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%	
502	New and Improved Food Products	5%		10%	
503	Quality Maintenance in Storing and Marketing Food Products	10%		15%	
607	Consumer Economics	10%		5%	
701	Nutrient Composition of Food	15%		10%	
702	Requirements and Function of Nutrients and Other Food Components	10%		10%	
703	Nutrition Education and Behavior	10%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	20%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	0.0	9.5	0.0
Actual Paid Professional	10.0	0.0	6.5	0.0
Actual Volunteer	1.0	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**
579284	0	877437	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
579284	0	1098128	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, and associated outreach and Extension programs. Research includes microbial studies, packaging, food taste tests, consumer preferences, and behavior. Laboratories, pilot plants, farms, and multiple business sites are available throughout state to permit data gathering and to continue long - term experiments. All functional laboratories and sites are improved over time as program need warrants. Extension has the capacity to advance knowledge acquisition, promote adoption strategies, and help build human capital to promote global food security and reduce hunger worldwide. OARDC and OSU Extension faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal and external stakeholders.

2. Brief description of the target audience

Targeted audiences include, but are not limited to:

- Specific individuals or groups who have expressed a need for food-related information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature
- Fellow academic units that partner with food scientists to create systems and processes needed to support not only the research, but also the adoption of the research findings by stakeholders
- Fellow agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change
- Populations who have not requested the information but will likely benefit from that information, e.g. persons who engage in home canning of food
- Other scientists and scientific groups
- Political entities
- Other Extension personnel
- Students from pre-school to post doctorate studies
- News organizations
- 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

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2398	9800	7800	8900

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

Patent Applications Submitted

Year: 2012

Actual: 2

Patents listed

- Reference # 2003-050; Issue # 2528210; Method and Apparatus for Peeling Produce
- Referene #2007-033; Issue # 8,274,293; APPARATUS AND METHOD FOR MEASUREMENT OF pH OVER A WIDE RANGE OF PRESSURE

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	3	34	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Output #2

Output Measure

- Number of participants attending educational programs of one teaching hour or more.
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Total number of workshops offered to producers and agri-business leaders

Year	Actual

2012	8

Output #4

Output Measure

- total number of participants in events related to 'Global Food Security and Hunger' (Extension)

Year	Actual
2012	13008

Output #5

Output Measure

- total number of volunteers participating in the planning and implementation of this event (committee members, teachers / trainers, unpaid staff, etc) (Extension)

Year	Actual
2012	325

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

16	improvement in economic and social conditions, as indicated by the number of dollars in direct farm sales (Extension)
17	number of schools purchasing Ohio-produced food as part of the Ohio Farm to School program (Extension)

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**

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

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

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

   Not Reporting on this Outcome Measure

Outcome #4

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 #5

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

Inform the process of collecting, storing, processing, and distributing waste products from plant and animal agriculture to the extent that there are demonstrated gains among multiple outcomes.

Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #10

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 #11

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.

Not Reporting on this Outcome Measure

Outcome #12

1. **Outcome Measures**

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

2. **Associated Institution Types**

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tanzania, a country of 42 million nestled on the east coast of Africa, is undergoing a significant change demographically. Currently, about one-third of Tanzanians live below the poverty line, and more than 4 of 10 Tanzanian children suffer from stunting due to malnutrition. By 2050, Tanzania's population is anticipated to double and its urban population will exceed its rural population. To keep pace with these demographic changes and to reduce high rates of malnutrition, agricultural productivity must increase.

What has been done

Tanzania is a focus country of FEED THE FUTURE, the Global Hunger and Food Security Initiative of the U.S. government. Eight Tanzanians are currently enrolled in advanced degree programs in OSU - CFAES, and other students are studying at five partner land-grant universities and at African institutions as part of The Innovative Agricultural Research Initiative funded by the Agency for International Development (USAID), which is, part of a Feed the Future program led by Ohio State.

Results

The impact is that this complex project has been implemented with graduate education underway. A needs assessment focusing on the current state of agricultural training and research in Tanzania is complete and identifies capacity gaps in Sokoine University of Agriculture (SUA) and in the Ministry of Agriculture, Food Security, and Cooperatives (MAFC). This needs assessment provides information for planning activities to be undertaken over the next five years. Information about training and research needs in the agricultural sector and the resources and outputs of SUA and MAFC is not readily accessible. The first knowledge gap to be addressed is the lack of information about the current capacity of these two organizations and the needs of their clientele. This information will be useful for the planning and implementation of iAGRI but may also be useful to other entities involved in agricultural training and research.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products

Outcome #13

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1598

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increasingly, across Ohio and the US, there is a growing public demand for fresh, locally grown food products. Making the connections between consumers, local agricultural producers and wholesale markets is needed. Creating efficiency in market connections is precisely the service that MarketMaker provides.

What has been done
MarketMaket is an interactive mapping system with business and market data for food products in Ohio. The MarketMaker mapping system provides important business information for agricultural entrepreneurs an a critical link between food producers and buyers. The program is part of a national network of state websites connecting farmers with food retailers, grocery stores, processors, caterers, chefs, and other food supply chain contacts. It boasts one of the most extensive, searchable food industry-related data collections in the US.

Results
1,598 producers registered with MarketMaker as of the end of 2012. More than 8000 people have visited the Ohio MarketMaker site to locate farmers, farmers' markets, food retailers, eating places, and agritourism sites.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics

Outcome #14

1. Outcome Measures

Establishment of a number of local/regional food systems.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Can agriculture boost the use of abandoned urban lands? Can such use help people who live in urban food deserts - areas having little or no access to affordable, nutritious foods -- grow more of their own food such as tomatoes, spinach and other fresh produce?

What has been done
OARDC, OSU Extension, and Cleveland Crops, an urban farming program, joined together to assess the potential of fruit and vegetable polyculture using ecologically designed mixed-crop plots in abandoned or under-utilized urban lands.

Results
The OSU team found in their study of fruit and vegetable polyculture that economic returns alone are equivalent of nearly $100,000 an acre a year. Community pride and job creation also resulted. Cleveland Crops, an urban farming program managed by the Cuyahoga County, Ohio, Board of Developmental Disabilities (CCBDD), was able to expand the growing season and keep people whom CCBDD serves employed year-round. They accomplished this by using a variety of season-extending techniques, such as high and low tunnel greenhouses, to grow as many vegetables as possible for as long as possible. Examples include lettuce, beets and carrots in December and January and parsley and other herbs throughout most of the winter.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
607	Consumer Economics
703	Nutrition Education and Behavior

Outcome #15

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	54000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Producers are exploring and entering direct-to-consumer and direct-to-wholesale markets.

What has been done
To help prepare for new market entry, more than 200 producers participated in "MarketReady" workshops in 2012. This curriculum guides producers through decisions of product selection, packaging, labeling, distribution, promotion methods and business / marketing planning.

Results
According to the 2007 USDA Census of Agriculture (we assume similar statistics for the reporting year of 2012), Ohio is one of the top 10 states for direct sales, with 6,827 farms reporting more than $54 million in agricultural products were sold directly to individuals for human consumption. In 2012, there are more than 260 farmers markets and more than 160 Ohio wineries.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
607	Consumer Economics

Outcome #17

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As interest in local food expands into school cafeterias and classrooms, evidence of farm to school projects are evolving throughout Ohio. By increasing the number of schools that purchase Ohio-produced food, we keep money within the state, thus supporting our own economy.

What has been done
An Ohio Farm to School Advisory group, Farm to School website and educational materials were established. More than 600 producers, school personnel and local food advocates learned about the Farm to School program through event presentations and 1800 people visited http://farmtoschool.osu.edu in 2012.

Results
More than 100 schools purchased Ohio-produced food in 2012. A USDA Farm to School census is being conducted in 2013 and there are plans for statewide network development in 2013, which will provide additional data.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
607	Consumer Economics
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

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 (World conflict and terrorism)

Brief Explanation

Each factor noted above is a key variable in affecting outcomes and impacts. As to which variables are most important, this is situational. As with other Planned Programs in this report, perhaps the greatest external factor is that need far exceeds resources available to land grant programs to respond.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The OSU Food Innovation Center (OSU-FIC), of which College of Food, Agriculture, and Environmental Sciences (CFAES) research and Extension are key components, is a primary link for feedback related to food security, as are other OSU Extension programs related to advancing food security. The premise of OSU-FIC, and that of all of CFAES's research and Extension programs, is that food is basic to life, but our global food system must improve and innovate. To sustain a projected eight billion people by 2025, world food production must increase by a staggering 40%. We currently lose ~40% of our food to flaws in process, economics, safety, health, nutrition, security, technology, and policy. Food discovery at Ohio State is ingenuity that cuts across disciplines; it is the best ideas from academia, government, and industry that solve these challenges. Food innovation is required to attack local, national and global food problems. We now have the tools and talent to improve access to abundant, safe, health-promoting food. These OSU networks are now providing both internal and external feedback related as to (1) need, (2) funding, (3) opportunities, and (4) assessment of impact.

OSU Extension notes the following evaluation results related to "Global Food Security and Hunger" programming efforts. To help help them prepare for new market entry, more than 200 producers completed MarektReady workshops and improved their skills/knowlege of product selection, packaging, labeling, distribution, promotions and business/marketing planning. More than 8000 people visited the Ohio MarketMaker website to locate farmers, farmers' markets, food retailers, eating places, and agritourism. More than 100 schools purchased Ohio-produced food in 2012.

Key Items of Evaluation

The Innovative Agricultural Research Initiative (iAGRI), funded through USAID's Feed-the-Future Initiative, and led by Ohio State University's College of Food, Agricultural, and Environmental Sciences (CFAES), is an investment in development-enabling knowledge. A dynamic agricultural knowledge information system is vital for improving farm-level productivity, value-chain efficiency, and the nutritional status of food-insecure populations. Gaps in the capacity to generate useful agricultural knowledge limit farmers' livelihoods and threaten national food security. We have helped to develop an iAGRI Report Series focusing on the current state of agricultural training and research in Tanzania and identified capacity gaps in two major knowledge-generating organizations: Sokoine University of Agriculture (SUA) and the Ministry of Agriculture, Food Security, and Cooperatives (MAFC).

This needs assessment study, a key formative evaluation component, provides a factual foundation for planning activities to be undertaken by iAGRI over the next five years. Information about training and research needs in the agricultural sector and the resources and outputs of SUA and MAFC is not readily accessible. The first knowledge gap, therefore, to be addressed by iAGRI is the lack of updated information about the current capacity of these two organizations and the needs of their clientele. This information will be useful for the planning and implementation of iAGRI but may also be useful to other entities involved in agricultural training and research.

OSU Extension would like to offer the following key items of evaluation as documentation of success, as well as looking to the future in programming for "Global Food Security and Hunger."

- One stakeholder provided the following assessment in reference to a CFAES faculty member's urban gardening research and extension contributions:

"Joe's research provides useful information for urban farming, container gardening, and year-round produce production. His work has been groundbreaking in demonstrating how small-scale farmers can integrate tree crops, fruits, and vegetables. The state dollars invested in this project will continue to guide innovative farmers for years to come."

--Meagan Tehua, program director, Goodness Grows, a greater Youngstown nonprofit sustainable farming ministry that participated by invitation in a March 2012 local foods meeting at the White House.

- A USDA Farm to School Census is being conducted in 2013, and there are plans for statewide development in 2014, which will provide additional data.