts, the number of peer reviewed publications, graduated degrees granted, and patents awarded, all within this planned program, are listed elsewhere in the report.

Collectively the quantitative and qualitative measures inform across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence our programs, services, processes, and products throughout this 2013 -2017 planning period, and beyond.

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 is a signature area of OSU Extension and OARDC, a NIFA priority area, a priority in the APLU/ESCOP Science Roadmap for Food and Agriculture, and a high priority item across our nation and the world. To meet growing demand, OSU food scientists and other agricultural and environmental scientists continue to make advances in techniques and processes that improve the quality of food, expand food preservation, protect against pathogens, advance detection systems for identifying threats to food security, increase functionality, and increase both the quantity and quality of food stocks. Global Food Security and Hunger will be a priority program throughout this 2013 -2017 planning period. 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. For example, OARDC is one of 11 institutions awarded a $20 million grant from USDA-NIFA, which aims to keep Midwest corn-based cropping systems resilient in the face of future climate uncertainties. Given the importance of corn worldwide as a food stock such research is critical. Thus impacts in the majority of this Planned Programs contribute to a greater of less extent to feeding the world. To advance global food security requires inputs, outputs, and impacts in the total food supply/value chain ranging from soil conservation to effective food distribution systems worldwide. This Planned Program emphasis is reflected in and is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. While signature area one (1) is primary to this Planned Program, signature areas two (2) and three (3) underpin the world's drive for food security. Without a sustainable environment and sustainable energy, other components of the food supply/value chain could not function.

This program's impacts are far-reaching. For example, OARDC works with NASA on methods to heat food and sterilize waste in space. Using ohmic heating, packaging containing electrodes has been developed allowing astronauts to enjoy a hot meal. The techniques are needed on a possible mission to Mars. A parallel study has resulted in a new way to peel tomatoes using very little lye-an environmental waste problem-and preserve the nutrient-rich peel for use in sauces and purees. Currently, more than 12 million tons of tomatoes nationwide are processed into tomato sauce, puree, paste, and whole and diced products. Ohio produces over 177,000 tons of processing tomatoes, valued at nearly $14 million annually.

OARDC and OSU Extension recognize that global food security is also a local issue as reflected by specialist who study maximizing fruit and vegetable production in limited spaces comparing methods of urban farming in empty, abandoned parking lots, in giant-sized pots, in raised beds on top of the blacktop, and in trenches cut right through the pavement. These findings will continue to serve as foundations as human nutrition and health continues to be a major focal area for OARDC and OSU Extension.

As baby boomers enter their retirement years, cancer and heart concerns grow, and obesity continues as a national problem, each incremental improvement we make in health care will have a major impact on society. In nutriceuticals research, for example, OARDC scientists are working with medical researchers in a 'crop to clinic'; program to examine how phytochemicals in foods fight certain human health problems. Research will continue to focus on nutrients found in berries to determine if they can stop or slow some types of cancer. OARDC research and OSU Extension programs will also continue to address how to make food safer, lengthening its shelf life, and provide expertise to medical researchers

and food companies on how to protect food from pathogens. Salmonellosis, for example, is a food-borne disease with 1.4 million cases nationwide with a $2.3 billion cost annually. Eggs are the primary source. OARDC scientists found that by treating whole shell eggs with a combination of ozone, mild heat, and slight pressure significantly reduced contamination in eggs without damaging their quality. Ohio is the second-largest egg producer in the country with production valued at well over $300 million annually. Salmonellosis can have tremendous negative economic impact in Ohio. OARDC and Extension members will continue to work diligently throughout this planning period to move this new knowledge into business, industry, and homes, in the US, 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	20%		20%	
502	New and Improved Food Products	15%		15%	
503	Quality Maintenance in Storing and Marketing Food Products	5%		10%	
607	Consumer Economics	10%		0%	
701	Nutrient Composition of Food	5%		10%	
702	Requirements and Function of Nutrients and Other Food Components	5%		15%	
703	Nutrition Education and Behavior	15%		5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%		15%	
	Total	100%		100%	

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

1. Situation and priorities

Advanced studies in systems related to food security are critical to providing for the sustained and secure flow of food in the producer - processor - distributor - consumer chain. Assuring that all their interests are informed by the best food science and extension programs available is an expectation of OARDC and OSU Extension. Requisite research by agricultural experiment stations and companion

extension programs are mandatory to meet domestic demand and in provisioning food worldwide. 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 direct needs of all their constituency groups by regularly interacting with them and understanding their needs. OSU scientists interact with fellow other research and extension units, and with organized groups of producers, processors, distributors, and consumers. Demand for their expertise, processes, and products is high. Without a growing body of knowledge in this area to create plentiful, high quality, and secure global food system, 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 continue to affect positive change in the science and service behind food security.

Effective research in this area requires modern laboratory facilities and access to industrial partners' facilities, as well as access to consumers who are the ultimate evaluators of the outcomes.. Faculty and staff in this program effectively provide the knowledge and technologies needed by stakeholders to inform production, processing, distribution, and consumer choices. OSU Extension has the capacity and expertise to advance programs to promote related knowledge acquisition, adoption of new techniques, and approaches to address global food security and hunger, and to help society grow the required expertise 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 overt and latent demands in this area. This program will continue at OSU throughout 2013 -2017. As we continue to address problems and needs within our stakeholder communities, the organization (OARDC and OSU Extension) will become better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas. Other key assumptions are: world hunger is expected to increase; the issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, reflect the more 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 domestically and worldwide; all citizens directly benefit from a safe, secure, and plentiful food supply supported by an advanced research and extension program; these lines of inquiry will provide necessary knowledge to inform human enterprises; food systems research and education are demands by society needed to meet current and future needs; and base federal funding will continue to be available and leverage for extramural grants to support this Planned Program and the scientific staff who carry out the

lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state funds.

2. Ultimate goal(s) of this Program

Food security research and extension programs (2013 -2017) at OSU will, in cooperation with other parallel areas will : 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 necessary to improve and develop new foods, advance research frontiers in food quality, and contribute to the understanding and development of functional foods, including nutriceuticals. Likewise 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. Other related impacts are reported in their respective Planned Programs.

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
2013	21.0	0.0	9.5	0.0
2014	21.0	0.0	9.5	0.0
2015	21.0	0.0	9.5	0.0
2016	21.0	0.0	9.5	0.0
2017	21.0	0.0	9.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

This Planned Program advances broad global food security goals and includes both basic and applied research, and associated outreach and extension programs. Research ranges from microbial studies, to packaging, to food taste tests, to consumer preferences and behavior. Laboratories, pilot plants, farms, and multiple business sites are available throughout state to permit data gathering and to continue long - term experiments. All functional laboratories and sites are improved over time as program need warrants. Extension has 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 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	● Public Service Announcement
● Workshop	● Newsletters
● Group Discussion	● Web sites other than eXtension
● Demonstrations	● Other 1 (Factsheets)
● Other 1 (One-on-one consultation)	

3. Description of targeted audience

Targeted audiences for global food security research and extension include, but are not limited to: specific individuals or groups who have expressed a need for food-related information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that partner with food scientists to create systems and processes needed to support not only the research, but also the adoption of the research findings by stakeholders; fellow 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 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; and 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 student completed
- Number of participants attending educational programs of one teaching hour or more.
- Total number of workshops offered to producers and agri-business leaders

☑ 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	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
3	Advance the study of stacking functional foods that have a lower than expected societal demand (e.g. soy) with more desirable foods such as tomato products as a means of providing consumers with more access than is currently present.
4	Expand utilization of products with known functionality or nutraceutical value and give consumers greater informed consumer choice, including the bioavailability of the desire substance in the food, than they presently have.
5	Reduce health risk by releasing at least one major study each five years demonstrating nutritional health benefits, e.g. carotenoids and cataracts, anthocyanins and colon cancer or as a substitute for artificial dyes.
6	Reduce health risk by releasing at lest one major study each five years demonstrating negative nutritional side effects, fatty acids and obesity or obesity-related hepatic stealosis or prostate cancer.
7	Advance the understanding of the potential role of trace minerals such as the role of selenium in protection against breast cancer or copper's protecting against cardiovascular diseases to that extent society can make science-based choices.
8	Processing technology research such as pulse electronic field, high pressure, ohmic heating, and microwave will provide processors with a set of alternatives leading to efficiency and quality gains within economic realities.
9	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.
10	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.
11	Advance and document improvements in quality and quantity of food stocks to meet global food security and hunger goals.
12	Ohio Market Maker results will indicate food preferences and number of farmers/retailers networks established (measured in number of networks established).
13	Establishment of a number of local/regional food systems.
14	The primary long term outcome measure for OSUE programming on this issue is the growth of direct farm sales in Ohio as reported through the Census of Agriculture and other Direct Marketing team activities that provide insight into improved economic and social conditions. (measured in dollars)
15	number of schools purchasing Ohio produced food as part of the Ohio Farm to School program.

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
- 502 - New and Improved 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 # 2

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

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 502 - New and Improved 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 Research

Outcome # 3

1. Outcome Target

Advance the study of stacking functional foods that have a lower than expected societal demand (e.g. soy) with more desirable foods such as tomato products as a means of providing consumers with more access than is currently present.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

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

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

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 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
- 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 health risk by releasing at least one major study each five years demonstrating nutritional health benefits, e.g. carotenoids and cataracts, anthocyanins and colon cancer or as a substitute for artificial dyes.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 502 - New and Improved 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 Research

Outcome # 6

1. Outcome Target

Reduce health risk by releasing at lest one major study each five years demonstrating negative nutritional side effects, fatty acids and obesity or obesity-related hepatic stealosis or prostate cancer.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 502 - New and Improved 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 Research

Outcome # 7

1. Outcome Target

Advance the understanding of the potential role of trace minerals such as the role of selenium in protection against breast cancer or copper's protecting against cardiovascular diseases to that extent society can make science-based choices.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved 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 Research

Outcome # 8

1. Outcome Target

Processing technology research such as pulse electronic field, high pressure, ohmic heating, and microwave will provide processors with a set of alternatives leading to efficiency and quality gains within economic realities.

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 # 9

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 # 10

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.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 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
- 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 # 11

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 Action Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 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 # 12

1. Outcome Target

Ohio Market Maker results will indicate food preferences and number of farmers/retailers networks established (measured in number of networks established).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 607 - Consumer Economics
- 701 - Nutrient Composition of Food
- 703 - Nutrition Education and Behavior
- 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 Extension

Outcome # 13

1. Outcome Target

Establishment of a number of local/regional food systems.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 607 - Consumer Economics
- 703 - Nutrition Education and Behavior
- 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 Extension

Outcome # 14

1. Outcome Target

The primary long term outcome measure for OSUE programming on this issue is the growth of direct farm sales in Ohio as reported through the Census of Agriculture and other Direct Marketing team activities that provide insight into improved economic and social conditions. (measured in dollars)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 607 - Consumer Economics
- 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 Extension

Outcome # 15

1. Outcome Target

number of schools purchasing Ohio produced food as part of the Ohio Farm to School program.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 502 - New and Improved Food Products
- 503 - Quality Maintenance in Storing and Marketing Food Products
- 607 - Consumer Economics
- 703 - Nutrition Education and Behavior

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

World conflict, cost of supply and distribution of foodstuff, and storage of foodstuffs, both raw and processed, are major limitations the affect outcome. Climatic extremes to the extent they impact growth and supply, economic shifts such as to cost of processing equipment or production costs, public policy shifts, regulations, and shifts in demand will impact outcomes. Food trends/fades, food advertising agendas, new biological and chemical threats, and public nutritional health related issues are also external factors that effect outcomes. In developing countries, technologies, availability of basics such as seeds or livestock, soil, and water for farming, labor, and a secure farming environment are limiting factors. Formative evaluation though can lessen the burden by seeking feedback throughout the life of the program. 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, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving program goals. OARDC and OSU Extension use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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. Each formal extension program does collect feedback from participants. The techniques that continue to be employed, most of them being qualitative surrogate measures, are: (1) Informal and formal feedback from stakeholders in terms of needs, willingness to participate, willingness to advocate for the institution, ease of participation/inclusion, willingness to support, willingness to bring their other colleagues into our discussions, and overall level of satisfaction with research and extension processes and products; (2) feedback from advisory committees that ranges from helping to determine needs of our constituencies to feedback on commercialization of a new patented product; (3) elected state and federal officials' support for the institution in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that were contracted for with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from our faculty, staff, and students.

Specifically for the planned program in global food security and hunger research indicators to be reported will be, but not limited to:

1. Numbers of plant cultivar releases.
2. Number of improved animal genetics.
3. Number of studies and quantity where increased efficiencies in the food production.
4. Number of new or improved innovations developed for food enterprises.
5. Number of new or improved value-added products that can be sold by producers (and other members of the food supply chain).
6. Number of innovations adopted in food enterprises including production, allied services, processing, and distribution.
7. Number of new diagnostic systems analyzing plant and animal pests and diseases.
8. Number of new diagnostic technologies available for plant and animal pests and diseases.

Impacts, the number of peer reviewed publications, graduated degrees granted, and patents awarded, all within this planned program, are listed elsewhere in the report.

Collectively the quantitative and qualitative measures inform across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence our programs, services, processes, and products throughout this 2013 -2017 planning period, and beyond.

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

Soil, air, and water resources underpin sustainable ecosystems. Sustainability is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Soil, air, and water resources are linked to each of these areas and to all of the Planned Programs reported herein. Likewise demands on the environment and natural resource base' is a priority in the APLU/ESCOP Science Roadmap for Food and Agriculture. OSU has provided national and international leadership in this area for well over a half a century and will continue to do so throughout this 2013 -2017 planning period.

Achievements within this and all OARDC Planned Programs are dependent upon stable functioning ecosystems; soil, water, and air are the primary physical underpinnings of those systems. The understanding of interactions among soil, water, and air resources provide a basis for delivering to society a secure supply of food, fiber, other associated products, and related services. The appraisal of soil systems, including the physical, chemical, and biological components, their management for targeted outcomes, and the monitoring and mapping thereof, are critical research components in this planning period. Likewise these activities provide a basis for extending such knowledge to stakeholders who have participated in defining the need.

Soil, water, and air interactions are explored in relationship to plant growth and development with particular focus on plant nutrition. Included in this line of inquiry, but not limited to, are soil microbes, management practices for surface and subsurface components, and amendments to soil and water and the effects thereof, both positive and negative. While analysis and individual practices are at the field and farm level, the total systems approach typically will be carried out at the watershed level, or sub region of the watershed. To that end, the supplying of water for plant, animal, human, and business use will be studied, as will methods to conserve and protect water resources and watersheds. Soil protection and management of effects of wind and water, and other natural forces, are included. Both components of the natural watersheds and built structures, e.g. wetlands, will continue as research and extension foci.

Scarcity of land and water resources demands the investigation of alternative uses and efficiency studies. Understanding of weather and climate as well as air resources including, for example, odors from animals or how atmospheric carbon that can be attracted and stored in soil, wetlands, and living plants are a growing areas of importance to a fuller comprehension of soil, water and air systems. Pollution prevention and mitigation of negative effects of odors, carbon loading, other related air quality issues are critical lines of inquiry that are being pursued. Each line of inquiry informs questions surrounding climate change and how to maintain sustainable in systems in the face of change. Knowledge from these inquiries provides a basis for extending knowledge that, for example, has been requested to help address rural urban interface conflicts, e.g. odors from animal operations. Those odors, while a social problem, also contribute to atmospheric loading of pollutants. Soil, air, and water related research and extension programs will continue to be foundational for all 2013 -2017 Planned Programs.

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	5%		10%	
102	Soil, Plant, Water, Nutrient Relationships	35%		25%	
103	Management of Saline and Sodic Soils and Salinity	0%		5%	
111	Conservation and Efficient Use of Water	20%		15%	
112	Watershed Protection and Management	20%		10%	
131	Alternative Uses of Land	0%		10%	
132	Weather and Climate	0%		5%	
133	Pollution Prevention and Mitigation	0%		10%	
141	Air Resource Protection and Management	20%		10%	
	Total	100%		100%	

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

1. Situation and priorities

As societal demands increase for natural resources and associated commodities such as biomass for advanced energy and biobased materials, and for ever-increasing environmental services, greater understanding of conservation and wise use of soil, water, and air resources are paramount. Environmental shifts, such as climate change, can have dramatic effects on soil, air, and water resources.....the elements that underpin all life. These shifts can lead to unmet needs and unresolved conflicts, all having social, economic, and environmental consequences. Agriculture experiment stations and extension programs, especially for OARDC and OSU extension being in a highly urbanized state, have a unique opportunity to aid in meeting both latent and overtly stated needs of society in this Planned Program area.

Individuals and families associated with food and fiber production need the research information that is generated through this program for their business, as do processors. Communities, both rural and urban, need both the biological and management knowledge to protect their natural resource base and to address rural - urban interface needs and conflicts. Commodity, environmental, community groups such as watershed-based community groups, regulators, and political leaders are demanding the best science and extension education programs to insure that resource conflicts are avoided or managed, and that growth and development can occur within reasonable social and environmental bounds. Such work is well-

grounded theoretically and extensive applied peer reviewed literature exists. The challenges lie in applying what is known to new and emerging issues such as energy independence and generating basic research as needed. While a number of areas, such as soil microbial ecology and plant nutrition still require extensive laboratory experiments, it is the on-farm and in-watershed fieldwork, where stakeholders live and work, that provide some of the richest opportunities for researchers and extension specialist to engage in situational analyses and priority setting.

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

This Planned Program will continue to be a primary focus for OARDC throughout this 2013 - 2017 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 problems and needs within our stakeholder communities. Key assumptions are: 1) The issues within this program that have been identified within our stakeholder communities and/or within the scientific literature reflect the more important issues and warrant allocation of resources; 2) The understanding of soils, soils systems, and how society utilizes and depends on soil is key to present and future decision-making in provisioning and managing food and fiber systems, sustaining environmental services, and mitigating impacts of global climate change; 3) 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; 4) 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; 5) 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; 6) Air-related research, as well as air resources (including sequestration of air borne carbon) for plant and animal production, for human health, and for mitigation on climate change, are high priorities among all sectors within our industry and support publics.

These issues are manifested at some community level and those stakeholders who are most vested will become involved; others' involvement will be limited, yet they will reap the benefits of a sound basic and applied understanding of related research and extension programming. 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 areas for this program. Likewise it is assumed that the federal base funding will be leverage to attract state and extramural funds

2. Ultimate goal(s) of this Program

OARDC goals 2013 -2017 are articulated in four different categories--soil, water, air and integration

thereof. Goals for Soils research are to: (a) support USDA, NRCS, ODNR and local government/stakeholder initiatives to understand, map, and to determine and implement best management/allocation practices for soils of Ohio and the region; (b) support multiple approaches to carbon management and climate change mitigation through carbon sequestration; and (c) enhance soil management for greater production, economic, and environmental gains.

Goals for Water research are to: (a) support USDA, NRCS, ODNR and local government/stakeholder initiatives to understand, map, and determine and implement best practices/allocation for water resources and watersheds of Ohio and the region; (b) enhance water management for greater economic and environmental gains.

Goals for Air research are to: (a) support federal, state, and local agendas, including stakeholders and beneficiaries thereof, seeking to mitigate program-related air quality problems or to enhance air quality for plant, animal, and human health, including the reduction of atmospheric pollution; (b) support unique, both new and yet to emerge, air related programs such as carbon sequestration for agronomic, economic (e.g. carbon trading), and environmental gains for society as a whole and for specific stakeholder groups.

Goals for Integrated Soil, Water and Air research are to: (a) understand the system in such manner as to inform both on-site (e.g. on-farm) and landscape scale decisions necessary to meet individual stakeholder groups' and societal needs; (b) Support international, national, state, and local agendas for advancing environmental quality to insure a sustained flow of goods and services that will meet intergenerational demands; (c) to contribute to the theoretical knowledge base within this Planned Program to ensure that, where feasible, all applied research can be grounded in the best basic science available.

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
2013	0.0	0.0	5.5	0.0
2014	0.0	0.0	5.5	0.0
2015	0.0	0.0	5.5	0.0
2016	0.0	0.0	5.5	0.0
2017	0.0	0.0	5.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

On -going OARDC research activities include both basic and applied agbioscience. Both laboratory and multiple field sites/research stations are available throughout state to permit data gathering and to continue long - term experiments, such as no-till plots. On-farm research takes place, as do national and international studies, as is evidenced by programs such as OARDC's carbon sequestration program. All functional laboratories and sites will continue to be improved over time as program need and resources available warrants. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders such as fellow extension personnel and with external

stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Group Discussion ● Demonstrations	● Public Service Announcement ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

OARDC's targeted audiences for this Planned Program include, but not limited to: 1) Specific individuals or groups who have expressed a need for certain information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at Ohio Dept. of Natural Resources or a county extension agent; 2) Fellow 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; 3) Populations who have not requested the information but will likely benefit from that information, e.g. immigrant populations; 4) Other scientists and scientific groups; 5) Political entities; 6) Extension personnel; 7) Students from pre-school to post doctorate studies; 8) News organizations; and 9) 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	Continue to advance soil, water, nutrient, and plant research to, among other outcomes, ensure Ohio continues to be one of the top five states in corn and soybean production and has knowledge to support growing niche market agriculture, organic farming, and biobased products.
2	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.
3	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.
4	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.
5	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.
6	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.

Outcome # 1

1. Outcome Target

Continue to advance soil, water, nutrient, and plant research to, among other outcomes, ensure Ohio continues to be one of the top five states in corn and soybean production and has knowledge to support growing niche market agriculture, organic farming, and biobased products.

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
- 132 - Weather and Climate

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

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 Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

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
- 131 - Alternative Uses of Land
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

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 # 5

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
- 131 - Alternative Uses of Land
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

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
- 131 - Alternative Uses of Land
- 132 - Weather and Climate
- 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

Climatic extremes, coupled with pest and diseases that are often climate related, can impact outcomes. As the food, fiber, and environmental economy adjust to the global marketplace, in conjunction with public policy shifts, regulations, and shifts in demand, outcomes will be impacted. Formative evaluation though can lessen the burden by seeking feedback throughout the life of the program. 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, will affect outcomes. Throughout this 2013 -2017 period external factors will continue to expand, such as the recent shale oil and gas drilling program in Ohio 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 as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty

members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

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

Natural resources and environmental systems are central within the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Natural resources and environment will continue to be central to OARDC research mission, with support from OSU Extension, throughout this 2013 -2017 planning period. Likewise the APLU/ESCOP Science Roadmap for Food and Agriculture has listed demands on the environment and natural resource base as a priority area. Faculty working in this planned program defined their mission: to develop an academic program focused on better understanding human interactions with the natural environment where social factors, science, and political practices serve as co-determinants of change. Natural resources and environmental systems research focuses on managing and sustaining natural resources and ecosystems for the citizens of Ohio, the nation, and the world. The concept of and faculty attracted to this program area are dramatically changing as this program expands their social science, wildlife management, and environmental systems scientists. Such new faculty members will certainly lead in growing new impact areas.

All renewable natural resources and related environmental systems are closely tied to climate change and other environmental shifts, both natural and human induced shifts. Ohio is one-third forested. Private landowners hold most of the forest thus a significant portion of our research and outreach is and will continue to be private-owner centered. Emphasis on grasslands/grazing lands, urban forest, agroforestry, and outdoor recreation are also found within this program. Key to managing the forest and other natural systems for a sustained flow of environmental goods and services is an understanding of how to conserve the diversity with particular emphasis on, and strengths in, aquatic and terrestrial wildlife ecology.

Research programs in this Planned Program focus both on the individual components as defined in the selected knowledge areas and the collective community and landscape scale functions. Ohio's landscapes are managed primarily in small tracks under fairly 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 route for song birds, hawks, ducks, and geese. The latter two are important to the hunting industry, while the songbirds and hawks are important non-game species and contribute to Ohio's tourism industry.

Forest sustainability is an important research area and requires an understanding of biology, silviculture, 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 Ohio Department of Natural Resources and 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 program for protection and

restoration of natural systems. Human- wildlife interactions are studied. An ever-growing area, and a second signature area within the College's 2008 Strategic Plan- advanced/sustainable energy and biobased 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	25%		15%	
124	Urban Forestry	0%		10%	
125	Agroforestry	0%		10%	
134	Outdoor Recreation	0%		10%	
135	Aquatic and Terrestrial Wildlife	60%		35%	
136	Conservation of Biological Diversity	15%		10%	
	Total	100%		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. With 11 million people in a relative small state, the demand for consumptive and non-consumptive uses of Ohio natural resources continues to grow. As travel costs continue to remain high, the demand for local resource utilization is expected to increase demand for agriculture experiment station 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.

Individuals and families, as well as companion agencies involved in the food and fiber production,

need the research information that is generated through this program, as do various sectors of the public including environmental organizations, hunters, fishers, birdwatchers, hikers, etc. Communities, both rural and urban, need both the conservation biology and management knowledge to protect and wisely use their natural resource base. All environmental resources are issues of concern from both a regulatory and from an aesthetic point of view. Conflicts do occur over differing human values, e.g. dove hunting. Work in these knowledge areas is well-grounded theoretically and extensive applied peer-reviewed literature exists. OARDC has sponsored efforts in this program since the late 1800s. The challenges lie in applying what is known to new and emerging issues and generating lines of research as needed to ensure that the citizens' needs are met and that related issues do not become an impediment to food, fiber, advanced energy, and advanced biobased materials production.

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

Within this 2013 -2017 Planned Program, 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 will be utilized for enhanced decision-making by stakeholders and all citizens. Research and education related to conservation of natural resources, and landscape-scale best management practices that are being adopted, are demanded by society to meet current and future needs. These issues are manifested at some community level and those stakeholders who are most vested will become involved; others' involvement will be limited, yet they will reap the benefits of a sound basic and applied research programs. It is 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 areas for this program. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OARDC 2013 -2017 goals are: Forest Resource Related Research - advance the understanding of forest biology and ecology commensurate with the demands in Ohio and the region, as well advance knowledge in 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; enhance overall management for greater economic, social (including recreational) and environmental gains.

Conservation Biology Related Research - support USDA, USDI, ODNR, and local government/stakeholder initiatives to more fully understand the biology of Ohio landscapes and determine and implement best practices/allocation strategies for resource protection and utilization.

Aquatic and Terrestrial Wildlife Related Research - supports federal, state, and local agendas, including all those who are stakeholders and beneficiaries thereof, in seeking to conserve and utilize these aquatic and terrestrial wildlife resources in a sustainable manner while managing associated conflicts; engage in scientific inquiries at the genetic, species, community, and landscape scale levels to investigate biological and physical components, including influences of human enterprises, for the purpose of meeting wildlife needs in Ohio and the region; study conflicts leading to negative human - wildlife interface for the purpose of mitigating negative effects on wildlife population and on human enterprises, e.g. wildlife depredation.

Integrated Natural Resources and Environmental Systems Related Research - understand the system in such manner as to inform both on-site (e.g. community, watershed) and landscape scale decisions necessary to meet individual stakeholder groups' 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; 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.

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
2013	0.0	0.0	3.5	0.0
2014	0.0	0.0	3.5	0.0
2015	0.0	0.0	3.5	0.0
2016	0.0	0.0	3.5	0.0
2017	0.0	0.0	3.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Natural resource and environmental systems program in the 2013 -2017 planning horizon includes both basic and applied research across the afore mentioned activities. Both laboratories and multiple field sites are available throughout 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, as is evidenced by programs such as OARDC's avian ecology studies. Close working relationships with the organizations such as the Ohio Department of Natural Resources will continue to greatly enhance program capacity and outputs/impacts. All functional laboratories and sites are improved over time as program need and resources available warrant. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation with both internal stakeholders, such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Group Discussion ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to: specific individuals or groups who have expressed a need for natural resources and environmental research knowledge that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at USDA, ODNR, or a county extension agent; related 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 that information, 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; and community collations such as watershed collations.

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	In conjunction with companion agencies and organizations, advance research in forest biology and ecology to promote advances in best management practices on private forest land in Ohio.
2	Improve the flow of forest raw materials to the extent it meets the needs of Ohio industries within ten years.
3	Increase the production of oak and reduce maple to eventually achieve a balance equivalent to forest with natural fire regimes.
4	Meet federal and state needs for research data related to Ohio ecosystems as the demand arises
5	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.
6	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.
7	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.
8	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.

Outcome # 1

1. Outcome Target

In conjunction with companion agencies and organizations, advance research in forest biology and ecology to promote advances in best management practices on private forest land in Ohio.

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

Improve the flow of forest raw materials to the extent it meets the needs of Ohio industries within ten years.

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
- 125 - Agroforestry
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Increase the production of oak and reduce maple to eventually achieve a balance equivalent to forest with natural fire regimes.

2. Outcome Type : Change in Action 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
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Meet federal and state needs for research data related to Ohio ecosystems as the demand arises

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

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 # 6

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 # 7

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 # 8

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

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

Public policy shifts, regulations, laws, and shifts in demand will be impact outcomes. Also climatic extremes, coupled with pest and diseases that are often climate related, will impact outcomes. Exotic species such as the Emerald Ash Borer is a significant external factor. Formative evaluation and early in process research can have positive returns throughout the life of the program. 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 all affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of

those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Plants Systems (OARDC Led)

2. Brief summary about Planned Program

Plant programs are a substantial component of Ohio's food, fiber, and agricultural industry, providing jobs, value-added products, and a healthy supply of raw and manufactured products worldwide. This will continue to be a major focal area for OARDC in 2013 -2017 with emphasis on the program's potential to help grow Ohio's economy. Most of the world relies on a plant based-diet. To help feed the world and secure the global food system, OARDC's plant related research is targeted to, among other goals, improving both quality and quantity of food plants, for both human and livestock consumption. The program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Plants are directly embedded in each of these three signature areas.

This program has a 100 plus year history at OSU and will continue to be primary throughout this planning period. The faculty group working in this area defines their mission as: to obtain knowledge about plants and their uses through innovation and discovery, and then disseminate that knowledge to benefit Ohio State University, the people of Ohio, and the world.

Plant programs are a major economic force in Ohio. OARDC has provided scientific leadership at all levels in this program for over a century, including the Green Revolution in Asia. The continued advancement in this Planned Program will improve the global capacity of the world to feed itself, reduce hunger within vulnerable populations, and improve regional capacity to grow much of the region's own food supply.

The Plant Systems Planned Program embraces multiple levels ranging from investigations at the genetic level to studying all aspects of production and pathology. Such program positions Ohio as a major contributor to both basic and applied plant sciences, and substantially contributes to the food security at national and global levels. Ohio has consistently been a leading state in the production of corn and soybeans for both domestic and export markets. It should continue this trend throughout the second decade of the 21st century. The Green Industry is often referred to as having its roots in Ohio. Genetics research provides a foundation for the program with inquiries from the genome level through gene pool studies. Emphasis will continue to be placed on pre-harvest programs to reduce risks for producers, processors, and consumers, and ensure high productivity. Plant management systems, as well as protecting plants from other plants, animal pests, and diseases is an area of research strength with emphasis on Integrated Pest Management (IPM). Producers, processors, and distributors in this program are well organized and rely heavily on OARDC for scientific information.

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	10%		10%	
202	Plant Genetic Resources	15%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	30%		20%	
205	Plant Management Systems	10%		10%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
212	Pathogens and Nematodes Affecting Plants	5%		5%	
213	Weeds Affecting Plants	5%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	15%		15%	
	Total	100%		100%	

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

1. Situation and priorities

Providing for the sustained and secure flow of food from the field and assuring producers, processors, distributors, and consumers that their plant-based food system is informed by the best science available is an expectation of OARDC. The science behind the system is not only critical for provisioning of food worldwide; it is also a major economic driver. Corn and soybeans collectively add about two billion dollars to Ohio and the regional economy each year, with approximately $600 million of soybean exports annually. As the prices increase worldwide for food and alternatives to petroleum, the return on investment will be strong.

OARDC addresses direct needs of multiple constituency groups by interacting with them to understanding their needs. Scientists also address needs often long before there is an issue or the need stated by stakeholders, i.e. studying soybean rust before it arrived in Ohio and breeding Ohio varieties that have the greatest potential for resistance.

There are no sectors in Ohio that this Planned Program does not impact in that plant-based food systems nurture the world. Much of OARDC's interactions are with organized groups of producers, processors, and consumers. Consumer demand for products is often relayed through feedback from other organized groups such as food distributors, e.g. demand for a firmer fruit. Without a growing body of knowledge to create efficiencies and security in the plant-based food systems, opportunities will be missed and society will not be well-served. With over one hundred 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 effect 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 threats and the need for a stronger and more secure food and fiber supply, as well as an international demand to reduce world hunger, now demands more advanced facilities such as the OARDC new biosecurity lab that will be fully operational by the beginning of this planning period, and more international research programs, such as OARDC Africa initiatives, to foster food security.

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

The issues within this 2013-2017 program have been identified by OARDC's stakeholder communities, including the international community, and/or via the scientific literature, thus reflecting the more important issues that warrant allocation of resources. 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, worldwide. All citizens directly benefit from a safe, secure, and plentiful plant based food system. It is these systems that will reduce world hunger. These lines of inquiry will provide necessary information to inform human enterprises. Research and education related to plant systems are demanded by society to meet current and future needs. It is assumed that base federal funding will continue to be available and leveraged to support this planned program and the scientific staff who carry out these lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OARDC goals for this 2013 -2017 Plant Systems Production Research are: generate new knowledge related to plant genomes, markers, structures, and similar areas of studies commensurate with the demand of other scientists and stakeholders who will apply this knowledge to their areas of plant breeding, growth, and development; and provide new contributions annually to the body of literature that will positively advance this area of study.

Plant Genetic Resource Research will: 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; and enrich the gene pool and gene pool knowledge to the extent that breeding programs have the materials with the desired traits on-demand to move forward with releasing varieties, etc.

Plant Pre-harvest Research will: provide the necessary quality and utility data, including cultural practices, seed quality assurance, breeding, and other biological and physical investigations necessary to support pre-harvest practices that achieve the prerequisite yield, disease resistance, and other characteristics to retain Ohio's status as a top soybean and corn producer; to advance other desirable crops as demand evolves, e.g. substitute crops for tobacco, disease resistance organics, and crops for biobased commodities.

Plant Management Systems Research will: participate in modeling and sampling of crop data, including remote sensing, for the purpose of deriving systems that are cost effective and cost efficient 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 biosecurity research commensurate with the overt or potential threats; support OSU Extension's Master Gardening program by providing the green industry research necessary to advance the development of materials and field trails required to keep the program viable.

Plant Protection Research will: 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
2013	0.0	0.0	29.5	0.0
2014	0.0	0.0	29.5	0.0
2015	0.0	0.0	29.5	0.0
2016	0.0	0.0	29.5	0.0
2017	0.0	0.0	29.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

OARDC's on -going research activities to advance plant systems goals include both basic and applied research. Both laboratory and multiple field sites/research stations are available throughout state to permit data gathering and to continue long - term experiments, such as commodity yields. On-farm research takes place, as do national and international studies. All functional laboratories and sites are improved over time as program need and resources available warrant. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders, such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations	● Public Service Announcement ● Newsletters

3. Description of targeted audience

Audiences targeted by OARDC include, but are not limited to: specific individuals or groups who have expressed a need for plant systems information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, NRCS, or a county extension agent; fellow 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 that information, e.g. home gardeners; other scientists and scientific groups; political entities; extension personnel; students from pre-school to post doctorate studies; and 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	Provide new contributions to the body of literature that will positively advance plant genetics, e.g. molecular techniques and materials to aid in low temperature plant tolerance research.
3	Advance germplasm science over the next ten years to the extent that the genetic resources targeted for acquisition are preserved and can be considered secure in terms of systems preservation, e.g. short season crops or for studying rice pathogens.
4	Enrich the gene pool, and knowledge thereof, to meet identified stakeholder turf needs for nutrient uptake efficient materials, turf with greater traction, etc.
5	Enrich the gene pool and knowledge thereof in disease/pest resistance, and gene recombination and interaction studies.
6	Enrich the gene pool and knowledge thereof in disease resistance of rootstocks such as for apple trees and green industry, and for resistance to plant stresses, e.g. discoloration in products such as tomatoes reducing a $60 million loss annually in tomato industry.
7	Enrich the gene pool and knowledge thereof in the areas of molecular studies to better understand how immune systems in plants in inhibit diseases and how bacteria perturb the immune system.
8	Annually provide adequate preharvest research findings, including field trial data, to support Ohio's status as a top soybean and corn producer
9	Release or support release by others of special cultivars to enhance Ohio agriculture, e.g. grapes to replace tobacco in southeastern Ohio, low maintenance turf grass, nitrogen uptake efficient crops including foliar based fertilization, field crop cultivars.
10	Continually participate in and promote the development and timely release of modeling/forecasting programs that are cost effective and cost efficient for producers, e.g. WEEDCAST.
11	Annually contribute to and report a basic or applied understanding of IPM, including all physical, biological, and chemical components of the plant system, to reduce environmental stresses, improve production, and lower costs when employed.

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

Provide new contributions to the body of literature that will positively advance plant genetics, e.g. molecular techniques and materials to aid in low temperature plant tolerance research.

2. Outcome Type : Change in Knowledge 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

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Advance germplasm science over the next ten years to the extent that the genetic resources targeted

for acquisition are preserved and can be considered secure in terms of systems preservation, e.g. short season crops or for studying rice pathogens.

2. Outcome Type : Change in Knowledge 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

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Enrich the gene pool, and knowledge thereof, to meet identified stakeholder turf needs for nutrient uptake efficient materials, turf with greater traction, etc.

2. Outcome Type : Change in Knowledge 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 - Pathogens 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 # 5

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 Knowledge 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 - Pathogens 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 # 6

1. Outcome Target

Enrich the gene pool and knowledge thereof in disease resistance of rootstocks such as for apple trees and green industry, and for resistance to plant stresses, e.g. discoloration in products such as tomatoes reducing a $60 million loss annually in tomato industry.

2. Outcome Type : Change in Knowledge 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 - Pathogens 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 # 7

1. Outcome Target

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

2. Outcome Type : Change in Knowledge 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 - Pathogens 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 # 8

1. Outcome Target

Annually provide adequate preharvest research findings, including field trial data, to support Ohio's status as a top soybean and corn producer

2. Outcome Type : Change in Knowledge 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 - Pathogens 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 # 9

1. Outcome Target

Release or support release by others of special cultivars to enhance Ohio agriculture, e.g. grapes to replace tobacco in southeastern Ohio, low maintenance turf grass, nitrogen uptake efficient crops including foliar based fertilization, field crop cultivars.

2. Outcome Type : Change in Action 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 - Pathogens 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 # 10

1. Outcome Target

Continually participate in and promote the development and timely release of modeling/forecasting programs that are cost effective and cost efficient for producers, e.g. WEEDCAST.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens 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 # 11

1. Outcome Target

Annually contribute to and report a basic or applied understanding of IPM, including all physical, biological, and chemical components of the plant system, to reduce environmental stresses, improve production, and lower costs when employed.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 202 - Plant Genetic Resources
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens 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

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, diseases, weeds, and climate change, among other factors can impact outcomes within plant systems. As the food, fiber, and environmental economy adjust to the global marketplace, in conjunction with public policy shifts, 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 and formative evaluation to identify opportunities and problems can have returns throughout the life of the program. 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, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and

products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

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 in Ohio is a key contributor to the food, agricultural, and environmental economy and will be throughout this 2013 -2017 planning period and well beyond. OARDC research is central to this industry. Developed nations and many rapidly growing nations, such as India and China, are now demanding more food animal products. To meet the demand at home and abroad, animal systems research remains an important Planned Program. The faculty group working in this area defines their mission as: to discover and communicate knowledge about animals and their products. This program is directed to the students of The Ohio State University, the citizens of Ohio and other parts of the world, the scientific community, stakeholders who are interested in animals used for food and fiber production, recreation, and companion animal purposes.

Research performed in 2008 by Battelle, sponsored by the Ohio Soybean Council, shows the livestock sector having the following Ohio economic impacts: $3.6 billion in Ohio economic output; 45,692 jobs in the state directly or indirectly related the livestock sector; and generation of more than $396 million annually in personal income for Ohioans. This program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. The food animal industry continually grows. For example, per capita consumption of chicken and turkey has increased dramatically since the 1970s. Nationally, chicken consumption has increased from 40 pounds per person in 1970 to present day 80 plus pounds per person. Turkey consumption has risen from 8 pounds in 1970 to current consumption of 17 plus pounds person. Breeders are focused on maximizing growth with an emphasis on the breast muscle. Every percent improvement in breast muscle yield is worth $100 plus million to the U.S. turkey industry, and is worth over $300 plus million to the U.S. broiler industry. OARDC scientists have provided a significant portion of research over the years to support this growth.

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, and new initiatives such as goat meat production for a new immigrant population. Such program positions Ohio as a major contributor to both basic and applied animal sciences, and substantially contributes to the food security at national and global levels.

OARDC scientists have provided leadership at all geographical levels, and worldwide for the past half a century. 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 ensure high productivity of quality products. Producers, processors, and distributors in this program are well organized and rely heavily 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 research is distributed in a timely manner 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	20%		15%	
302	Nutrient Utilization in Animals	20%		15%	
303	Genetic Improvement of Animals	10%		10%	
304	Animal Genome	10%		5%	
305	Animal Physiological Processes	0%		15%	
306	Environmental Stress in Animals	0%		5%	
307	Animal Management Systems	10%		10%	
308	Improved Animal Products (Before Harvest)	20%		15%	
311	Animal Diseases	10%		10%	
	Total	100%		100%	

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

1. Situation and priorities

Supporting the sustained and secure flow of food animals for producers, processors, distributors, and consumers, and knowledge that their animal-based food system is informed by the best science available are continuing expectations of OARDC. The science behind the system is not only critical for provisioning the food worldwide; it is also a major economic driver in Ohio. OARDC addresses direct needs of all their food animal constituency groups by interacting with them and understanding their needs. Scientists also address needs before they ever arrive in the state, e.g. studying potentially infectious animal diseases that have not yet impacted Ohio.

Much of OARDC's interactions are with organized groups of producers, processors, distributors, and consumers. Consumer demand for products is often relayed through feedback from other organized groups such as food distributors, e.g. demand for more tenderer and more marbled beef. Without a growing body of knowledge to create efficiencies and security in the animal based food systems, opportunities will be missed and society will not be well served. With over one hundred years of research history in the US, a robust body of literature, and a well-developed network of clientele, supporters and

companion agencies and organizations, including OSU Extension, OARDC are well - positioned to continue to affect positive change in this Planned Program.

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

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 overt and latent demands for a secure supply of food animals. As we address problems and needs within our stakeholder communities, the OARDC becomes better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas. Other key assumptions are: the issues within this program 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 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 needed to meet current and future needs; and base federal funding will continue to be available and leveraged to support this planned program and the scientific staff who carry out these lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OARDC animal production research will continue to work with all agriculturally important animals in Ohio to enhance reproductive performance that are both effective and economically efficient in meeting commensurate demands of the industry and consumers.

Nutrient utilization research will continue 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 at reduced environmental costs.

Genetic research, including genomics, will continue to work with our stakeholders to better understand and provide the genetic improvement information, including work at the molecular level, that is in current demand, or that is emerging as a potential demand.

Animal management research will: focus on improving management systematics for multiple farm types including organics, and will include modeling, decision-making, humane care and treatment of the animals, and alternative management strategies.

Pre-harvest research will 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.

Research related to animal protection will continue to focus primarily on animal diseases, both present ones and those that have likelihood of impacting this geographic region, to ensure that society has a safe and secure animal based food supply and that human and animal heath, business enterprises, and environmental and food security are not compromised, locally and 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
2013	0.0	0.0	14.5	0.0
2014	0.0	0.0	14.5	0.0
2015	0.0	0.0	14.5	0.0
2016	0.0	0.0	14.5	0.0
2017	0.0	0.0	14.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

OARDC research activities, in this 2013 -2017 period, to advance food animal and global food security goals include both basic and applied agbioscience research. Laboratory, animal enclosures, farms, and multiple field sites/research stations are available throughout state to permit data gathering and to continue long - term experiments. Ohio on-farm research is conducted as part of this program as is national and international studies. Effective research requires a mixture of laboratory, animal enclosures, and on-farm research to maximize knowledge. Emerging threats now require more advanced facilities such as OARDC's biosecurity lab, particularly needed in the study infectious animal diseases. OARDC will have its biosecurity lab fully functional throughout this planning period. All functional laboratories and sites are improved over time as program need warrants. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders, such as fellow extension personnel, and with external stakeholders

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

Extension

Direct Methods	Indirect Methods
● Group Discussion ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

OARDC's targeted audiences include, but are not limited to: specific individuals or groups who have expressed a need for food animal systems information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, NRCS, Ohio Department of Agriculture, or a county extension agent; fellow 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 that information, e.g. small or recreational farmers; other scientists and scientific groups; political entities; extension personnel; students for pre-school to post doctorate studies; news organizations; and business groups such as 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 nutrition utilization for the purpose of increased growth and quality of products commensurate with consumer demand, as well as nutrition utilization, performance, and efficiency to the point that savings will off-set increases in costs of animal feedstocks
3	Show incremental gains annually in dietary research to increase utilization of food stocks (e.g. via better understanding of protozoal ecology), increase bioavailability of nutrients including trace minerals, and protect animal and human health
4	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
5	Provide new contributions to the body of literature that will positively food animal genetics, e.g. molecular techniques and materials to aid in identifying genetic codes of bacteria in that breaks down cellulose
6	Improve management for multiple animal farm types, including organics, that will produce higher yields for and lower costs to the producer and consumer
7	Advance preharvest research over five years to the extent that new technologies are being adopted and showing profitability in area such as improved muscle growth, quality of meat, tenderness, lower fat in dairy products, etc.
8	Animal disease researchers will continue to serve on first responder teams when stakeholders have an immediate disease problem
9	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
10	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 nutrition utilization for the purpose of increased growth and quality of products commensurate with consumer demand, as well as nutrition utilization, performance, and efficiency to the point that savings will off-set increases in costs of animal feedstocks

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

Show incremental gains annually in dietary research to increase utilization of food stocks (e.g. via better understanding of protozoal ecology), increase bioavailability of nutrients including trace minerals, and protect animal and human health

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems
- 311 - Animal Diseases

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

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 # 5

1. Outcome Target

Provide new contributions to the body of literature that will positively food animal genetics, e.g. molecular techniques and materials to aid in identifying genetic codes of bacteria in that breaks down cellulose

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

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 # 7

1. Outcome Target

Advance preharvest research over five years to the extent that new technologies are being adopted and showing profitability in area such as improved muscle growth, quality of meat, tenderness, lower fat in dairy products, etc.

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 # 8

1. Outcome Target

Animal disease researchers will continue to serve on first responder teams when stakeholders have an immediate disease problem

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 306 - Environmental Stress in Animals
- 307 - Animal Management Systems
- 311 - Animal Diseases

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

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 # 10

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 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

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 climate change that often leads to abnormal weather patterns, can impact outcomes. Public policy shifts, regulations, and shifts in demand for product will impact outcomes. Human values and environmental sensitivities of the populace to animal production and processing are also external factors that affect outcomes. Formative evaluation relating to animal care norms and protocols can be effective in informing the process. Uncertainty, though, is a constant factor in the animal industry. Factors such as the availability of base funding to ensure a core research faculty and staff, availability of extramural research funds, and programmatic demands that often exceed resources, all will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to

help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

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

For the 2013 -2017 period, research and extension 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, sustainable energy efforts, as well as research programs that are seeking to advance human health and advance safety in agricultural work places. This Planned Program will continue to support other CFAES programs and advance the collective mission of the organization throughout this planning period. Even though our engineering facility on the Wooster campus facilities was destroyed by the 2010 tornado, programmatic recovery is well underway with a new replacement building planned for this 2013 - 2017 planning period.

The faculty group working in this area defined their goal as: to advance the science and application of engineering systems involving food, agriculture, environment, and construction. This program is dedicated to advancing science, teaching principles and application, and disseminating knowledge of engineering and construction needed to efficiently produce, distribute, and process biological products (such as food, feed, fiber, and fuel) while conserving natural resources, preserving environmental quality, and ensuring the health and safety of people.

This line of research is highly ranked nationally and has a history of innovation and leadership. Likewise it is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products.

Within this program are a number of most important initiatives. For example, agriculture leads the nation in occupational unintentional-injury death rates in the U. S. OARDC research tracks the agents, nature of the fatal incident, and demographics. Surveillance of agricultural work related fatalities are necessary to guide both present and future research and outreach initiatives. Surveillance of agricultural work related fatalities provide guidance to direct both present and future research and outreach initiatives. Gathered agricultural fatal injury data are being incorporated into a central database; analyzed on a yearly basis; and trends determined over a five-year period. Data are being posted to a website for use by county extension agents and other professionals. Data and emerging trends appear in Ohio research reports.

Research related to structures and facilities is heavily focused on greenhouse technologies for the benefit of stakeholders and fellow research units. Additional research in broader areas of structures and facilities is often carried out at the request of OSU Extension, USDA/USDI partners, state partners such Ohio Department of Agriculture, and local entities such as Soil and Water Conservation Districts. Systems engineering and development of equipment and associated methodologies for industry efficiency are important lines of inquiry given the need to reduce costs. Such research will continue to seek to advance the competitiveness of the various industries informed by OARDC research and OSU Extension programming. Research emphasis will continue to be placed on waste disposal for the food and fiber industry. Where practical, this waste stream will yield bioenergy as is being demonstrated at the Wooster campus BioHio Research Park.

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	20%		20%	
402	Engineering Systems and Equipment	30%		25%	
403	Waste Disposal, Recycling, and Reuse	50%		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	100%		100%	

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

1. Situation and priorities

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

OARDC addresses direct needs of all their constituency groups by interacting with them and understanding their needs. Much of engineering's interactions are with fellow research and extension units, and with organized groups of producers, processors, and consumers. Demand for their expertise and the processes and products generated are often in conjunction with or brokered through other academic units or support agencies and organizations. Without a growing body of engineering knowledge to create efficiencies and security in the food systems, opportunities will be missed and society will not be well served. With a long 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 effect positive change by supporting and advancing food, agricultural and biological engineering sciences.

Effective research requires a mixture of laboratories, animal enclosures, plant support facilities,

statewide research stations, and 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 the building of advanced facilities such as the new OARDC biosecurity laboratory that has been constructed on the Wooster campus; systems and facilities engineers will continue to be critical to such planning efforts.

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 by food, agricultural and biological engineers is critical to meeting society's overt and latent demands in this area. As we address problems and needs within our stakeholder communities, the organization (OARDC and OSU Extension) builds capacity and becomes better prepared to serve, take advantage of emerging opportunities, and to more rapidly address stakeholder problems.

Other key assumptions are: The issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, reflect the more 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, fiber, and environmental services; all citizens directly or indirectly benefit from a safe, secure, and plentiful food system supply support by state of the art engineering; these lines of inquiry will provide necessary to inform human enterprises; engineering research and education are demands by society needed to meet current and future needs; and 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 areas for this program. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

Throughout 2013 -2017 engineering structures and facilities research will: carry out investigations leading to the design of facilities and associated engineered process necessary to support the food, fiber, agricultural, and environmental needs of stakeholders and fellow research units.

Engineering systems and equipment research will: help develop unique systems for converting biobased products into sustainable energy and advanced materials; develop enhanced systems 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 or yet to emerge or novel needs such as bioreactors to treat landfill waste biologically or reduction of axle loads of farm equipment to prevent compaction of agricultural soils.

Waste disposal engineering research will: inform the process of collecting, storing, processing, and distributing waste products from plant and animal agriculture; advance study and modeling of state of the art integrated systems; 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 onsite waste disposal systems. The program will also 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.

Goal attainment through this 2017 planning period has strong potential to contribute to Ohio's economic recovery and job creation efforts and advance science and service in the state's agbioscience sector.

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
2013	0.0	0.0	3.0	0.0
2014	0.0	0.0	3.0	0.0
2015	0.0	0.0	3.0	0.0
2016	0.0	0.0	3.0	0.0
2017	0.0	0.0	3.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Engineering research activities to advance OARDC goals will continue to include both basic and applied research as discussed in the afore mentioned sections. Laboratories, construction sites, farms, a research park, and multiple field sites/research stations are available throughout state to permit data gathering and to continue long - term activities. All functional laboratories and sites are improved over time as program need warrants. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods

● Workshop ● One-on-One Intervention ● Demonstrations	● Public Service Announcement ● Newsletters

3. Description of targeted audience

OARDC's targeted audiences include, but not limited to: specific individuals or groups who have expressed a need for engineering information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, NRCS, 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 not only the research, but also the adoption of the research findings by stakeholders fellow 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 that information, e.g. recreational animal owners; other scientists and scientific groups; political entities; extension personnel; students for pre-school to post doctorate studies; news organizations; and 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 systems to that will permit small farmers to take advantage of alternatives to traditional commodity crops at a rate commensurate with demand
4	Improve mechanical devices and instrumentation needed by stakeholders
5	Develop improved systems to aid in meeting new or yet to emerge or novel needs
6	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
7	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
8	Aid rural stakeholders with onsite waste disposal systems to the extent that all rural Ohio onsite waste management systems could meet state standards
9	Reduce through research, development, and outreach the negative impact of farm-, recreation-, or industry-related accidents within agriculture and natural resources.

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 systems to that will permit small farmers to take advantage of alternatives to traditional

commodity crops at a rate commensurate with demand

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

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 # 5

1. Outcome Target

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

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

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 # 7

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 # 8

1. Outcome Target

Aid rural stakeholders with onsite waste disposal systems to the extent that all rural Ohio onsite waste management systems could meet state standards

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 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 # 9

1. Outcome Target

Reduce through research, development, and outreach the negative impact of farm-, recreation-, or industry-related accidents within agriculture and natural resources.

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 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, housing foreclosures, public policy shifts, regulations, shifts in demand, and issues such as climate change will be impact outcomes. Human values and conflicts, e.g. urban - rural issues, and environmental sensitivities to agriculture processes and location concerns related to facilities by the populace are also external factors that affect outcomes, e.g. engineering of large farms. Climate change may dictate new and different types of structures, equipment and processes. Factors such as the availability of base funding to ensure a core research and extension faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes;

(10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Agricultural, Environmental, and Development Economics (OARDC Led)

2. Brief summary about Planned Program

The Agricultural, Environmental, and Development Economics Planned Program will continue to support OARDC and OSU Extension's full range of planned programs and in meeting the needs of our stakeholders throughout this 2013-2017 planning period. This planned program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan that focuses on advancing education, scholarship, knowledge acquisition, and information diffusion in three signature areas: (1) food security, production, and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. Found within this program is research that contributes both directly and indirectly to the National Institute of Food and Agriculture's five national priority areas as well as the priorities in the new APLU/ESCOP Science Roadmap for Food and Agriculture.

The faulty group leading this research defined their mission as: to generate knowledge and disseminate impartial information through application of economic 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 applied understandings within our home College's four-element paradigm-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 for knowledge regarding production economics, management strategies, and associated business related information is high as would be expected in a state with an 100 plus billion dollar agriculture sector.

Without a sound research and extension program to inform production, business management, and other financial aspects, Ohio's food and agricultural industry would be at risk. Understanding of market economics, because of both traditional market forces and the new global economy, are more critical than ever as producers, processors, and distributors factor in the multiple forces that govern the business risks they take and the decisions they make.

Strong stakeholder communication has provided those conducting research and extension in this program area a sound understanding of stakeholder needs. The food and fiber industry continues to demand a robust natural resource base and a sustained flow of environmental services. Understanding the multiple economic factors that govern the wise use and sustainability of these resources and services is addressed under this program. From carbon trading to the economics of river restoration, knowledge generated in this planned program has a high demand statewide, nationally, and internationally.

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 science based information available, require that science to 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 continues to support research that helps reduce risk and improve profitability. Understanding the economics and social impacts of domestic programs and polices emanating from government is necessary to aid stakeholders in their decision

making and to inform those who make policy as to impact or how to create polices that will yield the desired impact. Policy research ranges from environmental policy and land use to many aspects of price and income related policy. Economic inquiry, whether focused on profitability or on maintaining environmental services and associated amenity values, has a long history of providing the science behind the agriculture scene and will continue to have impact well beyond this planning period. This planned program is central to Ohio's economic recovery and jobs growth in the agbioscience sector.

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	20%		10%	
602	Business Management, Finance, and Taxation	20%		10%	
603	Market Economics	15%		15%	
604	Marketing and Distribution Practices	0%		5%	
605	Natural Resource and Environmental Economics	15%		10%	
606	International Trade and Development	15%		5%	
607	Consumer Economics	0%		5%	
608	Community Resource Planning and Development	0%		5%	
609	Economic Theory and Methods	0%		20%	
610	Domestic Policy Analysis	15%		10%	
611	Foreign Policy and Programs	0%		5%	
	Total	100%		100%	

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

1. Situation and priorities

Research related to economic theory, policy and practice, and associated extension programs, especially in human capital development are critical to maintaining and growing an effective and efficient food, agriculture, and natural resources industry. Eleven million people live in a relatively small state of Ohio, with high rates of agriculture sector activity, from production to processing to consumption, and have 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 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 resources will greatly influence the long-term outcomes and impacts of all planned programs within this Plan of Work.

Agriculture experiment stations and extension programs have a heightened obligation to understand the multiple dimensions of economics to increase both quality and quantity of products and services that are important to the citizens of Ohio. Individuals, families, and communities, as well as businesses, related agencies, etc. involved in the food and fiber industry 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 citizens of Ohio's needs are met and that economies do not become an impediment to food and fiber production, as Ohio and the nation seek to provide positive direction for economic recovery.

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

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

Key assumptions for this 2013-2017 program are: the economic issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, and reflect the more 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; these economic issues are manifested at some community level and those stakeholders who are most vested

will become involved; others involvement will be limited yet they will reap the benefits of a sound basic and applied understanding of this research and extension program; and federal base funding will continue to be available and leveraged to support this Planned Program and the scientific staff who carry out these lines of inquiry. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

OARDC goals for this Planned Programs are: Advance knowledge regarding economic choices related to protection, management, size/scale/growth factors, and overall profitability required to support Ohio's agriculture industry and meet stakeholder demand. Grow the understanding of agribusiness management and associated systems necessary to support Ohio's agriculture industry and meet stakeholder demand. Expand 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 natural resource and environmental economics 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 in terms of government policy impact on agriculture and natural resources.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	0.0	0.0	5.5	0.0
2014	0.0	0.0	5.5	0.0
2015	0.0	0.0	5.5	0.0
2016	0.0	0.0	5.5	0.0
2017	0.0	0.0	5.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

To fulfill the goals of the Food, Agricultural and Economics Development Planned Program, OARDC will support both basic and applied research initiatives. Both laboratories and multiple field sites are available throughout state to permit data gathering and to continue long - term experiments. Extensive in-state research will take place, as will national and international studies. 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 outputs/impacts. All functional laboratories and sites are improved over time as program need and resource availability warrants. OARDC faculty and staff will engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations	● Public Service Announcement ● Newsletters

3. Description of targeted audience

OARDC's targeted audiences for this 2013 -2017 planned program include, but are not limited to: specific individuals or groups who have expressed a need for economic findings related to some aspect of human capital that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that depend on scientists in this program for support information and for the approaches/measures they generate; fellow 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 that information; other scientists and scientific groups; political entities; extension personnel; students from junior high school to post doctorate studies; news organizations; and 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

- Report 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	New knowledge of production variations in 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	Advanced knowledge of how to market and manage quality attributes of commodities leading to demonstrated value added/ profits for producers, processors, and distributors, and reported satisfaction/needs attainment among consumers.
3	Business management knowledge 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.
4	Research findings on novel programs such as pollution trading, carbon trading, conservation programs, cooperatives, etc. that results in enhanced profits, new sources of income, and/or prevention of loss of profits or loss of other resources, e.g. soil.
5	Relational contracting theory and practice information that will contribute to reduction of risks, improving profits, and adding stability to the system that meet stated stakeholder needs.
6	Stakeholders will have the necessary models that will improve on the forecasting of risk, demand, and prices in various commodity sectors leading to enhanced decision making, increased profits, and reductions in uncertainty.
7	Resultant management models that explain potential impacts of new/emerging trends e.g. trade agreements, bio-terrorism threats, and renewable fuels requirements, on specific agriculture sectors to the extent that negative impacts can be mitigated in a timely manner.
8	Market economies and efficiencies studies relating to factors such as pricing, finance, supply and demand, etc. ensuring that stakeholders are informed and their identified needs, e.g. lower operating costs, become more attainable.
9	Research finding on valuing environmental resources, e.g. wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.
10	Biocomplexity analysis to understand human-nature interactions at the landscape level that informs human enterprises, leading to demonstrated profitability, environmental protection, and/or improvements in quality of stakeholders' lives.
11	Increase profitability, reduce environmental impact, and/or improve quality of stakeholders' lives through bio-resource utilization efficiency and effectiveness research such as biomass to energy, nitrogen utilization, biocides, etc.
12	Market and non-market valuation of environmental resources, e.g. steelhead trout fishing, open space, that have often lacked economic justification that meets client needs, and informs individual, group, and government decision making.
13	Advance knowledge of vertical markets in developing counties that when applied leads to documented increased trade with the US.
14	Exchange rate, trade policy, and similar uncertainties research findings that lead to documented mitigation for stakeholders of certain negative effects of international trade.
15	New policy analysis research that informs policy development and fosters demonstrated gains for stakeholders in areas such as conservation programs, farmland protection, Farm Credit System resources, etc.

Outcome # 1

1. Outcome Target

New knowledge of production variations in 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 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
- 609 - Economic Theory and Methods

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Advanced knowledge of how to market and manage quality attributes of commodities leading to demonstrated value added/ profits for producers, processors, and distributors, and reported satisfaction/needs attainment among consumers.

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
- 606 - International Trade and Development
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Business management knowledge 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
- 607 - Consumer Economics
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Research findings on novel programs such as pollution trading, carbon trading, conservation programs, cooperatives, etc. that results in enhanced profits, new sources of income, and/or prevention of loss of profits or loss of other resources, e.g. soil.

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
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis
- 611 - Foreign Policy and Programs

4. Associated Institute Type(s)

- 1862 Research

Outcome # 5

1. Outcome Target

Relational contracting theory and practice information that will contribute to reduction of risks, improving profits, and adding stability to the system that meet stated stakeholder needs.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 603 - Market Economics
- 606 - International Trade and Development
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Stakeholders will have the necessary models that will improve on the forecasting of risk, demand, and prices in various commodity sectors leading to enhanced decision making, increased profits, and reductions in uncertainty.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 606 - International Trade and Development
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis
- 611 - Foreign Policy and Programs

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Resultant management models that explain potential impacts of new/emerging trends e.g. trade agreements, bio-terrorism threats, and renewable fuels requirements, on specific agriculture sectors to the extent that negative impacts can be mitigated in a timely manner.

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
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis
- 611 - Foreign Policy and Programs

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Market economies and efficiencies studies relating to factors such as pricing, finance, supply and demand, etc. ensuring that stakeholders are informed and their identified needs, e.g. lower operating costs, become more attainable.

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
- 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 # 9

1. Outcome Target

Research finding on valuing environmental resources, e.g. wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.

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
- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Research

Outcome # 10

1. Outcome Target

Biocomplexity analysis to understand human-nature interactions at the landscape level that informs human enterprises, leading to demonstrated profitability, environmental protection, and/or improvements in quality of stakeholders' lives.

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
- 608 - Community Resource Planning and Development
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 11

1. Outcome Target

Increase profitability, reduce environmental impact, and/or improve quality of stakeholders' lives through bio-resource utilization efficiency and effectiveness research such as biomass to energy, nitrogen utilization, biocides, etc.

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
- 607 - Consumer Economics
- 608 - Community Resource Planning and Development
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 12

1. Outcome Target

Market and non-market valuation of environmental resources, e.g. steelhead trout fishing, open space, that have often lacked economic justification that meets client needs, and informs individual, group, and government decision making.

2. Outcome Type : Change in Action 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
- 607 - Consumer Economics
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 13

1. Outcome Target

Advance knowledge of vertical markets in developing counties that when applied leads to documented increased trade with the US.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 606 - International Trade and Development
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 14

1. Outcome Target

Exchange rate, trade policy, and similar uncertainties research findings that lead to documented mitigation for stakeholders of certain negative effects of international trade.

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
- 606 - International Trade and Development
- 607 - Consumer Economics
- 608 - Community Resource Planning and Development
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Research

Outcome # 15

1. Outcome Target

New policy analysis research that informs policy development and fosters demonstrated gains for stakeholders in areas such as conservation programs, farmland protection, Farm Credit System resources, etc.

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
- 608 - Community Resource Planning and Development
- 609 - Economic Theory and Methods
- 610 - Domestic Policy Analysis

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 economy impact all aspects of peoples lives, psychologically, socially, business - wise, and physically. The economic climate, for example, preceding this 2013-2017 plan of work period will have dramatic carryover effect. Within this program area, public monies, and the fluctuations in appropriations of such, can have dramatic (both positive and negative) affect on human well-being, as do levels of government regulations. Likewise public policy, priorities, and perceptions, including popular culture and trends/fads, are major external factors impacting this program. Priority of economics research for limited dollars, and the resulting competition, impact the extent that research can be carried out. Other factors such as economic conditions and needs of migrant populations entering the community and workforce, or new populations who have recently immigrated into the area and are ill - prepared to sustain themselves socially and monetarily, are impacts. To an extent though, it is these various external factors that are studied in relationship to economic theory that yields the valued research generated by the scientists in this program. Weather related factors impact the conditions and attributes that are being studied by creating uncertainty that cannot be controlled for. 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, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer

- reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Human Health (OARDC Led)

2. Brief summary about Planned Program

The United States spends approximately 16% of its Gross Domestic Product (GDP) annually on health care, more than any developed country in the world. France and Switzerland, the closest in expenditure ranks, each spends approximately 11% of their GDP annually. Four decades ago, total health care spending in the US was about $75 billion (slightly over 7% of US GDP), or approximately $350 per person. The costs have grown to over $2 trillion per year, or $7000 plus per year per person. While overall health has improved in the US, we still rank 42nd in life expectancy for men and women among the 192 World Health Organization member states and nations.

Human health, as it relates to food and environment ,is a major concern from both the agricultural experiment station's research perspective, and from that of cooperative extension programs. Such is the case at Ohio State University. Agricultural crops (both plant and animal), their residues, renewable natural resources, and the related manufacturing processes and food products, all have human health and safety risks associated with them.

This Planned Program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan and will continue to be a focal area throughout this 2013 -2017 planning period. The goal is to reduce threats to human health and improve societal well-being within OARDC's and OSU Extension's sphere of influence. Faculty working in OARDC's food and animal health program wrote: emerging pathogens, zoonoses, and microbial contamination of food and the environment 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 scientist, 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.

For example, many Ohioans suffer and sometimes die in response to allergens produced by arthropods, such as dust mites. Asthma and allergy patients need solutions other than drugs. The goal is to develop and test economically efficient, socially acceptable, and environmentally benign strategies for controlling allergen producers. Over 10% of adults in Ohio have asthma, which is greater than any other chronic disease. The percentage of children suffering from asthma approaches 15% in some areas with minority and lower income families suffering the most. In the US, about 5,000 people die from asthma annually. Asthma is a chronic disease it is one of the most expensive to manage. Thus, health care organizations are eager for novel developments in reducing or preventing asthma. Our research offers a solution in integrated pest management of allergen producers as more than half of the asthma sufferers are sensitive to indoor allergens, especially dust mites. This Planned Program will address this and other

state and national needs that are central to OARDC, OSU Extension, NIFA, and APLU/ESCOP health - related goals through 2017 and beyond.

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
703	Nutrition Education and Behavior	0%		5%	
721	Insects and Other Pests Affecting Humans	25%		20%	
722	Zoonotic Diseases and Parasites Affecting Humans	50%		50%	
723	Hazards to Human Health and Safety	25%		10%	
724	Healthy Lifestyle	0%		15%	
	Total	100%		100%	

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

1. Situation and priorities

The science behind advancing human health, including healthy lifestyles, has personal consequences as well as importance for insuring a safe, stable society and protecting the economy from unnecessary losses. Providing for human health within our related industries and among producers, processors, distributors, and consumers, studying overall societal well-being within OARDC's sphere of influence, including obesity research (to be reported under a different Planned Program), and using the best science and extension methods available are expectations of OARDC's stakeholders. OARDC and OSU Extension address direct needs of their constituency groups by regularly interacting with them and understanding their needs. These programs directly support CFAES's broader goals of production efficiency, economic viability, environmental stewardship, and social acceptability by better protecting the workforce who produces, and the consumers who buy the technologies and products from the agriculture and natural resource sectors.

Without a growing body of knowledge to help protect society, opportunities will be missed for social and economic security, and society will not be well served. OARDC and OSU Extension are well positioned to continue to affect positive change in this planned program. To effect greater change in this and other planned programs, a new CFAES Department of Entomology, with both extension and research components, will be in place throughout this 2013 -2017 planning period.

To meet growing demand of better human health, scientists must continue to make advances in techniques and processes that are associated with the food systems. Due to the complexity of the problems, research and extension programs are integrated in multiple academic departments across

multiple colleges at Ohio State University.

2. Scope of the Program

- In-State Extension
- 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 is critical to meeting society's overt and latent needs in this area. As we address problems and needs within our stakeholder communities through 2017, the organization (OARDC and OSU Extension) will become better prepared to take advantage of emerging opportunities and more rapidly address associated problems. Other key assumptions are: The issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, reflect the more important issues, and warrant allocation of resources; The understanding of this planned program and how society utilizes and depends on the safety research and associated extension programs is key to present and future decision-making in provisioning for society 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.

Such research and education efforts are demanded by society to meet current and future needs. To this end, OARDC and OSU Extension fund this planned Program in multiple OSU colleges.

2. Ultimate goal(s) of this Program

Human health research will advance the study of insects, ticks, and mites to protect human health, including methods of control. Human health research will seek to better understand the means and methods related to transmission of zoonotic diseases to humans, including prevention; and grow fundamental and applied knowledge as to animal reservoirs for zoonotics. Likewise this planned program will seek to expand knowledge of and application to human health issues that are within the sphere of agricultural, food, and environmental research science that are not related to zoonotics per se. The factors may be the result of production and processing, ingestion, or similar of foods, byproducts, or wastesteams from agriculture.

Obesity, a critical component of human health, is report in a seperate planned program.

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
2013	0.0	0.0	2.0	0.0
2014	0.0	0.0	2.0	0.0

Year	Extension		Research	
	1862	1890	1862	1890
2015	0.0	0.0	2.0	0.0
2016	0.0	0.0	2.0	0.0
2017	0.0	0.0	2.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

On -going research activities to advance human health goals for societal well-being include both basic and applied research, as discussed in previous sections for this Planned Program. Effective research requires a mixture of laboratory and gathering places for subjects to maximize research knowledge. Emerging threats now require more advanced facilities such as a biosecurity lab, particularly needed in the study infectious animal diseases that may directly impact humans. All functional laboratories and sites are improved over time as program need warrants. OARDC faculty and staff will engage in appropriate levels of outreach, engagement, and consultation with both internal stakeholders such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Targeted audiences include, but are not limited to: specific individuals or groups who have expressed a need for health, obesity, and safety information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that depend on scientists in this program for support information and for new health and safety technologies and approaches/measures fellow 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 that information; other scientists and scientific groups; health workers/organizations; political entities; extension personnel; students from pre-school to post doctorate studies; news organizations; and 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	Reduce health risk by releasing at least one major study each five years demonstrating techniques, procedures, or products that lessen the chance of contacting, or the impact if contacted, zoonotic diseases.
5	Create a growing base of knowledge that supports improving human health as it relates to food, environment, and lifestyle

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

Reduce health risk by releasing at least one major study each five years demonstrating techniques, procedures, or products that lessen the chance of contacting, or the impact if contacted, zoonotic diseases.

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 # 5

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

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 such as noted above, and others such as 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 government or society in general abilities to attend to human health matters. Access to health care, both real and due to political positions, and education regarding healthy lifestyles also affects outcomes. Within this program area public monies, and the fluctuations in appropriations of such, have dramatic affect on human health, as do levels of regulations. Likewise public policy and the public's priorities and perceptions, especially regarding risks, are major external factors impacting this program.

Priority of this research for limited dollars and the resulting competition impact the extent of research that can be carried out. Other factor is migrant populations entering the workforce without fully understanding the risks. New populations, who have recently immigrated into the area, often do not understand risk and are subject to disease because of uninformed choices. Items such as potential levels of public exposure to certain zoonotic diseases are major external factors. Likewise public willingness to learn safety procedures in terms of pests or zoonotic disease threats are factors that are beyond the researchers control. Willingness to pay by consumers 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 often exceed resources, will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and

products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Human and Community Resource Development (OARDC Led)

2. Brief summary about Planned Program

Research and extension investments in human capital are critical to Ohio's 100 plus billion dollar food, agriculture, and natural resources industries. To that end a Human and Community Resource Development (HCRD) Planned Program, that includes faculty from multiple departments and two colleges, will continue to collectively guide outcome/impact-based research and associated extension efforts. This program is central to the College of Food, Agricultural, and Environmental Sciences 2008 Strategic Plan. Programs that advance the understanding of how rural individuals and communities utilize their resources to effectively participate in the agriculture economy is central to understanding the phenomena of human capital. First individuals and families are studied to better grasp how family structures function and what is required for their well-being. Rapid changes in sociological parameters and in technologies influence how individuals, families, and communities organize and behave in order to maintain functionality within the rural economy. For example the influx of shale oil leasing, exploration, and production have required greater attention to associated social change and how individuals and communities are to plan for these. Within this program are also foci directed towards program design, administration, management, and the analytical tools needed for evaluation and assessment. All of these aforementioned areas will remain in the portfolios related to this planned program.

Now, more than ever, outcome-based planned programs need the tools and techniques within this program to aid in more rapidly moving programs, technologies, and products into society. A well-educated society is often the key to adoption of these new programs, technologies, and products. To that end agricultural and environmental communication and education are program foci. While this planned program contributes to the broader College of Food, Agricultural, and Environmental Sciences' goals of production efficiency, economic viability, and environmental compatibility, it provides major research and extension leadership in understanding and extending the concept of social acceptability of agricultural industry practices. Its importance will continue throughout this planning period (2013 -2017) and very well may be enhanced by organization changes that have added some OSU Extension faculty members to the team working primarily in this Planned Program.

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

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	0%		10%	
802	Human Development and Family Well-Being	15%		15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	40%		20%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		5%	
805	Community Institutions, Health, and Social Services	0%		5%	
901	Program and Project Design, and Statistics	10%		10%	
902	Administration of Projects and Programs	15%		15%	
903	Communication, Education, and Information Delivery	20%		20%	
	Total	100%		100%	

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

1. Situation and priorities

To maintain and effective food, agriculture, and natural resource program throughout the state requires investment in the human side of the agricultural equation, especially as we seek to grow the economy and improve job opportunities. With 11 million people in a relative small state, the demand for consumptive and non-consumptive uses of the resources continues to grow. How human capital and their programs are investigated in will greatly influence the long-term outcomes of all planned programs. Agriculture experiment stations and extension programs, especially in a state such as Ohio, have a heightened obligation to understand the societal component to meet the multiple outcomes desired by individuals, families, and communities as well as businesses and related agencies. The food and fiber industry need the research information that is generated through this program. Programs regarding how people live, work, and function, as well as how they learn, make decisions, and organize for personal and human enterprises are important. Work in these knowledge areas is well-grounded theoretically, and extensive applied peer-reviewed literature exists. The challenges lie in applying what is known to new and emerging issues and generating lines of research as needed to ensure that the citizens of Ohio's needs are met and that human issues do not become an impediment to food and fiber production.

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 major assumption within this 2013 -2017 program is that by understanding the social underpinnings (both basic and applied) of how individuals and communities are maintained, we can better serve the food, agriculture, and environmental reseach and extesnion needs of Ohio and beyond. Knowledge of stakeholder populations, their built environment, how they organize themselves, and the influence of sociological and technological changes are prerequisite to maintaining the human enterprise of agriculture. Multiple issues related to the human condition, both rural and urban, as well as issues related to rural- urban interface, human ecology, and social responsibility within food, agricultural, and environmental enterprises, are areas in need of research inquiry and extension education. As the problems and needs within these stakeholder communities are addressed, the organization (OARDC and OSU Extension) becomes better prepared to take advantage of emerging opportunities or to more rapidly address problems within these areas.

Other key assumptions are: The issues within this program have been identified by our stakeholder communities, and/or via the scientific literature, reflect the more 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, fiber, and environmental services; To a greater or lesser extent all citizens at some point in their life directly benefit from this area of inquiry; These lines of inquiry will provide necessary information to inform human enterprises while protecting individuals, families and communities. 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 human capital is a demand by society to meet current and future needs. These issues are manifested at some community level and those stakeholders who are most vested will become involved; others involvement will be limited yet they will reap the benefits of a sound basic and applied understanding of these research and extension programs; and 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 areas for this program. Likewise it is assumed that the federal base funding will be leverage for continuing to attract state and extramural funds.

2. Ultimate goal(s) of this Program

Human and community resource development research will: advance the understanding of human development and family/societal well-being to better understand the role of human capital in agriculture and natural resources, in both the rural and urban setting as well as the ecology of human enterprises; expand knowledge of how rural populations, their organizations, their built and social environments, and associated technologies, including changes, effect individuals, families, groups and communities in terms of functionality within the business of agriculture/natural resources; improve upon program and project design in order to effect outcomes; study project formulation and administration in order to better understand and promote creativity, productivity, partnerships, collaboration, and proficiency within our own programs; and provide applied insights into multiple dimensions of communication, education and information services to advance the teaching and learning process within agriculture and natural resources. These goals are effective through 2017.

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
2013	0.0	0.0	3.0	0.0
2014	0.0	0.0	3.0	0.0
2015	0.0	0.0	3.0	0.0
2016	0.0	0.0	3.0	0.0
2017	0.0	0.0	3.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

The activities carried out in this Human and Community Resource Development Planned Program is primarily applied research and is supported by several CFAES academic departments. The preceding sections help to characterize actives within this Planned Program. Both laboratories and multiple field sites/community settings are available throughout state to permit data gathering and to continue projects requiring data over time. All functional laboratories and sites are improved over time as program need warrants. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders such as fellow extension personnel, and with external stakeholders.

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

Extension

Direct Methods	Indirect Methods
● Group Discussion ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Targeted audiences include, but not limited to: specific individuals or groups who have expressed a need for information related to some aspect of human capital that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; fellow academic units that depend on scientists in this program for support information and for approaches/measures; fellow agencies or support organizations who will not only use the social information but will also extend that information; populations who have not requested the information but will likely benefit from that information; other scientists and scientific groups; political entities; extension personnel; students from pre-school to post doctorate studies; news organizations; and 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 gradaute 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	Advance human capital and sociological studies that will inform strategies for expanding and strengthening the agricultural workforce leading to improved quality and quantity of jobs in rural areas yielding demonstrated economic growth.
2	Advance human capital and sociological studies that will inform strategies for strengthening individual and family well-being, and community stability, e.g. grandmother daycare in single head households.
3	Develop a more complete understanding of the relationship between learning style and cognitive abilities of Ohio agricultural students to inform teaching ?learning leading to gain score increases within and a better-educated workforce.
4	Conduct statewide survey research to better understand public attitudes, perceptions, opinions, and behaviors related to select topics in agriculture, annually documenting how those data impact decision-making, e.g. public policy, industrial decisions.
5	Investigate shifts in rural-urban interface, land use, immigration, and similar changes to determine if community policies and/or levels of social capital in the community can shape the future of agriculture in face of urbanization pressures.
6	Improve through research the understanding of and skill development for decision-making by local farmers that will result in improved farm viability and competitiveness at the rural-urban interface.
7	Develop a conceptual framework within five years that will inform programming for developing statewide leadership characteristics, skills, and attitudes in a core of present and future leaders in order to advance a more socially responsible industry.
8	Study rural educational 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.
9	Investigate the social implications of structural changes in agriculture and their economic implications, documenting challenges and opportunities for rural individuals, families, groups and communities, including business and government.
10	Investigate project formulation and administration to the extent that the findings help the institution to document gains in creativity, productivity, partnerships, collaboration, and proficiency within five years.
11	Advance understanding of communication, education and information services to show gain scores in the teaching and learning process within related agriculture and natural resources programs.

Outcome # 1

1. Outcome Target

Advance human capital and sociological studies that will inform strategies for expanding and strengthening the agricultural workforce leading to improved quality and quantity of jobs in rural areas yielding demonstrated economic growth.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
- 805 - Community Institutions, Health, and Social Services
- 901 - Program and Project Design, and Statistics

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Advance human capital and sociological studies that will inform strategies for strengthening individual and family well-being, and community stability, e.g. grandmother daycare in single head households.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Develop a more complete understanding of the relationship between learning style and cognitive abilities of Ohio agricultural students to inform teaching ?learning leading to gain score increases within and a better-educated workforce.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Conduct statewide survey research to better understand public attitudes, perceptions, opinions, and behaviors related to select topics in agriculture, annually documenting how those data impact decision-making, e.g. public policy, industrial decisions.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 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

Investigate shifts in rural-urban interface, land use, immigration, and similar changes to determine if community policies and/or levels of social capital in the community can shape the future of agriculture in face of urbanization pressures.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services
- 901 - Program and Project Design, and Statistics

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Improve through research the understanding of and skill development for decision-making by local farmers that will result in improved farm viability and competitiveness at the rural-urban interface.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Research

Outcome # 7

1. Outcome Target

Develop a conceptual framework within five years that will inform programming for developing statewide leadership characteristics, skills, and attitudes in a core of present and future leaders in order to advance a more socially responsible industry.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services
- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Research

Outcome # 8

1. Outcome Target

Study rural educational 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)

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

4. Associated Institute Type(s)

- 1862 Research

Outcome # 9

1. Outcome Target

Investigate the social implications of structural changes in agriculture and their economic implications, documenting challenges and opportunities for rural individuals, families, groups and communities, including business and government.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Research

Outcome # 10

1. Outcome Target

Investigate project formulation and administration to the extent that the findings help the institution to document gains in creativity, productivity, partnerships, collaboration, and proficiency within five years.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs

4. Associated Institute Type(s)

- 1862 Research

Outcome # 11

1. Outcome Target

Advance understanding of communication, education and information services to show gain scores in the teaching and learning process within related agriculture and natural resources programs.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

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 (Trends and fads)

Description

In addition to the multiple measures noted above, weather, climate change and related environmental conditions can play a major role in creating adverse working and living conditions thus impacting people who are the focus of this Planned Program. Shifts in economy impact all aspects of people's lives, psychologically, socially, and physically. Impacts from the economic downturn preceding this 2013 - 2017 period will more than likely continue, affecting both our organization and the people we serve.

Within this program area public monies, and the fluctuations in appropriations of such, have dramatic (both positive and negative) affects on human well-being, as do levels of government regulations. Likewise public policy and the public's priorities and perceptions, including popular culture and trends/fads, are major external factors impacting this program. Priority of social science research for limited dollars, and the resulting competition, impact the extent that research can be carried out. Other factors such as migrant populations entering the community and workforce, or new populations who have recently immigrated into the area, and are ill-prepared to sustain themselves socially and monetarily. Learning styles, disabilities, background, education, and similar affect how one learns and how they will use any new knowledge gained. Often, individual's traits are well inculcated into that individuals psyche and behavior change is slow. 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, all will affect outcomes.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

OARDC 's Planned Programs have incorporated as an integral part of the approval and funding process protocols for documenting success in achieving Program goals. OARDC researchers, and the organization per se, use multiple methods and evaluation strategies to gather data from assessment of needs, to formative, to summative evaluation. Each department, center, program, lab, 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: (1) 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, willingness to bring their

other colleagues into OARDC discussions, and overall level of satisfaction with OARDC processes and products; (2) 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; (3) elected state and federal officials' support for OARDC in terms of base budgets, new initiatives, willingness to help us link with new stakeholders, their unsolicited feedback, request for information, and their request for intervention or action for specific research projects; (4) support from USDA, feedback from NIFA regarding our federal reports, and feedback and support we receive from other federal agencies; (5) accountability measures required by extramural grants and contracts and our level of attainment of those required metrics; (6) impacts reported by individual CFAES departments in their OARDC budget requests in our differential funding model, as well as individual faculty member's impact statements; (7) level of attainment and feedback from the OSU Provost Office on our report of accomplishments against the metrics we set forth, and that were approved by OSU, in our current CFAES Strategic Plan; (8) peer - reviewed publications and tier level of the journals, as well as other publications; (9) citation indexes; (10) patents warded; (11) commercialization of our research findings; (12) national rankings of various entities or CFAES departments supported in part by OARDC, as well as individual faculty recognition and memberships; (13) both independent and total summation of our economic indicators in terms of state and federal base funding, extramural funding, special competitive university funding our faculty members receive, funding from business and industry, funding and support from various entities such as cities, counties, development districts, associations, trade groups, as well as the political support we receive from the afore mentioned, and their willingness to engage in collaborative ventures and meaningful partnerships; (14) from a limited number of formal assessments such as occasional statewide telephone surveys, surveys of targeted groups, and secondary data from organizations in Ohio that gather data that are OARDC - related; (15) media coverage and response to by stakeholders; (16) formal assessments such those that OARDC has contracted with Battelle to conduct between 2004 and 2008 and our subsequent follow-up; (17) feedback from and standing among our peer institutions, (18) feedback and standing among other research entities at OSU as well as feedback and support from our University administration, Ohio Board of Trustees , and Ohio Board of Regents; and (19) feedback from OARDC employees.

Collectively the quantitative and qualitative measures inform OARDC across the needs assessment - formative - summative spectrum. Such feedback will continue to gathered and will strongly influence OARDC processes and products throughout this 2013 -2017 planning period, and beyond.

V(A). Planned Program (Summary)

Program # 14

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 efforts involving individuals and groups of all sizes will focus on Community Economics, Small Business, and Job Development throughout the state, whether metropolitan, rural, or a combination.

The Business Retention and Expansion (BR&E) program is an OSUE signature program. The Ohio BR&E program has aimed to strengthen the capacity of local leaders and residents to affect economic conditions in more than 140 communities since 1986. Many of the program's resources are now available to participating communities via the web, providing a great deal of flexibility to the participants in how the program is delivered. Ultimately, the program aims to engage community stakeholders in a formal dialogue in order to empower local development officials and community at large to act on economic development issues of strategic 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	34%		0%	
608	Community Resource Planning and Development	33%		0%	
801	Individual and Family Resource Management	33%		0%	
	Total	100%		0%	

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

1. Situation and priorities

Communities, individuals and families must find ways to thrive in the rapidly changing economic environment. Therefore, community leaders and residents need to develop new strategies for addressing these changes.

2. Scope of the Program

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

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

1. Assumptions made for the Program

By investing in OSU Extension Faculty and Staff time and expertise with the intent to teach community leaders and citizens integrated activities including research, teaching, providing technical assistance, coaching, facilitating and forming coalitions, communities and leaders will implement new strategies.

2. Ultimate goal(s) of this Program

Empowering 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
2013	22.0	0.0	0.0	0.0
2014	20.0	0.0	0.0	0.0
2015	18.0	0.0	0.0	0.0
2016	18.0	0.0	0.0	0.0
2017	19.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Workshops
- Programs
- Curriculum Development
- Leadership Development
- Development of on-line resources
- Research to build plans and implement strategies
- One-on-one BR&E consultations

- BR&E volunteer organizational efforts

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Other 1 (Public Forums)	● Web sites other than eXtension

3. Description of targeted audience

Community Leaders, economic development professionals, citizens (families and individuals)

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

- formal training workshops (BR&E)
- number of one-on-one consultations
- number of formal presentation of findings to communities
- number of web-based questionnaires distributed (BR&E)
- number of hard-copy questionnaires distributed (BR&E)

☑ 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	# of participants who increased their financial literacy
2	# of participants who have developed an integrated plan for achieving financial security
3	# of participants who understand their roles in the development of a community economy
4	# of participants using information to make community decisions
5	# of community plans developed and adopted
6	# of jobs created and retained
7	# of dollars of additional business financing leveraged
8	number of local leaders or community residents that are using evaluation skills and data to make important community decisions (BR&E)

Outcome # 1

1. Outcome Target

# of participants who increased their financial literacy

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

# of participants who have developed an integrated plan for achieving financial security

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

# of participants who understand their roles in the development of a community economy

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

# of participants using information to make 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
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

# 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

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

# of jobs created and retained

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development
- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

# of dollars of additional business financing leveraged

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 8

1. Outcome Target

number of local leaders or community residents that are using evaluation skills and data to make important community decisions (BR&E)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

{NO DATA ENTERED}

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)
- Before-after (before and after program)
- During (during program)

The following are planned data collection methods for the 'Advancing Employment and Income Opportunities' program:

- Sampling
- Whole population
- Mail survey
- On-site survey
- Observation

V(A). Planned Program (Summary)

Program # 15

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 $94 billion to the state's economy every year. OSU Extension assists with technology, marketing, and educational support advancing Ohio's position in the global marketplace. OSU Extension also works to enhance and sustain the environment and natural areas in the state, balancing economic advancement with environmental sustainability. OSUE works with farmers to strengthen their businesses, adopt new technology, and improve efficiency while protecting the environment. OSUE helps 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. Using OSUE as a resource, homeowners enhance the value of their homes and communities, and OSUE trains Master Gardener volunteers to apply and share research-based yard and garden information. OSUE protects Ohio's natural environment by working with landowners in managing woodlands and preserving streams and other water resources, such as Lake Erie.

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	10%		0%	
123	Management and Sustainability of Forest Resources	5%		0%	
133	Pollution Prevention and Mitigation	5%		0%	
205	Plant Management Systems	5%		0%	
213	Weeds Affecting Plants	5%		0%	
216	Integrated Pest Management Systems	5%		0%	
307	Animal Management Systems	10%		0%	
308	Improved Animal Products (Before Harvest)	10%		0%	
315	Animal Welfare/Well-Being and Protection	5%		0%	
402	Engineering Systems and Equipment	10%		0%	
403	Waste Disposal, Recycling, and Reuse	5%		0%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
602	Business Management, Finance, and Taxation	5%		0%	
603	Market Economics	5%		0%	
721	Insects and Other Pests Affecting Humans	5%		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 $94 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 entrepreneurial by differentiating their commodities and evaluating direct and other value-added 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 and a rural landscape increasingly occupied by homeowners seeking 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 endowment of resources. Ohioans are also concerned with overarching issues including global climate change, invasive species, and farm-land preservation. The challenge is to raise awareness and understanding that development should proceed in concert with economic, environmental and societal health.

2. Scope of the Program

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

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

1. Assumptions made for the Program

OSU Extension Agriculture and Natural Resources program area's multi-disciplinary teams will continue to conduct applied research and identify the most efficient means to disseminate research-based information through just-in-time electronic newsletters, programs, field days and satellite series. 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

Ohio's agriculture and green industries will generate a $4 - 5 million gross increase over the next 5 years through implementation of OSU Research and Extension programs, products, and recommendations.

Incorporate environmental components into programs primarily aimed at producers of agricultural products in Ohio.

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
2013	28.0	0.0	0.0	0.0
2014	27.0	0.0	0.0	0.0
2015	27.0	0.0	0.0	0.0
2016	27.0	0.0	0.0	0.0
2017	27.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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.

Conduct workshop training sessions for livestock haulers, food animal veterinarians, livestock producers, consultants and integrators.

Prepare and distribute research-based educational materials in the areas of animal welfare and bio-security through worksheets, factsheets, web-based sites, podcasts, and emerging technologies.

Conduct tax education workshops for practitioners.

Pesticide Applicator Training, Small Farm Conferences, Small Farm College, Transitioning Your Farm Business to the Next Generation Workshops, and Women in Agriculture seminars.

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention ● Demonstrations	● Public Service Announcement ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Ohio farm families, commercial green-industry companies, consumer horticulture advocates, commodity/farm advocacy groups, federal/state agricultural/environmental agencies, state-wide consumer groups, volunteer groups, community leaders, business leaders, elected and appointed officials, and non-government 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 volunteers involved in delivery and implementation of program
- number of multi-state partnerships
- number of people completing the 'Transitioning Your Farm/Agricultural Business to the Next Generation' workshops
- number of Crop Observation and Recommendation Network Newsletters distributed
- number of participants reached with agronomic information provided in regional / local Agronomy meetings
- number of hits to website
- number of local / on-farm research project sites
- number of participants in local Field Days
- number of 'Weed Control Guide for Ohio and Indiana' distributed
- number of 'Corn, Soybean, Wheat and Alfalfa Field Guides' distributed

☑ 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 agronomic crop, fruit and vegetable producers that demonstrate an increase in biosecurity knowledge and skills.
2	Number of food animal producers that increase their knowledge of how to mitigate animal biosecurity hazards and risks on their farm operations and agribusinesses due to livestock mortality.
3	Increased knowledge of current practices and emerging technology.
4	Number of youth shows / county fairs that implement animal ID or quality assurance programs.
5	Increase profitability for the food animal sector of the Ohio agricultural industry.
6	Number of Schedule "F" tax forms filed by tax practitioners that participated in OSU Income Tax Schools.
7	Number of farms using transitioning planning.
8	number of Increasing Profitable Crop Yields participants that indicate they will implement new management practices based on information received at meetings
9	number of crop production acres that will implement best management practices for nutrient management
10	number of crop production acres that implement weed resistance management strategies
11	number of Ohio crop acres where appropriate utilization of integrated pest management (IPM) practices occur
12	number of individuals taught about disease identification, control and scouting or key weed control concepts

Outcome # 1

1. Outcome Target

Number of agronomic crop, fruit and vegetable producers that demonstrate an increase in biosecurity knowledge and skills.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 133 - Pollution Prevention and Mitigation
- 216 - Integrated Pest Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Number of food animal producers that increase their knowledge of how to mitigate animal biosecurity hazards and risks on their farm operations and agribusinesses due to livestock mortality.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 315 - Animal Welfare/Well-Being and Protection
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Increased knowledge of current practices and emerging technology.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 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
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 315 - Animal Welfare/Well-Being and Protection
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of youth shows / county fairs that implement animal ID or quality assurance programs.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 315 - Animal Welfare/Well-Being and Protection
- 402 - Engineering Systems and Equipment
- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Increase profitability for the food animal sector of the Ohio agricultural industry.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 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
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 315 - Animal Welfare/Well-Being and Protection
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Number of Schedule "F" tax forms filed by tax practitioners that participated in OSU Income Tax Schools.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

Number of farms using transitioning planning.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 8

1. Outcome Target

number of Increasing Profitable Crop Yields participants that indicate they will implement new management practices based on information received at meetings

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 402 - Engineering Systems and Equipment
- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

number of crop production acres that will implement best management practices for nutrient management

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 10

1. Outcome Target

number of crop production acres that implement weed resistance management strategies

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 11

1. Outcome Target

number of Ohio crop acres where appropriate utilization of integrated pest management (IPM) practices occur

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 12

1. Outcome Target

number of individuals taught about disease identification, control and scouting or key weed control concepts

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems

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

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 'Enhancing Agriculture and the Environment' program:

- After only (post program)
- Retrospective (post program)

- Before-after

The following are planned data collection methods for the 'Enhancing Agriculture and the Environment' program:

- Sampling
- On-site survey
- Case study
- On-line survey

V(A). Planned Program (Summary)

Program # 16

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 need advanced skills to be successful. OSU Extension, through 4-H and other programming efforts, provides resources and support for volunteers who deliver educational programs focused on critical issues affecting youth. 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.

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
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 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. There is opportunity to build human and social capital in individual neighborhoods and communities by creating sustained volunteer-led groups that promote youth contribution. The educational priorities are: (1) Science, Engineering and Technology tied to scientific learning and discovery; and (2) Citizenship tied to the activities of people with institutions, government and communities for the common good.

2. Scope of the Program

- In-State 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.

2. Research will continue to support Positive Youth Development Practices/Programming as the most effective way for reaching youth.

3. Demands on family time will continue to be a factor in the programs youth choose.

4. There will continue to be risk factors that influence youth and the need for programs that address those factors.

5. Youth will face in increasing amount of choices and opportunities in all facets of their lives

2. Ultimate goal(s) of this Program

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
2013	52.0	0.0	0.0	0.0
2014	52.0	0.0	0.0	0.0
2015	52.0	0.0	0.0	0.0
2016	52.0	0.0	0.0	0.0
2017	52.0	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

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

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites other than eXtension ● Other 1 (Pod Casts) ● Other 2 (Emerging Technology)

3. Description of targeted audience

- Youth - infant 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

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 enrolled/ engaged in military 4-H clubs
- 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
- Number of teen volunteers
- number of sessions (RMRW)

☑ 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 understanding of decision making processes
2	Increase knowledge in educational topic being presented
3	Demonstrate decision making and problem solving skills
4	Practice improved basic life skills
5	Youth who have participated in 4-H programs possess transferrable workforce skills
6	number of participants who increased awareness about what it costs to maintain a household (RMRW)
7	number of participants who increased awareness about how every spending decision affects other spending opportunities (RMRW)
8	number of participants who increased awareness about how the type of job they have affects how much money they will make (RMRW)
9	number of participants who increased feeling of importance about getting more education or training after high school (RMRW)
10	number of participants who increased feeling of importance about waiting to have children until financially ready (RMRW)
11	number of participants who increased feeling of importance about having a plan for spending that includes both needs and wants (RMRW)
12	number of participants who indicated their likeliness to make changes relative to getting more education or training after high school (RMRW)
13	number of participants who indicated their likeliness to make changes relative to learning how to make wise financial decisions (RMRW)

Outcome # 1

1. Outcome Target

Increase 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

Increase knowledge in 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

Demonstrate 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

Practice improved basic life 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 # 5

1. Outcome Target

Youth who have participated in 4-H programs possess transferrable 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 awareness about how every spending decision affects other spending opportunities (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 increased awareness about how the type of job they have affects how much money they will make (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 # 9

1. Outcome Target

number of participants who increased feeling of importance about getting more education or training after high school (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 # 10

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 # 11

1. Outcome Target

number of participants who increased feeling of importance about having a plan for spending that includes both needs and wants (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 # 12

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 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 participants who indicated their likeliness to make changes relative to learning how to make wise financial decisions (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

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

{NO DATA ENTERED}

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

V(A). Planned Program (Summary)

Program # 17

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 offerings that transfer the latest creative and innovative thinking. 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 : 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
607	Consumer Economics	10%		0%	
703	Nutrition Education and Behavior	20%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	5%		0%	
723	Hazards to Human Health and Safety	10%		0%	
724	Healthy Lifestyle	20%		0%	
801	Individual and Family Resource Management	25%		0%	
802	Human Development and Family Well-Being	10%		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 increasingly multidisciplinary.

Across the breadth of four interdisciplinary Impact Areas, 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 to meet local needs and to 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.

2. Scope of the Program

- In-State Extension
- Multistate Research
- 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 already 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

Participants will apply practical information 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
2013	36.0	0.0	0.0	0.0
2014	36.0	0.0	0.0	0.0
2015	36.0	0.0	0.0	0.0
2016	36.0	0.0	0.0	0.0
2017	36.0	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 ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Public Service Announcement ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Strengthening Families and Communities programming is tailored to meet the needs of the intended audience. For example school programming is age appropriate whereas programs at Senior Centers are targeted to individuals living alone or with one other person in terms of food preparation. The end result is a program that has the potential to encompass all residents of the county. 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 may not have 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

☑ 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	# of participants who increased knowledge on topic presented as a result of the education program/session(s)
2	# of participants who plan to adopt one or more recommended practices as a result of the education program/session(s)
3	number of participants whose knowledge of diabetes management has increased (DWD)
4	number of participants who are able to count carbohydrates (DWD)
5	number of participants who are eating smaller portion sizes (DWD)
6	number of participants who have lowered blood sugar levels (DWD)

Outcome # 1

1. Outcome Target

# of participants who increased knowledge on topic presented as a result of the education program/session(s)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

# of participants who plan to adopt one or more recommended practices as a result of the education program/session(s)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 703 - Nutrition Education and Behavior
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

number of participants whose knowledge of diabetes management has increased (DWD)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

number of participants who are able to count carbohydrates (DWD)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

number of participants who are eating smaller portion sizes (DWD)

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

number of participants who have lowered blood sugar levels (DWD)

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

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 studies for the 'Strengthening Families & Communities' program area:

- After only (post program)
- Retrospective (post program)
- Before-after

- During
- Case study
- Comparisons between program participants (individuals, group, organizations and non-participants)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity

The following are planned methods of data collection for the 'Strengthening Families and Communites' program area:

- Sampling
- Mail survey
- Telephone survey
- On-site survey
- Structured interview
- Unstructured interview
- Case study
- Observation
- Tests