

# 2015 Ohio State University Combined Research and Extension Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

The Ohio Agricultural Research and Development Center (OARDC) and Ohio State University Extension (OSUE) are symbiotic components of The Ohio State University's (OSU) College of Food, Agricultural, and Environmental Sciences (CFAES). OARDC serves as the research arm of CFAES, whereas OSUE is the public interface that delivers research-based education to Ohioans to better lives, businesses, and communities. The mission of the college is simply but profoundly stated, "We Bring Knowledge to Life."

2015 was a year of multiple leadership changes for the college. In November 2015, Ohio State University President Michael V. Drake named Dr. Bruce McPheron Interim Executive Vice President and Provost, effective December 2, 2015. For the past three years, Dr. McPheron has served as Vice President for Agricultural Administration and Dean of CFAES. He will serve in the interim position while the university conducts a national search for a successor to Executive Vice President and Provost Joseph Steinmetz. Dr. Ron Hendrick serves as the Interim Vice President for Agricultural Administration and Dean of CFAES.

Dr. Steve Slack retired at the end of 2015 after 16 years as Associate Vice President and Director of OARDC and Associate Dean of Research for CFAES. Dr. David Benfield now serves as Associate Vice President of Agricultural Administration and Director of the Wooster Campus. Dr. Jerry Bigham serves as the Interim Associate Dean for Research and Graduate Education.

Dr. Roger Rennekamp succeeded Dr. Keith Smith as the 12th leader of Ohio State University Extension on January 4, 2016. Dr. Smith retired in 2015 after 23 years serving as the Director of OSU Extension. Dr. Rennekamp comes to Ohio State from Oregon State University, where he had served as the Associate Dean for Outreach and Engagement.

Though the leadership of the college has changed, its mission and goals have not. OSUE and OARDC are to be engaged, to deliver impacts, and to make a difference in the lives of Ohioans. This charge is implicit in the land-grant mission and is reinforced by university leadership, elected officials, and by those we serve. Likewise, this charge is central to the USDA-NIFA mandate. Engagement and impact-oriented programs continue to be our hallmark. OARDC and OSUE are leaders in "Agbioscience": the integration of scientific disciplines to address critical needs of (1) food security, production and human health; (2) environmental quality and sustainability; and (3) advanced bioenergy and biobased products. CFAES' agbioscience program underpins Ohio's \$107+ billion agricultural industry. These three signature areas of agbioscience have been adopted as key research priorities for OARDC. At any given time, OARDC researchers are engaged in more than 400 research projects in these areas.

Similarly, CFAES' research and Extension programs continue to focus on OSU's three University-wide Discovery Themes: (1) Food Production and Security; (2) Energy and Environment; and (3) Health and Wellness. The Discovery Themes provide Ohio State with an unprecedented opportunity to find durable solutions to today's--and tomorrow's--most compelling issues. The Discovery Themes Initiative is a transformative effort. The college has committed funding for 17 new Discovery Themes faculty members who will be tenured or tenure-track, and will provide a focused and significant opportunity to enhance the

diversity of Ohio State's faculty. This number is expected to increase to 23 new faculty members within the next two years.

OARDC and OSU Extension, collectively employ approximately 1,500 fulltime employees, and work jointly with all CFAES agbioscience programs. Seventy-six faculty members hold joint appointments in OARDC and OSUE, and most also have advising and teaching appointments in CFAES academic programs. Likewise, OSU Extension and OARDC work closely with CFAES' Agricultural Technical Institute (ATI), the nation's largest two-year degree program of its kind. ATI is ranked number one in the nation among two-year schools awarding degrees in agriculture and related sciences. This close collaboration among the three entities in CFAES (OARDC, OSUE and academic programs including ATI) results in seamless programs, such as our agronomic field days--that are held annually at our research stations across the state. OARDC, while serving as the research arm of CFAES, is also intimately involved in student learning. OARDC research supports approximately 200 graduate level and postdoctoral students each year who spend their time in field and laboratory investigations.

OARDC and OSU Extension have continued to manage their programs within current fiscal realities despite ever-increasing demands for services, and in the face of Ohio's need for advancing job growth and economic development. While economic turnaround is evident throughout Ohio, OARDC and OSU Extension have continued to lead from a position based on leveraging investments made in research and Extension to expand the economy while ensuring the wise use of our social, environmental, and human capital.

OARDC uses capacity funds to leverage additional funding. In fiscal year 2015, OARDC had a portfolio of 566 active grants valued at \$154 million. Some examples are listed below.

**From the United States Department of Agriculture:**

- \$6.7 million to create a novel, translational, multidisciplinary approach to control poultry respiratory diseases in the United States
- \$1.9 million to explore uniting farmers and scientists in participatory research and education to explain the effects of "soil balancing" on farms, soils, crops, weeds and insects
- \$0.6 million to create germplasm resources for the floriculture and nursery industry at the Ornamental Plant Germplasm Center
- \$0.5 million to study the influence of gestational age of gilts and porcine epidemic diarrhea virus (PEDv) exposure on the gut-mammary-sIgA axis and protective lactogenic immunity

**From the National Science Foundation:**

- \$3.8 million to understand the exploitation of genetic and epigenetic variation in the regulation of tomato fruit quality traits

**From the Ohio Soybean Council:**

- \$1 million to address soybean priority areas

**From the Ohio Department of Agriculture:**

- \$0.9 million targeting wildlife biodiversity in Ohio

While each of these programs is funded to conduct both basic and translational science, OSU Extension is a major partner in many of these studies. Without the expertise of Extension faculty and staff, translating the science to the point of adoption by stakeholders would not occur efficiently.

In order to manage programmatic priorities, OSU Extension has recently engaged in a process of looking to and imagining the future of OSU Extension programming. Beginning in 2014, Dean McPheron of CFAES launched a project, "VP Conversations on the Future of Extension." This project is described as a "strategic foresight project intentionally asking questions about envisioning a long-term future for OSU Extension including the role the organization should play in shaping and positively impacting Ohio's residents."

The project is two-pronged: futuring--identifying challenging trends and issues that will affect Ohioans; and visioning--examining how OSUE uses its strengths and resources to meet educational needs for the identified topics and how OSUE will address those issues. In 2015, the VP Conversations on the Future of Extension project moved into the second phase, visioning. Visioning is "an aspirational exercise in leveraging internal culture, capabilities, resources, goals, and mission to offer successful products and services to customers and stakeholders in the future." It provides the internal foundation for operational success; it is a basis for managing long-term investments and risks.

Information was gathered in the futuring phase from a wide variety of sources. As the project transitioned into its visioning phase, this information was analyzed, keeping in mind the question, "SO WHAT? Now that we have glimpsed into the potential alternative futures, what could or should OSU Extension do?" During 2015, there were 15 opportunities (including 12 in-person workshops, 2 virtual / online workshops, and one online survey) where individuals could attempt to answer the question. Over 3,000 data points were gathered during the visioning phase. The conversation on the future of OSU Extension is continuing into 2016, as both Extension and CFAES' new leadership begin to form their own plans for the future of our organization.

OARDC and OSU Extension have submitted an array of impacts for this 2015 reporting period that are helping to advance both society and science. The institution has moved beyond food production to the creation of energy and manufacturing materials such as natural rubber, biogas, and ethanol. Plant and animal genetics research, in combination with food technologies, engineering, and plant and animal health research are supporting a safer, healthier food supply that is also more sustainable, with less environmental impact. These programs will substantially contribute to reducing global hunger. For the most part, these are all collaborative efforts involving OARDC and OSU Extension, as well as multiple business and industry partners, and multiple federal, state, local agencies and non-government organizations. CFAES continues to support the integration of cutting-edge research, innovative Extension and outreach programs, and development across five other OSU colleges, entering into interdisciplinary partnerships to address complex problems and issues that require broad thinking.

Our programs impact Ohioans every day. A new avian flu outbreak has devastated the U.S. poultry industry this past year, killing close to 50 million birds and sending egg prices soaring. OARDC experts are conducting innovative research to improve detection, prevention and management of avian flu and other respiratory diseases that threaten the state's valuable poultry industry. Researchers have also developed safe methods to compost dead birds and prevent the spread of this disease. The stakes are high in Ohio, one of the nation's top producers of eggs and turkeys and home to an industry worth \$2.3 billion, which directly supports more than 14,600 jobs.

Senate Bill 150 was passed in 2014, which requires farmers with 50 or more acres to attend a course on fertilizer application. To meet the requirements of Senate Bill 150, and to meet the need for education that will aid in reducing harmful algal blooms, OSU Extension has developed a signature program, 'Nutrient Stewardship for Cleaner Water.' The goal of the signature program is to improve water quality in Ohio by educating farmers on the correct rates, times, amounts and placement of phosphorus-containing fertilizers. Long-term benefits of this program are increasing crop yields, boosting farm profits through increased production, and generating less nutrient runoff from fields, which ultimately results in safer, cleaner

drinking water for all Ohioans. The drinking water for more than half of Ohioans comes from water at risk for harmful algal blooms.

Senate Bill 1 was passed and went into effect on July 1, 2015. The bill effects the 24 Ohio counties (or parts of counties) that make up the Western Lake Erie Basin. This bill sets parameters for when fertilizer may or may not be applied. In the bill, fertilizer is defined as phosphorus and nitrogen. Under the bill, fertilizer and manure may not be applied to frozen or snow-covered soil; when the top two inches of soil are saturated with precipitation; or if the local weather forecast calls for a 50% or greater chance of precipitation exceeding 1" in a twelve hour period for fertilizer, or ½" in a 24 hour period for manure. Currently, the enforcement process is complaint-driven, which requires someone to contact the Ohio Department of Agriculture (ODA) in order to report a violation. If the ODA investigates and finds the complaint valid, the farmer in violation may be fined up to \$10,000. 'Nutrient Stewardship for Cleaner Water' programming, initially developed for addressing the requirements of Senate Bill 150, will also provide farmers with the knowledge necessary to be in compliance with Senate Bill 1.

The college dedicated \$1 million shortly after dangerous microcystin levels from harmful algae in Lake Erie shut down Toledo's water supply for two days in August 2014. The program's goal is to ensure safe drinking water while maintaining an economically productive agricultural sector. Phosphorus, an important nutrient for crop production, can lead to hazardous algal blooms in lakes.

Field to Faucet projects currently underway include:

- Developing an app for farmers to record nutrient application rates and methods;
- Developing a controlled-access, geospatial-data warehouse that allows producers and researchers to secure and share publicly available data;
- Finding ways to best remove phosphorus and nitrogen from manure and anaerobic digester discharge before the materials are applied to fields. This effort will especially benefit the watershed around Grand Lake St. Mary's in western Ohio;
- Using unmanned aerial vehicles to provide real-time data on concentrations of microcystin created by harmful algal blooms in Lake Erie; and developing a sensor to detect real-time concentrations of microcystin in the lake.

OARDC contributes powerful research to provide safe and affordable food worldwide. One such project applies proprietary virus-like-particle (VLP) technology to develop new vaccines and diagnostics to address viral diseases of food animals. VLPs are structurally analogous to viruses, but they do not contain genetic material and do not cause disease yet still induce a strong immune response. The patented technology developed at the OARDC has led to the creation of a startup company, LARAD Inc. (Leadership for Advancing Responses to Animal Diseases).

LARAD was established to develop and commercialize the VLP technology, initially in products for the prevention and diagnosis of infectious bursal disease (IBD), an immunosuppressive disease in poultry caused by the infectious bursal disease virus (IBDV). IBD is one of the most significant contagious immunosuppressive diseases, affecting nearly all poultry producing regions around the world. Financial losses due to IBD result not only from high mortality, but also from a dramatic decrease in the overall health of surviving birds.

No VLP vaccines for IBDV or any poultry diseases are commercially available. LARAD's VLP technology is most powerful when used to protect against viral diseases where the pathogen has a history of frequent mutations. The VLP vaccines can be rapidly re-engineered to keep pace with viruses as they evolve. While conventional vaccines become less effective as viruses mutate, LARAD will be able to adapt its VLP vaccines to combat changing viruses. This ability to produce VLPs to the current virus strain is a game-changing approach that has not been possible in the animal vaccine industry until now. LARAD is also

working toward similar products for other diseases in poultry, fish, cattle, swine and companion animals.

Ohio has a \$2.3 billion dollar poultry industry. The outbreak of avian influenza in 2015 threatened that industry. On June 2, 2015, the Ohio Department of Agriculture cancelled all live bird exhibitions at fairs for 2015 as a way to help protect the Ohio poultry industry from avian influenza. OSU Extension immediately began working on ways to communicate this information and its repercussions on events like poultry projects at the state fair to all Ohioans, especially to 4-H youth set to exhibit poultry at county fairs. OSUE's response included a 'Poultry Exhibition Cancellation Guide' document, which included 12 suggestions for alternatives to showing live poultry at county and state fairs, which was of use for the Ohio youth that took 5,736 chicken market projects last year.

Additionally, Dr. Lucinda Miller, OSU Extension program specialist for companion and small animal programs, spoke with reporters from four television stations and 11 local newspapers, as well as the Wall Street Journal, Farm and Dairy, and Ohio Country Journal, where she provided information on how Ohio 4-H was responding to the ban on live birds. Utilizing social media, Dr. Miller put 10 posts about avian influenza on the Ohio 4-H Animal Sciences Facebook page in 2015, which reached 74,822 people, and was shared 884 times. Dr. Miller also visited 11 county fairs to view poultry displays. Dr. Miller received lots of feedback from fairgoers, commenting that they learned much from the educational poultry exhibits. Dr. Tony Forshey, the Ohio Department of Agriculture State Veterinarian, also noted many testimonies from fairgoers commenting that they had increased knowledge of 4-H poultry projects and poultry issues as a result of the educational displays. OSUE also partnered with the Ohio Poultry Association to create educational banners which were displayed in poultry barns at all county and independent fairs. The banners educated the public about the ban on live birds, and the impact of avian influenza on the poultry industry.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	530.0	0.0	420.0	0.0
Actual	561.7	0.0	306.0	0.0

**II. Merit Review Process**

**1. The Merit Review Process that was Employed for this year**

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

**2. Brief Explanation**

For OARDC, OSU Extension, and CFAES, merit review processes are critical to our mission and are mandated at all levels. Over the years, the review process has been streamlined and, with the introduction of digital media, we have seen dramatic changes in quality, quantity, and timeliness of reviews. Throughout 2015, internal and external stakeholder advisory committees have been used for input on multiple topics including: annual reports; new facilities such as the construction of swine facilities on the

Wooster campus and a new multispecies facility for teaching at the Waterman Farm in Columbus; and new dimensions for agbioscience initiatives.

In addition, documents such as annual reports and one-page information sheets, are typically produced in draft form and targeted for initial review and future consumption by advisory committees, individuals, partner business groups, public officials and commodity organizations who are both knowledgeable and vested in the subject matter. They are asked to provide feedback on content, relevance and presentation of the stories and impacts.

All OARDC and OSU Extension published materials, ranging from traditional print to social media releases, are compiled and reviewed by panels with both technical and communication expertise. Most of these products also have some type of administrative review. OSU Extension requires all publications (whether electronic or print) that are intended for statewide (or broader) distribution to be submitted for blind peer review by a minimum of three people. This internal oversight provides a high-quality document for stakeholder use.

With the introduction of OSU's Discovery Themes in 2012, an extensive internal review process has been developed to identify and fill new Discovery Themes positions. The candidates are reviewed by academic department representatives, college-level administrators, and the University Office of Academic Affairs.

During 2015, the Dean of CFAES in collaboration with the Directors of OARDC and OSU Extension held meetings with stakeholders to discuss the CFAES facilities master plan and the Animal Facilities Re-envisioning Committee's recommendations for facilities improvements and construction. Stakeholder inputs at these meetings were recorded and used to improve the plans where feasible. The facilities planning process is a work in progress, and additional stakeholder input in 2016 will be important to finalizing the master plan.

OARDC utilized its advisory committee this year, as well as various other committees, to focus on facilities, programs, operations, and long-term planning. We have an extensive amount of one-on-one researcher-to-stakeholder interaction to identify needs, establish priorities, and engage in research and development programs. For the most part, a partnership with a stakeholder group exists for each program.

OSU Extension implements several levels of advisory committees, each tasked with helping to ensure that local or statewide programs are relevant and address the highest priority needs of our clientele. Tasks within the charge of the advisory committees include: identifying and prioritizing needs, providing input into the identification of staffing needs, connecting Extension with potential partners or those who could fill gaps in service, helping develop budgets, educating stakeholders on Extension's impacts, and advocating for Extension.

In Ohio, there is one state Extension advisory committee, which advises the Director on statewide programmatic issues, county-level advisory committees which provide feedback on county-level program issues, and program area advisory committees, which advise educators within the scope of their specific program area (agriculture and natural resources, family and consumer sciences, 4-H youth development, and community development). Extension also has local, specialized / topical committees (for example, goat committee, sheep committee, etc).

Each of these committees has guidelines, which dictate how they should be composed. Diversity of membership is key, with consideration for diversity in categories such as: geography, age, race / ethnicity, gender, socio-economic status, program area, and political affiliation. Additional guidelines exist for term / length of membership, size of committee, meeting frequency, and membership rotation.

Excellent examples of the review process at work in OSU Extension are the signature programs. Signature

programs are a cornerstone of the OSUE strategic plan. A key requirement of a program receiving the signature program designation is that it addresses a critical need or issue relevant to a significant proportion of Ohioans. The designation is only given to a small number of programs that complement the impacts of OSU Extension's current portfolio of core programs. Potential signature programs must apply to become a "signature program", and must demonstrate meeting pre-determined criteria. Applications are reviewed by a committee, and finally approved by OSUE Administrative Cabinet. Proposals for new signature programs are accepted annually, and a review of the relevance of current signature programs is also considered each year.

Signature programs are the broad strokes of OSUE's programming efforts. While Extension seeks to deliver programming that is readily applicable across the state, we also realize the need to develop programming specific to the needs of certain/more local parts of the state. Extension Educators and program staff also work to develop programming that meet the needs of citizens within their county and region.

Given that all OARDC and OSU Extension efforts are planned to benefit some targeted group or groups, we engage those groups at the beginning of the process, thus providing formative reviews. This policy holds true even in highly theoretical research where interdisciplinary partners have been engaged to advance lines of inquiry. In such cases, the stakeholders may be internal to the organization, or they may be found in other colleges and universities. Specialists from academic disciplines provide insight from personal research and published literature, while county Extension personnel provide insight from local communities. Program area personnel work together to identify key issues that cut across disciplines, and special task forces collaborate to identify priority program efforts to address these issues. Funding is then allocated to support program priorities.

Our system provides flexibility for educators to maintain the ability to be responsive to unanticipated issues. In situations where grant monies were obtained, staff members with specific, short-term employment contracts have been 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 identify 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, and they work with other educators to address local needs in a timely manner. In addition, educators remain 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. As OSU Extension specialists continue to work in the context of ever increasing societal needs and tight budgets at all levels, the need for assessment and input is more important than ever to ensure limited resources are targeted to yield the greatest impacts.

As OSU Extension and OARDC continuously strive to be more relevant, make wiser use of limited resources, and maximize impact, program and publication review by stakeholders, internal and external peer review, and external specialists are more important than ever. To that end, the organization is committed to making use of both informal and formal reviews at all levels of the organization.

### **III. Stakeholder Input**

#### **1. Actions taken to seek stakeholder input that encouraged their participation**

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals

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

**Brief explanation.**

Stakeholder input is central to our organization's well-being and has long been part of our corporate culture. OARDC and OSU Extension, as well as CFAES as a whole, continually have wide support and active participation from our stakeholders. As groups and individuals are provided with meaningful opportunities to influence outcomes in their industry or area of expertise, they become increasingly engaged.

As an institution, emphasis is placed on business and industry participation and creating collaborative efforts that yield new commercialized products and jobs. This level of stakeholder engagement is critical as the organization seeks to help Ohio grow its economy and create jobs. Stakeholders understand that their collaborative participation is necessary to make this happen.

Throughout the year, we use both formal and informal methods to engage our stakeholders and encourage their participation. Due to the changing nature of economic and societal trends, agriculture, food, and the green industry depend on innovators and researchers to generate new processes and products. Ohio's agricultural industry increasingly links with other industries to take on common challenges and opportunities in key areas such as food production and security, energy and the environment, and health and wellness.

One example of this public-private collaboration is SEEDS: The OARDC Research Enhancement Competitive Grants Program. The SEEDS program encourages excellence in OARDC research by promoting exploration that is consistent with the mission and vision of the OARDC and by encouraging connections across disciplines, with industry and with external partners or stakeholders.

Established in 1996 and supported by OARDC, SEEDS is a unique program among U.S. state-assisted universities. By fostering high-quality research among scientists supported by OARDC and CFAES, SEEDS provides startup dollars for scientists to collect preliminary data needed to give them a competitive edge in national programs, and it provides them with leverage to attract industry and stakeholder funding support. SEEDS has returned approximately \$5 for every state dollar invested over the life of the program. Since its creation in 1996, SEEDS has supported research with over \$23 million in awards, nine patents, 20 invention disclosures and three licensing agreements.

OARDC centers and programs, and their stakeholders participate in three annual meetings to discuss research programs, infrastructure, annual reports, planning, and re-envisioning related to OARDC. OARDC asks for stakeholder input annually on our annual report format and content, as well as input on the direction of our research programs. For example, the OARDC holds meetings with the Ohio Soybean Association to discuss different varieties and soybean breeding programs.



As part of the previously mentioned "VP Conversations on the Future of Extension" project and in order to seek stakeholder input, the Dean of CFAES selected a steering committee consisting of college employees. They worked closely with their colleagues and called upon the assistance of two experienced futurists, one internal and one external to the university. The steering committee and futurists were tasked with engaging stakeholders in conversations to attempt to identify, explore, and analyze the most important emerging and challenging issues likely to confront Ohioans by the year 2035. In 2015, as the project moved into "visioning," nearly 400 individuals were engaged in conversations about the future of OSU Extension. Approximately 40% of the participants were volunteers, clientele, partners, donors to OSUE, members of various OSUE advisory councils, Ohio elected officials, county commissioners, and industry or community leaders. The participating individuals provided visioning feedback through in-person workshops held around the state, virtual workshops, or through an online survey. This process is still evolving as new college leadership review what has been done thus far and determine a future course.

Additionally, OARDC, OSU Extension, and most academic departments/schools within CFAES each effectively use their external advisory committees and stakeholder groups as forums to discuss current programs and gather input for future direction and strategic planning. Electronic messaging, social media, webinars, Tweeting, and blogging, as well as interactive group meeting/messaging systems have continued to expand rapidly. More stakeholders can now participate at lower time and travel costs using communication technology.

OSU Extension develops stakeholder-based strategic plans to inform the focus of statewide priority programs. The process is ongoing and involves collaboration with local advisory committees, reviews of demographic and other relevant data, and prioritization based on need and availability of resources. The process enables the creation of focused teams comprised of campus, center, and field specialists, as well as county educators who develop curriculum and evaluation strategies for statewide programs. In many cases, these teams have specific target audiences, whom they regularly involve in program planning and evaluation, including the development of educational materials. Some of the program teams include members from external organizations (e.g. state agencies, organizations, commodity groups) who can offer additional resources to enhance program outreach. County Extension Advisory Committees, as well as the State Extension Advisory Committee, are engaged in reviewing and prioritizing new interdisciplinary programs. Due to their long history of collaboration with OSU Extension and OARDC, stakeholders at a variety of levels make significant input into our programs.

**2(A). A brief statement of the process that was 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.**

OARDC and OSU Extension are continually making targeted efforts to find and link with representatives of all stakeholder groups. OARDC and OSU Extension identify individual

stakeholders and stakeholder groups by utilizing faculty and staff, associates from support organizations, traditional stakeholders, and political leaders.

OARDC and OSU Extension use every opportunity, such as CFAES' Farm Science Review (FSR), to engage and garner stakeholder participation, feedback and support. FSR--Ohio's premiere agricultural event, and one of the largest in the nation--is dedicated to demonstrating the best agricultural research and best management practices with ready-access for our stakeholders. In September 2015, Farm Science Review hosted approximately 117,000 visitors over a three-day period. One-on-one sessions at FSR, the state fair, local fairs, special events, and active participation by faculty and staff in community group processes and business/professional meetings have provided an opportunity to better link with constituents. This process also provides a means to expand our clientele list, knowledge of needs, and feedback on outputs and impacts. These contacts are logged and maintained.

The OARDC advisory committee is composed of a cross-section of members from the agricultural, natural resources and environmental sectors. Members serve a three-year term with no limits on reappointments to the committee. When a committee term expires, the committee recommends a new member from a similar area as the retiring member. Once the advisory committee approves the individual, the name is forwarded to the Director of OARDC for final approval and appointment.

County Extension advisory committee members are most useful in linking with our traditional stakeholders and expanding the list of those within the county that should be contacted. Extension advisory committees have guidelines, which dictate how they should be composed. Diversity of membership is key, with considerations for diversity in categories such as: geography, age, race/ethnicity, gender, socio-economic status, program area, and political affiliation. Additional guidelines for term length of membership, size of committee, meeting frequency, and membership rotation also exist. The membership of committees is reviewed during annual onsite and self-study diversity reviews to ensure that involvement is sought from the broadest array of constituents feasible. Extension educators are encouraged to reach out to new and underserved target audiences. Each team, or faculty and staff group, working on a project proposal or existing project will have a client partner list that is ever expanding. Likewise, all administrative units in CFAES have advisory committees that continually seek to be more representative; thus, they are constantly opening up new channels to new stakeholder individuals and groups.

Our future success in meeting needs and fulfilling our land-grant mission lies in our ability to maintain links with a representative cross-section of our stakeholders. These linkages aid in assessing research and Extension-related needs, extending information, growing human capital, opening opportunities for Ohio based products and services that we have helped to develop, and ensuring we have a feedback mechanism from our stakeholders.

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

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of the general public
- Meeting specifically with non-traditional groups

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

**Brief explanation.**

The methods noted above have all been utilized to a greater or lesser extent this reporting year at various levels of the organization to gather data from stakeholders. While there are some formal processes used to gather input, many of our efforts are informal. Our survey of various groups is often done in open forum interview/discussion settings that generate more qualitative data than quantitative. OSU Extension and OARDC, as well as many faculty and staff members, departments and schools, and various research and Extension groups within the institution have stakeholder lists that serve as their foundational contact points. In turn, there are business and industrial partners, fellow research and Extension institutions, and support organizations that are on our contact list. Federal, state, regional, and local governments; agencies; advisory committees and friends groups; commodity groups; as well as special interest groups also add to the list of stakeholders from whom we seek input in the initial planning and execution phases of our programs.

OARDC invites members of private and public industry from around the state of Ohio to participate as OARDC advisory committee members. This committee meets three times a year along with the OARDC Directors and other OARDC representatives to discuss current research, gather input for future direction, and address any other immediate priorities. In 2015, the OARDC advisory committee provided input on a new SEEDS Annual Report of Progress publication, and discussed how the OARDC can balance immediate research priorities with long-term initiatives.

Additionally, each year, OARDC's eight Outlying Research Station advisory committees review research projects, impacts of research projects, budgets, and equipment and facilities needs for their respective locations. The Station Manager and the Assistant to the Director for Research Operations provide input and data to the committees. The committee uses this information to revise the five-year strategic plan at each location on an annual basis. Examples include: new vegetable crops or new varieties of vegetable crops produced at a research station; changes in pesticide use due to new pests discovered by producers or research personnel; and new recommendations for nitrogen and phosphorus management on agronomic crops.

Data has been collected for the "VP Conversations on the Future of Extension" project in several ways. The project team organized and facilitated approximately 15 dialogue sessions from May - July 2015. The participants included OSUE employees, volunteers, clientele, and partners; donors to CFAES; members of various advisory councils; elected officials; county commissioners; and industry, organization, and community leaders. Data was gathered from these individuals through in person workshops, virtual workshops, and an online survey.

All of these stakeholders are continually being re-engaged as we move forward. The ultimate aim is to have 'meaningful engagement' so our stakeholders find reasons to stay involved. We work on the premise that 'meaningful engagement' will yield meaningful data, both quantitative and qualitative, and that interpretation and internalization of that data will help lead the organization to meaningful partnerships that will, in turn, help foster real impacts.

### 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 strives to address the needs of our stakeholders in an efficient and effective manner, especially in times of crisis. For example, OARDC virologists have responded to the aforementioned outbreak of highly pathogenic avian influenza H5 that is gripping the U.S. poultry industry. Their goals are to better understand the ecology of poultry diseases to develop more effective prevention strategies; validate diagnostic methods currently employed and create better ones as needed; and gain a better understanding of the relationship between disease, host, and environment to aid in the development of new control methods. Keeping the virus out of Ohio and minimizing its impact if it were to reach the state are crucial for both consumers and farmers. If the outbreak would extend to Ohio layer operations, egg prices would increase even more dramatically nationwide, affecting both consumers and food manufacturers.

Jim Chakeres, Executive Vice President of the Ohio Poultry Association, said having Ohio State as a partner is a significant asset to the industry: "The partnership between Ohio State and Ohio's poultry farming community has never been more important than during the current avian influenza crisis. As our industry faces unprecedented disease challenges, having a leader in animal science and veterinary medicine like Ohio State by our side, providing expert guidance and resources, is invaluable."

OSU Extension and OARDC, collectively and independently, promote both basic and applied research, and build and test advanced models for Extension/outreach programming that meet client needs. Accomplishing this goal requires close client/stakeholder/customer interaction. Throughout this reporting year, both OARDC and OSU Extension have continued stakeholder engagement activities that reinforce our customer-centered, customer-focused organizational culture. At each juncture of our decision-making, our organization has sought to weigh stakeholder input against demand for our science and programs, and our capacity to deliver. While there are often competing and conflicting demands, for the most part, input from our stakeholders is strongly reflected in what we do. Client needs and their feedback are critical in the state-level budget process. Meeting client requests is the key to fulfilling the land-grant mission and demonstrating that stakeholder support exists for programs that fulfill their needs and contribute to national well-being.

It is the field-level interactions among stakeholders, researchers, and Extension specialists where we jointly identify the majority of emerging issues. While strong, theoretical academic insight is critical, food, agricultural, and environmental issues most often manifest themselves in field settings and in our clients' daily work and social lives. Stakeholders remain our true partners by joining with faculty and staff to identify emerging issues. Needs and issues originating from producers, processors, manufacturers, distributors, consumers and special interest groups have, and will continue to inform both Extension and research programs. It is this input, when filtered through our

academic knowledge base, which provides our scientists with relevant study questions. Once answered, the response is framed for the clients as well as other interested parties. The response includes interventions to effect change, deliver new goods, provide services, and ultimately to generate real impacts. This approach has and will continue to influence faculty and staff hiring, shifts in priorities and resource allocation, and strategic planning.

Likewise, stakeholder input continues to influence how our college positions itself in the marketplace and conducts business. Stakeholder input has transformed the corporate culture in that, as a public institution, it is imperative for society to see our organization reflecting their aspirations.

Stakeholder 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 and the OARDC advisory committee have met multiple times this year to provide input on programmatic needs and proposed priorities. Cooperative Extension administrators 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 and the capacity of Extension to deliver programs, and guide the overall local programmatic vision.

Across all levels of administration, as well as at all program levels, stakeholder input has and continues to prove most valuable. Both OSU Extension and OARDC are extensively engaged with federal, state, and local officials, as well as business, industry, and special interest groups. The stakeholders' voices and needs are central to setting our institution's agendas and fulfilling our collective land-grant mission.

### **Brief Explanation of what you learned from your Stakeholders**

The individuals, groups, organizations, and businesses that are vested in CFAES' research and Extension activities provide a level of input that is central to our success. The primary information learned in these interactions is that:

- The stakeholder perspective is not always as we assume; thus, it is imperative that we listen intently, communicate broadly, and stay engaged. This has been a strong recommendation from a number of stakeholders who have noted that periodic mailings and webpages do not equate to staying engaged;
- Our science and services are highly valued. Our research and Extension work has positive social, economic, ecological, and ethical impacts, both quantitatively and qualitatively, for individuals, families, groups, communities, businesses and industry;
- OARDC and OSU Extension do not have the resources and personnel to meet all demands, or to take advantage of all opportunities that present themselves. The breath of demand is so wide and the quantities so great that the organization must be engaged in constant planning to garner and optimize resources, invest them in targeted programs, and generate impacts in a timely manner. We also must clearly articulate to the full array of stakeholders what we have the capacity and resources to accomplish.

Through feedback during the 14 dialogue sessions and online survey hosted in 2015 for the "VP Conversations for the Future of Extension" process, over 3,000 data points were generated. Qualitative analysis was conducted to expose emerging trends within the data. A large-format quad

fold deliverable was created for distribution at OSUE's annual conference event in December 2015. The brochure provided a summary of the May - June 2015 conversations regarding the futuring process, including an infographic spanning the inside of the brochure. The deliverable and the full summary report are available through CFAES' website.

Key findings shared in the brochure included 10 concepts detailing what Ohioans would need to thrive in 2035. Needs included the following concepts: respect for cultural differences; equitable access and affordability of technology, healthcare, education, food, and energy; a flexible and diverse educational system that produces highly skilled individuals ready to work. Additionally, a balanced use of applied technology was identified, as well as leadership, interpersonal, and relationship building skills; an accountable and efficient government; a strong, diversified, and resilient economy; responsible and sustainable practices as they relate to the environment; and personal accountability.

The findings also provided some insight into how OSUE might meet the future needs detailed above. Ways to meet these needs were broken down into two categories: sharing research-based information and skills, and maximizing our educational impact. Some of the opportunities identified for sharing research-based information and skills included: addressing health and wellness issues through preventative measures, nutrition, food safety / security education; teaching financial literacy and personal decision making skills to foster self-reliance and resourcefulness; providing education related to relationships, family dynamics, interpersonal skills, and conflict management. Other education topics which might address identified needs included: land use, urban farming, production practices, innovation and technology solutions for agriculture; community economics, food systems and their global impact; understanding and adapting to the effects of climate change, and recycling / repurposing.

In order to maximize our educational impact, findings showed that OSUE might meet future needs by seeking to balance technology and personal interaction; developing customized services; coordinating interdisciplinary teams around new issues; offering certificates and continuing education credits that are supported by businesses / industries; and acting as a knowledge broker sharing ideas and research. Additionally, it was determined that OSUE should strive to improve communication and networking to prevent duplication of efforts. Moreover, a continuous assessment of current and relevant technology should be conducted; data security should be managed in-house; and documentation of value and impact of educational efforts should be gathered / maintained. Finally, the concept of "connectors" was identified. The data revealed that many felt OSUE could serve as a connector by bringing people together to facilitate conversations. These conversations could include: how to build community; how to encourage community involvement; problem solving; and change management.

Institution-stakeholder interaction is providing OARDC and OSU Extension with better insights into stakeholder needs, willingness to participate and at what levels, and ability to pay. Stakeholders better understand our institutional capacity to respond to needs, our funding models, institutional support (political, monetary, and client participation) needed, and the mission of the institution in the 21st century. Because of our college's culture of 'meaningful stakeholder engagement,' OARDC and OSU Extension better understand how to match existing resources and expertise with high priority needs of stakeholders. From these interactions emerge an improved understanding among all parties as to realistic expectations.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
11262041	0	7649900	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
	<b>Extension</b>		<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	10085689	0	7392055	0
<b>Actual Matching</b>	10085689	0	18288232	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	20171378	0	25680287	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	3554909	0	0	0

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Climate Change
2	Sustainable Energy
3	Childhood Obesity
4	Food Safety
5	Global Food Security and Hunger
6	Soil, Air and Water (OARDC Led)
7	Natural Resources and Environmental Systems (OARDC Led)
8	Plants Systems (OARDC Led)
9	Animals Systems (OARDC Led)
10	Food, Agricultural, and Biological Engineering Systems (OARDC Led)
11	Economics and Social Dimensions (OARDC Led)
12	Human Health (OARDC Led)
13	Advancing Employment and Income Opportunities (Extension)
14	Enhancing Agriculture and the Environment (Extension)
15	Preparing Youth for Success (Extension)
16	Strengthening Families & Communities (Extension)



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

**Program # 1**

**1. Name of the Planned Program**

Climate Change

Reporting on this Program

**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	0%		25%	
133	Pollution Prevention and Mitigation	0%		65%	
605	Natural Resource and Environmental Economics	0%		10%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	2.0	0.0	1.0	0.0
<b>Actual Paid</b>	0.0	0.0	1.1	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	161152	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	455408	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

On-going research activities related to climate change will include both basic and applied research. This research will continue to take 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 will support this program. All functional laboratories and sites will be improved over time as program needs warrant. OSU Extension will provide parallel programs within this planned program to advance knowledge, promote adoption and change, and develop human capital. For the 2015 ROA, Extension will not be reporting on the 'Climate Change' planned program. OARDC and OSU Extension faculty and staff will engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

**2. Brief description of the target audience**

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

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

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2015</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	7	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of participants attending educational programs  
Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- number of webinars / online educational and research sessions  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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	create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change (OARDC)
3	Number of program participants who plan to share the knowledge they gained from their involvement in educational programming (Extension)
4	Advance knowledge of how climate change affects animals, including wildlife (OARDC).

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

Number of program participants who plan to share the knowledge they gained from their involvement in educational programming (Extension)

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Turkey consumption has tripled over the last four decades as a result of consumer demand for lean, inexpensive and nutritious meat. Intensive genetic selection for rapid growth of turkey breast muscle has helped meet some of the global demand for meat, but an unintended consequence of this selection is the susceptibility of some birds to negative effects of environmental heat stress. The incidence of birds with inferior meat quality increases dramatically with the onset of hot, humid weather.

**What has been done**

Scientists at OARDC, University of Minnesota, and Michigan State University are collaborating to identify genetic and molecular mechanisms to select subpopulations of heat-tolerant birds for preferred breeding stock. Experiments will test the effects of varying heat stressors on muscle cells to define the inherited control of cellular proliferation and differentiation. The ultimate goal is the discovery of new approaches in genetic selection of turkeys that will lead to more efficient production of high quality, lean and nutritious animal protein independent of the influence of ambient temperatures.

**Results**

Every percent change in breast meat yield equals \$75 million gain or loss to the turkey industry. Realized and forecasted changes in climate have a potential to greatly decrease turkey meat yield and quality, thus, threatening global food security. Discovery of the genetic control regulating negative effects of heat stress on turkey breast meat yield and quality will allow selection of breeding animals to minimize the adverse effects of climate change on poultry meat quality.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
132	Weather and Climate

**V(H). Planned Program (External Factors)**

**External factors which affected 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)

**Brief Explanation**

Limited resources require choices. Should a more compelling issue surface, it is possible that resources currently devoted to this program and planned for the future could be re-directed. Likewise, natural disasters / climactic extremes may shift the focus of some programming efforts back towards issues regarding climate change.

**V(I). Planned Program (Evaluation Studies)**

## Evaluation Results

Climate change is a global problem, but specific subsets of challenges are already affecting the Great Lakes region. Climate change can: affect the safety of drinking water, increase the number of droughts and floods, cause changes in precipitation and higher mean temperatures, and cause a decrease in crop yield dramatically over time and impact species migration.

For 2015, OSU Extension will not be reporting any evaluation results for the 'Climate Change' planned program.

## Key Items of Evaluation

The current avian flu outbreak is a serious threat to Ohio's \$2.3 billion poultry industry, which directly supports more than 14,600 jobs. Nationally, Ohio ranks second in egg production and ninth in turkey production.

Jim Chakeres, executive vice president of the Ohio Poultry Association said having Ohio State as a partner is a significant asset to the industry:

"The partnership between Ohio State and Ohio's poultry farming community has never been more important than during the current avian influenza crisis. As our industry faces unprecedented disease challenges, having a leader in animal science and veterinary medicine like Ohio State by our side, providing expert guidance and resources, is invaluable."

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

**Program # 2**

**1. Name of the Planned Program**

Sustainable Energy

Reporting on this Program

**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%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	2.0	0.0	2.5	0.0
<b>Actual Paid</b>	2.0	0.0	1.4	0.0
<b>Actual Volunteer</b>	0.1	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
103295	0	179879	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
103295	0	653839	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**



Throughout the 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. 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 throughout the state support this program. All functional laboratories and sites are improved over time, as program needs warrant.

'Energize Ohio' is one of OSU Extension's signature programs. The program is multidisciplinary and addresses a wide range of energy education needs including youth energy education, energy policy, renewable and shale energy development, energy efficiency, and sustainable community planning. In 2015, educators from all four OSUE program areas (4-H Youth Development, Community Development, Agriculture and Natural Resources, and Family and Consumer Sciences) were engaged in the delivery of 'Energize Ohio' programs.

A total of 47 'Energize Ohio' programs were offered in 2015, reaching 1,834 participants. Of those 47 programs, 37 were focused on renewable energy (1,422 attendees) and 10 programs focused on shale energy, reaching 412 participants. The attending participants of 2015 'Energize Ohio' events represented 21 of the 88 Ohio counties. Programs related to Energize Ohio are delivered in one of two face-to-face formats: either a 90-minute workshop that provides an introduction to an energy issue, or a lunch-and-learn structure featuring multiple sessions that provide more in-depth information. In 2015, the majority of Energize Ohio events followed the 90 minute introductory information format.

The Energize Ohio program also offered a one day in-service for OSUE educators as a professional development opportunity. The topic was "Energy Infrastructure & Shale Workshop", with the goal of educating our faculty and staff on topics related to Ohio's energy boom, including the statewide impacts of shale and alternative energy development.

OARDC and OSU Extension faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders, to ensure the research has the greatest chance of effecting change within society.

## **2. Brief description of the target audience**

Targeted audiences include, but are not limited to:

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

- Energize Ohio participants in 2015 events included people from the business community, agricultural sector, residential homeowners, youth, and local community leaders.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1510	640	619	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 1

**Patents listed**

Combined Liquid to Solid-Phase Anaerobic Digestion for Biogas Production from Municipal and Agricultural Wastes (patent issued)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	3	26	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- number of educational workshops and seminars

<b>Year</b>	<b>Actual</b>
2015	47

**Output #2**

**Output Measure**

- number of research-based assessments of energy project sites  
Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- number of counseling sessions / meetings concerning community energy project assistance & planning  
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- number of page views for the 'OSU Extension Energize Ohio' website (within the past calendar year)

<b>Year</b>	<b>Actual</b>
2015	44832

**Output #5**

**Output Measure**

- number of educational programs focusing on the topic of renewable energy

<b>Year</b>	<b>Actual</b>
2015	37

**Output #6**

**Output Measure**

- number of educational programs focusing on the topic of shale energy

<b>Year</b>	<b>Actual</b>
2015	10

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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	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.
3	By 2018, the program will contribute at least two alternatives to a petroleum-based product or process that meets client needs with an acceptable point of purchase price.
4	Support, through 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.
5	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.
6	Increased understanding of energy alternatives, resources and project support (OSUE)
7	implement change in energy behavior by workshop participants (OSUE)
8	Complete installation of alternative energy activity (OSUE)
9	complete plan for community, business, or farm energy activity (OSUE)

### **Outcome #1**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

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

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Crude glycerol is a low-value byproduct (approximately \$0.05 per lb) from the biodiesel industry. About 12 ounces of crude glycerin is generated for each gallon of biodiesel produced. Compared to pure glycerol, crude glycerol has a substantially different composition that includes water, methanol, soap, fatty acids, fatty acid methyl esters, and glycerides. Nearly all the polyurethane (PU) foams on the market are petroleum based. Bio-based PUs developed by other groups use soybean oil, which poses a critical issue of competition with the food supply and biodiesel production from vegetable oils.

### **What has been done**

A process has been developed to produce biopolyols with properties compatible to petroleum analogs on the market. A patent for the technology (US 8,022,257) was approved in 2012. The technology has been recently licensed to Durable Poly Plastics LLC for commercial production of pipeline spray foams. Current research activities at OARDC focus on the development of other PU products such as PU adhesives and coatings from extended feedstocks, including soybean meal and CO<sub>2</sub>.

### **Results**

With this technology, crude glycerol-based PUs will have a much lower production cost than petroleum-based PU products. This benefit is expected to have major impacts on the biodiesel industry, including increased value of crude glycerol and increased use of soybean oil for biodiesel production. The project will also impact the PU industry by providing a low-cost, bio-based alternative feedstock.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
511	New and Improved Non-Food Products and Processes

### **Outcome #4**

#### **1. Outcome Measures**

Support, through 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.

Not Reporting on this Outcome Measure

### **Outcome #5**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #6**

#### **1. Outcome Measures**

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

#### **2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	1788

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In 2010, world energy use was estimated to be more than 507 British thermal units (Btu). The 2012 International Energy Outlook Report estimates that worldwide energy consumption will reach 630 quadrillion Btu in 2020, and 820 quadrillion Btu in 2040. Second only to China, the United States consumed 18% of the world energy total in 2011, with Ohio ranked as the sixth highest energy consuming state in the nation. In 2012, the average per capita energy expenditures in Ohio was \$4,265, representing roughly 12% of Ohioans' per capita income. Finding energy alternatives in Ohio is important for future vitality, as it will influence economic growth and the general quality of life of all Ohioans.

**What has been done**

Energize Ohio programming engaged participants from the agricultural sector, business community, residential homeowners, youth, and local community leaders in 21 (of 88) Ohio counties. In 2015, a total of 47 programs were delivered, reaching 2,129 participants. 37 of the 47 programs were taught on the topic of renewable energy / solar energy, and 10 of the programs were taught on the topic of shale energy. The standard program length was 90 minutes, with additional follow up programs and workshops to help develop energy plans.

**Results**

All 'Energize Ohio' programs have three common evaluation measures on their assessment tools. Regardless of the programming topic, all Energize Ohio participants indicate on post-program evaluation if (as a result of the program), they feel they know more about renewable or shale energy.

84% of Energize Ohio program participants in 2015 events indicated via a pre/post test evaluation tool that they now know more about renewable or shale energy.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
608	Community Resource Planning and Development

## **Outcome #7**

### **1. Outcome Measures**

implement change in energy behavior by workshop participants (OSUE)

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1533

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In 2010, world energy use was estimated to be more than 507 British thermal units (Btu). The 2012 International Energy Outlook Report estimates that worldwide energy consumption will reach 630 quadrillion Btu in 2020, and 820 quadrillion Btu in 2040. Second only to China, the United States consumed 18% of the world energy total in 2011, with Ohio ranked as the sixth highest energy consuming state in the nation. In 2012, the average per capita energy expenditures in Ohio was \$4,265, representing roughly 12% of Ohioans' per capita income. Finding energy alternatives in Ohio is important for future vitality, as it will influence economic growth and the general quality of life of all Ohioans.

#### **What has been done**

Energize Ohio programming engaged participants from the agricultural sector, business community, residential homeowners, youth, and local community leaders in 21 (of 88) Ohio counties. In 2015, a total of 47 programs were delivered, reaching 2,129 participants. 37 of the 47 programs were taught on the topic of renewable energy / solar energy, and 10 of the programs were taught on the topic of shale energy. The standard program length was 90 minutes, with additional follow up programs and workshops to help develop energy plans.

#### **Results**

All 'Energize Ohio' programs have three common evaluation measures on their assessment tools. Regardless of the programming topic, all Energize Ohio participants indicate on post-program evaluation if they plan to use the materials and / or information from this program in making decisions related to renewable or shale energy in their home, farm, or business. 72% of Energize Ohio participants indicated via post-program assessments that they plan to use the materials and / or information from the program to make decisions related to renewable or shale energy on their home, business, or farm.



#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
608	Community Resource Planning and Development

#### Outcome #8

##### 1. Outcome Measures

Complete installation of alternative energy activity (OSUE)

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	8

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

According to the U.S. Energy Information Administration '2013 Annual Energy Outlook Report', the national average cost for electricity in the industrial sector, which includes agriculture and irrigation, is projected to increase from 6.4 cents per kWh in 2013 to 12.8 cents per kWh in 2040. An increase in energy costs will generally raise the prices of agricultural products and reduce farm income. In the period of 2005 - 2008, direct and indirect energy-related expenses represented an average of more than 13% of total farm production expenses. The average price per kWh of a large-scale solar electric project has dropped from \$0.21/kWh in 2010 to \$0.11/kWh in 2013. To offset rising energy costs, many farmers are now considering investments in energy efficient on-farm solar electric generation.

###### **What has been done**

Despite falling costs of solar electric projects and the rising costs of "traditional" energy sources, individuals must still evaluate the financial prudence of an investment in solar energy. There are many aspects to consider: system costs, the value of production, solar energy operation, and maintenance costs. OSU Extension programming helps farmers and business owners understand all of these concepts, and provides them with a variety of resources, including educational workshops, informational videos, and numerous fact sheets on topics related to farm energy considerations. In 2015, 37 On-Farm Solar Energy workshops were conducted as 90-minute sessions.

**Results**

A follow up with 2015 Energize Ohio program participants found that eight Ohio farmers have implemented an on-farm solar energy system to offset a portion of their electric needs for their farms. Combined, these eight systems will generate roughly 324,500 kWh annually while offsetting nearly 434,830 pounds of CO<sub>2</sub>e (greenhouse gases) per year. In addition, three participants were able to determine that a solar project was not a good investment for their business or farm based on Energize Ohio education.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

**Outcome #9**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	5

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Shale oil gas development, stimulated by the new technologies of horizontal drilling and hydraulic fracturing, has rapidly impacted Eastern Ohio's social well-being, economic vitality, and environmental health. Local public officials in communities impacted by shale development are often not prepared to effectively address the positive and negative results of this economic development activity. The "Economic Sustainability in Ohio's Shale Region" program was developed by a team of Extension professionals to provide local leadership with the knowledge, tools, and capacities to proactively address shale impacts. By facilitating a sustainable planning process that engages all sectors of the community, and by providing education regarding the various impacts of shale development, Extension is helping local communities to develop the capacity for informed decision making.

**What has been done**

Ten programs (offered as ninety minute workshops) were taught on the topic of "Economic

Sustainability in Ohio's Shale Region." Following the workshops, interested groups partnered with OSU Extension faculty and staff to develop community plans to address shale development issues. The planning process included the following activities: conducting an advanced industry cluster analysis, industry capacity assessment, asset mapping, implementing a sustainable strategic shale energy planning process, and establishing implementation strategies. Participants worked together in the following ways: large group planning sessions, smaller workgroup meetings, and public input gathering sessions.

### Results

In 2015, one comprehensive community plan was adopted in Guernsey County, and an additional four plans were created, and will be adopted in 2016. Participants learned the new concept of sustainability by gaining an understanding of the interconnection and balance of economic, social, and environmental considerations. Through the planning process, different organizations and entities in the county were brought together, increasing each entity's understanding of others in the community. New collaborative partnerships emerged from the planning process. Other results included the creation and hiring of a Workforce Development Coordinator to further collaborative efforts among economic development and education, and implementation of an internship program in local industry.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes

#### Brief Explanation

ECONOMY: Volatile oil prices greatly influence the exploration and development of shale formations in Ohio. Shale development creates jobs, increases demand for retail and other services, which results in the stimulation of the local economy. The challenge is to ensure that many of the new jobs benefit the local labor force. Workforce development becomes an important strategy to build local economic sustainability.

PUBLIC POLICY CHANGES: The following policies all influence the development of distributed renewable energy systems:

- Ohio State Bill 221
- Ohio State Bill 310
- Consolidated Appropriations Act (40% ITC)
- Clean Power Plan

### V(I). Planned Program (Evaluation Studies)

#### Evaluation Results

Energize Ohio programming directly reached 2,129 individuals in 2015. Common knowledge assessment measures among the various 'Energize Ohio' programs found that

84% of participants indicated that the program provided valuable information they would recommend to others; 84% indicated (as a result of attending the program) they knew more about renewable or shale energy; and 72% indicated they plan to use the materials and / or information from the program in decision making related to renewable or shale energy on their home, business or farm.

Eight farmers who had participated in Energize Ohio programming have adopted an on-farm solar system to offset a portion of their electricity needs.

A comprehensive community plan was adopted in Guernsey County as a result of OSUE energy programming and technical reports. Four additional community plans will be adopted in 2016.

Other less quantifiable outcomes include new collaborative partnerships as a result of planning process activities, and increased understanding of other organizations and entities within a community.

### **Key Items of Evaluation**

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

**Program # 3**

**1. Name of the Planned Program**

Childhood Obesity

Reporting on this Program

**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	0%		90%	
703	Nutrition Education and Behavior	0%		5%	
724	Healthy Lifestyle	0%		5%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	8.0	0.0	0.5	0.0
<b>Actual Paid</b>	0.0	0.0	0.5	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	78451	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	187159	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Obesity research includes food science, plant and animal sciences, and consumer research related to human health and obesity. Given the complex nature of obesity, the subject 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 to ensure that 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. For 2015, OSU Extension will not be reporting under this planned program.

**2. Brief description of the target audience**

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

- Specific individuals, families, and groups who have expressed a need, or where there are latent needs.
- Fellow academic units that partner with OARDC and OSU Extension who will support not only the research, but also the adoption of the research findings by stakeholders;
- Agencies or support organizations who will not only use the information, but will also be brokers of that information, including embedding it into groups to encourage change;
- Populations who have not requested the information but will likely benefit from access, e.g. obese children;
- Other scientists and scientific groups;
- Political entities;
- School administrators;
- Students from pre-school to post doctorate studies;
- News organizations;
- Businesses and industry groups concerned about obesity in their workforce;
- Businesses and industry groups who are producers of foods and food additives that can help reduce obesity and its side effects.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- number of educational sessions held  
Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Total number of participants in this event/project that are defined as under-represented individuals (i.e., individuals who may not have participated fully -- e.g., women, minorities, persons with disabilities, small farm owners, etc.)  
Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- Total number of participants in this event/project that are defined as under-served individuals (i.e. individuals whose needs have not been addressed in past events)  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	To better understand human decision making; specifically with reference to how individuals make food consumption decisions.
2	Apply new knowledge to programs at the field level with a goal of significant long term weight loss and overall improvement of health in those who participate.
3	To identify research activities such as new data sources, improved techniques for data analysis, and improved hypotheses for obesity research questions.
4	Number of participants who learned new information from this program. (OSUE)
5	Number of participants who plan to increase their level of daily physical activity. (OSUE)
6	Number of participants who plan to increase their consumption of fruits and vegetables (OSUE)
7	Number of participants in this event / project who actually adopted one or more recommended nutritional practices that reduce the risk of chronic disease (OSUE)



### **Outcome #1**

#### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

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. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Skipping meals in order to save calories could be counterproductive as it results in larger fluctuations of insulin and glucose that can lead to fat gain instead of fat loss.

##### **What has been done**

Ohio State University researchers observed mice that ate all their food as a single meal and fasted the rest of the day developed insulin resistance in their livers, which scientists consider a telltale sign of pre-diabetes. When the liver doesn't respond to insulin signals telling it to stop producing glucose, the extra sugar in the blood is stored as fat. Fat around the middle--the equivalent to human belly fat--weighed more in the restricted-diet mice than in mice that were free to nibble all day long. An excess of that fat is associated with insulin resistance and risk for type 2 diabetes and heart disease.

##### **Results**

The research supports the notion that small meals throughout the day can be helpful for weight loss. Gorging and fasting in mice affected a host of metabolic measures that the researchers attributed to a spike and then severe drop in insulin production. Researchers saw elevations in inflammation, higher activation of genes that promote storage of fatty molecules and plumper fat

cells--especially in the abdominal area--compared to mice that nibbled all day. Glucose also lingered in the blood of mice that gorged and fasted, meaning the liver developed insulin resistance leading to type 2 diabetes a major disease in many overweight adults.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
702	Requirements and Function of Nutrients and Other Food Components

#### **Outcome #3**

##### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

#### **Outcome #4**

##### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

#### **Outcome #5**

##### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

#### **Outcome #6**

##### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

## **Outcome #7**

### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- 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 )

#### **Brief Explanation**

Obesity is a complex topic to address, in that it encompasses a range of variables, including food quality, socio-emotional elements, access to healthy foods, economics, and the decisions of individuals in food choice. Shifts in these variables impact all aspects of people's lives-- psychologically, socially, and physically. Recent research shows that obesity outcomes for individuals are somewhat determined by the time children reach kindergarten. Reaching individuals with education and prevention measures on such a compressed timeline presents challenges to researchers and Extension personnel as they consider new curriculum and delivery methods.

Within this program area, public monies and the fluctuations in appropriations have had a dramatic (both positive and negative) effect on human well-being, as have levels of government support for obesity education. The varying level of importance placed on social science research impacts our ability to compete for limited dollars, and thus impacts the extent to which research can be carried out. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and excessive programmatic demands can affect outcomes.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

OSU Extension will not be reporting any evaluation results for the 'Childhood Obesity' planned program this year.

#### **Key Items of Evaluation**



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

**Program # 4**

**1. Name of the Planned Program**

Food Safety

Reporting on this Program

**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%		20%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		80%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	5.0	0.0	0.5	0.0
<b>Actual Paid</b>	4.0	0.0	1.9	0.0
<b>Actual Volunteer</b>	0.3	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
206589	0	267362	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
206589	0	643439	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

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

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

Specific activities of food safety education for consumers will include:

- Conducting ServSafe classes with food establishment managers and employees;
- Providing research-based information to consumers through various forms of media, phone calls, etc.
- Providing Home Canning / Food Preservation workshops for individuals

## **2. Brief description of the target audience**

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

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

## **3. How was eXtension used?**

eXtension was not used in this program

## **V(E). Planned Program (Outputs)**

### **1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8121	10078	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 4

**Patents listed**

1. Apparatus and Method for Treating Items with Gas
2. Coating Compositions for Shell Eggs
3. Colorant Compositions and Methods of Use Thereof
4. Antimicrobial Agent, Bacterial Strain and Methods of Use (patent issued)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	2	64	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of educational sessions held

Year	Actual
2015	210

**Output #2**

**Output Measure**

- Individual instructions through email, phone, and office visits

Year	Actual
2015	9987

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Contribute to the advancement of knowledge about food packaging technologies, e.g. ultrasonic sealing, controlled environment packaging, to the extent that, annually, the risk of contamination due to packaging is reduced measurably.
2	Expand the knowledge base for contamination detection within packaged foods by developing or refining technologies such as magnetic resonance or infrared spectroscopy that will, within ten years, eliminate the problem.
3	Reduce food borne pathogens in the food supply chain.
4	Number of participants who learned new information from this program. (OSUE)
5	Number of participants who plan to adopt one or more recommended practices. (OSUE)
6	number of participants who gained knowledge from Good Agricultural Practices educational events
7	number of 'Food Preservation' participants who indicated that they will follow current OSUE and USDA canning and freezing recommendations after attending an educational event
8	number of ServSafe® Level 1 attendees who indicated they plan to use the information learned in the educational program
9	number of ServSafe® Level 2 attendees that answered "Agree" or "Strongly Agree" when presented with the statement "I am comfortable talking with my coworkers about increasing the safety of food in my establishment."



### **Outcome #1**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

Reduce food borne pathogens in the food supply chain.

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

The fungus *Fusarium graminearum* infects the wheat spike causing the disease Fusarium head blight (FHB), and contaminates grain with mycotoxins--particularly vomitoxin--which is a major food safety concern for humans and animals. Under wet, humid conditions, FHB and vomitoxin may cause millions of dollars in losses to the wheat industry as a result of reduced yield, damaged grain, price discounts, and grain rejection. In addition, FHB reduces the milling and baking quality of flour, and the consumption of toxin-contaminated grain causes vomiting and feed

refusal in livestock.

### **What has been done**

Field experiments were conducted to develop effective management strategies that are more robust to adverse field conditions and provide producers with flexible options in minimizing losses caused by FHB and vomitoxin. In particular, post-flowering fungicide sprays were evaluated as options for treating fields when wet or humid weather prevents applications from being made at flowering, and grain harvesting strategies were evaluated as options for mitigating losses due to vomitoxin and FHB-damaged grain.

### **Results**

Data were generated showing that fungicide applications can be made several days after flowering without losing efficacy when compared to applications made at flowering. During harvest, increasing airflow through the combine helps to eliminate damaged, vomitoxin-contaminated kernels. Compared to fungicide and use of disease-resistant cultivars that individually provide about 50% reduction in FHB and 40% reduction in vomitoxin, combining the two management strategies provides more than 70% reduction of both. The integration of fungicide application, disease-resistant cultivars, and grain harvesting strategies is the most effective and economically beneficial approach for managing FHB and vomitoxin as it minimizes yield loss, reduces vomitoxin contamination and disease-damaged grain, and substantially reduces price discounts. Using this integrated approach will save the wheat industry millions of dollars in lost income and reduce the risk of vomitoxin entering the food chain.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

### **Outcome #4**

#### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

### **Outcome #5**

#### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	679

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

OSU Extension formed the Fresh Fruit and Vegetable Food Safety Team as a result of many requests from producers to have an offering for employee education on good agricultural practices (GAPs). The target audience of GAP programming includes: produce farmers, greenhouse growers, and backyard gardeners. Education focuses on the prevention of microbial contamination of fruits and vegetables.

#### **What has been done**

GAP programming is offered as a three-hour workshop. Twenty five workshops on GAP were held in 2015, attended by 604 participants. An additional 75 farmers attended a three hour "Water workshop".

#### **Results**

All 679 individuals successfully completed GAP educational programming. OSUE GAP workshops do not provide formal GAP certification (this must be done through a farm audit conducted by the Ohio Department of Agriculture or a third-party). OSUE programming does provide individuals with the knowledge required to make changes to on-farm conditions and practices which will enable producers to successfully pass the on-farm audit and receive GAP certification. In 2015, a survey was developed which was designed to assess what changes in practices were implemented as a result of the training. Data is still being collected on these long-term conditional changes.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

## **Outcome #7**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	340

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Gardeners and other lovers of fresh produce are often interested in extending the season's bounty by learning more about preserving fresh fruits and vegetables at home with safe methods.

#### **What has been done**

OSU Extension faculty and staff teach home food preservation courses covering topics such as basic food safety principles, proper home canning equipment (including use and care of the equipment), canning fruits and vegetables, freezing fruits and vegetables, and drying fruits and vegetables. Periodically, pressure canner testing sites are offered around the state to ensure that home canning equipment is functioning properly.

#### **Results**

Over 400 people participated in OSUE Food Preservation educational events in 2015. On a retrospective evaluation, participants indicated that prior to the educational event, only 124 "usually" or "always" followed OSUE / USDA recommendations for canning and freezing, with a mean score of 3.22 on a five point scale (never, rarely, sometimes, usually, always). After the educational event, 340 participants indicated they would "usually" or "always" follow OSUE / USDA canning and freezing guidelines, with a mean score of 4.61 on a five point scale. Participants indicated learning gains on all educational goals, including 'acidify tomatoes with lemon juice or citric acid', 'use a boiling water bath canner to process high acid foods', and 'use the correct headspace while filling the jars.' Comments from participants included, "Learned a lot even though I had canned for years. I am so happy I came tonight. Thank you!" and "Thoroughly enjoyed the presentation and am happy to change some of my techniques."

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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- 703 Nutrition Education and Behavior
- 712 Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #8**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	117

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Targeting restaurant managers, school food service, nursing homes, and other food service personnel, the ServSafe® program is the industry standard for food safety education. The program helps to build a culture of safe food handling practices in restaurants and other establishments that serve food. The ultimate goal of the program is to reduce the instances of foodborne illnesses.

**What has been done**

Level 1 courses are four hours long. Participants learn about proper handwashing techniques; glove use; cross-contamination and allergens; time and temperature effects on microorganisms in food; and cleaning and sanitation of food preparation areas and utensils.

**Results**

100% of those completing the pre-post assessment for ServSafe® Level 1 courses in 2015 indicated that they plan to use the information they learned from the educational program. 100% of participants indicated they are confident they can make the changes recommended in the program. Planned behavioral changes include educating staff on cross-contamination, buying colored handles for utensils (to help make identification easier), upgrading cleaning and sanitizing standards; getting new cutting boards; waiting longer for the thermometer to provide a reading; and changing gloves after every task.

**4. Associated Knowledge Areas**

**KA Code    Knowledge Area**

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

**Outcome #9**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	94

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Building a culture of safe food handling practices in restaurants is important for the overall reduction in foodborne illnesses. ServSafe® classes not only educate food industry employees but encourage them to take what they have learned back to their place of employment.

**What has been done**

ServSafe® Level 2 classes are designed for managers. In the courses, managers learn to implement essential food safety practices and create a culture of food safety. All content and materials taught are based on actual job tasks identified by food service industry experts. Participants learned about bacteria, viruses, parasites, and fungi which may develop in foods; cross-contamination; the impact of time and temperature on microorganism growth in foods; and proper handwashing techniques.

**Results**

94 (99%) of respondents on the ServSafe ® Level 2 post-test answered "Agree" or "Strongly Agree" when presented with the statement, 'I am comfortable talking with co-workers about increasing the safety of food in my establishment.' This was compared to only 57.9% on the pre-test.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

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

### **Brief Explanation**

Food safety is impacted by all sectors of agbioscience: physical; chemical; biological; social; economic; and environmental. Climatic extremes, for example, impact food safety by fostering the growth and dispersion of pests and pathogens. Climatic extremes that are now occurring throughout the world 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 the cost of processing equipment or production costs, public policy shifts, new regulations, and changes in demand will impact outcomes. Food trends, food advertising agendas, new biological and chemical threats, and public health-related issues are also external factors that affect outcomes. All of these place greater demands on the land-grant system. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that exceed resources may affect outcomes.

A botulism outbreak stemming from contaminated food at a church potluck in an Ohio town increased the number of individuals interested in food preservation and food safety. The botulism outbreak claimed one life, and required anti-toxins to be administered to 23 other individuals.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

OSU Extension addressed food safety related educational needs in a variety of ways in 2015. Education was delivered to farmers, growers, producers, and food industry workers through Good Agricultural Practices (GAP) programming and ServSafe. The general public received education through home preservation educational programming, which teaches safe canning and preserving methods for fruits and vegetables. All programs documented educational gains through pre-post or retrospective assessments.

### **Key Items of Evaluation**

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

**Program # 5**

**1. Name of the Planned Program**

Global Food Security and Hunger

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%		20%	
503	Quality Maintenance in Storing and Marketing Food Products	20%		10%	
701	Nutrient Composition of Food	0%		10%	
702	Requirements and Function of Nutrients and Other Food Components	20%		15%	
703	Nutrition Education and Behavior	20%		5%	
704	Nutrition and Hunger in the Population	0%		15%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	40%		15%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	11.0	0.0	5.0	0.0
<b>Actual Paid</b>	5.0	0.0	4.3	0.0
<b>Actual Volunteer</b>	1.9	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
258237	0	668957	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
258237	0	1831428	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

This Planned Program advances broad global food security goals and includes both basic and applied research along with associated outreach and Extension programs. As a result of OSU's Discovery Themes investments, Dr. Casey Hoy, Kellogg Endowed Chair in Agricultural Ecosystems Management in CFAES has developed the Resilient, Sustainable and Global Food Security for Health initiative. This initiative aims to improve agroecosystem health, and the associated property of food security, with balance between the cultural/humanities and scientific/technical contributions of OSU faculty, staff and students.

Additional research foci include both traditional and non-traditional plant and animal production systems, microbial studies, food processing and preservation, packaging, food taste tests, consumer preferences and behavior. Laboratories, pilot plants, farms, and multiple business sites are available throughout the state to permit data gathering and to continue long-term experiments. All functional laboratories and sites are improved over time, as program needs warrant.

In 2015, Extension offered: conferences to swine producers to educate them on porcine diseases and prevention; eight livestock mortality composting training events; two "swine days", targeting youth attendees to provide quality assurance for swine fair market projects; quality assurance training for all youth taking animal projects to fairs; and a wide variety of local foods-related activities.

OARDC and OSU Extension faculty and staff engage in outreach and consultation with both internal and external stakeholders, across Ohio and nationally.

**2. Brief description of the target audience**

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

- Individuals or groups who have expressed a need for food-related information that resulted from new and on-going research or is extracted from scientific literature;
- Fellow academic units that collaborate with food scientists to create systems and processes needed to support research and the adoption of the research findings by stakeholders;
- Federal, state or local agencies or support organizations that will not only use the information, but will also be brokers of that information, including embedding it into groups to encourage change;
- Populations who have not requested the information but will likely benefit from access, e.g. persons who engage in home canning of food;
- Youth who plan to exhibit and sell livestock into the food system;

- Operators of animal product farm operations
- Other scientists and scientific groups;
- Political entities;
- Other Extension personnel;
- Students from pre-school to post doctorate studies;
- News organizations;
- Business and industrial groups.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	12658	50539	24347	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 1

**Patents listed**

Novel Use of Pharmacological Inhibitors of Gap Junctions as Insecticides

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	2	60	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Total number of participants attending educational programs of one teaching hour or more on food security (Quality Assurance, Plant / Animal Health System Management, Local Foods, Farm to School, Marketing, etc.) (OSUE)

<b>Year</b>	<b>Actual</b>
2015	34929

**Output #2**

**Output Measure**

- Total number of workshops offered to producers and agribusiness leaders on topics related to global food security and hunger (OSUE)

<b>Year</b>	<b>Actual</b>
2015	773

**Output #3**

**Output Measure**

- Total number of volunteers and participants in the planning and implementation of events (committee members, teachers/trainers, unpaid staff, etc.) related to global food security and hunger (OSUE)

<b>Year</b>	<b>Actual</b>
2015	1759

**Output #4**

**Output Measure**

- number of food animal producers that completed 'Livestock Mortality Composting' training

<b>Year</b>	<b>Actual</b>
2015	213

**Output #5**

**Output Measure**

- number of participants in 'Local Foods' related events

<b>Year</b>	<b>Actual</b>
2015	15126

**Output #6**

**Output Measure**

- number of new garden sites

<b>Year</b>	<b>Actual</b>
2015	152

**Output #7**

**Output Measure**

- number of youth participating in 'Assuring Quality Care for Animals' educational programming (OSUE)

<b>Year</b>	<b>Actual</b>
2015	24347

**Output #8**

**Output Measure**

- number of Local Foods-related educational events (OSUE)

<b>Year</b>	<b>Actual</b>
2015	550

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

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	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.
3	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.
4	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.
5	Advance and document improvements in quality and quantity of food stocks to meet global food security and hunger goals.
6	Ohio Market Maker results will indicate food preferences and number of farmers/retailers networks established (measured in number of networks established) (OSUE)
7	Number of new local / regional food systems (community gardens, farmers markets, food banks) established following an OSUE educational program or guidance by an OSUE professional or volunteer (OSUE)
8	number of schools purchasing Ohio produced food as part of the Ohio Farm to School program (OSUE)
9	improvement in economic and social conditions, as indicated by the number of dollars in direct farm sales (OSUE)
10	number of individuals who indicated plans to change their swine operations based on information learned at an OSUE educational event
11	number of individuals who received certification to conduct livestock mortality composting on their farm
12	number of youth receiving quality assurance certificates from the Ohio Swine Day event
13	number of youth participants who increased their knowledge of producing quality and safe animal products for consumers through responsible animal handling, care, and welfare (OSUE: Assuring Quality Care for Animals)
14	number of teens trained to be leaders in Local Foods awareness with their peers
15	number of individuals experiencing increased awareness of local foods issues

**Outcome #1**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Pressure-assisted thermal processing (PATP) combines the lethal effects of high pressure and heat to inactivate harmful bacterial spores and preserve low-acid foods. However, harsher pressure-thermal treatment is detrimental to product quality. Milder treatment options are desired.

#### What has been done

OARDC researchers collaborated in the investigation using natural antimicrobial compounds in combination with PATP to enhance to inactivation of bacteria and bacterial spores during food processing. The team investigated 35 different natural and synthetic antimicrobial compounds. Among the different compounds tested, chitosan and combination of chitosan with surfactants were most effective in enhancing the lethality of PATP and thermal processing in general. This study suggests that certain antimicrobials can be added to the low-acid substrate prior to PATP or simple thermal treatment to enhance the microbial efficacy of the process. The antimicrobials allow sterilization of low-acid foods at lower process temperatures; thus ensuring better preservation of food quality attributes.

#### Results

An invention disclosure has been filed with OSU's Office of Technology licensing. The research gives food processors the opportunity to introduce extended shelf-life, pressure-assisted thermally processed products.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies

#### Outcome #5

##### 1. Outcome Measures

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

Not Reporting on this Outcome Measure

#### Outcome #6

##### 1. Outcome Measures

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

Not Reporting on this Outcome Measure

**Outcome #7**

**1. Outcome Measures**

Number of new local / regional food systems (community gardens, farmers markets, food banks) established following an OSUE educational program or guidance by an OSUE professional or volunteer (OSUE)

Not Reporting on this Outcome Measure

**Outcome #8**

**1. Outcome Measures**

number of schools purchasing Ohio produced food as part of the Ohio Farm to School program (OSUE)

Not Reporting on this Outcome Measure

**Outcome #9**

**1. Outcome Measures**

improvement in economic and social conditions, as indicated by the number of dollars in direct farm sales (OSUE)

Not Reporting on this Outcome Measure

**Outcome #10**

**1. Outcome Measures**

number of individuals who indicated plans to change their swine operations based on information learned at an OSUE educational event

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	94

**3c. Qualitative Outcome or Impact Statement**



**Issue (Who cares and Why)**

Swine diseases cause economic losses to pork producers. Porcine reproductive and respiratory syndrome (PRRS) alone cost the United States swine industry over \$560 million annually according to a 2005 study. Pork producers are eager for information that can reduce their risk of disease amongst their swine.

**What has been done**

The Ohio Swine Health Committee is composed of the State Veterinarian, Ohio swine veterinarians, OSU Extension faculty and staff, and pork producers. The committee recommended that a swine health symposium be held to educate pork producers. 2015 was the eighth year that the symposium was held, with a record attendance of 173 producers and industry affiliates. Educational resource materials and proceedings of the presentations were made available to attendees.

**Results**

103 post-symposium evaluations were collected. 91% of the responses indicated that individuals planned on making changes to their swine operation as a result of knowledge gained by attending the symposium. Additionally, producers reported a minimum yearly economic benefit of \$172,000 as a result of knowledge gained from attending the symposium.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #11**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	213

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Environmentally safe, cost effective disposal of mortality from livestock and poultry production enterprises is a critical issue for all of Ohio. Mortality composting training and certification is directed by personnel within the department of Animal Sciences and carried out through the cooperative efforts of Ohio State University Extension educators. The program continues to be a highly sought-after program by livestock producers. High quality training and certification of producers will ensure protection of ground and surface waters, land resources, and air quality while maintaining social acceptability within Ohio. Attendance at the training session fulfills the legal requirements for conducting mortality composting on producer farms.

**What has been done**

In 2015, eight livestock mortality composting educational workshops / sessions were held at locations around Ohio. Workshops typically last two hours.

**Results**

213 adults received legal certification to conduct mortality composting on their farms.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #12**

**1. Outcome Measures**

number of youth receiving quality assurance certificates from the Ohio Swine Day event

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	295

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Ohio has a thriving show pig industry with over 7,000 youth showing swine at county, state, and national shows on an annual basis. Many of these youth are not raised on a farm and do not have the resources available to learn the skills needed to be successful with their swine projects. Food safety is paramount to animal agriculture, assuring consumer acceptance and confidence in a market where competing proteins and other alternatives are emerging, rivaling food products of

animal origin. Youth involved in food animal exhibitions are food animal producers. The Ohio Department of Agriculture mandates that all youth exhibiting food animal projects participate annually in quality assurance programming, which teaches them about proper animal handling, care, and welfare.

**What has been done**

The OSU Junior Swine Day was held in March 2015 at the OSU Animal Sciences building of the Columbus campus, and concurrently at the OSU ATI campus in Wooster. Judging and selection of swine projects, quality assurance, carcass cuts, swine health and bio-security, nutrition and showmanship, and preparing for the show circuit / day were among the topics discussed.

**Results**

163 youth from 32 Ohio counties attended the Columbus swine day. 132 youth from 18 Ohio counties, Indiana, and New York attended in Wooster. 84% of the attendees completed a post-event evaluation. Mean overall satisfaction with the events (on a five-point scale, with 5 being the highest level of satisfaction) was 4.76 for the Columbus group and 4.69 for the Wooster group. Each family attending received educational resource materials on USB flash drives. Additionally, all youth attending obtained their quality assurance certificates for the 2015 show season.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
503	Quality Maintenance in Storing and Marketing Food Products
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #13**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	24052

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

The Ohio Department of Agriculture (ODA) requires that every youth who plans to exhibit and sell livestock into the food system attend annual training on animal quality assurance (QA). The QA training helps to ensure that food products entering the food system are as safe and nutritious as possible, and animals are cared for and handled responsibly and ethically.

#### What has been done

4-H members are provided with activity and record books which help educate them, and provide resources to help them track the care of the livestock projects. The activity books teach lessons on topics such as: developing and implementing an effective health management plan; using antibiotics responsibly; how to properly store and administer animal health products; how to properly follow feed and processing protocols; how to practice good environmental stewardship; and how to provide proper animal handling and care. 4-H Educators administer pre- and post-session evaluation surveys to document knowledge gains of youth participants.

#### Results

In 2015, 4-H educators in 54 Ohio counties administered pre-and post-surveys to a total of 24,543 youth. The surveys contained 10 statements relating to quality assurance practices. All statements were evaluated on a 5-point Likert scale. The 10 statements included items such as: how proper care can result in safe, quality animal products; how to properly identify animals; the proper services provided by a veterinarian; how to properly administer antibiotics; and how to provide adequate space, food, and water for animals. In 53 of the counties administering QA training, all youth in those counties showed a knowledge increase related to the 10 indicators from pre-assessments to post-assessments. 98% of youth participating in QA experienced knowledge gains from the curriculum.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

#### Outcome #14

##### 1. Outcome Measures

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

##### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	25

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In 2015, the Local Foods signature program partnered with Ohio 4-H professionals to recruit teens to be trained to increase awareness and interest of local foods in Ohio youth. Increasing awareness in youth will help build a future market of local foods consumers, and even increase the current market (youth may share with their parents, or teens who can drive may begin to frequent farmers' markets, etc). Increased focus on local foods will help support local economies and promote local sustainability.

**What has been done**

Twenty five teen youth were trained and committed to teaching about local foods in their communities; this project will continue into 2016.

**Results**

A retrospective survey was used with the teen leaders immediately following the training. Survey results showed positive trends towards increasing awareness of, and interest and confidence in teaching about local foods. Interviews with key youth leaders revealed:

- \* Youth leaders were not previously aware that local foods was a focus of Extension and programs were being offered
- \* Youth participants felt valued and took ownership of the process
- \* Youth desired to be more involved, especially with lesson planning, for added experience
- \* Youth felt their opinions mattered.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior

**Outcome #15**

**1. Outcome Measures**

number of individuals experiencing increased awareness of local foods issues

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	15126

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Local Foods is a very interdisciplinary signature program for OSU Extension, with crossover from all four program areas. Local Foods programming includes education on topics including: food safety for growers and consumers; home food preservation; community gardening; farm to institution programs and direct marketing.

**What has been done**

In 2015, 550 educational events were provided in Ohio, reaching 15,126 direct contacts. Education was delivered via the following formats:

- \*Lectures
- \*Demonstrations
- \*Face-to-face instruction
- \*Field days
- \*Farm tours
- \*Webinars
- \*Online Ohio Local Foods week campaign

**Results**

During Ohio Local Foods Week, OSUE faculty and staff use social media and email to share updates and event information with the public. Over 30 community events were publicized around the state to celebrate the week. A campaign was held online, which challenged individuals to commit to spending at least \$10 on local foods during the week. 225 individuals pledged to spend approximately \$3,820 during the 2015 Local Foods week.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Other (Avian flu outbreak, swine diseases (such as porcine respiratory and reproductive syndrome, or PRRS))

### **Brief Explanation**

The outbreak of several animal-borne illnesses (avian flu, porcine respiratory and reproductive syndrome) impacted the availability of safe food sources in 2015. Prices for eggs soared in the United States, due to the deaths of nearly 50 million birds due to avian influenza. Swine diseases continue to cause economic losses for pork producers. One study estimated that PRRS alone costs the U.S. swine industry over \$560 million dollars annually.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

24,543 Ohio youth were provided with quality assurance training (QA) in 2015. This training is required by the Ohio Department of Agriculture for all youth who plan to exhibit and sell livestock into the food system. Fair market animals were properly handled due to this educational program. QA youth participants who later become part of the food production industry will have a strong knowledge base due to QA training. Nearly 99% of all youth participating in Quality Assurance for Animals in 2015 met the learning objectives prescribed by the curriculum.

213 producers gained legal certification to conduct livestock mortality composting on their farms in 2015 through OSU Extension programming. Successful completion of OSUE livestock mortality composting helps to ensure the protection of Ohio's ground and surface waters from mortality composting by-products, as well as maintain air quality.

Local Foods programming directly reached over 15,000 people in 2015, through programming on topics such as food safety for growers and consumers, home food preservation, community gardening, farm to institutions, and direct marketing. In 2015, Local Foods program staff also reached out to teens, to recruit teen leaders to help extend the reach of the Local Foods programming through awareness programs targeting teens. 25 teens were trained in 2015, and the program will continue into 2016.

### **Key Items of Evaluation**

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

**Program # 6**

**1. Name of the Planned Program**

Soil, Air and Water (OARDC Led)

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		10%	
102	Soil, Plant, Water, Nutrient Relationships	0%		25%	
103	Management of Saline and Sodic Soils and Salinity	0%		15%	
111	Conservation and Efficient Use of Water	0%		15%	
112	Watershed Protection and Management	0%		10%	
132	Weather and Climate	0%		5%	
133	Pollution Prevention and Mitigation	0%		10%	
141	Air Resource Protection and Management	0%		10%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	4.5	0.0
<b>Actual Paid</b>	0.0	0.0	3.9	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	583715	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1348557	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

### 1. Brief description of the Activity

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

### 2. Brief description of the target audience

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

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

### 3. How was eXtension used?

eXtension was not used in this program

## V(E). Planned Program (Outputs)

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**  
**Patent Applications Submitted**

Year: 2015  
 Actual: 1

**Patents listed**

Wet Scrubber Apparatus for Ammonia Capture

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	0	28	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
 Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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	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.
3	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.
4	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.
5	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.
6	Provide the necessary research (scientific knowledge and techniques) to support stakeholder compliance with Ohio and Federal EPA regulations, and future regulations, regarding water quality issues in agricultural production and processing.

**Outcome #1**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

Provide the necessary research (scientific knowledge and techniques) to support stakeholder compliance with Ohio and Federal EPA regulations, and future regulations, regarding water quality issues in agricultural production and processing.

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In Ohio, Lake Erie tourism annually generates nearly \$11 billion and supports about 120,000 jobs. A 5% decline in Lake Erie tourism due to algal blooms, caused by phosphorus from agricultural fields entering the lake, could cost Ohio more than \$500 million and about 6,000 jobs.

The Maumee River watershed is in an area of intense agriculture and crop production, and is the largest contributor of non-point pollution to Lake Erie. In the past, farm fields have contributed phosphorus to Lake Erie via eroded sediment. More recently, soluble phosphorus in runoff and tile flow has been implicated as the main cause of algal blooms in Lake Erie. Thus, land management technologies are being sought to reduce soluble phosphorus leaving agricultural land.

#### **What has been done**

Researchers at OARDC are conducting both laboratory and field studies across northwest Ohio to determine if gypsum, calcium sulfate dehydrate, can be used to "bind" soluble phosphorus so that it stays in the field, but remains available for crop uptake in the near term. Gypsum is being surface applied at a rate of one ton per acre, and surface runoff and tile water drainage are being monitored for phosphorus. Studies to measure the overall effect of gypsum application to farm fields in reducing not only soluble phosphorus concentrations, but also total amounts of phosphorus are in progress.

#### **Results**

Soluble phosphorus concentrations decreased by 40-70% in the first year after gypsum application. In the second year, reduced concentrations were still averaging close to 40%, but only about a 10-20% reduction was measured in the third year. Thus, gypsum applications need to be repeated about every third year. On some fields, gypsum can also boost corn yields and

farm income. As much as \$256 million in increased economic activity in Ohio could be realized as a result of this project. The use of gypsum as a soil amendment is thus a win-win situation as it positively impacts both the farm community and the lake communities receiving water from Ohio farm fields.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

#### V(H). Planned Program (External Factors)

##### External factors which affected 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)

##### Brief Explanation

Climatic extremes, coupled with the introduction of pests and diseases that are often climate related, can impact outcomes. As the soil-dependent food, fiber, and environmental economies adjust to the global marketplace, in conjunction with public policy shifts, new regulations, and shifts in demand, outcomes are impacted. Worldwide, the availability of productive soils is a limiting factor. In addition, the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that exceed available personnel and resources can affect outcomes.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of the college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research

program throughout 2015, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

### **Key Items of Evaluation**

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

**Program # 7**

**1. Name of the Planned Program**

Natural Resources and Environmental Systems (OARDC Led)

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	0%		5%	
122	Management and Control of Forest and Range Fires	0%		5%	
123	Management and Sustainability of Forest Resources	0%		5%	
124	Urban Forestry	0%		10%	
125	Agroforestry	0%		10%	
134	Outdoor Recreation	0%		20%	
135	Aquatic and Terrestrial Wildlife	0%		35%	
136	Conservation of Biological Diversity	0%		10%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual Paid</b>	0.0	0.0	1.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	76479	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	156879	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

### 1. Brief description of the Activity

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

### 2. Brief description of the target audience

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

- Individuals or groups who have expressed a need for natural resources and environmental research knowledge that resulted from new or on-going research, or is extracted from the scientific literature. Often these requests are communicated to OARDC by an intermediary such as a staffer at USDA, the Ohio Department of Natural Resources, or a county Extension agent;
- 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 access; e.g. people who fish for recreation;
- Other scientists and scientific groups;
- Political entities;
- Extension personnel;
- Students from pre-school to post doctorate studies;
- News organizations;
- Business groups such as Ohio Farm Bureau;
- Community groups such as watershed collations.

### 3. How was eXtension used?

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	18	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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 and flow of goods and services from Ohio ecosystems.
2	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.
3	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.
4	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.
5	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 Measures**

In conjunction with companion agencies and organizations, advance research in forest biology and ecology to promote advances in best management practices on and flow of goods and services from Ohio ecosystems.

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

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. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Emerald ash borer (EAB) is an invasive, wood-boring insect that has killed tens of millions of ash trees since its accidental introduction from Asia, and has now been detected in most of Ohio's counties. As EAB continues to spread, it threatens the very existence of ash trees in North America's cities and forests with staggering economic and ecological impacts.

**What has been done**

In 2011, OARDC scientists and collaborators at Wright State University and the USDA Forest Service began working to develop EAB resistant ash trees. This project has demonstrated that Asian species are naturally resistant, identified potential mechanisms of resistance, and characterized resistance-associated genes. 'Lingering' native ash trees found surviving where ash mortality exceeded 99% have increased tolerance to EAB and are being evaluated as a source of native germplasm for use in breeding programs. An ash genetics plantation at OARDC was expanded in 2012 to evaluate genetic lines of Asian and North American ash for their resistance to EAB, as well as their horticultural and forestry characteristics.

**Results**

Ash species represent 10% of the tree cover in Ohio's forests, and ash is one of the common shade trees in Ohio's urban forests. An economic analysis found that it will cost up to \$3 billion to remove the several million ash trees growing in Ohio communities once they are killed, and another \$1.25 billion to replace them with new trees. Costs could exceed \$10 billion over the next 10 years in Midwestern states. Development of resistant ash trees will lead to the reintroduction of ash to the nursery industry, and to the reestablishment of ash trees in urban and natural forests throughout North America.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
123	Management and Sustainability of Forest Resources

**Outcome #4**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

## **V(H). Planned Program (External Factors)**

### **External factors which affected 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.)

### **Brief Explanation**

Changes in public policies, new regulations and laws, and shifts in demand continue to impact outcomes. Climatic variations, coupled with pests and diseases that are often climate related, are also impacting outcomes. Exotic invasive species, such as the Emerald Ash Borer, represent significant external factors, especially in terms of forest ecosystem management. 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 are exceeding resources can affect outcomes.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of this college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

**Key Items of Evaluation**

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

**Program # 8**

**1. Name of the Planned Program**

Plants Systems (OARDC Led)

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	0%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		20%	
205	Plant Management Systems	0%		10%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
213	Weeds Affecting Plants	0%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	0%		15%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	24.5	0.0
<b>Actual Paid</b>	0.0	0.0	22.9	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	2968974	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	6839436	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

### 1. Brief description of the Activity

The goals of 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 Ohio to permit data gathering and to continue long-term experiments, such as commodity yield trials and public breeding programs. Computational science and information technology are being used in a complementary fashion to improve our ability to analyze and utilize giant sets of molecular and genomic data. Bioemergent materials research is focused on the discovery, manipulation, and utilization of unique crops as alternatives to synthetic materials.

OARDC's efforts to develop and commercialize domestic, alternative rubber sources from dandelions will continue. With significant private investment from Bridgestone Corporation, Goodyear Tires and Ford Motor Company, research currently focuses on producing a crop that reaches production standards.

On-farm research takes place, as do national and international studies. All functional laboratories and field sites are improved over time as program needs and available resources warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal colleagues, such as fellow Extension personnel, and with external stakeholders.

### 2. Brief description of the target audience

Audiences targeted by OARDC include, but are not limited to:

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

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 7

**Patents listed**

1. Agrobacterium Strains for Plant Transformation and Related Materials and Methods
2. Azalea Plant Named 'STEWLA#1'
3. Engineering Plants with Rate Limiting Farnesene Metabolic Genes
4. Prothioconazole Tolerant Cryptococcus Flavescens Strains for Biological Control of Fusarium Head Blight (patent issued)
5. Small Molecule Modulators of Clavibacter Michiganensis susp. Michiganensis as a Means to Control Tomato Bacterial Canker
6. System for Delivery of Microbial Inoculants and Related Materials and Methods
7. System for Expression of Genes in Plants from a Virus-Based Expression Vector (patent issued)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	123	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Meet or exceed the demand of fellow scientists and stakeholders within the next ten years for materials relating to plant genetics and plant breeding technologies, including identification of molecular markers for elite germplasms.
2	Enrich the gene pool, and knowledge thereof, to meet identified stakeholder needs.
3	Annually provide adequate preharvest research findings, including field trial data, to support Ohio's status as a top soybean and corn producer
4	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.
5	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.
6	Develop cultivars and crop management strategies that limit the potential negative impacts of weather variations on crop yields.

**Outcome #1**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Enrich the gene pool, and knowledge thereof, to meet identified stakeholder needs.

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Researchers have determined that precipitation and temperature variations over the past 20 years have suppressed the U.S. average soybean yield gain-how much it goes up every year-by about 30%, representing a loss to the industry of \$11 billion nationally. In Ohio alone, that suppression is estimated to have cost \$2.9 billion during the past 20 years. According to a new study by OARDC scientists, failure to acknowledge and develop regional strategies to mitigate climate change impacts will greatly weaken the competitive advantage of U.S. farmers.

#### **What has been done**

The study is based on data gleaned from 12 states, including data from OARDC researchers' Ohio Soybean Performance Trials, which documents precipitation, temperature, cultural practices, soybean varieties, and technology in soybean production from 1970 to the present. The study found that for every 1 C rise in temperature during the growing season, soybean yields fell about 2.4%. Global annual temperatures have increased by 0.4 C since 1980, and several regions have seen even greater increases. Ohio was the second-hardest hit state after Missouri in terms of lost soybean income over the past 20 years.

#### **Results**

The U.S. is one of the world's largest soybean exporters, with some 80% of its soybean varieties being grown in the upper Midwest. Because most of that production is not irrigated, soybean production in the region is highly affected by weather conditions during the growing season. While more state-specific research is needed to help mitigate the effects of weather variability, some existing crop management strategies could help limit the potential negative impacts of weather variations on crop yields. Strategies include the development of new cultivars and hybrids, the use of altered maturity groups, changes in planting dates, the use of cover crops, and greater management of crop residues from the previous year. If strategies are not developed to mitigate weather variability, it could have a long-term impact on soybean farmers, the soybean industry,

trade policy, consumer food prices, food security and the economy.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

#### V(H). Planned Program (External Factors)

##### External factors which affected 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.)

##### Brief Explanation

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

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES research programs;
- Number of patents received;
- Economic impact of this college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

### **Key Items of Evaluation**

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

**Program # 9**

**1. Name of the Planned Program**

Animals Systems (OARDC Led)

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	0%		15%	
302	Nutrient Utilization in Animals	0%		15%	
303	Genetic Improvement of Animals	0%		10%	
304	Animal Genome	0%		5%	
305	Animal Physiological Processes	0%		15%	
306	Environmental Stress in Animals	0%		5%	
307	Animal Management Systems	0%		10%	
308	Improved Animal Products (Before Harvest)	0%		15%	
311	Animal Diseases	0%		10%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	10.0	0.0
<b>Actual Paid</b>	0.0	0.0	10.3	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1442668	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	3677092	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

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

**2. Brief description of the target audience**

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

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

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 5

**Patents listed**

1. Compositions and Methods for Preventing Porcine Reproduction and Respiratory Syndrome (patent issued)
2. Compositions and Methods Related to Viral Vaccines
3. Cultivable Porcine Deltacoronavirus
4. Immortalized Embryonic Duck Intestine Derived Cells and Methods of Use of the Same
5. Nanoparticle Based Vaccine Strategy Against Swine Influenza

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	61	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Improve reproduction efficiency and enhanced application of new technologies over the next five years to fully meet the competitive demands faced by OARDC's stakeholders in areas such as early maturation, estrus, fertility, and ovulation
2	Increase dietary research and nutrition utilization for the purpose of increased growth and quality of products commensurate with consumer demand.
3	Meet the demand of fellow scientists and stakeholders within ten years for materials relating to genetics and breeding, including id of molecular markers for improved animal health and reproductively, and increased quality and quantity of products
4	Improve management for multiple animal farm types, including organics, that will produce higher yields for and lower costs to the producer and consumer
5	Animal disease researchers will provide the necessary research to inform producers in a timely manner how to protect against known and present diseases, e.g. bovine mastitis
6	Animal disease researchers will advance the research frontiers in emerging disease investigations to the extent that OARDC continues to serve as a center for excellence.

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

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. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Since November 2014, an outbreak of highly pathogenic avian influenza H5 spread by wild waterfowl has gripped the U.S. poultry industry, and has resulted in the elimination of 50 million birds in at least 19 states. While the virus has not yet reached Ohio, OARDC experts are conducting innovative research to improve detection, prevention and management of avian flu and other respiratory diseases that threaten the state's valuable poultry industry.

#### **What has been done**

OARDC virologists are leading a consortium of USDA and university researchers in a project aimed at combating avian influenza. The project's goals are threefold: to better understand the ecology of poultry diseases in order to develop more effective prevention strategies; to validate diagnostic methods currently employed and create better ones as needed; and to gain a better understanding of the relationship between disease, host and environment in order to aid in the development of new control methods.

#### **Results**

The current avian flu outbreak is a serious threat to Ohio's \$2.3 billion poultry industry, which directly supports more than 14,600 jobs. Nationally, Ohio ranks second in egg production and ninth in turkey production. If Ohio were to experience just a 50% poultry loss, OSU experts estimate the effect would reach \$1 billion in overall economic losses, including \$815,000 in annual wages. Heavy losses to Iowa's egg farms from this virus have sent egg prices soaring across the United States. If the virus reaches Ohio, prices would increase even more dramatically, affecting both consumers and food manufacturers. The wide and fast spread of the virus in poultry farms in the Midwest indicates that the major change the poultry industry needs to adopt is tighter biosecurity. OARDC research is helping producers take biosecurity to a new level to avoid spread of the disease; including the adoption of on-farm disposal methods.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

#### V(H). Planned Program (External Factors)

##### External factors which affected 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.)

##### Brief Explanation

Animal diseases coupled with abnormal weather patterns often impact outcomes. Public policy shifts, new regulations, and shifts in demand for animal products continue to impact outcomes. Human values and environmental sensitivities of the population to animal production and processing are also external factors that influence results. Formative evaluations relating to animal care norms and protocols can be effective in informing the process; however, uncertainty is a constant factor in the animal industry. Factors such as the availability of base funding to ensure a core research faculty and staff, availability of extramural research funds, and programmatic demands that exceed resources can affect outcomes.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of the college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative

evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

**Key Items of Evaluation**

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

**Program # 10**

**1. Name of the Planned Program**

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

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
401	Structures, Facilities, and General Purpose Farm Supplies	0%		20%	
402	Engineering Systems and Equipment	0%		25%	
403	Waste Disposal, Recycling, and Reuse	0%		25%	
404	Instrumentation and Control Systems	0%		10%	
405	Drainage and Irrigation Systems and Facilities	0%		15%	
723	Hazards to Human Health and Safety	0%		5%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	1.5	0.0
<b>Actual Paid</b>	0.0	0.0	1.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	138591	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	421994	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0



**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

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

**2. Brief description of the target audience**

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

- Individuals or groups who have expressed a need for engineering information that resulted from new and on-going research, or is extracted from the scientific literature. Often these requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, the Ohio Department of Agriculture, Soil and Water Conservation Districts, or a county Extension agent;
- Fellow academic units that rely on engineers to create systems and processes needed to support their research and the adoption of research findings by stakeholders;
- Federal, state and local agencies or support groups who not only use information but broker that information by embedding it into clientele groups supportive of change;
- Populations who have not requested the information but will likely benefit from access, e.g. recreational animal owners;
- Other scientists and scientific groups;
- Political entities;
- Extension personnel;
- Students from pre-school to post doctorate studies;
- News organizations;
- Business groups such as small town administrators, county commissioners, or commodity groups.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**  
**Patent Applications Submitted**

Year: 2015  
 Actual: 9

**Patents listed**

1. Filler-Natural Rubber Composites
2. Fungal Treatment to Enhance Extractable Rubber Yield from Plants
3. Fungal Treatments for Extracting Rubber from Plants
4. Latex Products Containing Fillers from Waste
5. Metabolic Perturbations to Enhance Mircobial Fermentation of Lignocellulose-Derived Sugars to Fuels and Chemicals
6. Methods to Extract Natural Rubber from Guayule and Other Plants Using Differential Flocculation
7. Nanochanneled Device and Method of Use
8. Nanochanneled Device and Related Methods (patent issued)
9. Wet Scrubber for Ammonia Capture (patent issued)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	0	24	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
 Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Provide appropriate facilities design and engineering processes commensurate with stakeholders demand, including fellow research units demands, to the extent that they have all the information necessary for making adoption decisions
2	Develop enhanced systems to support integrated plant growth systems that will annually result in increased productivity at reduced costs for the industry
3	Improve mechanical devices and instrumentation needed by stakeholders
4	Advance development of state of the art integrated waste management systems to the extent that OARDC and Ohio are viewed as one of the top ten programs/states in this area nationally
5	Advance the knowledge of ecological based engineered systems for waste management to the extent that, where cost effective and appropriate, they will be adopted over mechanical systems
6	Develop improved systems to aid in meeting new or yet to emerge or novel needs

## **Outcome #1**

### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

## **Outcome #2**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Weather extremes disrupt normal farming practices, and seasonal patterns define the production cycle of most crops in temperate climates. Drought, rain, snow, wind, cold and other stresses, including some pests and disease-causing pathogens, limit production and are only partially offset by fertilizer, irrigation, pesticides and labor.

#### **What has been done**

High tunnels help farmers grow more food of higher quality, and OARDC scientists are working to widen their use. At OARDC facilities in Piketon, OH and Wooster, OH and also on cooperating farms, researchers are studying high tunnels, documenting their benefits and refining the best ways to use them. Then, they're sharing their findings with farmers.

#### **Results**

In Ohio, high tunnels can extend the marketing season of some farm produce from six months to year-round. High tunnels increase a farm's annual food production. Warm- and cool-season crops are grown and sold in succession. Hundreds to thousands of pounds of more and different kinds of produce are taken from tunnels when outside fields are dormant. That means more revenue to

growers and greater choice and health benefits to consumers.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
401	Structures, Facilities, and General Purpose Farm Supplies

##### **Outcome #3**

###### **1. Outcome Measures**

Improve mechanical devices and instrumentation needed by stakeholders

Not Reporting on this Outcome Measure

##### **Outcome #4**

###### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

##### **Outcome #5**

###### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

##### **Outcome #6**

###### **1. Outcome Measures**

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

###### **2. Associated Institution Types**

- 1862 Research

###### **3a. Outcome Type:**

Change in Condition Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2015	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

In the world of agriculture, having access to rich data sources about field conditions, weather patterns, pests and more can make a huge difference in the profitability and sustainability of Ohio farms.

#### What has been done

The OARDC is working with farmers, industry groups and state agencies to boost access to and analysis of field data gathered from new-generation farm machinery, satellite data, and remote-sensing imagery captured by unmanned aerial vehicles (UAVs). These data can support farmers' management decisions, for example, how much nitrogen should be applied to corn and whether or when a fungicide needs to be used. But all this data needs to be gathered and provided quickly for farmers to make the best use of it. OARDC experts are creating a repository that will then be made available to growers in a user-friendly manner to help them make data-driven decisions.

#### Results

The enhanced use of precision farming technology and "big data" analysis can benefit the agricultural industry and society in three key areas:

\*Economy: Providing remote-sensing imagery and other types of data to growers and their crop consultants can help growers make more efficient use of fertilizers and other expensive inputs, thus lowering costs.

\*Environment: Reducing fertilizer and agrochemical applications benefits the environment, protecting water, pollinators and other valuable natural resources.

\*Research: Developing an extensive data repository can help university scientists save time in their research projects and develop innovative recommendations to assist both farmers and the environment.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
404	Instrumentation and Control Systems

## **V(H). Planned Program (External Factors)**

### **External factors which affected 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.)

### **Brief Explanation**

Economic shifts such as interest rates to borrow money for facilities, public policy shifts, new regulations, changes in demand, and issues such as climate change are impacting outcomes. Human values and conflicts, e.g. urban-rural interface issues and environmental sensitivities to agricultural processes and facilities, are also external factors that affect outcomes. Climate change may dictate new and different types of structures, equipment, and processes. Factors such as the availability of base funding to ensure a core research and Extension faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources can affect outcomes.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of this college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

### **Key Items of Evaluation**

In Ohio, high tunnels can extend the marketing season of a farm from six months to year-round. Thanks to OARDC's research efforts, Dana Hilfinger, farm manager of Urban Farms of Central Ohio said:

"We're a nonprofit commercial farming organization providing fresh produce access to food-insecure individuals. We've used OARDC's high tunnel research to increase our impact by providing high-quality produce for more months of the year. We've been able to market our produce earlier in the season, generating more revenue to support our mission and generally supporting central Ohio's local food economy."



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

**Program # 11**

**1. Name of the Planned Program**

Economics and Social Dimensions (OARDC Led)

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	0%		10%	
602	Business Management, Finance, and Taxation	0%		10%	
603	Market Economics	0%		10%	
604	Marketing and Distribution Practices	0%		5%	
605	Natural Resource and Environmental Economics	0%		5%	
606	International Trade and Development	0%		5%	
607	Consumer Economics	0%		5%	
608	Community Resource Planning and Development	0%		5%	
609	Economic Theory and Methods	0%		10%	
610	Domestic Policy Analysis	0%		5%	
611	Foreign Policy and Programs	0%		5%	
801	Individual and Family Resource Management	0%		5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		5%	
805	Community Institutions, Health, and Social Services	0%		5%	
901	Program and Project Design, and Statistics	0%		5%	
903	Communication, Education, and Information Delivery	0%		5%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890

<b>Plan</b>	0.0	0.0	6.5	0.0
<b>Actual Paid</b>	0.0	0.0	4.9	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

## 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	678808	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1657516	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

### 1. Brief description of the Activity

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

### 2. Brief description of the target audience

OARDC's targeted audiences for this planned program include, but are not limited to:

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

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	27	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
 Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	New knowledge of production variations in markets, including vertical markets, that help producers, processors, and distributors have requisite information for enhanced decision making leading to decreased costs of inputs and an increase in profits/outputs.
2	Business management knowledge, including policy analysis, in targeted areas, e.g. risk management, weather insurance, impacts of land use shifts, grant management that are necessary for and result in increased profitability for stakeholders.
3	Market economies and efficiencies studies relating to factors such as pricing, finance, supply and demand, exchange rates, trade policies, etc. ensuring that stakeholders are informed and their identified needs.
4	Grow research findings on valuing (market and non-market) environmental resources, including biocomplexity, e.g. wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.
5	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.
6	Advance basic and theoretical knowledge in sociological, educational, and human capital dimensions related to food, agriculture and environment topics

## **Outcome #1**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Despite Ohio's \$11.8 billion food processing industry, \$13.3 billion food wholesaling and retailing industries, and \$6.9 billion food service industry, most food consumed by Ohioans is imported. A similar situation exists for basic needs like energy and many of our manufactured goods. Replacing those imports with Ohio production and value chains is a tremendous opportunity for Ohio farmers and entrepreneurs.

#### **What has been done**

The Agroecosystems Management Program, together with colleagues in many other states, is harnessing the power of social networks to build local economies. The project team is developing online social networking tools that help Ohio agricultural entrepreneurs map their assets, find potential supply chain connections, and launch cooperative networks of businesses that meet basic needs for food, energy and biobased products. Work this year has also focused on aligning existing entrepreneurial support organizations to support agricultural bioscience supply chain development.

#### **Results**

To date, over 160 business cases have been described and mapped on the project entrepreneurial social networking site, localfoodsystems.org, with over 300 potential direct supply chain connections that offer collaborative opportunities. Results this year include 82 new business cases with support led by four different organizations. At least 25 previously recorded business cases are seeking or have received infusions of capital, with 38 jobs, \$675,000 in payroll, and \$3,052,000 in investment documented. Researchers project an increase to 400 new jobs, \$20 million in investment and \$3 million in payroll within five years.

### **4. Associated Knowledge Areas**

**KA Code**    **Knowledge Area**  
608            Community Resource Planning and Development

**Outcome #2**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

One hundred Ohio breweries produce 1.09 million barrels of craft beer annually, requiring four million pounds of dried hops at four pounds per barrel--worth more than \$30 million--all currently purchased from out-of-state farms. To meet this demand, an estimated 6,000 acres of hops are required by Ohio craft brewers at current-use rates. Today, 100 acres are planted with hops in the state, so the potential for growth is enormous. Based on the increased interest in buying locally grown and produced items, this is an excellent opportunity for Ohio farmers to incorporate this crop into their operations. However, to do this they need to know how to establish, manage and market hops successfully.

**What has been done**

OARDC scientists established two experimental hop yards in 2013 located at the OARDC in Wooster, OH and The Ohio State University South Centers in Piketon, OH. The goal of these yards is to measure the feasibility of hop production within the state. Within each hop yard, nine varieties are being evaluated and variables such as cold hardiness, insect and disease susceptibility, yield potential, processing options and local marketability are being measured.

**Results**

OARDC's hops research trials are helping growers identify the following: new hops varieties for Ohio, effective pest and disease management techniques, successful fertility and irrigation management methods, and the use of mechanical harvesting tools. The work done by OARDC thus far has illustrated that hops can be successfully produced within the state, but that growers need to monitor multiple disease and arthropod pests. To facilitate this, two Extension fact sheets

focused on hop pest management have been produced. Researchers are also working on a disease scouting and management fact sheet. In 2014 and 2015, full-day winter workshops were held to discuss variety selection, pest and disease management, harvesting, drying and marketing in detail with experts from around the state including established growers. The 2015 meeting was held with the Ohio Brewing Association to facilitate networking among growers and brewers. Over 300 people attended the winter workshops from Ohio, Michigan, Kentucky, Indiana, Pennsylvania and Nebraska to learn of our findings to date.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

#### Outcome #3

##### 1. Outcome Measures

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

Not Reporting on this Outcome Measure

#### Outcome #4

##### 1. Outcome Measures

Grow research findings on valuing (market and non-market) environmental resources, including biocomplexity, e.g. wetlands, river restoration, and how it applies to stakeholder needs for demonstrated gains in profits, resources sustained, and/or actions mitigated.

Not Reporting on this Outcome Measure

#### Outcome #5

##### 1. Outcome Measures

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.

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

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

Not Reporting on this Outcome Measure

### **V(H). Planned Program (External Factors)**

#### **External factors which affected 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.)

#### **Brief Explanation**

Shifts in economic dimensions impact all aspects of people's lives. Within this program area, public monies, and fluctuations in the appropriations of such, can have both positive and negative effects on human well-being, as do levels of government regulation. Likewise, public policies, societal priorities and perceptions, popular culture, education, and family norms are major external factors impacting this program in its research and Extension efforts. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that exceed available resources can affect outcomes.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of this college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new



knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

### **Key Items of Evaluation**

Dave Volkman formerly grew produce on his 12-acre Maineville, Ohio farm. However, by attending a workshop on hops production offered by the OARDC and OSU Extension horticulturists, Volkman learned about the crop's potential strong profit and high demand. As a result, he traded in his produce for hops.

Volkman said, "After significant research and attending numerous Ohio State hops production workshops, I've gone from no hops to now more than 400 plants on 12 acres, supporting two Ohio craft breweries. With Ohio State's research and input, the economic potential for Ohio hops is huge."

He also formed the Ohio Hop Growers Guild, which currently brings together more than 50 Ohio hops growers.

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

**Program # 12**

**1. Name of the Planned Program**

Human Health (OARDC Led)

Reporting on this Program

**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%		10%	
721	Insects and Other Pests Affecting Humans	0%		20%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		50%	
723	Hazards to Human Health and Safety	0%		10%	
724	Healthy Lifestyle	0%		10%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	1.0	0.0
<b>Actual Paid</b>	0.0	0.0	1.3	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	147019	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	415485	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

On-going research activities to advance human health and societal well-being include both basic and applied research, such as that conducted through OARDC's Center for Advanced Functional Foods Research and Entrepreneurship (CAFFRE). Examples include the identification, extraction and commercialization of natural, cancer-fighting food dyes from berries. Effective food science research requires a mixture of laboratory and gathering places for human subjects to undergo sensory evaluations of experimental food products. Emerging health threats now require more advanced facilities--such as bio-security labs--particularly needed in the study of infectious animal, plant and insect-vectored diseases that may directly impact humans. All functional laboratories and sites are improved over time, as program needs warrant. OARDC faculty and staff engage in appropriate levels of outreach and consultation with both internal and external stakeholders.

**2. Brief description of the target audience**

Targeted audiences include, but are not limited to:

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

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2015</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	13	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of graduate students completed  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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 Measures**

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. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

With the rise of internet commerce and social networking has come a new phenomenon of internet-based human milk sharing between women who have extra breast milk and those who want to feed their infant breast milk but cannot. Results of the current study revealed the unregulated sharing of breast milk via the internet exposes infants to increased risk of consuming infectious agents capable of causing a variety of preventable neonatal diseases. Approximately 10% of samples contained bovine milk, a potential health risk for allergens. Popular press media coverage of the trial reached an audience of 800 million via the internet, television, radio and print media. The three largest internet breast milk exchange sites each changed their operations following publication of the research to serve as collection sites and pasteurize milk before delivery.

#### **What has been done**

In a collaborative project with Vanderbilt University, OARDC scientists are discovering new insecticides targeting potassium channels of mosquitoes and aphids. They have discovered synthetic chemicals that kill mosquito vectors of malaria and dengue fever by interfering with renal potassium transport. Current efforts are focused on improving the efficacy and selectivity of these chemicals that interfere with an insect's ability to excrete urine.

#### **Results**

The results suggest that renal function disruption through potassium channel blockage is a viable target for novel insecticides to combat "resistant" mosquitoes and agricultural pests. The products of this research have the potential to slow the spread of mosquito-borne diseases, which collectively debilitate the health and well-being of hundreds of millions of people around the globe each year. The development of new insecticides to reduce mosquito populations is very important, considering new diseases continue to emerge, such as the recent Zika virus. These

compounds have the potential to reduce mosquito populations and protect human health worldwide.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
721	Insects and Other Pests Affecting Humans

#### **Outcome #2**

##### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

#### **Outcome #3**

##### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

#### **Outcome #4**

##### **1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

#### **Outcome #5**

##### **1. Outcome Measures**

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

##### **2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The nutrition, medical, and public health communities have strongly promoted the benefits of breastfeeding for decades. A simple internet search reveals that the informal sharing of raw breast milk with minimal or no quality and safety assurance happens frequently. More than 17,400 original posts were placed on four major milk-sharing sites in 2011 to exchange milk. Some women were willing to donate their milk, while an equal proportion sold milk for \$2/oz. The safety and health implications of this practice have not been evaluated.

**What has been done**

An interdisciplinary study involving the OARDC Mastitis and Milk Quality Lab, OSU Department of Pediatrics, OSU Department of Internal Medicine, and the University of Cincinnati Children's Center for Breastfeeding Medicine was initiated to compare milk quality of breast milk from internet milk sharing sites with breast milk from a certified milk bank. Breast milk was anonymously purchased from 100 publicly available posts or ads. Twenty samples were obtained from an Ohio breast milk bank. The microbiological and compositional qualities of samples were compared. This represents one of the first interdisciplinary studies on the quality of commercial sales of breast milk.

**Results**

With the rise of internet commerce and social networking has come a new phenomenon of internet-based human milk sharing between women who have extra breast milk and those who want to feed their infant breast milk but cannot. Results of the current study revealed the unregulated sharing of breast milk via the internet exposes infants to increased risk of consuming infectious agents capable of causing a variety of preventable neonatal diseases. Approximately 10% of samples contained bovine milk, a potential health risk for allergens. Popular press media coverage of the trial reached an audience of 800 million via the internet, television, radio and print media. The three largest internet breast milk exchange sites each changed their operations following publication of the research to serve as collection sites and pasteurize milk before delivery.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior



## **V(H). Planned Program (External Factors)**

### **External factors which affected 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.)

### **Brief Explanation**

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

Research priorities, limited research dollars, and the resulting competition impact the extent of research that can be carried out. Items such as potential levels of public exposure to certain zoonotic diseases are major external factors. Likewise, public willingness to learn safety procedures to contain pests and mitigate zoonotic disease threats may impact research outcomes. Willingness of consumers to pay for additional food safety is also an external factor. Factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that exceed available resources can affect outcomes.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

For 2015, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics that are considered indicators of research success are:

- Research contracts and awards received/ongoing/completed (\$154 million plus in active projects during 2015);
- Number of referred publications reported elsewhere in this report;
- Number of businesses, industries and groups engaged in CFAES' research programs;
- Number of patents received;
- Economic impact of the college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2015;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2015, both in terms of breadth of programs and depth of new

knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of businesses, industries, commodity groups, special interest or community groups, or other interested parties. These are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

### **Key Items of Evaluation**

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

**Program # 13**

**1. Name of the Planned Program**

Advancing Employment and Income Opportunities (Extension)

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

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

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	8.0	0.0	0.0	0.0
<b>Actual Paid</b>	5.0	0.0	0.0	0.0
<b>Actual Volunteer</b>	1.8	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
258236	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
258236	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

- On-site workshops
- Meetings
- Curriculum development and maintenance
- Leadership development training
- Development and maintenance of online resources
- Establishment of collaborative partnerships
- One-on-one client consultations
- Volunteer organizational efforts
- Conduct tax education workshops for practitioners, attorneys, CPAs, CFPs

**2. Brief description of the target audience**

- Community Leaders
- Economic development professionals
- Community residents (families and individuals)
- Business owners/operators
- Professional economic developers
- Extension partners
- Attorneys
- Certified public attorneys
- Certified financial planners
- Enrolled agents with the Internal Revenue Service
- Tax return preparers

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	11859	10342	2564	4634

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2015</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	15	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- number of people participating in BR&E programming

<b>Year</b>	<b>Actual</b>
2015	190

**Output #2**

**Output Measure**

- number of formal presentations of findings to communities

<b>Year</b>	<b>Actual</b>
2015	51

**Output #3**

**Output Measure**

- number of multi-state partnerships for Business Retention and Expansion (BR&E) programming efforts

<b>Year</b>	<b>Actual</b>
2015	15

**Output #4**

**Output Measure**

- number of formal training workshops

<b>Year</b>	<b>Actual</b>
2015	32

**Output #5**

**Output Measure**

- number of program planning and implementation volunteer hours donated

<b>Year</b>	<b>Actual</b>
2015	3706

**Output #6**

**Output Measure**

- number of companies visited (to discuss opportunities for growth or possible hindrances to growth)  
Not reporting on this Output for this Annual Report

**Output #7**

**Output Measure**

- number of in-person, two-day OSU Income Tax School events offered

<b>Year</b>	<b>Actual</b>
2015	9

**Output #8**

**Output Measure**

- number of participants in OSU Income Tax School in-person events (single day)

<b>Year</b>	<b>Actual</b>
2015	697

**Output #9**

**Output Measure**

- number of two-hour "Ethics" webinars offered through the OSU Income Tax School program

<b>Year</b>	<b>Actual</b>
2015	2

**Output #10**

**Output Measure**

- number of participants in "Ethics" webinars offered through the OSU Income Tax School program

<b>Year</b>	<b>Actual</b>
2015	359

**Output #11**

**Output Measure**

- number of five-hour "Agriculture and Natural Resource Tax Issues" webinars offered

<b>Year</b>	<b>Actual</b>
-------------	---------------

2015 1

**Output #12**

**Output Measure**

- number of participants in "Agriculture and Natural Resource Tax Issues" webinars offered through the OSU Income Tax School program

<b>Year</b>	<b>Actual</b>
2015	167

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of participants who increased their financial literacy (FCS)
2	# of participants who have developed an integrated plan for achieving financial security (FCS)
3	number of community plans developed and adopted
4	number of jobs created
5	number of jobs retained
6	number of local leaders and community residents that have indicated they are using knowledge gained from BR&E programming to make better informed community decisions (BR&E)
7	number of participants in OSU Income Tax School educational sessions who experienced an increase in knowledge on at least one subject as a result of attending an educational program
8	number of identified active retail sectors in the surveyed area
9	number of local government leaders reporting a gain in knowledge as a result of OSUE leadership training
10	number of public officials / township trustees who completed professional development workshops teaching sustainability education
11	number of coastal communities who now have an economic strategy to help retain and / or expand business operations



**Outcome #1**

**1. Outcome Measures**

# of participants who increased their financial literacy (FCS)

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

number of community plans developed and adopted

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	12

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Communities and regions strive to achieve sustainable economies through a variety of community economic development strategies. Planning is important in setting goals and objectives and establishing action plans to achieve these goals. OSUE offers targeted planning programs to help communities and regions: 1) develop community capacity; 2) prioritize projects and programs; 3) manage and leverage resources; 4) implement action plan strategies; and 5) evaluate progress.

**What has been done**

Elected officials, community leadership, and citizen volunteers were the target audience in 2015. OSU interacted with these groups of people through meetings, counseling, and workshops. 19

meetings / workshops were conducted in 2015.

**Results**

In 2015, 26 reports or presentations aimed at educating communities about assets and opportunities for sustainable growth were given to 256 participants, resulting in the implementation of at least 12 planning priorities and projects to forward community vision and begin to make substantive and positive change. Over 100 volunteers and community members were involved in program activities in 2015.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
902	Administration of Projects and Programs

**Outcome #4**

**1. Outcome Measures**

number of jobs created

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

number of jobs retained

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

number of local leaders and community residents that have indicated they are using knowledge gained from BR&E programming to make better informed community decisions (BR&E)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	190

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The Business Retention and Expansion program has been positively impacting communities for 30 years as a structured approach to assessing and addressing business needs. The program helps to inform community leadership about their economy and assist in decision-making. Local community leaders in Ohio frequently lack an understanding of issues related to their economy. Local officials lack knowledge of existing business needs and resulting expansion and growth strategies. Relations among community stakeholders (businesses, residents, local leaders / officials) are often fragmented, challenging communities even more. The goals of BR&E programming are: 1) to assist businesses in solving local problems and working with local government; 2) to assist businesses in using state and federal development programs; 3) to develop a database for local economic strategic planning to improve the community's climate for growth; and 4) to establish an early warning system for plant closures, allowing the community to prevent or ease such situations when possible.

**What has been done**

22 workshops were held, including a train-the-trainer session. Through a community engagement process, local community socio-economic data and resident input have been collected and compiled by OSU Extension professionals in community plan / report formats that can be referenced to better inform local decision making. BR&E sessions are hosted as either one-on-one individual instruction or as a small group workshop.

**Results**

Program participants are demonstrating improved working relationships: county and city officials are now meeting once a month to discuss community and economic development issues. New BR&E curriculum has been developed, and a mobile application was developed and is currently being tested by BR&E practitioners. The mobile BR&E app enables a user to enter questionnaire data as they visit with a respondent, which will eliminate the need for bringing laptops to assessment sessions, and centralize gathered data.

Local elected and appointed officials in 25 communities have used locally informed community planning documents (as provided by OSU Extension professionals) to inform decisions regarding infrastructure expansion, zoning, subdivision review, and development patterns for the future.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
902	Administration of Projects and Programs

## **Outcome #7**

### **1. Outcome Measures**

number of participants in OSU Income Tax School educational sessions who experienced an increase in knowledge on at least one subject as a result of attending an educational program

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1220

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The OSU Income Tax School program is designed for individuals who have some experience preparing and filing federal and state tax returns. The programming focuses on recent tax law changes and issues that may be encountered when preparing 2015 tax returns.

#### **What has been done**

In 2015, 1223 individuals attended OSU Income Tax School programming events. There were 9 in-person, two-day events offered; 2 two-hour "Ethics" webinars, and 1 5-hour "Agriculture and Natural Resources Tax Issues" webinar offered. The in-person schools were taught by a team of five experts in tax law: a CPA, two representatives from the IRS, an Assistant Professor from OSU, and a taxpayer assistance representative from the IRS. The "Ethics" webinars were taught by an Enrolled Agent with the IRS. The Agriculture and Natural Resources Tax Issues webinar was taught by an Agricultural Economics Professor from the University of Wisconsin.

#### **Results**

Nearly 100% of participants in 2015 OSU Income Tax Schools indicated on post-seminar / post-webinar evaluations that they had more knowledge on at least one subject after attending a program than before they had attended the program. Participants to the OSU Income Tax Schools were able to obtain continuing education credit, as required by the IRS for tax preparers. Additionally, all participants to the two-day, in-person OSU Income Tax Schools received a copy of The National Income Tax Workbook - a 750+page, peer-reviewed book.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
602	Business Management, Finance, and Taxation

**Outcome #8**

**1. Outcome Measures**

number of identified active retail sectors in the surveyed area

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	43

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The Sidney-Shelby Economic Partnership wanted to better understand the pattern of retail spending within their local communities as a means to facilitate under-represented business attraction and improve the local economy.

**What has been done**

Ohio Sea Grant, OSU Extension, and the OSU Center for Urban and Regional Analysis led the development of a retail market analysis for the Sidney-Shelby Economic Partnership to determine which retail business sectors were over- or under-represented in the area.

**Results**

The retail market analysis revealed that the Sidney-Shelby retail market area represents 43 of 57 active retail sectors. Total retail sales were \$530 million, while potential sales were estimated to be closer to \$586 million, indicating an overall leakage of over \$56 million in retail sales to other competing areas. The retail market analysis will enable the Sidney-Shelby Economic Partnership officials to concentrate on targeted business recruitment in its underserved retail business sectors.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
902	Administration of Projects and Programs

**Outcome #9**

**1. Outcome Measures**

number of local government leaders reporting a gain in knowledge as a result of OSUE leadership training

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	33

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Increased understanding of how public officials' decisions can affect the Lake Erie watershed and coastal communities can lead to more sustainable decision making. Four counties on Lake Erie wanted to develop better informed leadership, as well as improve the decision making skills of the leadership.

**What has been done**

Ohio Sea Grant led a partnership with OSU Extension, the Toledo Chamber of Commerce, and the Youngstown / Warren Chamber of Commerce to develop a 10-week curriculum for local government officials. The goal of the 10 week program was to help local elected and appointed officials understand and develop leadership skills in the areas of local government finance, team building, conflict management and dispute resolution, sustainable development, and potential impact of land use decisions.

**Results**

45 officials representing 15 coastal communities participated in two 10-week training sessions in Mahoning, Trumbull, and Lucas counties. 74% of surveyed attendees self-reported an overall increase in knowledge gained as a result of this training course and also indicated they will use the training provided by OSUE in their jobs. In addition, multiple participants have been elected at the local and state level, and helped create new relationships among political entities which increased collaboration on emergency management service, police, and fire operations and land use planning.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development

902 Administration of Projects and Programs

**Outcome #10**

**1. Outcome Measures**

number of public officials / township trustees who completed professional development workshops teaching sustainability education

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	128

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Effective decision making is crucial for public officials in Ohio. The Ohio Township Association (OTA), which represents 1,308 Ohio townships, wanted education for its elected and appointed officials to make more sustainable decisions for future generations.

**What has been done**

Ohio Sea Grant worked with the OTA to create a curriculum geared towards sustainable decision making that focuses on environmental sustainability, economic stability, and societal health.

**Results**

In 2015, 128 Ohio township trustees and fiscal officers from all parts of the state participated in and successfully completed 2 two-hour workshops -- part of a series of 10 workshops -- in the sustainability professional development series. The successful completion of these workshops helped the trustees and fiscal officers to earn various professional certifications.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
902	Administration of Projects and Programs

## **Outcome #11**

### **1. Outcome Measures**

number of coastal communities who now have an economic strategy to help retain and / or expand business operations

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The Ohio cities of Oregon and Fremont are concerned about their business communities, abandoned store fronts, and a declining local economy that is centered on service and retail sector businesses. The cities desired to learn of local business concerns and perceptions as a means of starting to form an economic development strategy to help retain and expand current business operations.

#### **What has been done**

Ohio Sea Grant and Ohio State University Extension led business retention and expansion programs with the cities of Oregon and Fremont to survey the existing business base in their respective communities to assess plans and concerns regarding job retention and creation in the business community. The two cities helped organized community volunteers to participate in a business retention and expansion task force. The volunteers contributed over 1,000 hours of service to the assessment.

#### **Results**

In the city of Oregon, officials have learned that the retail and service sectors in the city plan to retain up to 857 full-time jobs with the potential to create up to 19 new full-time jobs. These jobs could create up to \$13,127 in additional tax revenue, and up to \$583,433 in personal income for the city economy.

In the city of Fremont, officials have learned that the industrial business sector plans to retain up to 260 full-time jobs, with the potential of 19 new full-time jobs. The new jobs could generate up to \$10,403 in additional tax revenue, and \$693,538 in personal income to Fremont's local economy.

### **4. Associated Knowledge Areas**



<b>KA Code</b>	<b>Knowledge Area</b>
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Competing Public priorities
- Other (staffing: Loss of two full time employees to external job opportunities)

##### **Brief Explanation**

BR&E programs compete with other economic initiatives on the local level as leadership decides how to best allocate limited dollars.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

For the 'Advancing Employment and Income Opportunities' planned program, OSUE faculty and staff work in communities around the state, helping local leaders and officials to:

- investigate, evaluate, and plan for stronger local economies;
- manage and leverage resources;
- implement action plan strategies;
- learn how to operate a sustainable community economy;
- make better decisions based on sound information;
- and evaluate progress.

The following outcomes were achieved in 2015:  
26 communities were provided with assessments of their local economies, and 12 of those communities moved forward with to achieving the goals of their developed community economic development and sustainability plans

##### **Key Items of Evaluation**

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

**Program # 14**

**1. Name of the Planned Program**

Enhancing Agriculture and the Environment (Extension)

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	5%		0%	
112	Watershed Protection and Management	15%		0%	
123	Management and Sustainability of Forest Resources	5%		0%	
133	Pollution Prevention and Mitigation	10%		0%	
205	Plant Management Systems	15%		0%	
216	Integrated Pest Management Systems	15%		0%	
307	Animal Management Systems	10%		0%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
602	Business Management, Finance, and Taxation	5%		0%	
723	Hazards to Human Health and Safety	15%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	42.0	0.0	0.0	0.0
<b>Actual Paid</b>	60.0	0.0	0.0	0.0
<b>Actual Volunteer</b>	95.8	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3098840	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3098840	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

- Maintain educational websites on related topics (e.g., Crop Observation and Recommendation Network; PestEd and Nutrient Stewardship for Cleaner Water websites); create and distribute educational materials / information (via fact sheets, field guides, manuals, webinars, tv spots, radio broadcasts, conference presentations, etc);
- Enhance the adaptation of production techniques through utilization of on-farm research to work directly with producers to evaluate practices to enhance productivity and profitability;
- Organize and conduct educational activities targeting 4R Nutrient Management ("Nutrient Stewardship for Cleaner Water") and Ohio's Waterways in response to phosphorus water quality concerns;
- Organize and conduct Women in Agriculture / "Annie's Project" seminars;
- Extend the reach of OSU Extension educational programming through the utilization of volunteers, such as Ohio Master Gardeners;
- Provide education on fertilizer and commercial and private pesticide application best practices (including potential certification);
- Organize / host / present at conferences, such as Farm Science Review, the Conservation Tillage Conference, Small Farm Conference, Women in Agriculture Conference, etc;
- Educate Ohioans on forest stewardship best management practices;
- Provide agriculture emergency management training for first responders and farm operators;
- Promote independence for Ohio farm families who have family members with disabilities that impact their ability to function in farm operations;
- Organize and conduct Transitioning Your Farm Business to the Next Generation Workshops;
- Organize and conduct meetings, seminars, conferences, programs and activities for the new "Local Foods" signature program (this program will address the critical need for outreach education around the broad topic of local food systems).

**2. Brief description of the target audience**

The target audience for efforts under the 'Enhancing Agriculture and the Environment' programs include:

- Ohio farm families
- Commercial green-industry companies
- Consumer horticulture advocates
- Commodity / farm advocacy groups
- Federal / state agricultural & environmental agencies
- State-wide consumer groups

- Volunteer groups
- Community leaders
- Business leaders
- Elected and appointed officials
- Non-government organizations
- New and small farmers

Included in the reporting of the NIFA planned program, 'Enhancing Agriculture and the Environment', OSU Extension has a number of programs that have more specific audiences, which are detailed separately below.

The target audience for programs which seek to increase profitable crop yields:

- Grain producers
- Fertilizer chemical retailers
- Input company representatives
- Crop advisory, agency soil and water conservation districts
- Natural Resources Conservation Service
- Ohio Department of Agriculture
- Environmental Protection Agency

The OSU Extension 'Ohio Volunteer Master Gardener Program' targets the following audiences:

- Ohio citizens
- Community leaders and officials
- Master gardeners

eXtension "Ask a Master Gardener" - Ohio targets the following audiences:

- New and beginning gardeners
- Gardeners with distressed gardens, plants, new / unusual problems with plants and / or diseases

The 'Ohio Certified Volunteer Naturalist' program targets the following individuals:

- Ohio citizens
- Community leaders and officials
- Certified naturalists

### 3. How was eXtension used?

eXtension was not used in this program

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	54287	315864	2857	16624

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	19	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of volunteers involved in the delivery and implementation of the Ohio Master Gardener Volunteer Program and the Certified Volunteer Naturalist Program

Year	Actual
2015	3241

**Output #2**

**Output Measure**

- number of multi-state partnerships in agriculture, horticulture, and natural resources

Year	Actual
2015	84

**Output #3**

**Output Measure**

- number of people completing the 'Transitioning Your Farm/Agricultural Business to the Next Generation' workshops

Year	Actual
2015	788

**Output #4**

**Output Measure**

- number of subscribers to the 'Crop Observation and Recommendation Network' (CORN) newsletter

<b>Year</b>	<b>Actual</b>
2015	3850

**Output #5**

**Output Measure**

- number of participants attending agronomy or agronomy-related meetings  
Not reporting on this Output for this Annual Report

**Output #6**

**Output Measure**

- number of hits to the "Crop Observation and Recommendation Network" (CORN) website

<b>Year</b>	<b>Actual</b>
2015	30000

**Output #7**

**Output Measure**

- number of local / on-farm research project sites  
Not reporting on this Output for this Annual Report

**Output #8**

**Output Measure**

- number of participants in local Field Days  
Not reporting on this Output for this Annual Report

**Output #9**

**Output Measure**

- number of 'Weed Control Guide for Ohio and Indiana' sold and / or distributed in Ohio  
Not reporting on this Output for this Annual Report

**Output #10**

**Output Measure**

- number of 'Corn, Soybean, Wheat, and Alfalfa Field Guides' sold and / or distributed in Ohio  
Not reporting on this Output for this Annual Report

**Output #11**

**Output Measure**

- number of people participating in an OSUE Local Foods program, activity, conference, or workshop  
Not reporting on this Output for this Annual Report

**Output #12**

**Output Measure**

- number of hits to the invasive species website (Great Lakes Early Detection Network)

Not reporting on this Output for this Annual Report

**Output #13**

**Output Measure**

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

Not reporting on this Output for this Annual Report

**Output #14**

**Output Measure**

- total number of people attending educational talks and meetings regarding bed bugs

Not reporting on this Output for this Annual Report

**Output #15**

**Output Measure**

- number of people attending the 'New and Small Farm College'

<b>Year</b>	<b>Actual</b>
2015	90

**Output #16**

**Output Measure**

- number of people attending the 'Small Farm Conference and Trade Show'

<b>Year</b>	<b>Actual</b>
2015	260

**Output #17**

**Output Measure**

- number of producers completing direct and indirect education on 'Weed Control in Agronomic Crops'

Not reporting on this Output for this Annual Report

**Output #18**

**Output Measure**

- Number of food animal producers that complete 'Livestock Mortality Composting' training

Not reporting on this Output for this Annual Report

**Output #19**

**Output Measure**

- total number of Ask a Master Gardener Volunteers that complete training for the AaMGV program.  
Not reporting on this Output for this Annual Report

**Output #20**

**Output Measure**

- total number of Ask a Master Gardener Volunteer (AaMGV) questions answered via online questions submissions and the AaMGV widget.  
Not reporting on this Output for this Annual Report

**Output #21**

**Output Measure**

- number of attendees to the annual Conservation Tillage and Technology Conference

<b>Year</b>	<b>Actual</b>
2015	903

**Output #22**

**Output Measure**

- number of individuals participating in nutrient stewardship educational programming

<b>Year</b>	<b>Actual</b>
2015	5658

**Output #23**

**Output Measure**

- number of Certified Crop Advisers (CCAs) certified to provide consulting in Ohio

<b>Year</b>	<b>Actual</b>
2015	525



**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	number of people (agronomic crops, fruit, and vegetable producers) that demonstrated an increase in plant-based food biosecurity / biosafety knowledge, including Good Agricultural Practices (GAPs).
2	total number of people indicating an increased knowledge of current practices and emerging technology in conservation tillage as a result of attending the Conservation Tillage Conference
3	Increase profitability for the food animal sector of the Ohio agricultural industry, measured in number of farms completing detailed financial and production data lists (FINLRB, FINAN, ETC.)
4	Number of Schedule "F" tax forms filed by tax practitioners that participated in OSU Income Tax Schools.
5	Total number of farms and agribusinesses that began using transitioning planning this year as a result of OSUE transition planning workshops
6	Total number of participants in an agronomic meeting, workshop, or field day that indicated they will implement at least 1 new management practice based on information received
7	number of crop production acres that will implement best management practices for nutrient management
8	number of crop production acres that implement weed resistance management strategies
9	Total number of Ohio crop acres (agronomic, vegetable and fruit crops) where appropriate utilization of integrated pest management (IPM) practices occur
10	Total number of individuals who learned something about disease identification, control, scouting or key weed control concepts in an OSU Extension workshop or field day
11	number of farmers reporting positive changes in management and / or profitability of their farm from the use of disease identification, control and scouting or key weed control concepts
12	number of farmers reporting positive changes in management and / or profitability of their farm as a result of information from farm financial analysis
13	reported economic impact of cost savings, increased yield, or other increased profitability from use of CORN newsletter reported as total dollars
14	number of female farm operators or partners completing the Annie's Project course, where they gained knowledge about issues related to women in agriculture
15	number of attendees at Ohio Women in Agriculture conferences who indicated the intent to implement at least one skill learned during the conference
16	number of Ohioans who learned new information about forestry / woodland stewardship
17	number of individuals attending commercial pesticide applicator training (PAT) who learned new information

18	number of participants in 'Nutrient Stewardship for Cleaner Water' programming who indicated they have improved their knowledge about nutrient management as a result of attending an OSUE educational event on fertilizer application
19	number of participants in Agricultural Emergency Management programming who experienced knowledge gains as a result of educational programming
20	number of Ohio youth and adults gaining knowledge on topics related to agricultural safety and health
21	number of individuals gaining information on assistive technology and other disability services to aid in farm operations
22	number of individuals gaining knowledge of farm processes and practices
23	number of individuals gaining knowledge on best management practices to treat nonpoint source pollution before it reaches Ohio's waterways
24	number of participants in private pesticide applicator training (PAT) programming who indicated they have improved practices to protect the environment as a result of attending an OSUE educational event
25	Number of new or small farmer operators receiving education that can help improve their: production practices, land use choices, assessment of personal and natural resources, or identification of marketing alternatives

**Outcome #1**

**1. Outcome Measures**

number of people (agronomic crops, fruit, and vegetable producers) that demonstrated an increase in plant-based food biosecurity / biosafety knowledge, including Good Agricultural Practices (GAPs).

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

total number of people indicating an increased knowledge of current practices and emerging technology in conservation tillage as a result of attending the Conservation Tillage Conference

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
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2015

795

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

The Conservation Tillage and Technology Conference (CTC) is an annual, two-day educational program. The target audience of the conference is farmers, agronomists, Certified Crop Advisers (CCAs), and agri-business dealers from Ohio and the Midwest seeking information about corn / soybean production, cover crops, tillage, water quality, nutrient management, precision agriculture, and crop scouting. The goal of the conference is to increase the knowledge of participants on recommended agronomic production practices, teach pre-approved educational materials for educational credits to CCAs, and to change the behavior of participants by providing new ideas or practices that will increase farm profitability.

#### What has been done

The conference featured approximately 60 speakers in concurrent sessions. Question and answer sessions followed all of the concurrent sessions.

#### Results

795 attendees (88%) learned one thing that they view will improve their farm or business. After attending the CTC, farmers indicated that they expected to increase their corn yields based on information learned at the conference. Of those surveyed, the expected increases (in units of bushels) were: 4 bushels (17%), 3 bushels (34%), 1-2 bushels (29%), 0.5 bushels (11%), no bushels (9%).

Certified Crop Advisers received training (for continuing education credits) at the conservation tillage conference. 286 CCAs attended educational sessions on the first day of the conference, and 250 CCAs participated in sessions on the second day. A total of 3,060 hours of continuing education credit were earned by CCAs at this year's conservation tillage conference.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
216	Integrated Pest Management Systems

### Outcome #3

#### 1. Outcome Measures

Increase profitability for the food animal sector of the Ohio agricultural industry, measured in number of farms completing detailed financial and production data lists (FINLRB, FINAN, ETC.)

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

Total number of farms and agribusinesses that began using transitioning planning this year as a result of OSUE transition planning workshops

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

Total number of participants in an agronomic meeting, workshop, or field day that indicated they will implement at least 1 new management practice based on information received

Not Reporting on this Outcome Measure

**Outcome #7**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #8**

**1. Outcome Measures**

number of crop production acres that implement weed resistance management strategies

Not Reporting on this Outcome Measure

**Outcome #9**

**1. Outcome Measures**

Total number of Ohio crop acres (agronomic, vegetable and fruit crops) where appropriate utilization of integrated pest management (IPM) practices occur

Not Reporting on this Outcome Measure

**Outcome #10**

**1. Outcome Measures**

Total number of individuals who learned something about disease identification, control, scouting or key weed control concepts in an OSU Extension workshop or field day

Not Reporting on this Outcome Measure

**Outcome #11**

**1. Outcome Measures**

number of farmers reporting positive changes in management and / or profitability of their farm from the use of disease identification, control and scouting or key weed control concepts

Not Reporting on this Outcome Measure

**Outcome #12**

**1. Outcome Measures**

number of farmers reporting positive changes in management and / or profitability of their farm as a result of information from farm financial analysis

Not Reporting on this Outcome Measure

**Outcome #13**

**1. Outcome Measures**

reported economic impact of cost savings, increased yield, or other increased profitability from use of CORN newsletter reported as total dollars

Not Reporting on this Outcome Measure

## **Outcome #14**

### **1. Outcome Measures**

number of female farm operators or partners completing the Annie's Project course, where they gained knowledge about issues related to women in agriculture

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	73

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

According to the 2012 Census of Agriculture, there were 31,413 women operators on Ohio farms, representing 40% of the farms in the state. In Ohio, almost 12% of farms are principally operated by a woman. These women play a major role in Ohio's farm economy and many times do so without any formal training or continuing education. The goal of the 'Annie's Project' program is to help women farm operators gain a better understanding of their farm's financial position and as a result, increase their ability in making educated management decisions.

#### **What has been done**

The Annie's Project program is presented as a six-part series. The program focuses on five areas of agricultural risks: human, financial, marketing, production, and legal. All sessions are highly interactive between the presenters and the participants. This program was offered in three Ohio counties this past year. Several other counties had to cancel their series due to weather issues.

#### **Results**

Participants successfully completed the six-part series, gaining not only knowledge, but new connections to other female farm operators. On post-session evaluations, participants indicated an increased awareness of their farm operation, an understanding of the need for their increased involvement in farm financial management, what avenues for successful marketing were available to them, and had a better understanding of farm transition planning. In post-series evaluations, participants noted the following improvements: better communication with others involved in the farm operation, implementation of methods to better track finances, and had discussed transition planning with their legal advisors. One participant commented, "The course was fantastic! I have already started using the strategies we learned, and I'm now a more integral part of the business, and I'm introducing the info I learned to my family so we can plan our new farm better."

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

#### Outcome #15

##### 1. Outcome Measures

number of attendees at Ohio Women in Agriculture conferences who indicated the intent to implement at least one skill learned during the conference

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	185

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Women in Agriculture conferences are designed to provide a socially positive day to recognize, educate, and encourage female farm operators or owners.

###### **What has been done**

Two Women in Agriculture conferences were held in Ohio in 2015. Each conference featured 12 possible breakout sessions to attend. Session topics followed four general "tracks" -- business and finance, production made / grown, entrepreneurial, and family / community.

###### **Results**

A total of 262 women attended the conferences. Of those 262, 204 women completed evaluation surveys. Approximately 90% of the women surveyed indicated that they planned to use knowledge gained from the conference in their farm operation. At the Wood County conference, 3 women had the opportunity to sit down with local legislators to discuss the importance of agriculture and the concerns of the community with elected officials.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

### **Outcome #16**

#### **1. Outcome Measures**

number of Ohioans who learned new information about forestry / woodland stewardship

#### **2. Associated Institution Types**

- 1862 Extension

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	11360

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Almost one third of Ohio's land cover is in forests. Of that land base, 86% of it is privately owned. OSU Extension offers the Woodland Stewards program (in addition to other programs and conferences) to help forest land owners make informed decisions based on scientific information.

##### **What has been done**

Currently, all programming is offered in a face-to-face format. Efforts are currently underway to develop online coursework. In 2015, the following activities occurred: 40 workshops and presentations on identification and management of invasive species, 14 workshops and presentations on forested wetland management, and 32 workshops and presentations on managing the forest resources for forest health. Additionally, the Ohio Woodland Water and Wildlife conference reached 194 natural resource land managers.

##### **Results**

All programs were evaluated with some form of post-workshop evaluation. Many attendees begin with one program, and end up participating in multiple educational events. Following the Ohio Woodland Water and Wildlife Conference, 91% of attendees indicated they learned something new from the conference, and 89% indicated they learned a management practice they intended to apply on their properties.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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123	Management and Sustainability of Forest Resources
216	Integrated Pest Management Systems

**Outcome #17**

**1. Outcome Measures**

number of individuals attending commercial pesticide applicator training (PAT) who learned new information

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	4996

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PAT programs are offered to train new pesticide applicators, as well as re-certify licensed commercial pesticide applicators in the state of Ohio. OSU Extension faculty and staff provide training, education, and outreach to pesticide applicators about the safe, proper, and legal use of pesticides. The program works with those who apply pesticides to publicly accessible sites, such as golf courses, apartment complexes, restaurants, schools, or those who work for a government agency.

**What has been done**

This program is offered through workshops, meetings, and conferences. In 2015, five large recertification conferences with concurrent sessions for all categories of commercial pesticide applicators were offered. Six smaller workshops for commercial pesticide applicators were hosted. There were nine all-day workshops geared towards new commercial pesticide applicators. One webinar was offered for a national audience of greenhouse and nursery growers. The pesticide applicator training program also provided professional development opportunities for its faculty and staff. Two in-services were offered for OSU Educators, as well as a webinar for new county Educators.

**Results**

A total of 297 people attended one of the six new commercial applicator workshops. 95% responded with 'Agree' or 'Strongly Agree' (on a five point scale) that the workshop improved their skills. 85% of those taking the pesticide core exam after class received a passing score compared to only 72% passing rate among those who did not take the pesticide applicator workshop.

221 individuals attended one of three wood-destroying insect inspection workshops. 97% responded 'Agree' or 'Strongly Agree' (on a five-point scale) that the information presented was applicable to their work, and 96% responded 'Agree' or 'Strongly Agree' that the workshop would improve their skills.

3,782 people attended the five commercial pesticide applicator re-certification conferences. 88% of attendees agreed that they learned how to control pests more effectively, 90% indicated they felt better informed about how to comply with pesticide regulations.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

#### Outcome #18

##### 1. Outcome Measures

number of participants in 'Nutrient Stewardship for Cleaner Water' programming who indicated they have improved their knowledge about nutrient management as a result of attending an OSUE educational event on fertilizer application

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	897

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

In 2014, Ohio passed legislation which required those who apply fertilizer to more than 50 acres of agricultural production to attend certification training workshops. In Ohio, OSU Extension is the exclusive provider of these workshops. Information provided includes topics such as soil sampling and testing, and phosphorus and nitrogen best management practices (proper timing, placement, source, and rate of these nutrients). Better management of fertilizer use has the potential to impact everyone - correct fertilizer application has direct impact on water quality. In recent years, Ohio has suffered from severe algal blooms in Lake Erie, which caused major

drinking water quality problems for cities near the lake. Additional benefits of application of program knowledge include increased crop yields and farm profits.

#### **What has been done**

"Nutrient Stewardship for Cleaner Water" is a newer signature program for OSU Extension. The program, which encompasses fertilizer application certification and pesticide application programming, addresses ways of increasing nutrient utilization efficiency via in-field and edge-of-field best management practices that limit off-site movement of nutrients while increasing plant productivity through small plot, on-farm research and education. Approximately 100 meetings where nutrient stewardship were taught in 2015. Workshops were offered in two-hour or three-hour sessions, which reached 1,153 and 921 people, respectively. Other delivery methods included workshops, field days, seminars, and individual consulting sessions. Additionally, nutrient stewardship information was on display for public consumption at Farm Science Review, Chamber Ag Days, and the Conservation Tillage Conference. In 2015, the program had direct contact with 5,658 adults and indirect contact with over 6,600 adults through email; phone calls; articles; newsletters; radio, TV, podcasts and webinar broadcasts.

#### **Results**

There were 2,074 evaluations collected from fertilizer application certification training in 2015. 975 individuals responded to the question, 'I have improved my knowledge about nutrient management', with 897 (92%) either agreeing or strongly agreeing with this statement (5-point Likert scale). When asked if they would change their nutrient management practices as a result of the meeting, 51% indicated they would; 61% indicated they would use an economic based nitrogen calculator when setting a corn nitrogen rate.

OSU Educators have observed behavior changes in operations where operators have attended OSUE educational programming. For example, livestock producers in Western Ohio are now using livestock manure as a nutrient source for top dressing wheat and side-dressing corn. The farmers now know that applying the manure to a growing crop will be more beneficial to them and is environmentally sound. Producers report using less nitrogen and phosphorus, because they have been taught the correct way to interpret soil reports and how to use an economic calculator for determining their nutrient needs.

One participant commented, "Excellent training manual. Good info and easy to read. Nice job!"

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
723	Hazards to Human Health and Safety

## **Outcome #19**

### **1. Outcome Measures**

number of participants in Agricultural Emergency Management programming who experienced knowledge gains as a result of educational programming

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2190

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

A variety of emergency prevention educational programs were developed to address both farm owner and worker audiences, as well as first responders serving rural areas (who may not understand the dangers when they arrive on farms and prepare for a technical rescue). 'Agritainment' businesses who invite the public to their working farm are also targeted to participate in emergency prevention programming.

#### **What has been done**

In 2015, emergency management prevention programs were offered in the following methods: 12 educational presentations, 56 hands-on training workshops, 11 demonstrations with simulators, and 4 webinars. Webinars reached approximately 5,820 adults, and all other formats engaged 2,190 adults and 450 youth.

#### **Results**

Technical training using the Grain C.A.R.T. (comprehensive agricultural rescue trailer) was provided to 890 fire and EMT personnel. Learning assessments were conducted at the conclusion of the program (evaluation used a 5-point Likert scale). Participants rated their experience in the following manner: instructors were clear and held my attention (4.68); demonstrations were realistic (4.98); I would like to receive additional training on other agricultural topics (4.94); the training program met my expectations (4.82).

For the general public, the OSUE Agricultural Safety Program offered a variety of educational sessions, attended by approximately 1,300 individuals. Educational venues included demonstrations at the annual Farm Science Review, regional agricultural field days, and agribusiness customer appreciation days.

Teaching evaluations administered revealed the following: the demonstration increased my

understanding and / or reinforced my understanding of safety hazards around confined spaces (4.73); the educational session gave me strategies to incorporate into my work practices (4.89). Comments provided by participants included: "I realize I should never work alone", "I needed to buy a work harness and never knew where to get one", and "our farmers {have} needed this information for many years."

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
723	Hazards to Human Health and Safety

**Outcome #20**

**1. Outcome Measures**

number of Ohio youth and adults gaining knowledge on topics related to agricultural safety and health

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	10222

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Agriculture is one of the most hazardous industries in the United States. Trends in Ohio's mortality and morbidity rates are closely in line with those reported in the national occupation rates. Youth fatalities on Ohio farms represent 17% of the total population fatally injured. The OSU Ag Safety Program offers educational presentations, one and two day workshops, and webinars to teach prevention strategies for agricultural workers and their families. These are valuable life-saving programs that are not typically offered in other educational venues by other agencies in the state. Our two-hour programs satisfy the requirements for Ohio farmers needing safety education credits through their workers compensation insurance policies.

**What has been done**

Eighty six presentations, 34 hands-on workshops, and 2 webinars were offered to rural residents and agricultural workers and their families. The Farm Safety Day Camp program engaged approximately 600 new youth participants in 2015.

In 2015, OSU Extension continued to work with Amish communities on roadway safety initiatives.

OSU Extension also offers an annual Tractor and Machinery certification program to youth. This program provides the training and work permit as required by the U.S. Department of Labor's Hazardous Occupations Order for Agriculture. Approximately 300 youth participated in 2015.

Agricultural safety programs were developed for adult audiences and offered through Workers' Compensation Group Ratings programs. Thirteen sessions were offered in 2015 to 655 attendees.

### Results

Farm Safety Day Camp: Camp evaluations show 76% of the youth learned information that was relevant to them and could be put to immediate use. 84.3% of campers reported they would attend another safety camp if offered.

Amish roadway safety initiative: Past research efforts to improve lighting and marking patterns of pony carts led to a revision of an ASABE Engineering Practice (576.1). Outreach efforts to disseminate lighting and marking recommendations were conducted with 800 Ohio Amish youth and their parents. The SMV emblem celebrated 50 years of being a national ASABE standard. Outreach efforts to promote the history and use of this standard were conducted at county, state, and national levels.

Tractor Machinery certification program: The program taught hazard awareness, ways to improve safety skills, and fatality prevention.

Workers' Compensation Adult Agricultural Safety programs: Participants acknowledged they were given information they could use (88%) and instructors answered specific questions clearly (89%).

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

### Outcome #21

#### 1. Outcome Measures

number of individuals gaining information on assistive technology and other disability services to aid in farm operations

#### 2. Associated Institution Types

- 1862 Extension

#### 3a. Outcome Type:

Change in Knowledge Outcome Measure

#### 3b. Quantitative Outcome

Year	Actual
2015	1650

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

The Ohio AgrAbility Project (OAP) promotes independence through rehabilitation and establishes service capacity to meet the needs of Ohio farm families with disabling injuries. Through a combination of education, networking, and assistive technology, the project bridges agricultural clientele to the disability services and appropriate technologies. The program seeks to engage those who participate in agriculture and have a disability. Some disabilities may be present at birth, while others may be a result of accidents, illness, or age-related conditions. Disabilities and conditions may include: arthritis, head or spinal cord injury, amputation, paralysis, back pain or injury, stroke, diabetes, visual or hearing impairments, respiratory problems, cerebral palsy, Parkinson's disease, repetitive motion injuries, and aging issues.

OAP is a collaborative effort between Ohio State University Extension and Easter Seals.

#### What has been done

OAP staff conducted 53 educational presentations and displays to 1,650 individuals, informing the agricultural community about OAP services, assistive technology, Universal Design, prevention of secondary injury and agricultural safety. OAP has provided a number of press releases, articles, and commentary to 15 media sources (electronic, print, and radio media sources), with an estimated 78,131 subscribers.

#### Results

Ohio farmers benefit directly from the AgrAbility program. Clients have initially received \$95,493 (collectively) in services and goods as a result of their assessments and several assessments are now being performed at the request of the Ohio Bureau of Rehabilitation Services as a fee service to their agency. Immediate safety modifications are made to various pieces of equipment and work environments to prevent secondary injuries, including step modifications, smooth transitions for working surfaces, installing hand rails and adding additional padding to levers and seating / lumbar supports. Over 50% of clients self-report using information / resources provided by OAP in making changes in work practices and making modifications to the workplace based on OAP staff recommendations. Consumers utilized 7,699 electronic copies of fact sheets created by OAP.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

#### Outcome #22

##### 1. Outcome Measures

number of individuals gaining knowledge of farm processes and practices

##### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	3009

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Breakfast on the Farm was hosted in 2015 on Sandland Farms in Fulton County, Ohio. The overarching goal of the event was to see if hosting a farm tour to the public would increase consumer trust in modern agriculture.

**What has been done**

Breakfast on the Farm was a free, family-friendly event. A breakfast featuring Ohio-grown and produced items was offered, as well as a self-guided tour of the farm. The tour included the opportunity to meet the family who owns and operates the farm, and learning opportunities on topics such as: bio-security, animal well-being, grain bin safety, cow nutrition, milk quality and safety, and nutrient management. Stations were set up to allow observation of calves, the milking parlor, the breeding barn, cow housing, tractors, farm equipment, and crops. Stations were staffed by OSU Extension Educators, host farm vendors, volunteers (who are also farmers), and other volunteers. The average station reported education an average of 900-1,000 adults.

**Results**

An IRB-approved exit survey was conducted, surveying the adult in the household who was primarily responsible for grocery and purchasing decisions. 578 surveys were collected. Several questions on the survey were measured with a retrospective Likert scale, investigating issues of the level of trust that dairy farmers will do the right thing in regard to a variety of topics, including: caring for the environment, caring for food-producing animals, safe-guarding milk, providing good housing for dairy animals, and protecting water quality. On all criteria, evaluations showed gains in trust. The survey also asked several questions using a five point Likert scale related to intent to change a behavior or attitude. 80% of respondents indicated that they agreed, strongly agreed, or already were more likely to disregard negative comments they might hear about how food is processed on modern farms. When asked if they were more likely to buy more milk or other dairy products as a result of the farm tour, 81% responded 'Agree', 'Strongly Agree' or marked they already bought significant amounts of dairy products.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
205	Plant Management Systems
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management



## **Outcome #23**

### **1. Outcome Measures**

number of individuals gaining knowledge on best management practices to treat nonpoint source pollution before it reaches Ohio's waterways

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	10268

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

With marinas being at the water's edge, they provide an excellent opportunity to implement best management practices to treat nonpoint source pollution before it reaches Ohio's waterways. Nonpoint source pollution is caused by rainfall or snowmelt moving over and through ground, picking up and carrying natural and human-made pollutants to rivers, wetlands, coastal waters, and ground waters. The Ohio Clean Marinas and Ohio Clean Boaters programs engage the marina and boating community in taking steps to reduce nonpoint source pollution that is impacting our air and water quality.

#### **What has been done**

In 2015, the Ohio Clean Marinas program offered 4 workshops (in the coastal cities of Port Clinton, Cleveland, Logan, and Delaware), made 28 site visits to marinas, made 4 certification visits to marinas, 15 recertification visits to marinas, and hosted 76 outreach events.

#### **Results**

As a result of programming efforts, 46 marina owners / operators received training on the Ohio Clean Marinas program and learned extensively about both environmental regulations and environmental best practices for marinas. Four marinas completed the program and became certified, implementing a total of 215 environmental best management practices to improve air and water quality. 259 citizens of Ohio took the Ohio Clean Boater Pledge, where they promised to improve or change their behavior by following best boater practices to protect air and water quality.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management

133      Pollution Prevention and Mitigation  
723      Hazards to Human Health and Safety

**Outcome #24**

**1. Outcome Measures**

number of participants in private pesticide applicator training (PAT) programming who indicated they have improved practices to protect the environment as a result of attending an OSUE educational event

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	653

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PAT programs are offered to train new pesticide applicators, as well as re-certify licensed private pesticide applicators in the state of Ohio. OSU Extension faculty and staff provide training, education, and outreach to pesticide applicators about the safe, proper, and legal use of pesticides. The program works with those who apply restricted-use pesticides on his / her owned land or rented land, and who produce an agricultural commodity. The Ohio Department of Agriculture requires that records be kept for private pesticide application. Completion of OSUE PAT educational programming benefits farmers by helping them stay in compliance with the law, be able to easily provide documentation to lenders when selling their property, and determine integrated pest management effectiveness. Further, by following best management practices, consumers of agricultural commodities are protected, and the honey bee population will also be protected from harmful pesticide drift.

**What has been done**

Applicators must be re-certified every three years. Re-certification training includes the following components; a 1 hour minimum core, a 1/2 hour minimum update training for each category in which certification is held, with a combined total of at least three hours training. Evaluations were collected from 708 individuals who participated in private PAT educational sessions.

**Results**

Of those surveyed, the average reported acreage that was owned, rented, or worked was 456. The average number of acres to which pesticides are applied was reported to be 391. 92% of those attending private PAT educational sessions indicated that they have improved practices to protect the environment; 91% indicated they have improved personal safety practices; 89% have

improved handling practices (such as mixing, loading, storing, or applying); and 80% report they are using pesticides more cost effectively; 89% indicate they have learned how to control pests, diseases, or weeds more effectively; and 93% believe they are better informed about how to apply pesticides safely.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

**Outcome #25**

**1. Outcome Measures**

Number of new or small farmer operators receiving education that can help improve their: production practices, land use choices, assessment of personal and natural resources, or identification of marketing alternatives

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	350

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

"Small farmer" is a term used for individuals who are practicing agriculture on a very small amount of acreage, usually under 100 acres. Often, these individuals are new to agriculture. The small farm program was developed in response to increasing requests for information from these new small farm owners / operators. The curriculum is designed to provide greater understanding of production practices, economics of land use choices, assessment of personal and natural resources, marketing alternatives, and the identification of sources of assistance for new and small farms in Ohio.

**What has been done**

Two eight week "Small Farm Colleges" were offered this past year, hosted by Greene and Darke counties. The colleges were attended by 90 individuals representing 62 small farms in Ohio, Indiana, Virginia, and Alaska. Two "Small Farm Conferences" were offered in Wilmington and

Wooster, Ohio. Total attendance was 260 participants, from Ohio, Kentucky, Pennsylvania, and West Virginia.

**Results**

Pre- and post-session evaluations were utilized at the small farm colleges. Post-session evaluations were used for the two conferences, as well as direct interviews and consulting. Evaluations revealed that 44% of participants in the new and small farm colleges were female, and 78.9% were new clientele to Extension programming. The average farm size was 27.7 acres, with an average ownership term of 9.7 years. 66.7% of the participants developed or changed their farm use plan after attending these colleges. Participants rated the overall program quality as 9.02 on a 10 point scale (ten is the highest score possible). 96% of all participants would recommend the program to others, and 96.5% felt the program met or exceeded their expectations.

The average farm size of attendees to the small farm conferences was 96 acres. Evaluations revealed that 42.7% of the attendees were women, and 4.45% represented minority farmers. 90% indicated that the subjects and content of the conferences would help them to improve the profitability of their farm enterprise(s). As a result of attending, 81.5% of respondents indicated they would add an additional enterprise, increase production, enter into a new market (such as a farmer's market or CSA), or buy / rent more acreage.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Programmatic Challenges
- Other (program expansion)

**Brief Explanation**

**NATURAL DISASTERS:**

- Extreme rains made the water quality issues even worse in 2015

**ECONOMY:**

- Lower commodity prices will help convince farmers to reduce their fertilizer inputs

**GOVERNMENT REGULATIONS:**

- Ohio's agricultural nutrient certification law (Senate Bill 150, 2014) requires growers meeting certain criteria to attend certification training.
- Ohio regulations affecting the western basin of Lake Erie (2015) have been important to communicate to this audience in counties that are affected (House Bill 1)

**COMPETING PROGRAMMATIC CHALLENGES:**

- OSUE educators were providing both Farm Bill training and fertilizer applicator training at the same (greater time commitment, due to increased programming)
- Understaffed to provide the need for programming in the area of forest management / wildlife management / invasive species

**OTHER, PROGRAM EXPANSION:**

- The Ohio Clean Marinas program was working on launching statewide program expansion, which had impacts on the time / schedules of current staff, as time was diverted from normal activities to train new staff and for travel

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

The activities reported under the 'Enhancing Agriculture and the Environment' planned program are very broad, ranging from addressing female farm operators to farmers with disabilities, to the general public. For our 2015 report, we tried to highlight some of our 'star' programs.

Over 330 women participated in 'women in agriculture'-type programming. These women were presented with diverse offering of courses, which will help them grow and develop as equal partners in their farm operations.

Over 10,000 Ohioans learned about invasive woodland species, forested wetland management, and managing forest resources for forest health. With nearly 30% of Ohio land covered by forests, good stewardship of these resources will continue to be important to preserving Ohio's land.

Pesticide applicator training was offered for both commercial and private applicators. Over 5,600 Ohioans participated in pesticide applicator training offering, learning best management practices. Application of this knowledge will protect human health through safer produce, which will be less tainted by pesticide chemicals. Best management practices also aim to protect the honey bee population, whose health has suffered over the past few years due to pesticide drift.

Lake Erie is a popular vacation destination for Ohioans. Through targeted educational efforts at marinas and coastal towns, Ohioans have been educated by OSU Extension professionals to help reduce the amount of nonpoint source pollution that is reaching Ohio's waterways.

**Key Items of Evaluation**

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

**Program # 15**

**1. Name of the Planned Program**

Preparing Youth for Success (Extension)

Reporting on this Program

**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%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	79.0	0.0	0.0	0.0
<b>Actual Paid</b>	86.8	0.0	0.0	0.0
<b>Actual Volunteer</b>	153.4	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
4480405	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4480405	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

- Conduct workshops
- Face to face and virtual meetings
- Develop curriculum
- Provide training to professionals, volunteers and youth
- Media and web site creations
- Partnering with businesses and other organizations
- Fair
- Camping
- Conduct educational programs with youth
- Conduct in-school and after school enrichment

**2. Brief description of the target audience**

- Youth: infants through 18 years of age (with a special focus on new and underserved audiences)
- Parents of youth
- Volunteers working with youth audiences
- Teachers / educators working with youth audiences
- Families
- Youth development professional staff
- Community leaders involved in subject specific areas
- Youth (8-18 years), parents of youth, and volunteers working with youth; all with association with animal projects
  - General public who have interest in animals

**3. How was eXtension used?**

Occasionally OSU Extension 4-H Professionals and/ or 4-H volunteers access eXtension to explore the limited information that is available on eXtension for 4-H Youth Development Programming; material most often accessed was that related to the subject matter content of 4-H individual projects.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	16317	146887	289298	328285

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2015</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	31	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of youth enrolled/engaged in organized community 4-H clubs

<b>Year</b>	<b>Actual</b>
2015	74367

**Output #2**

**Output Measure**

- Number of youth enrolled/engaged in after school 4-H programs

<b>Year</b>	<b>Actual</b>
2015	1842

**Output #3**

**Output Measure**

- Number of youth enrolled/ engaged in military 4-H clubs  
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Number of youth participating in Special Interest and short term programs

<b>Year</b>	<b>Actual</b>
2015	28567

**Output #5**

**Output Measure**

- Number of youth participating in School Enrichment programs



<b>Year</b>	<b>Actual</b>
2015	55266

**Output #6**

**Output Measure**

- Number of youth participating in 4-H overnight camping programs

<b>Year</b>	<b>Actual</b>
2015	9774

**Output #7**

**Output Measure**

- Number of youth participating in 4-H day camping programs

<b>Year</b>	<b>Actual</b>
2015	2372

**Output #8**

**Output Measure**

- Number of adult volunteers

<b>Year</b>	<b>Actual</b>
2015	16317

**Output #9**

**Output Measure**

- Number of teen volunteers

<b>Year</b>	<b>Actual</b>
2015	5259

**Output #10**

**Output Measure**

- number of youth participating in "Assuring Quality Care for Animals" sessions  
Not reporting on this Output for this Annual Report

**Output #11**

**Output Measure**

- number of volunteers participating in the planning and implementation of this program (committee members, teachers / trainers, unpaid staff, etc.) (RMRW)

<b>Year</b>	<b>Actual</b>
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2015 1810

**Output #12**

**Output Measure**

- Number of youth participating in "STEM Pathways" signature program

<b>Year</b>	<b>Actual</b>
2015	55000

**Output #13**

**Output Measure**

- number of youth participating in "Real Money Real World" youth financial literacy programming

<b>Year</b>	<b>Actual</b>
2015	17289

**Output #14**

**Output Measure**

- number of youth participating in the 4-H CARTEENS ("Caution And Responsibility" teen safe driving) research project

<b>Year</b>	<b>Actual</b>
2015	397

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	number of youth indicating an increase in understanding of decision making processes
2	number of youth indicating an increase knowledge of the educational topic being presented
3	number of youth who have demonstrated decision making and problem solving skills
4	number of youth who have indicated the intention to practice improved basic life skills
5	number of youth who have participated in 4-H programs and indicated that they now possess 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)
14	number of participants who indicated they will think through how every spending decision affects other spending opportunities and choices (RMRW)
15	number of participants who increased awareness about how the type of job they have affects how much money they will make / their earning potential (RMRW)
16	number of participants who indicated their likeliness that they have a plan for spending that includes both wants and needs (RMRW)
17	number of youth participants who indicated the likelihood of considering how their spending decisions affect /impact other people (RMRW)

18	number of youth participating in the 4-H CARTEENS ("Caution and Responsibility" Teens safe driving program) research project who increased their knowledge, attitudes, and / or skills relative to safe automobile driving habits
19	number of OSUE professionals who increased their STEM knowledge / skills
20	number of Ohio youth who increased their STEM knowledge / skills

**Outcome #1**

**1. Outcome Measures**

number of youth indicating an increase in understanding of decision making processes

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	64800

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Youth need to increase their understanding of decision making processes to become more productive citizens as adults.

**What has been done**

Past Ohio studies have determined that the typical club member attends an average of 11 club meetings per year, and educational delivery methods employed by clubs included: Work night meetings (31%); workshops / clinics (59%); Skill-a-thon kits (54%); required demonstrations by members (81%); outside speakers (59%); subject matter volunteers (45%); field trips / tours (56%); and community service (91%). Through these delivery methods, 4-H members learn how to make decisions in the operation of their local 4-H clubs. 4-H members learn how to prepare for and participate in project interviews. They also acquire from subject matter specialists necessary information to weigh alternatives to select the best course of action in completing their individual 4-H projects.

**Results**

When 4-H members were asked if they learned any decision making skills through their 4-H club experience, the percentage of respondents who answered YES to the following decision making skills: 90% -Think about what might happen because of the decision; 90% - Generate ideas for

possible solutions before making a decision; 89% - Determine the best alternative and actually make the decision; 88% - Implement the decision; 86% - Gather background information that will help to make a decision; 85% - Evaluate the outcome of the decision; 79% - Make decisions without delaying too much (timely).

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

#### Outcome #2

##### 1. Outcome Measures

number of youth indicating an increase knowledge of the educational topic being presented

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	75129

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Youth need to increase their knowledge of presented educational topics to become more productive citizens as adults.

###### **What has been done**

Ohio youth participate in a variety of activities (including clubs, after-school programs, military clubs, special interest and short term programs, school enrichment programs, overnight camping, and day camping programs).

###### **Results**

4-H members were asked to rate the amount of project knowledge/ skills gained through 4-H on a four point scale where 1=NONE and 4=A LOT; the highest ratings were "Exhibiting the product(s) of a 4-H project" and "Working on a 4-H project". Next were: "4-H project books and written 4-H materials" and then "One-on-one visits with an adult 4-H volunteer". The lowest rating was "Attending 4-H workshops/ clinics". However, all were rated 3 or higher on a 4 point scale.

#### 4. Associated Knowledge Areas

**KA Code**    **Knowledge Area**  
806            Youth Development

**Outcome #3**

**1. Outcome Measures**

number of youth who have demonstrated decision making and problem solving skills

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	33520

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Youth need to demonstrate their decision making and problem solving skills to become more productive citizens as adults.

**What has been done**

Within the last five years local 4-H volunteers were asked to assess their club members' decision making / problem solving skills and transferable workforce preparation skills. Youth were asked to assess basic life skills learned, decision-making / problem solving skills learned, and project skills / knowledge gained during 4-H programming and events.

**Results**

When 4-H club advisers were asked to indicate about how many of their club's members could demonstrate decision making skills, on each of the seven decision making skills, 91%-96% of the respondents stated that half or more of their members demonstrated such skills. The highest rated skill was "Generate ideas for possible solutions before making a decision" (96%) and the lowest was, "Implement the decision" (91%); and "evaluate the outcome of the decision" (94%).

**4. Associated Knowledge Areas**

**KA Code**    **Knowledge Area**  
806            Youth Development

#### **Outcome #4**

##### **1. Outcome Measures**

number of youth who have indicated the intention to practice improved basic life skills

##### **2. Associated Institution Types**

- 1862 Extension

##### **3a. Outcome Type:**

Change in Action Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	70015

##### **3c. Qualitative Outcome or Impact Statement**

###### **Issue (Who cares and Why)**

Youth need to improve basic life skills to become more productive citizens as adults. The concept of "basic life skills" includes, but is not limited to: using time wisely; meeting scheduled deadlines; demonstrating self-motivation; being a team player; displaying positive attitudes; being able to share information learned with others; acquiring and applying new knowledge; demonstrating responsibility; being respectful. These are skills, behaviors and abilities that are desirable in productive adults. The 4-H experience, both in working on individual 4-H projects and in participating 4-H club activities, provides scenarios in which such skills can be taught, nurtured, and developed.

###### **What has been done**

Data were collected and summarized from a questionnaire in which 4-H advisers / volunteers assessed their club members' decision making / problem solving skills and transferable workforce preparation skills. Youth were asked to assess basic life skills.

###### **Results**

4-H members were asked if they learned any basic life skills through their 4-H club experience. The percentage of 4-H members who responded 'YES' is indicated for each life skill: 96% understand it is important to follow through on commitments; 96% have control over personal goals / future; 95% work / play with people who are different than they are; 94% use time wisely; 94% take care of personal belongings; 94% listen carefully to what others say.

##### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

## **Outcome #5**

### **1. Outcome Measures**

number of youth who have participated in 4-H programs and indicated that they now possess transferrable workforce skills

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	35380

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Youth need to possess transferable workforce skills to become more productive citizens as adults. 4-H workforce preparation programming intentionally links interactions with youth to meet specific workforce preparation, content, and outcomes. Studies have shown that in typical workforce preparation programs, very little attention has been paid to the quality of work experiences or development opportunities. Many youth are unaware of the skills they need to succeed in the workforce, and are unskilled in the steps required to make themselves "job-ready" to meet their career goals.

#### **What has been done**

Workforce preparation programming teaches the following skills: critical thinking, problem solving, creativity and innovation; how to communicate effectively using the range of methods and tools available; working cooperatively with others, building relationships; how to take responsibility for continuous improvement of skills; understanding and selecting appropriate technology; using technology effectively to solve problems; demonstrating personal accountability; effective work habits; and ethical behavior. One of the project events at the Ohio State Fair is 'Workforce Preparation Day', where youth can demonstrate their skills and knowledge.

#### **Results**

4-H adult volunteers were asked to assess their club members' decision making / problem solving skills and transferable workforce preparation skills. Similarly, youth were asked to assess basic life skills learned, decision making / problem solving skills learned, and project skills / knowledge. Assessment surveys showed that at least 92% of 4-H club advisers reported that half or more of their youth club members demonstrated transferable workforce skills. The highest rated skill demonstrated by club members was 'Display positive attitudes' (99% of club members demonstrating); the lowest rated skill was 'Demonstrate self-motivation' (92%). Other skills were rated as follows: 'Use time wisely' (94%); 'Meet scheduled deadlines' (95%); 'Demonstrate



responsibility' (96%); 'Are team players' (97%); 'Acquire and apply new knowledge' (97%); 'Are able to share information they have with others' (98%); 'Are respectful' (98%). 10 projects were completed in 2015 for Workforce Preparation.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

#### Outcome #6

##### 1. Outcome Measures

number of participants who increased awareness about what it costs to maintain a household (RMRW)

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	10096

##### 3c. Qualitative Outcome or Impact Statement

###### Issue (Who cares and Why)

This outcome will impact both parents and children. Parents will see benefits from their children's increased knowledge about household costs. Children who can understand the scope and degree of expenses parents face may also better understand why parents must sometime say "no" when asked for money or for material purchases to be made.

###### What has been done

Students participated in a 'Real Money Real World' simulation and made decisions on what to purchase based on a salary received, thus simulating the "real world."

###### Results

60.8% of students participating in RMRW programming in 2015 increased their awareness of what it costs to maintain a household. It is of note that 5,367 (32.3%) students indicated that prior to RMRW programming, they already had "a lot" of knowledge / a strong awareness of what it costs to maintain a household.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
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801 Individual and Family Resource Management  
806 Youth Development

**Outcome #7**

**1. Outcome Measures**

number of participants who increased awareness about how every spending decision affects other spending opportunities (RMRW)

Not Reporting on this Outcome Measure

**Outcome #8**

**1. Outcome Measures**

number of participants who increased awareness about how the type of job they have affects how much money they will make (RMRW)

Not Reporting on this Outcome Measure

**Outcome #9**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #10**

**1. Outcome Measures**

number of participants who increased feeling of importance about waiting to have children until financially ready (RMRW)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	7827

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

This impact is especially important to parents of youth. This program indirectly discourages teenage pregnancy. Once students realize the extent of costs related to children and child care, they are able to make connections about the gravity of engaging in activities that could lead to teenage pregnancy.

#### What has been done

During the course of the RMRW evaluation, students were required to purchase childcare if they were "assigned" children. The simulation did not allow for students to use a spouse or assistance from other relatives as a means of childcare - this was an intentional part of the design of the simulation, so students could see how expensive child care costs are.

#### Results

47.1% of students indicated an increased understanding of the importance of waiting to have children until they are financially ready.

One of the most common types of comments provided to the open-ended questions on the RMRW assessment related to childcare costs. Comments to the question, "What did you learn in this program that surprised you the most?" included: "How expensive children can be. So, basically, how expensive I am." and, "Babies are expensive!" and "Caring for a child costs much more than expected."

It is of note that 7,585 students indicated that prior to RMRW programming, they already understood the importance of waiting to have children until they are financially ready.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

#### Outcome #11

##### 1. Outcome Measures

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

Not Reporting on this Outcome Measure

#### Outcome #12

##### 1. Outcome Measures

number of participants who indicated their likeliness to make changes relative to getting more education or training after high school (RMRW)

##### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	11159

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Teachers, parents, and employers should see benefits from this outcome. If students stay in school and continue training after high school, the chances of better employment opportunities increase.

**What has been done**

Students participated in a 'Real Money Real World' simulation and made decisions on what to purchase based on a salary received, simulating the real world. If students did not have adequate training or education after high school, they were able to see first-hand how this affected how much they could purchase on a limited salary.

**Results**

66.1% of students participating in RMRW programming indicated they planned to get more education or training after high school.

It is of note that 5,147 (30.5%) indicated that they already planned on getting more education after high school. Only 3.4% indicated that it was "not likely" they would get more education or training after high school.

Therefore, of the students that did not already believe (prior to RMRW programming) it was likely they would get more education or training after high school, 95% determined post-high school education and training was important and something they planned to do.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management
806	Youth Development

**Outcome #13**

**1. Outcome Measures**

number of participants who indicated their likeliness to make changes relative to learning how to make wise financial decisions (RMRW)

Not Reporting on this Outcome Measure

**Outcome #14**

**1. Outcome Measures**

number of participants who indicated they will think through how every spending decision affects other spending opportunities and choices (RMRW)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	13537

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Future family members of RMRW participants stand to benefit from this outcome. During the RMRW simulation, students began to gain an understanding of how spending decisions affect other spending opportunities, and how budgeting for needs first (over wants) is important to the way in which monthly expenses are allocated. Future family members will depend upon RMRW participants to make wise financial decisions in order to afford necessities as well as wants.

**What has been done**

Students participated in a "Real Money Real World" simulation and made decisions on what to purchase based on a salary received, thus simulating the "real world."

**Results**

80.7% of RMRW participants indicated that they were "somewhat likely" or "very likely" to think through how their spending impacts other opportunities or choices. 15.9% of participants indicated they were already thinking about the impacts of their spending choices, and only 3.3% said it was unlikely they would consider the consequences of their spending choices.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management
806	Youth Development

### **Outcome #15**

#### **1. Outcome Measures**

number of participants who increased awareness about how the type of job they have affects how much money they will make / their earning potential (RMRW)

#### **2. Associated Institution Types**

- 1862 Extension

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	7424

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Teachers, employers, parents will care about this impact. If students are interested in earning a good salary as adults, they will be more likely to stay in school, do well academically, and get a better education, thus leading to a better job in the "real world."

##### **What has been done**

Students participated in a "Real Money Real World" simulation and made decisions on what to purchase and how to budget for necessary expenses based on a salary received, thus simulating the "real world." Those who 'received' less than a desirable job had to make many concessions to stay on track and not overspend.

##### **Results**

44.4% of participants indicated an increase (positive change from before RMRW programming to after RMRW programming) in awareness about how the type of job they have affects how much money they will make in the future.

It is of note that 8,436 students indicated on the evaluation that before RMRW programming, they already strongly understood the correlation between education and future potential earnings.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management

806 Youth Development

**Outcome #16**

**1. Outcome Measures**

number of participants who indicated their likeliness that they have a plan for spending that includes both wants and needs (RMRW)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	13630

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Parents may likely benefit from this outcome. Students in middle school and high school are often still egocentrically-minded. Among other learning outcomes, students begin to see and appreciate the difference between wants and needs, and how sometimes sacrifices must be made, based on available funds and income. By experiencing situations where sacrifices and tough choices must be made during the simulation, students may gain a better appreciation for the times where parents must say "no" to requests from their kids for money or purchases / goods.

**What has been done**

Students participated in a 'Real Money Real World' simulation and made decisions on what to purchase based on a salary received, simulating the real world. If students overspent on non-essentials, they were made to go back and re-do their plan to take care of needs before wants. In addition, sometimes their salaries didn't even cover all basic needs, so they had to have another job to get by.

**Results**

It is of note that 2,861 (17%) of students indicated that prior to RMRW programming, they already decided to have a plan for spending that would include both their wants and needs. Many comments were made on the retrospective assessment tool regarding a better understanding for making choices between wants and needs. One student commented, "[I now understand] How expensive everything is! I'm now even more grateful for all my parents do for me!"

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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801 Individual and Family Resource Management  
 806 Youth Development

**Outcome #17**

**1. Outcome Measures**

number of youth participants who indicated the likelihood of considering how their spending decisions affect /impact other people (RMRW)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	13770

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Future family members of RMRW participants stand to benefit from this outcome. During the RMRW simulation, students began to gain an understanding of how spending decisions affect other spending opportunities, and how budgeting for needs first (over wants) is important to the way in which monthly expenses are allocated. Students also began to see how they are not the only people affected by spending choices - future family members will depend upon them to make wise financial decisions in order to afford necessities as well as wants.

**What has been done**

Students participated in a "Real Money Real World" simulation and made decisions on what to purchase based on a salary received, thus simulating the "real world."

**Results**

82.1% of students indicated that they were either "somewhat likely" or "very likely" in the future to think about how their spending impacts other people. 11.5% of students indicated that they were already thinking about the impact of their spending on others. Only 6.4% indicated it was unlikely they would consider others in relation to their spending decisions.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development



## **Outcome #18**

### **1. Outcome Measures**

number of youth participating in the 4-H CARTEENS ("Caution and Responsibility" Teens safe driving program) research project who increased their knowledge, attitudes, and / or skills relative to safe automobile driving habits

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	397

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The United States is a highly vehicle-dependent society with a long tradition of allowing driver licensing at age 16 or younger in most states. With that dependence, inexperienced adolescent drivers often demonstrate risky driving behaviors that put themselves, their passengers, other motorists and personal property at risk. 4-H CARTEENS is a traffic safety program for juvenile traffic offenders conducted by 4-H teen leaders and their program partners. 4-H CARTEENS goals include: (a) reducing the number of repeat juvenile traffic offenders; (b) decreasing the number of teen traffic offenders, and (c) increasing teen awareness of traffic/ vehicular safety. The "CAR" in CARTEENS stands for "Caution And Responsibility", and "TEENS" refers to the teenagers who help prepare and present the program. CARTEENS program topics include excessive speed, driving under the influence, seat belt safety use, consequences of unsafe decisions, dealing with peer pressure, understanding traffic laws, and recognizing and reacting to traffic signs and signals.

#### **What has been done**

Depending on the county, either monthly or bi-monthly educational programs are conducted for first time teen traffic offenders in the 4-H CARTEENS counties. Teens are assigned to the 4-H CARTEENS program through local court systems. Eight Ohio counties participated in the research project in 2015 (though there were 54 Ohio counties offering CARTEENS). While the total number is greater, we were only able to report on those teen participants who have had parental consent granted for their data to be used in the research study.

#### **Results**

Selected results from the retrospective pre-post assessment instrument in this research, a positive change in knowledge and behavior from the pre- to the post-assessment included the following percentages for the respective statements:

I know which Ohio laws govern teen drivers (47% increase); I do not engage in distracting behavior while driving (47% increase); I understand the relationship between vehicle speed and stopping distance (39% increase); I think about my responsibility as a safe driver (40% increase); I think about my behavior as a driver (38% increase); I think about the consequences of engaging in risky driving behaviors (40% increase); and I adjust all things that might distract me (eating, cell phone, music) before I drive a car (46% increase).

In addition, 91% of the teen participants stated that the 4-H CARTEENS program is "Very" (59%) or "Somewhat" (32%) Likely to change their driving habits; and 89% of the 4-H CARTEENS participants agreed with the statement, "I am less likely to be a repeat traffic offender as a result of attending this CARTEENS program."

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
806	Youth Development

**Outcome #19**

**1. Outcome Measures**

number of OSUE professionals who increased their STEM knowledge / skills

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	50

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The national dialogue continues regarding STEM, Science, Technology, Engineering and Mathematics, education. Recent statistics show STEM education in the U.S. is not improving. In 2011, only 30% of high school graduates were prepared for college level science work. And only 45% were math-ready. Out of 100 ninth graders interested in a STEM field, only six actually graduate from college with a STEM degree.

Several key themes emerge when examining current data about engaging young people in STEM education: (1) Focusing our efforts on building awareness in youth and their parents; (2) creating interest in STEM subjects; (3) and understanding the context of these skills and how they lead to

STEM jobs will provide direction for developing STEM education in Ohio.

**What has been done**

Over fifty 4-H Professionals participated in the 2015 4-H STEM Pathways Signature Program Professional Development in-service held on Friday, February 6, 2015.

**Results**

STEM Pathways Extension professional training program participants reported:

- \* 100% increased their STEM knowledge;
- \* 100% received useful resources to implement STEM in their 4-H programming efforts;
- \* 96% enhanced their STEM skills;
- \* 91% increased their comfort level to teach STEM to others; and
- \* 96% expanded their understanding of how to incorporate STEM in their county 4-H program.

OSU Extension professionals participating in the STEM Pathways Professional Development Training programs have written and received more than \$109,000 in Ohio 4-H Foundation grant funding to implement STEM programming efforts in their respective counties, EERA's, and camping operations.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #20**

**1. Outcome Measures**

number of Ohio youth who increased their STEM knowledge / skills

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	56000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The national dialogue continues regarding STEM, Science, Technology, Engineering and Mathematics, education. Recent statistics show STEM education in the U.S. is not improving. In

2011, only 30% of high school graduates were prepared for college level science work. And only 45% were math-ready. Out of 100 ninth graders interested in a STEM field, only six actually graduate from college with a STEM degree.

Several key themes emerge when examining current data about engaging young people in STEM education: (1) Focusing our efforts on building awareness in youth and their parents; (2) creating interest in STEM subjects; (3) and understanding the context of these skills and how they lead to STEM jobs will provide direction for developing STEM education in Ohio.

#### **What has been done**

STEM activities and demonstrations developed at the state level have been shared through county and club venues in every Ohio county.

Three days of 4-H STEM activities were conducted during the Farm Science Review September 22-24, 2015.

#### **Results**

72% of the participants answered 'yes' after attending STEM camp that they were now planning a career in a STEM related field. 66% of fourth graders stated that they would be interested in exploring STEM subjects.

Pre-and post-evaluations showed improvements in areas of STEM concepts, ability to work with a partner, and knowledge of 4-H Youth program. Youth comments included "Bam! Learned so much my head exploded!" and "I like doing stuff on my own but it was fun working with my friend to build and create."

Due to the increased STEM knowledge gained from STEM professional training and increased stakeholder requests, the educators from Cuyahoga and Summit Counties collaborated to create a 9-month STEM program, "Extreme Science" using OSU Extension's STEM Pathways Signature Program. Youth are able to practice applied problem-solving abilities through STEM investigations.

Three-quarters of the more than 1200 youth who participated in the Water Wind Mill Challenge created by Ohio State University and funded by National 4-H Council and Monsanto, agreed that teamwork and communication are two essential elements of engineering projects and real-life problem solving, and those skills were important to accomplish this STEM challenge.

Teen leaders reported positive impacts as a result of helping with this program: more than 60% agreed they are more interested in pursuing a career in agriculture; nearly 80% are more interested in learning about food production. 85% are more interested in advocating for agriculture issues that impact the world and nearly all felt that by helping with this program, they gained skills that will help them in the future.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Economy
- Competing Programmatic Challenges
- Other (Avian flu outbreak; ban on live poultry exhibits at Ohio fairs)

### **Brief Explanation**

The "new personnel" situation continues: there have been 38 new 4-H educators hired in Ohio since February 2012; many are inexperienced with the data collection and reporting processes, which were a part of the 4HOnline enrollment reporting system. At the same time, there continues to be less Extension educators in other program areas, which demands more 4-H educator resources in efforts other than reporting and data manipulation. Of particular note for 2015 was the ban implemented by the Ohio Department of Agriculture on the exhibition of poultry at fairs due to the outbreak of avian influenza. This ban was not implemented until most quality assurance training sessions were held, but eliminated the possibility of live bird interaction at county and state fairs.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

4-H began in Clark County, Ohio in 1902. The intent behind the initial meetings was to teach boys and girls how to harvest corn, plant a garden, test soil samples, tie knots in ropes, and identify natural wildlife, such as weeds and insects. This group came to be known as the "Boy's and Girl's Agricultural Club." By 1905, there were over 2,000 youth within 16 counties engaging in programming similar to that of Clark County's 1902 club. Ohio is still very proud of its 4-H heritage.

Society has changed greatly since 1902; 4-H is no longer geared exclusively towards youth in farming communities. Despite the sprawl of 4-H programming to more urban and suburban areas, the ultimate goal is still the same today as it was in 1902: to contribute to "the development of youth as individuals and as responsible, productive members of the community in which they live."

In 2015, Ohio 4-H programming had 289,298 direct contacts with youth through participation in organized clubs, school enrichment programs, special interest programs, and camping programs. Ohio's 4-H'ers live in many diverse areas of the state. In 2015, 13% of youth participants were from farming communities, 32% were from towns (less than 10,000 citizens and rural), 21% were from towns and cities (10,000 - 50,000 citizens), 17% were from suburbs (cities over 50,000 people), and 17% were from central / urban settings (cities over 50,000 people). Ohio 4-H is engaging youth all over Ohio, not just farming communities.

A web-based survey was completed of all parents of 2015 first year 4-H members who had email addresses in 4HOnline. Major findings included: (a) 86.8% of respondents agreed with the statement "During 4-H in 2015 my child worked on things of interest to her or him"; (b) 75.8% agreed with the statement, "In 2015 my child explored topics in the way that s/he wanted in 4-H."; (c) 65.4% agreed with the statement, "In 2015 my child became really good at something worked on in 4-H."; (d) 77.2% of the parents were overall satisfied

with their child's/children's 4-H involvement; and (e) 86% of the parent respondents stated that they planned to enroll their child in 4-H in 2016. On the same survey the parent respondents stated that their children were involved in the following 4-H programs: 4-H club (92%); 4-H at county fair (74%); 4-H activity or event (44%); 4-H service project (33%); 4-H overnight camp (14%); 4-H day camp (9%); and 4-H at state fair (8%).

During last year's 4-H programming, there were several notable outputs and outcomes. A new OSUE signature program, STEM Pathways, had over 20,000 direct contacts. Additionally, the curricula for STEM Pathways are content-driven and align with Ohio's new Learning Standards for Science, thus supplementing traditional classroom education. In-school or after-school enrichment programs were offered to over 15,000 students, teaching lessons about chick embryology, rockets and physics, weather, and the life cycle of plants (to name a few topics). Formal assessments are still under development for this program and its wide and diverse curriculum.

Real Money. Real World is a well-established graduated signature program. It has a documented history of strong learning gains by participants. 2015 was no exception. While some students indicated via post-program retrospective self-assessments that they "already knew" the topic being evaluated, of the remaining students who had no prior knowledge, at least half experienced learning gains on all topics evaluated. Students learned how to budget money, distinguish between needs and wants, plan for emergencies (by saving money) and got a glimpse of what it takes (financially) to maintain a household and to be a parent and have to budget for child-related expenses. 95.9% of youth participating indicated that they "believe participating in this program gave me a better idea of what is involved in earning, spending, and managing money." 95.1% of youth participating indicated that they "believe participating in this program will help me in the future."

Whether youth are learning about science, technology, engineering, math, workforce development, basic life skills, budgeting money, or how to care for livestock, the outputs and outcomes in this planned program show that Ohio 4-H is engaging a diverse youth audience in activities that meet not only the goals of the 4-H curriculum in which they are participating, but also the goals first set forth in 1902: "the development of youth as individuals and as responsible, productive members of the community in which they live."

## Key Items of Evaluation

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

**Program # 16**

**1. Name of the Planned Program**

Strengthening Families & Communities (Extension)

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	20%		0%	
724	Healthy Lifestyle	20%		0%	
801	Individual and Family Resource Management	30%		0%	
802	Human Development and Family Well-Being	30%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	24.0	0.0	0.0	0.0
<b>Actual Paid</b>	32.5	0.0	0.0	0.0
<b>Actual Volunteer</b>	9.1	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1680087	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1680087	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

- 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. Brief description of the target audience**

Strengthening Families and Communities programming is tailored to meet the needs of the intended audience. 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 state. Below is a listing of the specific groups we intend to reach with targeted awareness, educational and skills-development programming:

- Parents of children ages birth to 18, including, but not limited to: teen, step, adoptive, foster, single, divorcing, incarcerated, fathers who 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)

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	38909	89939	0	0



**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	11	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Educational sessions held with two or more participants

Year	Actual
2015	1508

**Output #2**

**Output Measure**

- number of volunteer hours given

Year	Actual
2015	4318

**Output #3**

**Output Measure**

- number of Dining with Diabetes classes taught

Year	Actual
2015	15

**Output #4**

**Output Measure**

- number of volunteers participating in the planning and implementation of this event (DWD)  
 Not reporting on this Output for this Annual Report

**Output #5**

**Output Measure**

- number of visits to the blog for the OSUE Signature Program, "Live Healthy Live Well"

<b>Year</b>	<b>Actual</b>
2015	25568

**Output #6**

**Output Measure**

- number of "Likes" on posts to the 'Live Healthy Live Well' OSUE Signature Program Facebook page

<b>Year</b>	<b>Actual</b>
2015	1458

**Output #7**

**Output Measure**

- number of individuals who participated in a 'Strengthening Families and Communities' event/project that are defined as under-represented individuals (i.e., individuals who may not have participated fully--e.g., women, minorities, persons with disabilities, small farm owners, etc.).

<b>Year</b>	<b>Actual</b>
2015	13587

**Output #8**

**Output Measure**

- number of participants in 'Live Healthy, Live Well' email challenges

<b>Year</b>	<b>Actual</b>
2015	4745

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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 individuals who indicated that they actually began practicing a behavior or skill that was learned from a 'Strengthening Families and Communities' educational events
5	number of participants who increased their financial literacy
6	number of participants who have developed an integrated plan for achieving financial security
7	number of 'Successful Co-Parenting' participants who plan on using information learned in the educational event they attended
8	number of 'Live Healthy Live Well' participants who reported using the information they learned during the email challenge, which may help reduce the risk of chronic disease
9	percentage of 'Dining with Diabetes' (DWD) participants that report engaging in cooking activities to help take control of their diabetes - using healthy oils in cooking, substituting herbs and spices for salt and using nutrition labels

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

number of individuals who indicated that they actually began practicing a behavior or skill that was learned from a 'Strengthening Families and Communities' educational events

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

number of participants who increased their financial literacy

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	290

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

OSUE Family and Consumer Sciences 'Healthy Finances' programming assists families in improving both their present and future economic well-being by helping them to assess their financial circumstances; increase their financial management skills, including organizing financial records, tracking spending, and improving bill paying; reducing debt and beginning or increasing savings; and improving consumer decision-making abilities.

**What has been done**

FCS Extension educators deliver 'Healthy Finances' programs through face-to face instruction with individuals and families, training of professionals such as teachers and social workers who work directly with individuals and families, and through reaching people in their own homes through distance education.

**Results**

95.4% of participants in 'Healthy Finances' programming indicated on post-event assessments that they learned new information from the program.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management

**Outcome #6**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	260

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

OSUE Family and Consumer Sciences 'Healthy Finances' programming assists families in improving both their present and future economic well-being by helping them to assess their financial circumstances; increase their financial management skills, including organizing financial records, tracking spending, and improving bill paying; reducing debt and beginning or increasing savings; and improving consumer decision making abilities.

**What has been done**

FCS Extension educators deliver 'Healthy Finances' programs through face-to face instruction with individuals and families, training of professionals such as teachers and social workers who work directly with individuals and families, and through reaching people in their own homes through distance education.

**Results**

88.7% of participants in 'Healthy Finances' programming indicated on a post-event assessment that they had developed a plan for achieving financial security and would use that plan and goals to guide their financial decisions.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management

**Outcome #7**

**1. Outcome Measures**

number of 'Successful Co-Parenting' participants who plan on using information learned in the educational event they attended

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
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2015

1687

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Experiencing divorce is a stressful time for all family members and often the degree to which children are affected by their parents' divorce is often overlooked. Research indicates that the impact of divorce on children's well-being can be minimized by parent's actions during this difficult period and that cooperative, mutually supportive, low-conflict co-parenting relationships are advantageous for both children and adults.

#### What has been done

'Successful Co-Parenting' is a 2.5 hour program for parents who are in the process of obtaining a divorce. As a result of participating in this program, parents understand the ways divorce impacts their children and learn skills to address the children's needs. The objectives for parents participating in the program are: 1) understand the practical and emotional processes of divorce (for adults and children); 2) learn how children react to divorce; 3) be able to identify behaviors that are harmful to their relationships with their children; 4) learn how to tell their children about the divorce process and learn skills for helping children cope; 5) learn how to communicate with a former spouse and learn guidelines for successful post-divorce parenting.

#### Results

1687 (96.7%) of participants in the 'Successful Co-Parenting' program report that they plan to use the information gained during the program in their lives. 89.9% of participants indicated on a retrospective evaluation that they feel more prepared to co-parent as a result of the program.

Additionally, the evaluation documented that 46.7% of participants experienced a positive change related to how to use healthy communication techniques such as problem solving with their co-parent (42.7% experienced no change to the same question).

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

### Outcome #8

#### 1. Outcome Measures

number of 'Live Healthy Live Well' participants who reported using the information they learned during the email challenge, which may help reduce the risk of chronic disease

#### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	919

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Chronic diseases are the leading cause of death and disability in the United States. Conditions such as heart disease, stroke, some cancers, diabetes, arthritis, and obesity are common, costly, and preventable health problems. These diseases can be addressed and mitigated with education and lifestyle modifications. These diseases have the potential to affect all Ohio citizens, depending on lifestyle choices.

**What has been done**

'Live Healthy Live Well' is one of the designated OSU Extension signature programs. The program educates Ohioans on nutrition, physical activity, and wellness issues. Utilizing social media, email wellness challenges, and lunch-and-learn lessons, the program strives to increase awareness and encourage the adoption of healthy lifestyle behaviors. In 2015, 3 email wellness challenges were offered. 'Live Healthy Live Well' programming targets working adults, public agencies or governments, and businesses with research-based information. By improving workforce health, employers may see reductions in insurance costs, improved morale, and fewer employee sick days.

**Results**

919 (89.7%) of post-wellness challenge survey respondents reported they are using the new information they learned. 91.3% reported learning new information. While all learning outcomes for the wellness challenge saw gains, the most notable were: using a coping technique to reduce stress (ex, laughter, hobbies, exercise) (22.3% increase); participating in a physical activity for at least 30 minutes 5 times or more a week (16.6% increase); and eating healthy foods as snacks (ex: nuts, vegetables, fruits, whole grains, dairy) (15.8% increase).

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle



**Outcome #9**

**1. Outcome Measures**

percentage of 'Dining with Diabetes' (DWD) participants that report engaging in cooking activities to help take control of their diabetes - using healthy oils in cooking, substituting herbs and spices for salt and using nutrition labels

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	68

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Diabetes is a problem for many Ohioans. According to 2007 statistics released by the Centers for Disease Control and Prevention (CDC) and a study done by the Ohio Department of Health (ODH), more than 830,000 adult Ohioans have been diagnosed with diabetes. An additional 200,000 are estimated to have diabetes and don't know it. According to the American Diabetes Association, the direct (medical costs) and indirect (low productivity) costs of diabetes total to an estimated \$5.9 billion in Ohio. It is estimated that \$3.9 billion are direct costs and \$2 billion are indirect costs.

**What has been done**

Dining with Diabetes is a series of classes conducted by Ohio State University Extension and community health partners. This program helps individuals learn strategies to manage their carbohydrate counting, portion control, label reading, and taste testing healthy recipes.

**Results**

On the DWD post-test, 68.3% of participants reported they "Often" or "Almost always" practice three significant healthy cooking practices - using healthy oils in cooking, substituting herbs and spices for salt, and using nutrition labels. This was compared to only 62% on the pre-test. Respondents also indicated they would make other lifestyle changes, including engaging in physical activity (such as walking) on a daily basis. After participating in DWD, 44% of participants indicated had engaged in physical activity on a daily basis.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Competing Programmatic Challenges

### **Brief Explanation**

There are other non-profits and organizations offering educational events similar to OSU Extension -- consumers have lots of choice when it comes to sources of their information. OSUE must be competitive to maintain a steady level of participants.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

The 'Strengthening Families and Communities' planned program largely aligns with OSU Extension's 'Family and Consumer Science' program area. This segment of Extension programming seeks to educate Ohioans to have healthy relationships, healthy finances, and to be healthy people.

Recently made an OSUE signature program, Successful Co-Parenting programming is offered to divorcing parents, to help ease the stresses of the divorce process on the family. The program educates divorcing parents on understanding the practical and emotional processes of divorce, how to identify behaviors that can be harmful to their relationships with their children, and ways to communicate with their former spouse that are respectful and positive. 96.7% of participants in 2015 Successful Co-Parenting programming indicated on post-session evaluations that they plan to use the information gained during the program in their lives.

OSU Extension financial programming evaluations revealed that after participating in Extension healthy finance educational sessions, 88.7% of participants had developed a plan for achieving financial security, and that they would use that plan to guide their financial decisions.

Another signature program of OSUE, 'Live Healthy, Live Well' educates Ohioans on nutrition, physical activity, and wellness issues. The program largely makes use of social media and email to maintain contact with participants, and as a way to provide constant information and encouragement. Three email wellness challenges were issued in 2015, reaching 4,745 individuals. Following the wellness challenges, email surveys were sent out to participants. 89.7% of those who responded to the survey indicated they are actively using the new information they learned during the email challenges.

### **Key Items of Evaluation**

## VI. National Outcomes and Indicators

### 1. NIFA Selected Outcomes and Indicators

<b>Childhood Obesity (Outcome 1, Indicator 1.c)</b>	
0	Number of children and youth who reported eating more of healthy foods.
<b>Climate Change (Outcome 1, Indicator 4)</b>	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
<b>Global Food Security and Hunger (Outcome 1, Indicator 4.a)</b>	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
<b>Global Food Security and Hunger (Outcome 2, Indicator 1)</b>	
0	Number of new or improved innovations developed for food enterprises.
<b>Food Safety (Outcome 1, Indicator 1)</b>	
0	Number of viable technologies developed or modified for the detection and
<b>Sustainable Energy (Outcome 3, Indicator 2)</b>	
0	Number of farmers who adopted a dedicated bioenergy crop
<b>Sustainable Energy (Outcome 3, Indicator 4)</b>	
0	Tons of feedstocks delivered.