2016 University of Wisconsin Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/02/2017

I. Report Overview

1. Executive Summary

Operating Philosophy/ Program Overview:
The Wisconsin Agricultural Experiment Station (WAES) and University of Wisconsin-Extension are partners who work together to generate new research-based knowledge and apply that knowledge to help Wisconsin's citizens and communities address challenges and take advantage of new opportunities.

Priorities are aligned with input from stakeholders with interests in traditional and non-traditional agriculture, natural resources, human health and communities. We receive input through conversations and correspondence with individuals and groups, as well as at public meetings such as field days at Agricultural Research Stations and other Extension events. We also ask issue-based teams, comprised of UW-Extension faculty and county-based educators, to determine the priorities in their areas.

These priorities inform decisions about what research to conduct, and about the development of educational initiatives conducted by Cooperative Extension in partnership with local, state, tribal and regional organizations, farmers, consumers, business owners and entrepreneurs, support services, coalitions, decision makers, and public and tribal government agencies.

How we allocate capacity funds
The success of our statewide educational efforts is founded on new, relevant knowledge through peer-reviewed, investigator-driven research supported by capacity grant funding. We seek to allocate these funds in a manner that best addresses the needs of our stakeholders.

The WAES's general approach is to allocate capacity funds to support specific, peer-reviewed projects rather than to distribute block grants to departments. We use capacity funds to support approximately 130 projects each year, covering the cost of personnel (mainly graduate students), supplies, student hourly help and travel. We use a different approach to distribute funds for capital equipment. In this case, departments set the priorities and where practical, several projects may share capital equipment. We cover the costs of travel to multistate research meetings (for two representatives per project) out of a central pool of funds.

We continually re-examine our research portfolio in order to address short-term, intermediate term and long-term issues. We may fund a small number of new projects at mid-year as new faculty members are hired or to address emerging problems that require immediate attention. These mid-year projects are funded at the discretion of the associate dean for research and the chief financial officer of WAES within the College of Agricultural and Life Sciences (CALS). This ongoing portfolio review ensures that we invest in projects that are relevant to the REE and NIFA national goals and emphasis areas and focus on current state research needs.

Cooperative Extension's interdisciplinary and cross-program area statewide teams are co-chaired by campus-based specialists and community-based educators. Structuring team leadership in this manner is intentional, building relationships and linkages among communities of research interest, communities of

practice, and communities of locale. Teams develop plans focused on interests that cut across these communities. They do so from the point of issue identification and priority-setting, to resource commitment, plan implementation and evaluation. This same approach applies to multi-state and joint research and extension activities.

How we measure success
WAES uses several indicators to assess the impact and outcomes of a research project. We consider peer-reviewed publications, efforts to share results with client groups, patent disclosures and graduate students trained. The list may be expanded in the future to include other criteria that will enable us not only to assess the effectiveness of current programs, but also to help us set future capacity grant funding priorities. CALS published research has been ranked first among peer institutions in terms of the Scientific Impact Factor. Formula funding plays a major role in this achievement, not just because of the success of our capacity-funded projects, but also because formula grants help our researchers attract significant funding from other sources. CALS also ranks very high in extramural funding awarded to land-grant universities and public institutions, as well as private universities.

UW-Extension's approach to measuring success is grounded in an overarching program development framework. This framework begins with understanding the need and context for a particular program and its intended change. Program plans, which includes measuring program outcomes and impact, are developed by statewide teams. As teams implement and evaluate their efforts, they can determine overall impact and make changes to address emerging trends.

Publications in refereed journals, books and extension bulletins have been reported on projects using the annual reports in the REEport system.

What follows are a few brief summaries which describe impact across our research and extension portfolio.

Title: A Novel Approach for Eliminating Allergenicity of Milk Proteins

Issue:
Cow's milk allergy is the most common food allergy in infants and young children, affecting around 2.5 percent of children under the age of three. The symptoms, caused by an immune reaction, can range from mild to deadly, including itchy skin, hives, wheezing, vomiting, abdominal cramps, diarrhea and anaphylactic shock. While most will outgrow this allergy, researchers have found that the average age of resolution is increasing, with many children still allergic beyond age five--and some into their teens and beyond. Afflicted individuals must avoid cow's milk and foods containing cow's milk proteins, including cheese, butter and yogurt, as well as certain baked goods, lunch meats, chocolates and candies. While hypoallergenic formulas are available for infants, alternative food options do not exist for older children and teens. There is a need for safe and palatable food options for children and teens with this food allergy.

What has been done:
Researchers at the University of Wisconsin-Madison used a special set of enzymes to hydrolyze, or cut, milk proteins into smaller fragments. They then put these pieces back together, but in an unusual way. Natural proteins are made of linear sequences of amino acids. In this case, however, the researchers put the pieces together in a non-linear, "branched" structure. This novel structure disrupts the "allergenic sites" on the protein, helping to reduce the immune response. In in vitro studies, they found that the novel proteins they created were significantly less allergenic than regular milk proteins. The modified proteins are nutritionally valuable, and can be incorporated into a variety of food products.

Results:
Researchers were able to create modified milk proteins with significantly lower allergenicity, as measured

using in vitro models. These promising findings are being published in a series of journal articles, and the modified proteins are ready for study by clinical researchers with access to milk allergy patients. If these novel proteins are shown to be safe in patients, food companies can move forward with incorporating these proteins into food products, creating a line of safe milk protein-based foods. These foods will give children and teens with milk protein allergy some "normal" food options, as the proteins can be used to make puddings, cakes and cookies, ice cream and other popular milk-based products.

Informed by this work, the UW-Madison research team is also pursuing a project to create "branched" soy proteins and assess their functionality. Results show that these modified soy proteins have better functional properties than regular soy proteins, meaning they can be incorporated into more processed food products. This is a promising approach to help increase consumption of a highly underutilized protein.

Title: Wisconsin Acidified Canned Foods School

Issue:
Wisconsin has a vibrant "buy local" economy and small food processors are benefiting from the economic momentum. Farmers wishing to add value to their crops and local entrepreneurs looking to meet customer demand are delving into the sale of canned pickles, salsas and other acidified food products. Product that is not safe presents the risk of botulism poisoning.

What has been done:
To support these small-business owners, UW-Extension developed an Acidified Canned Foods School in 2009. This program meets the federal standards for training while also addressing the unique needs of small artisanal processors for assistance in recipe development and ongoing process support. Federal law requires the training to ensure that safe food is manufactured and appropriate records are kept; Wisconsin requires the training before a license is issued for manufacture of this type of food. Since 2009, a total of 595 small business owners and entrepreneurs have graduated from Wisconsin Acidified Canned Foods School.

Results:
Follow-up evaluations demonstrate that the Wisconsin Acidified Canned Foods School has provided small businesses with a foundation for success. More than 50% of graduates are currently processing acidified canned foods for sale under state license and another 34% are preparing to do so. With an average of 60% of their sales coming from acidified canned food products, 33% of graduates report over $25,000 in total annual sales. These businesses also contribute to the economy by way of local jobs, employing on average 6 people each. Acidified Canned Foods School graduates overwhelmingly rated the training and follow-up support provided by UW-Extension as extremely important factors in being able to sell acidified canned foods today.

Title: University of Wisconsin-Extension Health Report

Issue:
In 2015, Family and Consumer Sciences (FCS) Extension in the North Central Region (NCR) commissioned the Battelle Study which stated "that limiting the prospects for America's future is related to the diminished health and well-being of its citizens, compared with previous generations." The study explicitly noted that the Cooperative Extension system is well placed to respond.

What has been done:
University of Wisconsin-Extension has been a leader in Extension's increased role in national community health programming. With the publication of the 2014 Cooperative Extension National Framework for Health and Wellness, more Wisconsin state specialists became engaged in local, state and national health work. In 2016, UW-Extension invested in state staff (a Health Promotion Specialist, a part time Health

Literacy Specialist, and University of Wisconsin faculty), supported statewide teams related to healthy living, and leveraged significant resources through grants and by serving as the fiscal home for the Statewide Prevention Conference.

Results:
UW-Extension education programs promote health and wellness by helping individuals and families eat well, stay active and make informed decisions about family and individual health behaviors. Extension educators also work alongside community partners to create and support community environments that promote health and wellness. Leading community coalitions that create positive community change is a hallmark of UW-Extension programs. UW-Extension county faculty reported spending nearly 20% of their time on Health/Health Promotion/Chronic Disease Prevention education in 2016 with the following outcomes.

Impacting families

- Eating well - 2,166 individuals reached with education about healthy eating. UW-Extension reached an additional 86,000 individuals with nutrition education through SNAP-Ed.
- Staying active - 4,025 individuals reached through promoting physical activity in community settings. Evaluations showed that community-based physical activity programs for older adults improved participant's health and wellness through increased strength, balance, competence and confidence in ability to complete daily activities, and social connectedness.
- Preparing food safely - 1,457 individuals reached with programs focused on preparing food safely. UW-Extension lessons on home food preservation increased individual's knowledge, confidence and intent to change behaviors related to preserving food safely at home.
- Accessing reliable healthcare information - 318 individuals and 54 community partners reached regarding health insurance or health literacy.
- Effectively managing stress - A successful pilot project of a stress-reduction curriculum with 59 individuals in Jackson County led to a 15 county train-the-trainer workshop, positioning UW-Extension to increase capacity to deliver the curriculum statewide in 2017.

Working with partners to create community change

- Engaging with 53 public health stakeholders statewide and beyond, through activities such as statewide Coalition Networking Calls and convening a Rural Health Advisory Committee.
- Developing a strategic health promotion framework, promoting a clear vision for health promotion work at UW-Extension and increasing collaboration between Extension and other agencies around health promotion
- Introducing 120 Extension colleagues to the National Framework and increasing their awareness, understanding and potential actions for applying a health lens to our work.

Leveraging resources
UW-Extension leveraged an additional $8.75 million to support SNAP-Ed nutrition education programming and received a $350,000 USDA/NIFA Grant Rural Health and Safety Education grant to reduce rural cancer disparities.

Meeting NIFA Priorities

The 2016 combined Research and Cooperative Extension federal annual report describes how statewide interdisciplinary campus and county faculty, staff and colleagues provide research-based education and assistance to sustain and grow the state's vital agricultural economy across NIFA priorities:

1. Global Food Security Food Availability: Crops and Agronomic Plants

The WAES and Cooperative Extension collaboration among campus, county and regional colleagues, partners and trained volunteers, provides research-based education and assistance to improve food security by strengthening local food markets and systems, responding to growing consumer demand for sustainably produced local foods, building community capacity to increase access to healthy foods for vulnerable populations, increasing household access to healthy foods for those in need, and providing education to assist with the succession of farm businesses and retaining on-farm jobs.

2. Global Food Security Food Availability: Livestock and Poultry

The WAES research and Extension colleagues, partners, and trained volunteers provide timely research-based education and assistance to producers to develop food production systems that enhance animal health, while increasing the production capacity, efficiency and nutritional value of food. Research and professional education of such topics as grass-fed beef, pasture-raised poultry, and managing pastures for water quality continue to be just a few areas of focus.

3. Global Food Security and Hunger: Food Accessibility

Cooperative Extension colleagues collaborate among campus, county and regional colleagues, partners and trained volunteers, providing research-based education and assistance to improve food security by strengthening local food markets and systems, responding to growing consumer demand for sustainably produced local foods, building community capacity to increase access to healthy foods for vulnerable populations, and increasing household access to healthy foods for those in need.

4. Climate Change and Energy Needs

Climate change and energy needs have a variety of impacts on communities, agriculture, natural resources, local economies and human health. In addition, the WAES and Cooperative Extension educators in both agriculture and community development program areas are being called upon to respond to questions about bioenergy and sustainable renewable energy. Professionals and community leaders need locally relevant, science-based climate change and energy needs information and methods to incorporate into economic development and resource management planning processes.

5. Sustainable Use of Natural Resources

Communities are interested in developing renewable energy industries for energy independence, job creation, and economic development. The Wisconsin Agricultural Experiment Station incorporates research to benefit forest production, weed management, surface water quality, and promote new farm based practices. Cooperative Extension campus and county faculty and staff are conducting integrated research and extension programs, and building capacity for scalable, sustainable energy among extension colleagues and communities.

6. Nutrition

The WAES and Cooperative Extension research projects explore basic human nutrition, and identify effective measures that guide individuals and families to make informed, science-based decisions to promote health and reduce malnutrition in high-risk populations. Effective research-based interventions that are practical to implement and sustain are needed to support parents and others to help young children develop healthy behaviors.

7. Food Safety

As the U.S. becomes more urban, youth and adults are becoming disconnected from a basic understanding of the science behind agricultural production and the technology it takes to make sure their food supply is safe and readily available. The WAES and Cooperative Extension plan collaboration among campus and county faculty and staff, colleagues, partners and trained volunteers to provide research-based training and support to reduce the incidence of food-borne illnesses and to improve the safety of the food supply by educating consumers and food safety professionals, and developing food processing technologies to improve food safety.

8. Education and Science Literacy

Education and science literacy reach beyond local communities to impact regional, national and global communities. The WAES and Cooperative Extension campus and county faculty and staff, colleagues, partners and trained volunteers work with Wisconsin youth in educational events using curriculum such as STEM and the Master Gardener and Master Naturalist programs.

9. Rural Prosperity

Rural Prosperity not only depends on attracting, retaining and informing young people through community development efforts that build upon a community's assets, while improving agricultural development and marketing, rural prosperity also means supporting established and possibly aging rural property owners through education and outreach. Cooperative Extension campus and county faculty and staff, colleagues, partners and trained volunteers work with rural property owners across the state to help them stay current regarding ownership and leasing decision-making. In addition, while half of Wisconsin farmers are nearing retirement, most do not discuss farm succession plans with anyone. Cooperative Extension county agriculture agents and campus specialists will continue to deliver comprehensive regional farm succession trainings.

10. Wisconsin Competitive Program

Capacity funds are being used to address a number of state priority research activities that cannot be classified in the nine priority areas. We have grouped these ongoing projects under the rubric of the "Wisconsin Competitive Research Program," but funds supporting these projects will be redirected to the new national priorities in the future. These projects do contribute to a variety of important state needs and are focused in several areas, including water resource issues, applied statistics in support of agricultural research, policy analysis for use in land use planning and commodity programs, management of invasive exotic organisms, and bio-waste management

Total Actual Amount of professional FTEs/SYs for this State

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	102.0	{No Data Entered}	133.0	{No Data Entered}
Actual	125.0	0.0	139.9	0.0

II. Merit Review Process

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

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

2. Brief Explanation

A 10--person faculty Research Advisory Committee (RAC), appointed by the associate director of the Agricultural Experiment Station, reviews proposals for capacity grant funding on the UW-Madison campus. Each proposal is reviewed by two RAC members (designated primary and secondary reviewers) and by two, non-committee members--drawn from the Madison campus, other UW campuses, state agencies, non-governmental organizations and other states--who are established experts in the field. The reviewers are asked to consider a proposal's merit in terms of its relevance to program guidelines and to national goals and emphases areas, pertinence to state problems and priorities, relationship to multistate projects and inclusion of integrated activity. Some Wisconsin faculty members are cooperators in multistate committees in the North Central, North East, Southern, and Western Region as well as a few National (NRSP) projects. Each region has a review process with slight modifications.

Cooperative Extension educators and WAES faculty with extension appointments are organized into self-directed teams that develop specifics for implementing and evaluating planned programs. At the state level, program area administrators review and oversee team programming. Teams co-chaired by campus and county faculty set the direction for their initiatives, complete a statewide team plan of work, develop research-based educational resources, and evaluate and report progress toward planned outcomes.

Team leaders and program directors conduct merit reviews jointly in Cooperative Extension. Teams use reviewers' recommendations to improve program quality and relevance for the intended audience, and include review comments in annual accomplishment reports and plans of work. Cooperative Extension curricula and publications are peer reviewed by research and extension faculty, government or industry colleagues and professionals as appropriate to the content, purpose and intended audience. Translations are reviewed for cultural appropriateness. Scholarly peer review and cultural review assure the quality and relevance of educational materials and outreach scholarship.

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
- Other (meeting specifically with non-traditional groups)

Brief explanation.

Methods of collecting stakeholder input vary depending on the type of meeting or activity around which the input process is organized. Most generally, this involves personal contact with someone from the UW-Madison WAES/CALS and Cooperative Extension administrative leadership group meeting with a traditional or non-traditional stakeholder group or individual, or meetings that are open to the general public or selected individuals. For example, this year we visited with representatives from the grape-growers and wine-maker stakeholders about their emerging research needs, and visited facilities run by a number of industry partners in the crop, meat and dairy industries. County educators routinely conduct local needs assessments that identify critical issues. These issues inform local educational programs and are transmitted to campus-based staff to inform research priorities.

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
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

The CALS Administrative Leadership group maintains a close relationship with leaders of the industries and advocacy groups that have an interest in disciplines we study. In addition to advisory groups, the CALS Administrative Leadership Group attends field days, hosted at our 12 agricultural research stations located throughout the state. These field days and other public events allow college leaders regular interaction with a variety of producers and growers representing the breadth of Wisconsin agriculture. Examples of face-to-face meetings with stakeholders include:

CALS researchers helped develop the Wisconsin Pollinator Protection Plan as part of a joint effort between the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) and the University of Wisconsin-Madison.

The UW-Madison Center for Integrated Agricultural Systems (CIAS), with the USDA-Agricultural Marketing Service's Transportation Division and the Chicago Metropolitan Agency for Planning, hosted a workshop on business innovations in regional food freight systems on January 5, 2016, in Chicago.

The Hancock Agricultural Research Station celebrated its 100th anniversary on July 28, 2016, and offered an expanded set of events during the station's annual Potato and Vegetable Research Field

Day. The station experienced a strong turnout, and attendees heard about the station's history, accomplishments, partnerships, such as the Midwest Food Processor Association and the Wisconsin Potato and Vegetable Growers Association, and its ongoing research.

CALS and UW-Extension researchers and policy analysts took part in the 2016 Wisconsin Agricultural Economic Outlook Forum organized by the UW-Madison's Renk Agribusiness Institute.

CALS scientists took part in a UW-Madison/UW-Extension-led workgroup charged with reviewing the potential advantages and concerns associated with manure irrigation-which is the practice of applying livestock manure to fields using irrigation equipment. The workgroup was convened at the request of the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Wisconsin Department of Natural Resources.

Two CALS researchers were part of a National Academies of Sciences, Engineering, and Medicine Committee tasked with assembling a report on GMOs. To write the report, titled "Genetically Engineered Crops: Experiences and Prospects," the committee examined over 1,000 research projects and publications, held in-person meetings and 15 webinars, and read more than 700 comments submitted by the public.

The Cooperative Extension county agents/educators have latitude in tailoring their planning processes to their unique needs. All individuals, whether they are internal or external, are encouraged to use methods that solicit feedback, needs and issues of concern from the communities' diverse populations. Because county governments co-fund the Cooperative Extension county educator positions, these county educators are accountable to the needs assessment and issue identification process.

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
- Meeting with the general public (open meeting advertised to all)
- 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

Brief explanation.

Stakeholders' input for the development and conduct of research relating to state needs are accomplished in a tiered system. Many departments, centers, and institutes maintain advisory committees that meet periodically with researchers in the units. Departments convey this input to the CALS Administrative Leadership Group.

A Board of Visitors advises CALS and meets with the Administrative Leadership Group twice a year. That board includes accomplished and influential individuals representing a number of interest groups, including agriculture producers, industries, consumers, environmentalists, and state agencies. In addition to advising CALS on research and outreach needs, the board also provides a source of contacts of various constituencies.

College leaders are also frequently invited guests at a monthly meeting of commodity groups, organized by representatives of those groups to better collaborate on emerging issues. These public events and organizational meetings provide periodic opportunities for leaders of user groups to interact informally with CALS Administration and faculty.

Input has been gathered from diverse and under-represented audiences statewide through focus groups, interviews, listening sessions and case studies. Statewide team efforts accord with the local context, where all 72 Wisconsin county extension offices have civil rights plans designed to increase access to educational programs among traditionally under-served audiences.

3. A statement of how the input will be considered

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

Brief explanation.

Results from stakeholder input identify priority issues. Planning is ongoing and continues to set direction for research and extension to address priority issues, for incorporation into budget and staffing decisions through statewide self-directed teams, and shape team implementation and evaluation plans as well as statewide federal plans of work.

Brief Explanation of what you learned from your Stakeholders

In meeting with stakeholders, we continue to learn of their interests in many areas related to agriculture, natural resources and environment, food, energy, rural life and health issues and rural economic development. The consistent theme being presented to us is the growing demands for food and new food markets, community food systems and health issues.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
9174725	0	6491578	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	6450941	0	7958909	0
Actual Matching	6450941	0	7958909	0
Actual All Other	0	0	0	0
Total Actual Expended	12901882	0	15917818	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	6450977	0	4767250	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security Food Availability: Crops and Agronomic Plants

☑ 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	20%		4%	
133	Pollution Prevention and Mitigation	15%		1%	
135	Aquatic and Terrestrial Wildlife	0%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
202	Plant Genetic Resources	5%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		9%	
204	Plant Product Quality and Utility (Preharvest)	0%		9%	
205	Plant Management Systems	10%		5%	
206	Basic Plant Biology	0%		4%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		10%	
212	Pathogens and Nematodes Affecting Plants	0%		14%	
213	Weeds Affecting Plants	0%		1%	
215	Biological Control of Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	20%		5%	
302	Nutrient Utilization in Animals	0%		1%	
307	Animal Management Systems	0%		1%	
402	Engineering Systems and Equipment	0%		3%	
601	Economics of Agricultural Production and Farm Management	10%		1%	
608	Community Resource Planning and Development	10%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		1%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	28.0	0.0	21.7	0.0
Actual Paid	24.0	0.0	54.0	0.0
Actual Volunteer	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
1374995	0	2292869	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1374995	0	2292869	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

Faculty working on food availability issues transcend discipline lines and use a variety of biological, physical and social science approaches in working on these issues. The majority of our work involves improvements in the management of important crop food sources in the upper Midwestern U.S. However, many projects have broad national and international applications, including herbicide resistance, identification and application of genes of economic significance, practices for maintaining soil fertility, conservation and management of crop genetic resources, and management of a variety of globally important micro-organisms. Work is also occurring in the areas of urban poverty and food security, especially in metropolitan areas and among recent immigrants, and in social network analysis and socio-ecological systems.

Cooperative Extension plans collaboration among campus, county and regional colleagues, partners and trained volunteers, providing research-based education and assistance to improve food availability by strengthening local food markets and systems, responding to growing consumer demand for sustainably produced local foods, building community capacity to increase access to healthy foods for vulnerable populations, and increasing household access to healthy foods for those in need.

2. Brief description of the target audience

What follows are brief summaries highlighting the diversity of our research and extension portfolio to reach specific audiences.

Building regional capacity among agricultural professionals and service providers

Simply counting educational contacts does not capture the extent of a program's reach. For example, the 1,669 agricultural professionals who attended the 2016 Wisconsin Crop Management Conference from Wisconsin, Minnesota, Iowa, Illinois, Indiana and Michigan produce a large multiplier effect as Wisconsin extension research-based recommendations, timely education and resources ultimately reach an increasing portion of the Great Lakes Region crop production sector including farmers. Crop consultants and industry agronomists are the primary clientele, reaching nearly every farmer in the state for grain production. Extension IPM and other state specialists in the UW-Madison departments of agronomy, entomology, plant pathology and soil science reinforce this work through regional professional development trainings including formal classroom instruction, field days and a YouTube training library developed and delivered by county and area extension educators for Wisconsin's 634 Certified Crop Advisors who earn 40 hours of continuing education units every 2 years to remain certified. Integrated research and outreach faculty and staff recorded 50 YouTube videos on basic crop pest, nutrient, soil and water management in January 2015 for the CCA pre-test training curriculum that received 115,107 views. For 2017, the conference has been renamed the Wisconsin Agribusiness Classic: http://agclassic.org

States: IA, IL, IN, MI, MN, WI

Nutrient Management Farmer Education (NMFE)

The curriculum combines classroom instruction, individual consultation and on-farm field trials to educate farmers on methods for improving NM practices from both an economic and environmental perspective. Once this is accomplished, the next step is to involve farmers in designing their own NM plans. University of Wisconsin-Extension provides technical information and local educational delivery. Collaborations include:

1) Endorsement of the curriculum by the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) as the only mechanism for certifying farmers to write their own NM plans.
2) Implementation funding at the county level with resources from DATCP, USDA-NRCS, and others.
3) Local delivery via collaborations of UW-Extension, Land Conservation Departments, NRCS, technical colleges, crop consultants and agronomists.

As a result of their participation in county-based NMFE programs around 420 farmers in 26 Wisconsin counties increased their knowledge of NM practices in 2016. An estimated 90% developed, or helped develop, NM plans for their operations on 130,765 acres of Wisconsin cropland with the major agricultural enterprises of dairy, cash grain, and beef. Cumulative accomplishments numbers from 2000 to 2016 show that as a result of local delivery of the NMFE curriculum, over 6,654 producers farming nearly 2 million acres in 55 counties have received in-depth education on NM planning.

Training the Next Generation: Involving Youth in On-Farm Research Projects

The UW-Extension Agriculture (Ag) Agent in Monroe County continues to involve Cashton High School Students in on-farm research projects. The students serve as co-investigators in the field plots conducted by the Monroe County Ag Agent and UW-Extension Specialists. The youth use this experience as a Junior Science and Humanities Symposia project where they present their findings and compete for scholarships. The students gain experience in conducting replicated trials and learn protocol and procedures of the trials and conducting unbiased research trials. By interacting with University researchers and specialists, students also gain valuable career exploration. Here are some examples. One of the students earned a scholarship for her presentation and report evaluating different traps and lures for monitoring spotted wing drosphila fly. Three other students were co-investigators on another spotted wing drosophila fly project, a disease resistance evaluation project on tomatoes, and a potassium rate trial in organic field corn production. They presented their findings at a national conference. A third project led to another student attending a national competition to present and report on a project evaluating potassium fertilizer rates on

corn production. Two students worked on projects in the summer of 2016. One worked on a Nitrogen rate trial, and the other on a seed maggot trial in vegetable crops.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 12 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2303	0	0	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	97	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-

Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	141

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Manage and minimize the loss due to plant pests and/or diseases.
2	Enhance the economic and environmental sustainability of agribusiness.
3	Build the capacity of the agriculture service and support industry.
4	Innovations and increased efficiencies in production.

Outcome #1

1. Outcome Measures

Manage and minimize the loss due to plant pests and/or diseases.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Enhance the economic and environmental sustainability of agribusiness.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Nutrient Management Extension Impacts

In 2016, grain producers faced high cost of production relative to commodity prices. With fertilizer up to 20% of total production cost and 40% of input costs, crediting nutrients from all fertilizer sources and maximizing return on investment in crop nutrients can help producers improve overall profitability. Nutrient application rate recommendations must be science-based, and require frequent updates to reflect recent research results on nutrient use and management. Continuous on-farm research by integrated state specialists as described in this report is essential to University of Wisconsin-Extension statewide education optimizing crop production efficiency, farm profitability, environmental quality and regulatory compliance. Trained farmers, agricultural professionals, government agency staff and the next generation rely on soil fertility guidelines specified in UW-Extension publications and software for career development, current best management practices, sound fertilizer and manure application rate decisions, nitrogen crediting, nutrient management plan development, and agency policy on nutrient management.

What has been done

As co-director of the UW Nutrient and Pest Management (NPM) Program, extension soil scientist Carrie Laboski is quick to credit collaborations among campus and county extension colleagues, their plant tissue and soil testing labs, students, farmers, community partners and funding agencies that support her accomplishments since arriving in 2004. As former co-chair of the interdisciplinary Grains Team, she tasked this statewide extension network to examine and report raw and composted manure applications on many soil types under seasonal conditions, setting up monitoring networks for severe drought and record flooding. Fed by Laboski's research, this extension network provides agronomically and economically sound science-based nutrient application rate and management guidelines to farmers, agricultural professionals and government agency staff including:

Fostering a novel approach: A work group including Carrie Laboski and her North Central Region colleagues examined how to develop nitrogen fertilizer rate guidelines for corn production, and whether the entire region could use a similar approach. Laboski contributed research-tested corn nitrogen response data for developing the maximum return to nitrogen (MRTN) approach to corn nitrogen rate guidelines, and was key in analyzing and interpreting the data used to develop the MRTN approach now widely adopted and tested across the Corn Belt. NPM's software version of the MRTN approach was one of the first, free iPhone apps of its kind (now also available for Android) downloaded worldwide, providing N fertilizer rate guidelines for corn using soil type/management along with the price of N and corn.

Bolstering careers while keeping costs affordable: In revising the Managing Nutrients on Wisconsin Soils (MNWS) curriculum in 2013, Laboski doubled enrollment by converting the classroom style workshop into a webinar series covering more advanced nutrient management (NM) topics for 90 agency personnel, agricultural professionals, UW and Vo-Tech staff and students. Evaluations showed that the webinar format was a cost-effective use of their time, knowledge level across all topics increased, and the webinar appealed to both newer and more seasoned professionals. In further transforming this course, Laboski recorded 8 of 21 videos for the revised MNWS 2015 online self-paced training. She then helped plan and record 6 videos for the in-depth Training for Nutrient Management Planners (TNMP) also self-paced online (7 hours) with a face-to-face workshop for production agronomists and county-based conservation staff in 2016 via the Learn@UW/Desire2Learn platform (D2L). During the 1-day follow-up workshop, participants worked in small groups to prepare a functional NM plan for a real Wisconsin farm. The D2L technology greatly reduced their travel, lodging, meal, hard copy and other expenses, and kept 21 video presentations from 10 speakers plus support publications available for 10 weeks.

Results

Science-based guidelines enhance farm fields and public policy: Carrie Laboski's integrated research and extension activities provide timely research-based information on nutrient management and soil fertility, developing and delivering decision-making tools that assist farmers, agricultural professionals and regulatory agencies in making decisions that help sustain economically and environmentally sound production of grains in Wisconsin and the Upper Midwest. She continues to work with county agents in conducting on-farm N rate research trials to demonstrate that N fertilizer rate selection is the first step in insuring profitable fertilizer management, strengthening relationships through collaboration among the University of Wisconsin-Extension, Nutrient and Pest Management (NPM) Program, UW-Madison Department of Soil Science, Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), USDA-Natural Resources Conservation Service (NRCS) and North Central Region Land Grant universities. For example:

When 2 brothers asked many questions at a field day, Laboski engaged them in MRTN research trials on their farm. Learning to take more crediting from all the different sources of fertilizer they use surprised them: "What we learned from Carrie is that we were putting out too much nitrogen." In changing nitrogen management, they cut back 20 pounds or more on 1,000 acres of corn with the same yield per acre. By conservative estimate, at 30 cents a pound using 20 pounds less on 1,000 acres saved the brothers at least $6,000 in 2016.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Build the capacity of the agriculture service and support industry.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Innovations and increased efficiencies in production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Enhancing nitrogen utilization in corn-based cropping systems to increase yield, improve profitability, and minimize environmental impacts

While nitrogen is essential to healthy crops, it negatively affects air and water quality when it escapes the soil. Farmers work to provide enough nitrogen to their crops for the best yields without adding excess nitrogen to the soil. Livestock manure is a source of naturally occurring nitrogen and is regarded as a good plant food. Applying manure at the best time and accurately accounting for the nitrogen in it is difficult, though, and farmers tend to apply additional nitrogen to ensure the best possible yields. To better manage nitrogen for optimum results with limited environmental impacts, researchers are working to better understand several important factors: the nitrogen cycle, highly variable soil types, seasonal weather and temperatures, manure types, varying field slopes and diverse farming practices.

What has been done
Dr. Carrie Laboski and other researchers at the University of Wisconsin-Madison established a large-scale, multi-year, multi-location trial on commercial dairy farms and at the Arlington Agricultural Experiment Station resulting in five research sites at which data were collected through two growing seasons. In addition to control plots, one set of treatments included raw, liquid manure, another used manure processed through a digester, and a third added a nitrification inhibitor product. Nitrogen levels, crop and soil conditions, and weather information was recorded throughout the trial using crop sensing technology and soil sample analysis.

Results
An enormous volume of high quality data is now available for analysis. Early results suggest the need for new ways of interpreting the information and producing accurate recommendations. The

data will lead to a better understanding of the timing of manure and supplemental nitrogen applications. Additionally, best management practices for the use of nitrogen inhibitors with manure will help farmers get the most from available resources while improving environmental outcomes. Because of the size and scope of the project, researchers now recognize that nitrogen responses are variable, even in a relatively small area in fields--an observation formerly based on farmer intuition and experience.

This research involved close collaboration between the university and the dairy farms. Farm personnel were included in research briefings, providing learning opportunities for everyone involved. New crop sensing technology is being introduced to gather data and evaluate potential for commercial use. The research project received in-kind contributions as well as funding from commercial companies and a state fertilizer council. An extensive public information program to distribute findings will include extension-based field days, conferences, workshops, webinars, on-line self-paced training and online videos.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under planned program activity and outcomes number 2 and number 4.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security Food Availability: Livestock and Poultry

☑ 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
111	Conservation and Efficient Use of Water	0%		2%	
204	Plant Product Quality and Utility (Preharvest)	0%		2%	
205	Plant Management Systems	0%		2%	
206	Basic Plant Biology	0%		2%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	0%		25%	
303	Genetic Improvement of Animals	0%		10%	
304	Animal Genome	0%		12%	
305	Animal Physiological Processes	0%		12%	
307	Animal Management Systems	15%		10%	
308	Improved Animal Products (Before Harvest)	10%		0%	
311	Animal Diseases	5%		7%	
315	Animal Welfare/Well-Being and Protection	5%		0%	
601	Economics of Agricultural Production and Farm Management	20%		2%	
602	Business Management, Finance, and Taxation	15%		2%	
702	Requirements and Function of Nutrients and Other Food Components	0%		2%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		0%	
806	Youth Development	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	35.0	0.0	21.0	0.0
Actual Paid	30.0	0.0	20.5	0.0
Actual Volunteer	100.0	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**
1565150	0	1325381	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1565150	0	1325381	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

Faculty working on food security and hunger issues transcend discipline lines and use a variety of biological, physical and social science approaches in working on these issues. The majority of our work involves improvements in the management of important crop food sources in the upper Midwestern U.S. However, many projects have broad national and international applications, including technologies to improve fertility in livestock and management of a variety of globally important micro-organisms. Work is also occurring in the areas of urban poverty and food security, especially in metropolitan areas and among recent immigrants, and in social network analysis and socio-ecological systems.

The WAES and Cooperative Extension plan collaboration among campus, county and regional colleagues, partners and trained volunteers, providing research-based education and assistance to improve food availability by strengthening local food markets and systems, responding to growing consumer demand for sustainably produced local foods, building community capacity to increase access to healthy foods for vulnerable populations, and increasing household access to healthy foods for those in need.

In preparation for today's specialized careers in agriculture, youth must understand their many options for gaining experience and obtaining the education needed to attain their chosen career. Wisconsin Cooperative Extension 4-H Youth Development outreach staff coordinates the annual National 4-H Dairy Conference in collaboration with a national committee of dairy specialists, industry leaders, recent alumni youth, and 4-H dairy project volunteers. All youth delegates explore careers while attending seminars on the UW-Madison College of Agricultural and Life Sciences campus, sparking an interest in attending this or another college to pursue a specialized educational degree for a career in agriculture.

2. Brief description of the target audience

What follows are brief summaries highlighting the diversity of our research and extension portfolio to reach specific audiences.

Meat Animal Quality Assurance (MAQA)
In 2016, the Meat Animal Quality Assurance Program certified over 5,500 youth in the species areas of beef, sheep, swine and meat goats. This program has been taught for 13 years by certified UW-Extension staff and agricultural science teachers with a curriculum based in good production practices such as Animal Care and Management, Animal Health Products and Animal Handling. Current topics and issues of concern include the new veterinary feed directive (VFD) requirements (described under Food Safety in this report), Porcine Epidemic Diarrhea (PED), sportsmanship and ethics, animal well-being protocols, agriculture advocacy and career development. Roughly 100 extension volunteers are trained each year to help 4-H and FFA youth keep their certification current. Youth ages 8 to 19 (grades 3 to 13) must be certified to exhibit swine at the Wisconsin State Fair and compete nationally. MAQA meets the requirements of the PQA Plus program from the National Pork Board through 2017. In 2018, Youth for the Quality Care of Animals (YQCA) debuts. YQCA is a national multi-species quality assurance program for youth ages 8 to 21 focusing on three core pillars: food safety, animal well-being, and character development. For updates and more information: http://fyi.uwex.edu/youthlivestock

Youth for the Quality Care of Animals (YQCA, replaces MAQA)
Since 2015 when the National Pork Board began exploring online certification of youth in multi-species food animal quality assurance -- beef, sheep, swine, goats, dairy, poultry and rabbits -- University of Wisconsin-Extension youth livestock specialist Bernadette O'Rourke has been key in organizing and developing this national effort called YQCA -- Youth for the Quality Care of Animals. This extends her involvement on the national Youth Pork Quality Assurance (Youth PQA Plus) committee. She is secretary to the board of directors, serving on the Research and Evaluation, Curriculum and Curriculum Consistency Review committees. Starting in 2013, the MAQA committee began examining options and costs of developing online youth certification, seeking a sustainable, fun new learning experience for youth with new and evolving programming and technology. Realizing the costly endeavor and the start of the national programming was moving forward faster with buy-in from commodity groups, Wisconsin chose to be a part of the national program that debuts in 2018. Commodity groups on board include the National Cattlemen Beef Association, National Pork Board, American Sheep Industry, Rabbit Growers and National Milk Producers Federation. National Pork Board's checkoff funds will go towards this national effort and their youth pork quality assurance program will be discontinued.

States: CO, IA, MO, NE, NV, OH, SD, WA, WI

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, at 11 agricultural research stations and the USDA Dairy Forage Research Center.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	119	0	5500	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	104	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	129

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Manage and minimize the loss due to animal disease.
2	Enhance the economic and environmental sustainability of agribusinesses.
3	Build the capacity of the agriculture service and support industry.
4	Innovations and increased efficiencies in production.

Outcome #1

1. Outcome Measures

Manage and minimize the loss due to animal disease.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Committee on Swine Nutrition

Swine kyphosis has been a significant, intermittent problem for the pork business. Shortly after birth, affected piglets develop "humpbacks" as the condition disturbs spinal growth. Afflicted pigs cannot thrive with such a disability and usually cause financial losses for farmers. The sporadic nature of the condition has remained a mystery. Pigs in a University of Wisconsin-Madison nutritional research trial unexpectedly developed kyphosis providing an opportunity for first-hand scientific study of the issue.

What has been done
Initial work determined that gestating sows were not getting enough vitamin D in their diets. Between 20 to 30 percent of piglets from vitamin D-deficient sows would routinely develop kyphosis. Therefore, a simple, cost-effective means to eliminate kyphosis is to assure gestating sows are getting enough vitamin D. Researchers also found that the vitamin D deficiency caused a lesion in the cartilage of the spine, not on the bone, meaning that kyphosis was not rickets. Further observation revealed a previously unknown, endocrine-like feature of bones. Discoveries connected to the original investigation of kyphosis also led to a new swine research model that can be used to the study mineral, vitamin and hormone pathways.

Results
Due to this work, pig farmers now have a means to manage a troublesome disease. The benefits of the research also extend into a new research model that has the potential to provide insight into vitamin and mineral utilization in mammals. One area researchers are now studying is phosphorus efficiency. Phosphorus is detrimental to water quality but essential for the swine diet, and scientists are confident they can improve phosphorus efficiency in swine to reduce the

amount of phosphorus in the environment. Better understanding of cellular interactions with minerals, vitamins and hormones may also provide benefits for human bone health via preventative or treatment protocols. Collaborative teams from mechanical engineering and the medical school have worked together to create novel ways of looking at cellular activity in the bone and develop diagnostic equipment and calibration algorithms that greatly enhance the accuracy of lab results.

This work gave numerous undergraduate and graduate students experiences in animal, medical and engineering sciences and the opportunity to earn scholarships and achievement awards. At least one student pursued this work as a career. Results have been published in numerous scientific journals, presented at scientific and industry conferences, and been made widely available to the broader scientific community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
702	Requirements and Function of Nutrients and Other Food Components
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #2

1. Outcome Measures

Enhance the economic and environmental sustainability of agribusinesses.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: 2016 Dairy & Livestock Quality Assurance PQA - Pork Quality Assurance Education and Assessments

As consumers place more scrutiny on knowing where their food comes from, and how and where it is being produced, Quality Assurance Programs and certifications have increased in importance as a way to demonstrate to consumers that dairy and livestock owners-and the next generation-are committed to producing high quality, safe and wholesome food products. While quality assurance is critical to any industry, it is especially important in agricultural industries since most consumers are generations removed from agriculture and farming practices. The pork industry has made quality assurance participation mandatory for pork producers who market to major outlets, showcasing Pork Quality Assurance and third-party audits of certified producers to maintain and expand their markets.

What has been done
Pork Quality Assurance is a long-standing nationwide program that encourages swine farmers to use standard operating procedures to produce healthy antibiotic-free pork for human consumption (as described under Food Safety in this report). The University of Wisconsin-Extension Swine Team partnered with the Wisconsin Pork Association and Dr. Peter Lahmmers at UW-Platteville to certify farmers, conduct site assessments, and train extension and other agriculture professionals in certifying both 61 farmers in Pork Quality Assurance (PQA) in 2016 as well as 10 truckers in Transport Quality Assurance (TQA), safely delivering more live hogs to market in good condition. They invite veterinarians, extension and other professionals to attend train-the-trainer workshops and connect with livestock owners. In 2016, certified Swine Team members held four advisor trainings and certified 22 veterinarians and extension agents to teach Pork Quality Assurance, and conducted at least 23 on-farm site assessments. As farmers ask questions and request assistance, county agriculture agents provide answers or request extension campus specialist to help solve concerns on the farm.

Results
Gaining consumer confidence and expanding markets: Quality Assurance Programs and certifications are gaining importance in animal agriculture. When consumers take interest in how and where their food is produced, Quality Assurance Programs provide them confidence in the products, showing how farmers are engaging in production practices that support animal well-being and quality. For pork producers, quality assurance certification provides expanded

marketing opportunities. For example:

In Marquette, Outagamie and Richland counties, the UW-Extension Swine Team and Dr. Peter Lammers trained 22 PQA+ Advisors who train farmers on the 10 Good Production Practices (GPP). Swine Team members also trained 61 farmers on the 10 GPP and conducted two PQA+ Site Assessments. PQA+ certification and site assessments are critical for pork farmers as most packers now require the training and site assessment to be completed before accepting hogs from a farm. With 2,210 hog farms selling pigs in Wisconsin (according to the 2012 Census of Agriculture), and total hog sales equaling $90.6 million, each farm averages hog sales of $40,990 each year. Using these figures, by 61 farms completing the PQA+ training, the farmers are maintaining their hog sales value of $2.5 million through commercial livestock sales barns and packers. Without the training, the farmers would not be able to move their market hogs or cull breeding stock through commercial channels, or would have significant discounts placed on their animals.

Lincoln and Marathon County agriculture development educator Dan Marzu and outreach specialist Alissa Grenawalt worked with four members of the Lincoln County Market Animal Show and Sale committee to teach Meat Animal Quality Assurance (MAQA) for 71 youth (37 female and 34 male). Youth learned animal identification, proper animal care and management, appropriate on-farm feed and commercial food processor procedures, and communicating with consumers. MAQA improves consumer perception of youth exhibitors, improves youth exhibitors' management and health practices, and teaches life skills of record-keeping, decision-making, general responsibility and care. In 2013-14 evaluation, 2,164 MAQA-certified youth from 58 of Wisconsin's 72 counties who completed retrospective evaluation surveys reported post-MAQA increases in all 29 measures in the survey and all were statistically significant-indicating that participation in MAQA increased their behaviors around 8 expected outcomes including producing a quality meat product. The largest gain was for reading antibiotic and feed labels and keeping accurate written records of feed and antibiotics, doubling after MAQA certification.

Expanding outreach for safer food: Extension's relationship with Wisconsin Pork Association has been developed by attending board meetings, hosting Swine Partners meetings at the Arlington Agricultural Research Station Swine Unit, working with rope test kits for detecting PRRS and PED viruses, and encouraging PQA certification and site assessments. Organic Prairie has become a supporter of extension programs and developed an open communication with the Swine Team, who now have increased opportunities to do site assessments on organic farms that have had little contact with UW-Extension professionals. The PQA training and site assessments are valued by the farmers, swine industry professionals and organic procurement professionals. The Swine Team has reached an underserved population of swine farmers, both traditional and organic, that has spurred development of Standard Operating Procedures on farms-providing better animal welfare to the animals and a safer food product to consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
301	Reproductive Performance of Animals

302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
702	Requirements and Function of Nutrients and Other Food Components
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #3

1. **Outcome Measures**

Build the capacity of the agriculture service and support industry.

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Innovations and increased efficiencies in production.

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

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely

disrupted unless
there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under planned program activity and outcomes number 1 and number 2.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Global Food Security and Hunger: Food Accessibility

☑ 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	5%		0%	
205	Plant Management Systems	10%		0%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
602	Business Management, Finance, and Taxation	15%		0%	
604	Marketing and Distribution Practices	10%		0%	
607	Consumer Economics	25%		0%	
608	Community Resource Planning and Development	15%		0%	
703	Nutrition Education and Behavior	15%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	0.0	0.0
Actual Paid	13.0	0.0	0.0	0.0
Actual Volunteer	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**
610920	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
610920	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

Cooperative Extension colleagues collaborate among campus, county and regional colleagues, partners and trained volunteers, providing research-based education and assistance to improve food security by strengthening local food markets and systems, responding to growing consumer demand for sustainably produced local foods, building community capacity to increase access to healthy foods for vulnerable populations, and increasing household access to healthy foods for those in need.

2. Brief description of the target audience

The audience includes farmers' market managers, vendors and customers, small-scale producers, producer associations, food processors and entrepreneurs, gardeners and Master Gardener volunteers, food coalitions and cooperatives, hunger coalitions and task forces, food pantries and other community service providers, local and regional economic development initiatives, local and tribal governments, school boards, school food service directors, teachers and parents of school-age children, low-income women with infants and young children, Hmong and Spanish-speaking central city residents, state and federal agency personnel, and others.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 12 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	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:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Strengthen local food markets and systems.
2	Increase household access to healthy foods for vulnerable populations

Outcome #1

1. Outcome Measures

Strengthen local food markets and systems.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Increase household access to healthy foods for vulnerable populations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Cooperative Extension Community Food Systems Team Summary

Approximately 12.7% of U.S. households (about 15.8 million Americans) experienced food insecurity, reduced food intake and/or reduced quality, variety, or desirability of diet at some point in 2015. The relationship between food insecurity, obesity, and chronic disease results from a mix of factors including lack of access to healthy, affordable foods; limited access to healthcare and physical activity; and heightened levels of stress, anxiety and depression among low-income populations, among others. As such, food security and health are not merely questions of caloric intake but are also related to food production and distribution systems, economic opportunity structures, the built environment, and healthcare more broadly.

What has been done
Recognizing the complexity of issues such as food security, a 2016 APLU report stressed the importance of Extension activities that "integrate food, environment and agricultural systems" to better promote "healthy food systems and healthy people." While UW-Extension has conducted research and outreach in these areas for many decades, disciplinary and program area boundaries have sometimes led to fragmented programmatic responses. The UW-Extension Community Food Systems Team (CFS Team) was created in 2011 to (1) enhance cross-program

area communication between colleagues engaged in community food systems programming ranging from agricultural market development to nutrition education, and (2) develop innovative approaches to complex food systems problems to increase the impact of UW-Extension programming.

The CFS Team has advanced these objectives by fostering a network of community food systems practitioners; building the capacity of educators to develop, implement and evaluate community food systems; catalyzing and supporting community food systems projects; and facilitating and disseminating learning on community food systems and interdisciplinary work. For example, the CFS Team holds semi-annual, statewide face-to-face meetings at which colleagues from all four program areas share work and build relationships with peers in other program areas. The team also provides funding for professional development opportunities and catalytic 'mini-grants' for local food projects that foster collaboration between two or more Extension program areas and/or engage new community partners.

Results

By developing a statewide network of extension colleagues, the CFS Team has increased county educators' access to specialists outside their program areas. As former Cooperative Extension Poverty and Food Security Specialist Amber Canto explained, "The team created a space for people to learn about my work. . . . So, now more than before, I get requests for assistance from CNRED or request for assistance from Ag and in some cases even 4-H. . . . I'm more accessible to all program areas." The CFS Team has also helped specialists re-contextualize their work within the larger food system. For example, Mike Maddox, a specialist working on a redesign of the Wisconsin Master Gardener's Program recalled: "By participating in the team, it'd influenced what I've done with the Master Gardener training. . . . I don't think I would have been thinking along these lines when I came into this position and realized, "Oh, we're not talking enough about food - if it wasn't for working with the team." Through a partnership with UW-Extension Program Development and Evaluation, the CFS Team has also built mini-grant recipients' capacity to articulate the program theories that underlie their projects and strengthen the linkages between small-scale, county-based gardening projects and larger organizational goals, such as food security.

Further, by providing funding for local food projects and professional development activities, the CFS Team has helped county educators better serve vulnerable populations, such as Hmong farmers and Somali immigrant communities. For example, Chippewa County CNRED educator Joseph Malual documented how a CFS Team scholarship to attend the National Value-Added Conference enabled him to meet the director of the Hmong American Farmers Association who offered valuable advice on developing culturally appropriate agricultural marketing and organizational development resources for Hmong farmers. Similarly, the CFS Team's mini-grant program has provided the necessary incentive and resources to foster new collaborations within county offices and with new partners such as local government officials, local Parks Departments, Middle Schools, pre-schools, and farmers' markets. By serving a networking function, incentivizing multi-disciplinary and multi-stakeholder collaborations, and offering small but catalytic funding, the CFS Team provides a crucial supportive function that enhances UW-Extension staff members' capacity to develop programming that comprehends the complexity of food systems issues and incorporates expertise from across the organization as well as from partnering institutions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
607	Consumer Economics
608	Community Resource Planning and Development
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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summary under outcome number 2.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change and Energy Needs

☑ 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	10%		13%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		4%	
123	Management and Sustainability of Forest Resources	0%		5%	
132	Weather and Climate	0%		4%	
133	Pollution Prevention and Mitigation	15%		4%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		4%	
205	Plant Management Systems	10%		4%	
206	Basic Plant Biology	0%		13%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		4%	
302	Nutrient Utilization in Animals	0%		4%	
306	Environmental Stress in Animals	0%		4%	
307	Animal Management Systems	0%		4%	
402	Engineering Systems and Equipment	0%		4%	
403	Waste Disposal, Recycling, and Reuse	5%		9%	
511	New and Improved Non-Food Products and Processes	0%		5%	
601	Economics of Agricultural Production and Farm Management	10%		5%	
605	Natural Resource and Environmental Economics	20%		0%	
608	Community Resource Planning and Development	25%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	17.0	0.0	30.0	0.0
Actual Paid	9.0	0.0	16.4	0.0
Actual Volunteer	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
457724	0	1064727	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
457724	0	1064727	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 WAES and Cooperative Extension plan collaboration among campus, county faculty and staff, tribal, regional and national colleagues, partners and trained volunteers to provide timely, science-based education and assistance for climate change adaptation and mitigation. Efforts will focus on developing, implementing, and evaluating outreach programs to reduce carbon, nitrogen, and energy and water footprints in local communities. One ongoing research project looks to advance the use of aspen for bioenergy, wood and fiber production.

The State of Wisconsin has initiated a Wisconsin Climate Change Initiative (WICCI) group that brings together faculty, interested clientele from other agencies, and industry representatives to discuss and plan for research and adaptive response to climate change. Current projects include work on developing monitoring systems for detecting changes in ecosystems structure and processes over time, soil carbon management practices, silvicultural practices to help ameliorate ecosystem changes resulting from climate change, and modeling conservation practices and land use patterns that might result from climate change.

Improving nutrient management practices improves farm profitability and reduces harmful effects of nitrogen and phosphorus on water quality. This likewise can reduce a harmful by-product of climate-mediated excess soil moisture and emissions of the greenhouse gas nitrous oxide into the atmosphere.

2. Brief description of the target audience

Integrated activity for our capacity grant programs targets a broad group of stakeholder audiences in agriculture, natural resources, and the public. The audience includes colleagues and other professionals, growers and grower associations, certified crop advisors, agricultural service providers, coalitions and

cooperatives, community leaders, business owners, local elected officials, town, city, county and tribal governments, state and federal agencies, local planning departments and regional planning commissions, utilities, school districts, economic development practitioners, the news media, and families.

The interdisciplinary BioEnergy and the BioEconomy Team is addressing statewide emerging bioenergy education needs. Farmers and foresters are interested in supplying feedstocks to the bioenergy industry as a potential alternative market and source of revenue. Communities are interested in developing renewable energy industries for energy independence, job creation, and economic development. At the onset of the bioenergy industry, policy makers, as well as entrepreneurial businesses, encouraged the rapid development of new energy sources using biomass as a renewable feedstock.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 12 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	64	0	360	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	53	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	73

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Work to reduce atmospheric greenhouse gas emissions.
2	Develop biomass use for biofuels
3	Build capacity to create, refine and implement scalable conversion technologies

Outcome #1

1. Outcome Measures

Work to reduce atmospheric greenhouse gas emissions.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Climate and Energy: Literacy of Youth

As the use of non-renewable energy sources increases, so do carbon emissions, which act as greenhouse gasses that are correlated with climate change. Rising temperatures and shifting weather patterns are disrupting natural and agricultural cycles, which put people and the planet at risk. Young people will inherit this situation, along with many others that will affect their well-being and that of their descendants. To understand and meet these challenges, youth need to develop creativity and skills in problem-solving and data analysis.

What has been done
In order to develop curriculum to educate youth about energy use tradeoffs, Wisconsin 4-H Environmental Education Specialist R. Justin Hougham collaborated with University of Wisconsin-Extension, the Wisconsin Environmental Education Board, and the U.S. Department of Agriculture-funded Northwest Advanced Renewables Alliance (NARA). Other project goals included increasing positive youth development in critical thinking and energy literacy. The U.S. Department of Energy defines energy literacy as "an understanding of the nature and role of energy in the universe and in our lives. Energy literacy is also the ability to apply this understanding to answer questions and solve problems."

The Value of a Tree (VOAT) curriculum addresses the work of the USDA and other governmental and private industry groups to create biofuels from forest, mill, and construction waste. The fuel is then refined into aviation fuel to fly commercial airplanes. This approach utilizes all parts of a tree-the bulk of it for lumber or paper products and the waste for fuel.

The Value of a Tree curriculum teaches youth about current research efforts to turn wood waste

into fuel and critically examine this new source of energy for jets in light of carbon emissions and climate change. Students calculate the age of a tree and how much jet fuel could be obtained from it, compared to the amount of carbon the tree could sequester in a year if left standing. Curriculum is designed to encourage a healthy debate about the value of trees and encourages students to examine a complex issue from various angles while taking stakeholder values and ecosystem needs into consideration.

Results
Nearly 360 youth and 64 adults participated in the Value of a Tree curriculum in Wisconsin, increasing youth ability to become better environmental stewards and interest in forestry careers. Because youth are able to interact with the lesson curriculum at both Upham Woods Outdoor Learning Center, operated by UW-Extension, and in their own communities, they develop a more powerful sense of place in their world.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
133	Pollution Prevention and Mitigation
205	Plant Management Systems
206	Basic Plant Biology
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Develop biomass use for biofuels

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Build capacity to create, refine and implement scalable conversion technologies

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summary under outcome number 1.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Sustainable Use of Natural Resources

☑ 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%		7%	
102	Soil, Plant, Water, Nutrient Relationships	0%		6%	
103	Management of Saline and Sodic Soils and Salinity	0%		4%	
111	Conservation and Efficient Use of Water	0%		4%	
112	Watershed Protection and Management	0%		6%	
123	Management and Sustainability of Forest Resources	0%		7%	
131	Alternative Uses of Land	0%		4%	
132	Weather and Climate	0%		7%	
133	Pollution Prevention and Mitigation	0%		7%	
135	Aquatic and Terrestrial Wildlife	0%		10%	
136	Conservation of Biological Diversity	0%		12%	
213	Weeds Affecting Plants	0%		7%	
304	Animal Genome	0%		4%	
307	Animal Management Systems	0%		4%	
311	Animal Diseases	0%		4%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		7%	
806	Youth Development	60%		0%	
903	Communication, Education, and Information Delivery	40%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890

Plan	2.0	0.0	22.0	0.0
Actual Paid	12.0	0.0	11.5	0.0
Actual Volunteer	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**
581371	0	806510	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
581371	0	806510	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 WAES encourages research to benefit forest production, weed management, surface water quality, and promoting new farm-based practices. An ongoing research project looks to provide input on nutrient recovery to reduce the environmental impacts on agricultural production and wastewater treatment.

Cooperative Extension plans collaboration among the cross-program area BioEnergy and BioEconomy Teams. Campus and county faculty and staff are conducting integrated research and extension programs, building capacity for scalable, sustainable energy among extension colleagues and communities. UW-Madison Environmental Resources Center staff worked with 50 North Central Region colleagues to develop the BioEnergy and Renewable Energy Community Assessment Toolkit and Energy Independence, BioEnergy Generation and Environmental Sustainability curricula disseminated via the Wisconsin Bioenergy Training Center web site: http://fyi.uwex.edu/biotrainingcenter.

ThinkWater, a national effort funded by USDA-NIFA, builds capacity of water educators, researchers, Extension, and policy professionals in the application of systems thinking to their work. ThinkWater in Wisconsin supports diverse interdisciplinary teams working on water issues, through a WI ThinkWater School and a WI Waterthinkers Network. WI Cooperative Extension Professional Development and Evaluation Staff provide leadership for the ThinkWater effort nationally and in WI. PDE provides leadership for ThinkWater as part of its commitment to innovation and advancement in the field of program development, organizational change and evaluation.

2. Brief description of the target audience

At the onset of the bioenergy industry, policy makers, as well as entrepreneurial businesses, encouraged the rapid development of new energy sources using biomass as a renewable feedstock. Farmers and foresters are interested in improving land, farming and supplying feedstocks to the bioenergy industry as a potential alternative market and source of revenue. Communities are interested in developing renewable energy industries for energy independence, job creation, and economic development.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 11 agricultural research stations and the USDA Dairy Forage Research Center.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4948	0	1600	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	15	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual

2016 29

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop and implement new ways to promote biomass use for biofuels
2	Build capacity to create, refine and implement scalable conversion technologies
3	Improve and encourage the use of and growth in the ThinkWater curricula
4	Implement and improve forest production, weed management, water quality, and promote new farming practices.
5	Implement and improve forest production, weed management, water quality, and promote new farming practices-Project Two

Outcome #1

1. **Outcome Measures**

Develop and implement new ways to promote biomass use for biofuels

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Build capacity to create, refine and implement scalable conversion technologies

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Improve and encourage the use of and growth in the ThinkWater curricula

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Implement and improve forest production, weed management, water quality, and promote new farming practices.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Ensuring Sustainable Water Resources in Wisconsin

Few issues are more important to the well-being of Wisconsin citizens than having an adequate supply of safe drinking water, as well as water resources to support tourism, agriculture and wildlife habitat.

The Center for Watershed Science and Education (CWSE), a partnership between the University of Wisconsin-Extension and the UW-Stevens Point, provides education and resources that make a difference by helping to ensure water resources meet the state's needs.

What has been done
The Center for Watershed Science and Education worked throughout Wisconsin to: Support watershed stewardship; Assist citizens with lake, river and drinking water quality problems; Promote management strategies for water resource protection; Provide water quality assessment and support; and Prepare students for careers as water resource professionals.

CWSE staff work with concerned citizens, lake and stream associations and stewardship organizations, county conservation and Extension offices, and state and federal agencies. CWSE also maintains the Water and Environmental Analysis Laboratory (WEAL) a state of the art facility performing dozens of different analyses on water and other environmental media.

Results
What follows are highlights of some of the Center's work.

CWSE tested the well water of over 3,500 Wisconsin residents in 2016; 12% of households had drinking water that exceeded standards for nitrate, the most common health-related contaminant found in Wisconsin groundwater; 17% of samples contained coliform bacteria. Staff counseled homeowners on ways to improve water safety.

14 community-based drinking water education programs reached over 1,200 well users in 10 counties (Clark, Dodge, Green, Green Lake, Kewaunee, Sauk, Sheboygan, St. Croix, Taylor, and Trempealeau).

Staff attended both the 2016 Wisconsin Farm Technology Days and the Midwest Renewable Energy Fair. Some 500 people at these events were counseled on water quality concerns; 200 had their water tested.

Staff attended the Wis. State Fair, where over 150 people participated in a "Water Taste-Test Challenge,' which explained what gives water its taste.

Staff trained 48 teachers on use of a groundwater education model.

Teachers reported over 1,600 students took part in groundwater activities after learning about the model.

Students in WEAL's partnership with the USGS helped analyze thousands of Great Lakes runoff samples, gaining professional-level experience.

CWSE partnered with citizens, Waushara County, UW-Extension, WDNR, and Golden Sands Resource Conservation & Development Council, Inc. to collect data from 30 lakes. The data was used to develop lake management plans.

Citizen scientists supported by CWSE monitored over 80 stream sites across 6 counties every month.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
132	Weather and Climate
133	Pollution Prevention and Mitigation
136	Conservation of Biological Diversity
806	Youth Development
903	Communication, Education, and Information Delivery

Outcome #5

1. Outcome Measures

Implement and improve forest production, weed management, water quality, and promote new farming practices-Project Two

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Project: Predicting sediment delivery in Wisconsin agricultural watersheds

Controlling soil erosion is an important component of preserving Wisconsin's surface water resources, which are critical for maintaining the state's drinking water supply, aquatic ecosystems and irrigation-based crop production systems. While considerable research has been done to

understand sediment and nutrient runoff from agricultural fields as well as the ecological impacts on water bodies, an important gap remains in our understanding of soil erosion and delivery through watershed drainage systems: the role played by the waterways that connect upland fields with downstream water bodies. Studying this unexplored area will help scientists better understand and predict sediment movement through an agricultural watershed. This information can help improve computer models of soil erosion and best management practices.

What has been done
Sediment delivery through a watershed drainage network is a complicated process owing to a wide range of landscape characteristics (field size, shape, slope, moisture level, management practices) combined with variable storm characteristics (rainfall intensity, duration). A team of UW-Madison and UW-Extension researchers took measurements and used existing data from the University of Wisconsin-Platteville Pioneer Farm near Platteville, Wisconsin to help better understand sediment movement through a complex agricultural landscape containing a grassed waterway channel. Using this data set, they developed new equations and models to predict runoff and sediment movement from agricultural fields.

Results
These findings are a significant addition to the understanding of sediment movement within drainage systems, and they are now available to watershed planners interested in optimizing management practices. The equations may also prove useful to hydrologists and hydraulic engineers interested in projects such as flood risk studies, channel stabilization and sediment trapping.

This work has been shared via three research publications. It has also been shared with key staff in the Wisconsin Department of Natural Resources as well as through state and national conferences, including meetings for the American Water Resources Association (Wisconsin Section) and the American Society of Agricultural and Biological Engineers. Longer-term goals for the project are to extend the model to agricultural watersheds across different physiographic regions of Wisconsin and to integrate the results into the Snap-Plus nutrient management planning model currently used by Wisconsin's farmers and local water quality managers. This project led to a collaboration with a University of Guelf professor, who is using the unique data set to help develop a different type of sediment delivery computer model.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

213	Weeds Affecting Plants
304	Animal Genome
307	Animal Management Systems
311	Animal Diseases
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
806	Youth Development
903	Communication, Education, and Information Delivery

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under outcomes number 4 and outcome number 5.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Nutrition

☑ 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%		5%	
206	Basic Plant Biology	0%		5%	
302	Nutrient Utilization in Animals	0%		15%	
305	Animal Physiological Processes	0%		10%	
501	New and Improved Food Processing Technologies	0%		5%	
502	New and Improved Food Products	0%		10%	
607	Consumer Economics	0%		5%	
701	Nutrient Composition of Food	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	0%		30%	
703	Nutrition Education and Behavior	75%		5%	
704	Nutrition and Hunger in the Population	10%		0%	
724	Healthy Lifestyle	15%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	7.0	0.0
Actual Paid	3.0	0.0	9.0	0.0
Actual Volunteer	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**
129918	0	592718	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
129918	0	592718	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

Faculty in CALS Nutritional Sciences, Bacteriology, Biochemistry, Food Science, and Genetics are assessing the causes and consequences of childhood obesity and poor nutrition. Ongoing projects include work in nutritional aspects of diabetes, promotion of healthful eating campaigns, dietary markers of human health and nutrition, obesity prevention, and related studies.

Cooperative Extension plans collaboration among Family Living Program's campus and county faculty and staff, colleagues, and partners providing research-based education and assistance for preventing childhood obesity through developing and implementing behavioral interventions that improve nutrition and increase physical activity, as well as building capacity among colleagues and communities to address issues related to preventing childhood obesity. Education and assistance that help preschoolers develop healthy eating and physical activity behaviors will improve children's health and ability to learn, and reduce childhood obesity.

Diverse participants will make informed, science-based decisions regarding nutrition, health and physical activity. These improvements will lead to decreased health care costs for families and the state BadgerCare program, and contribute to a more productive workforce in the future.

Wisconsin Assistant Program (SNAP-Ed) provide keys to better health by showing people how to eat better and incorporate healthy activity into their lives. Extension educators reach diverse audiences through a variety of methods from home visits to classes and activities at community centers, festivals and fairs.

2. Brief description of the target audience

The audience for research and extension includes colleagues and other professionals, diverse children and youth, caregivers, parents and family members, local and tribal officials, public and private collaborating and community agencies, child care providers, teachers, school districts, administrators, tribal, state and federal agencies and others in a variety of educational settings to reach under-represented audiences including low-income Latino/a, African American, American Indian and Hmong parents, families and youth, translating and interpreting as needed.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues

are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	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:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	15	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	26

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

Develop and implement behavioral interventions that improve nutrition and increase physical activity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Parenting, energy dynamics, and lifestyle determinants of childhood obesity: New directions in prevention

Obesity is a major public health problem and a contributor to the development of many diseases including diabetes, heart disease, fatty liver disease and some cancers. There are over 60 million obese adults in the U.S., and 17% of children aged 2-19 years are obese. High-fat and high-carbohydrate diets contribute to obesity both in the U.S. and around the world. While therapies for reducing obesity in children and adults have been largely unsuccessful so far, understanding the molecular mechanisms by which diet influences obesity could lead to successful treatments.

What has been done
Researchers at the University of Wisconsin-Madison are using mouse models to understand the mechanism by which high-fat and high-carbohydrate diets lead to obesity. In earlier work, they found that when mice lacking just one gene called SCD1 (involved in lipid metabolism) were fed high-fat and high-carbohydrate diets, they were protected against weight gain and type 2 diabetes when compared to normal mice.

For this project, scientists aimed to better understand how SCD1 was affecting obesity by deleting the gene from specific tissues instead of the entire mouse. When they deleted the gene from the liver of mice, the animals were protected against weight gain from high-carbohydrate diets specifically. Interestingly, when the gene was absent from the skin, the mice were protected against weight gain from high-fat diets. These results suggest that the body uses different mechanisms to control weight gain depending on the composition of the diet, and a better understanding of these differences could lead to more effective treatments and prevention

strategies.

Results
This work has uncovered a powerful role of the SCD1 gene in the development of obesity. Researchers are currently following up on their findings to determine the unique mechanisms by which SCD1 works in the liver and in the skin to influence metabolism and weight gain. Scientists are also gleaning information about how the liver and skin may communicate with other tissues to affect metabolism throughout the bodies of the mice.

Findings from this mouse model can be applied to human health and obesity since the SCD1 gene in mice is very similar to that in humans. Additionally, other groups have shown that people with reduced activity of the gene are naturally protected against diabetes. Scientists are working to develop inhibitors that could block the activity of the gene in specific tissues and mimic the deletion used in the mouse models.

Burhans M.S., M.T. Flowers, K.R. Harrington, L.M. Bond, C. Guo, R.M. Anderson, and J.M. Ntambi. 2015. Hepatic oleate regulates adipose tissue lipogenesis and fatty acid oxidation. J. Lipid Res. 56:(2) 304-318.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
607	Consumer Economics
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Build capacity among community partners and schools to address issues related to nutrition and childhood obesity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Mobilizing rural communities to assess and improve the ecological environment to prevent childhood obesity

The White House Task Force on Childhood Obesity report to the President, "Solving the Problem of Childhood Obesity within a Generation," presents an action plan for the prevention of childhood obesity. Childhood obesity is a serious issue in the early childhood years that causes the development of heart disease and diabetes at increasingly younger ages, resulting in poor health, increased health care costs and shortened and limited life spans and quality of life. Low income families with young children in rural areas face many challenges to healthy eating and living. One of the data collection tools, Active Where, offered insights as to the challenges facing these families: rural isolation, lack of transportation, lack of funds to pay for physical activity and lack of access to healthy affordable food.

What has been done
In response, a collaborative, multi-state (Indiana, Kansas, Michigan, North Dakota, Ohio, South Dakota and Wisconsin), multi-disciplinary team from the North Central Extension Region proposed an innovative, integrated research and Extension project that will: (1) collect data using a community development model of Extension intervention to prevent childhood obesity; (2) promote the use of effective communication tools in communities; (3) use a quasi-experimental design to examine outcomes; and (4) utilize online distance learning tools to document best practices to energize and improve the professional development of Extension staff working to prevent childhood obesity; and (5) examine the usefulness of community coaching skills to coalitions.

A unique aspect of this proposal is the focus on investigating communities' abilities to provide environments that support healthy eating and promote physical activity from the vantage point of 4-year- old low-income children in rural communities. The Wisconsin Project team includes, Ann Keim, Andrea Newby, Sonya Lenzendorf, Jane Schaaf, Joy Schelble, Amber Canto and Rachael Glaza. The two project counties are Iron and Crawford. For the complete proposal, contact ann.keim@ces.uwex.edu

Both of the Wisconsin counties were given $20,000 to spend over the five years in support of their coalition's work.

Head Start proved to be a great partner for this project as low income families with 4-year-old children was the target audience. Many activities such as gardening and physical activity events were held in partnership with Head Start.

Results

Ripple Effect Mapping was done in both the Coached and non-Coached communities. This process showed multiple partnerships and activities that were a result of the project. The Coached community's map showed a more cohesive and planning approach to current activity centered around the planning process and indicated more potential for institutionalization of the partnerships and the efforts. The 7 state project was diligent about creating posters, conference presentations and publishing papers about this project. Each state had funds for a graduate student. Wisconsin had three over the course of the project that successfully finished their degrees and published. Publications from this project are filed in the Cooperative Extension Recording Results system.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
607	Consumer Economics
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely

disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved. Similar input will be sought from UW-Extension's issue-oriented teams.

Preventing Childhood Obesity project focuses on 4-year-old, low-income rural children because multiple parties provide food and activity for these children, not just parents. Head Start, Food SHARE, WIC, child care, family and friends all play a role. Results will be used by Cooperative Extension colleagues and community partners in seven collaborating states and nationwide to improve the environment for preventing childhood obesity, and by extension professionals in determining how to be effective coalition leaders and members

Key Items of Evaluation

1) Assessments of Quality of CPCO Coalitions in terms of functioning and outcomes.

2) Effectiveness of interventions/educational programs in improving the diets and activity levels of rural
low-income 4-year-olds.

3) Changes in the Socio-ecological environments for families of rural, low income 4-year-old children.

V(A). Planned Program (Summary)

Program # 7

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
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
311	Animal Diseases	0%		9%	
501	New and Improved Food Processing Technologies	0%		5%	
502	New and Improved Food Products	0%		13%	
703	Nutrition Education and Behavior	0%		5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	50%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	50%		39%	
723	Hazards to Human Health and Safety	0%		9%	
903	Communication, Education, and Information Delivery	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	17.0	0.0
Actual Paid	6.0	0.0	14.0	0.0
Actual Volunteer	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**
327176	0	946462	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
327176	0	946462	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 development and evaluation of improved technologies in food processing, and on-farm food safety practices have received increasing attention from faculty in several departments. Research is being conducted on several important food toxins and their causal organisms (e.g. Aspergillus), mastitis resistance as a component of on-farm food safety, the development of new thermal food preservation technologies, biotoxins and food safety, nanotechnology applications in food sensors, residual pesticides in foods, symbiotic associations between antibiotic producing bacteria and honeybees, and several other areas.

The WAES and Cooperative Extension plan collaboration among interdisciplinary campus and county faculty and staff, colleagues, partners and trained volunteers providing research-based training and support to improve the safety of the food supply by helping youth and adult agricultural producers, meat, dairy and acidified canned food processors and entrepreneurs adopt best practices and comply with government regulations. County Extension educators and state specialists are Beef Quality Assurance trainers, Swine Team members are certified Transport Quality Assurance trainers, and Pork Quality Assurance Plus Advisors. This group also helps train certified 4-H youth and volunteer leaders in Meat Animal Quality Assurance required for participation in county and state fair swine, beef and sheep projects and auctions.

2. Brief description of the target audience

Integrated activity for our capacity grant program targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. The audience includes colleagues, veterinarians and other professionals, individuals, families, 4-H and FFA youth, school-age children and preschoolers, fresh market vegetable and fruit growers and sellers, small food processors and entrepreneurs, crop, dairy and livestock producers, producer associations, dairy food processors and artisan cheesemakers, natural, organic and conventional meat processors, local and regional economic development initiatives, local and tribal governments, state and federal regulatory agencies, and others preserving food safely and keeping the food supply safe and wholesome.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster

Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 11 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	481	0	0	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	28	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	45

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve the safety of the food supply.
2	Develop and implement behavioral interventions that improve consumer food safety practices.

Outcome #1

1. Outcome Measures

Improve the safety of the food supply.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Food Safety-Quality Assurance - Veterinary Feed Directive (VFD) Education

The U.S. Centers for Disease Control and Prevention report that at least 2 million people acquire serious bacterial infections that resist multiple antibiotics and at least 23,000 die each year as a result (CDC, 2015). With growing concern over the global public health threat, the American Medical Association (AMA) and American Veterinary Medical Association (AVMA) adopted policies to stem the spread of antibiotic-resistant bacteria. As of January 2017, the U.S. Food and Drug Administration (FDA) changed antibiotic use in feed and water given to food-producing livestock. Medicines critical to treating human diseases are no longer available over the counter, but require a veterinary feed directive (VFD); livestock owners must obtain a written order from a licensed veterinarian to purchase medically important antibiotics, and administer them to food animals through feed and water only as directed.

What has been done
As FDA launched VFD education during 2016, the Wisconsin Cattlemen's Association, North Central WI Cattlemen's Association and Heartland Cooperative asked veterinarian and Taylor County agriculture agent Sandy Stuttgen to present VFD information to their dairy and beef producers. Stuttgen's extension county colleagues for their local programs and the extension Beef Team for statewide heifer and cattle feeder's workshops also requested the VFD presentation. The 16 trained extension certifying agents presented VFD materials at 14 locations in Clark, Grant, Jackson, Lafayette, Marathon, Monroe, Richland, Taylor and Trempealeau counties.

All livestock are subject to the new VFD rules (as well as quality assurance, described under Dairy and Livestock). Lyssa Seefeldt of the UW-Extension Swine Team is working to create a

map listing veterinary practices who provide swine services (including writing VFDs) for swine farmers statewide. This map will be hosted on the UW-Extension Swine Team website at: http://fyi.uwex.edu/swineextension

Results

Safeguarding public health: The outcome of UW-Extension quality assurance training results in attendees being certified in Beef and Dairy Beef Quality Assurance in cooperation with the Wisconsin Beef Council. Certified individuals strive to apply the concepts learned to improve their skills and best management practices in producing wholesome and safe beef for human food. In 2016, 481 beef (84% including dairy beef) and dairy heifer (16%) producers received Quality Assurance continuing education units (CEUs) valid for 3 years while improving their understanding of veterinary feed directives and the importance of safeguarding public health. Using a 5-point Likert Scale, all respondents reported they better understood their role in using VFDs-a 1.7 positive change in knowledge from 2.7 before and 4.4 after hearing the presentation-and rated their belief that antimicrobial use on their farms impacts public health an average 3.9 (N=238, 49% response rate).

Changing how farmers, veterinarians and feed mills conduct business: The 2012 Census of Agriculture reported 70,552 total farms in Wisconsin; 21,706 of these farms (31%) are involved with beef cattle ranching and farming (10,381), cattle feedlots (893), and dairy cattle and milk production (10,432, USDA National Agricultural Statistics Service). Stuttgen anticipates that many more will be seeking VFD information and assistance. Veterinarians and feed mills are on a steep learning curve, because they must understand how to actually implement the new VFD rules in 2017. UW-Extension agents have the opportunity to help facilitate the VFD conversation among livestock owners, veterinarians and feed mill personnel at programs where all three groups are present. This can strengthen their relationships and keep key antibiotics available for the treatment, prevention and control of diseases.

Training the next generation: Youth raising food-producing livestock for fair projects are also impacted by new veterinary feed directive (VFD) rules. UW-Extension youth livestock specialist Bernadette O'Rourke, outreach specialist Alissa Grenawalt, dairy youth specialist Beth Heinze, and Sarah Mills-Lloyd, Oconto County agriculture educator adapted the VFD Application Summary created by Stuttgen and Halfman into a 4-page fact sheet for a youthful audience. Distributed at statewide Animal Science Days and included in the 2016-2017 UW-Extension Meat Animal Quality Assurance Training curriculum, the Youth Producer Guide to the Veterinary Feed Directive is available to print and for those with slow Internet connections at: https://fyi.uwex.edu/youthlivestock/vfd

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Develop and implement behavioral interventions that improve consumer food safety practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Project: Understanding the public opinion dynamics of meat products: Connecting citizens and the Wisconsin meat industry

Meat processing is the fourth largest manufacturing industry in Wisconsin, generating more than $12 billion in economic activity each year and employing close to 90,000 workers--and it's still growing. At the same time, food safety, including the safety of meat, is emerging as a public concern. A highly publicized example of this was the 2012 controversy surrounding the use of lean finely textured beef (LFTB), which a series of national news reports referred to as "pink slime" amid claims that it was used in 70 percent of ground beef in supermarkets. Although LFTB is USDA-approved, negative media coverage throughout the year incited the public against it, and beef sales plummeted. The damage to an industry crucial to Wisconsin's economy highlighted stakeholder need for a better understanding of Wisconsin consumer perceptions and behavior regarding LFTB along with a better statewide public information and outreach program about LFTB and other food safety concerns.

What has been done
Researchers at the University of Wisconsin-Madison distributed a survey to 2,000 Wisconsin residents about their perceptions of food and food-related issues, embedding in survey questions an experiment on the effects of media framing of LFTB. Approximately half of the participants were asked select questions containing the phrase "pink slime," while the other half saw "lean finely textured beef." Researchers found that subjects perceived greater risk related to ground beef containing "pink slime" as opposed to "lean finely textured beef." This finding extended to media coverage as subjects reported paying greater attention to media stories about the issue when asked about stories using the media-created term "pink slime," as opposed to the industry-created term "lean finely textured beef."

Results
Researchers shared and built upon this work through a number of channels. They produced a report summarizing their findings entitled "Exploring public opinion and risk perceptions of food in Wisconsin." They also held a workshop for industry stakeholders, public relations professionals and academics in meat-related fields to share findings and encourage reflection. Participants included the executive director of the Wisconsin Beef Council and the director of Wisconsin-exported foods from the state Department of Agriculture, Trade and Consumer Protection (DATCP). Findings were also presented at other statewide meetings including the Joint Conference for Extension Professionals, the Wisconsin Rural Partners Annual Meeting and the Wisconsin Community Food Systems Inservice. The work was profiled on WisContext, Wisconsin Public Radio's outreach blog.

Researchers shared their findings in a number of academic articles and conference papers. One of them, "Media framing and perceptions of risk for food technologies: The case of pink slime," was published in the book "Food Futures: Ethics, Science and Culture." Other articles are awaiting publication.

Conference papers include: "Pink slime attention cycle" (Association for Politics and the Life Sciences Conference, 2015), "Framing and perceptions of risk for food technologies" (European Society for Agricultural and Food Ethics Conference, 2016), and "Wisconsin residents' personal risk perceptions of genetically modified organism (GMO) foods" (Association for Education in Journalism and Mass Communication Conference, 2016).

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
311	Animal Diseases
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety
903	Communication, Education, and Information Delivery

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under outcome number 1 and outcome number 2.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Education and Science Literacy

☑ 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
806	Youth Development	100%		0%	
903	Communication, Education, and Information Delivery	0%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	2.0	0.0
Actual Paid	8.0	0.0	0.9	0.0
Actual Volunteer	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**
346793	0	47176	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
346793	0	47176	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 WAES will incorporate research projects to address the needs of farmers and landowners and to educate them to improve agriculture, the land and use of natural resources. Cooperative Extension 4-H STEM specialists will build capacity in 4-H educators and volunteers to provide LEGO® Mindstorms® Robotics programs across Wisconsin. Extension's Wednesday Nite at the Lab (WN@TL) engages the general public with campus-based researchers around emerging research findings and trends.

2. Brief description of the target audience

The audience includes farmers, landowners, 4-H youth, parents, staff, teachers, community leaders, business owners, school districts, economic development practitioners, the news media, and families.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes,11 agricultural research stations and the USDA Dairy Forage Research Center.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12	0	55	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	To increase the knowledge and implement decision-making tools for farmers and landowners.
2	To increase the knowledge of youth and teachers in the 4-H STEM program.

Outcome #1

1. Outcome Measures

To increase the knowledge and implement decision-making tools for farmers and landowners.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Project: Experimental approaches to understanding technology adoption among Wisconsin farmers

Acres cultivated with genetically modified (GM) crops has increased 67-fold in the U.S. since 1996. As new technologies, like GM crops, become available to farmers, some choose to adopt them while others don't. That choice can depend on a number of factors including risk aversion (aversion to choices for which the probability of each outcome is known) and ambiguity aversion (aversion to choices for which the probability of any outcome is unknown). Understanding motivations is a difficult thing to study since people's responses to survey questions can be unreliable. To address this shortcoming, researchers at the University of Wisconsin-Madison set out to experimentally determine what motivates farmers to adopt GM crop technology.

What has been done
Researchers sought to distinguish between farmers who are risk averse versus those who are ambiguity averse and to determine what those characteristics mean for the adoption of GM technologies. To measure risk and ambiguity aversion, farmers were asked to take part in carefully structured games designed to identify aspects of behavior and learning. To measure risk aversion, farmers were asked to either take a "safe bet" or gamble on an increasingly riskier choice with an advantageous outcome. Researchers measured ambiguity aversion with a similar experiment in which the risk was defined as a range instead of a definite number. Over 300 farmers took part in 30 experimental sessions in two different years.

Results

As part of this work, the participating farmers also took part in Extension presentations after the experiments. These presentations provided farmers with information from experts as well as the opportunity to talk with experts and amongst themselves about new technologies, seed choices and adoption practices.

From these experiments, researchers found that the influence of farmer characteristics on adoption of GM crop technology depended upon the technology traits. For example, ambiguity-averse farmers are more likely to adopt Bt corn early. This is likely due to the fact that an infestation of corn borers (which Bt protects against) may or may not happen. At the same time, ambiguity aversion does not affect adoption of herbicide-tolerant (HT) soy since there is no doubt that weeds will be an issue when growing soy.

Understanding these characteristics in farmers and how they affect the adoption of new technologies will help a number of agencies and groups that interact with farmers including Extension agents, crop consultants and companies. These organizations can use data from this and similar studies to help farmers choose GM technologies they are most interested in. This helps the company trying to sell a new technology as well as the farmer who will benefit from it.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

To increase the knowledge of youth and teachers in the 4-H STEM program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Education and Science Literacy: 4-H Tech Wizards

Growing numbers of jobs require training in Sciences, Technology, Engineering and Math (STEM). The nation's future and workforce is strengthened by attracting and retaining students in those disciplines. Wisconsin 4-H Youth Development programming and staff have worked at the state and national levels to bring STEM programming to new and diverse audiences, as well as to develop the soft skills necessary to help youth live and work effectively.

What has been done
Through the 4-H Tech Wizards program, youth in three at-risk counties (Milwaukee and Racine Counties and Fort McCoy Military Base in Monroe County) participate in projects and afterschool programs where they learn STEM skills through fun, hands-on activities like coding and building and coding robots.

4-H Tech Wizards participants engage with scientists, engineers and skilled volunteers who mirror their ethnic and racial diversity. In addition, youth are encouraged to pursue courses in school that support their work in the 4-H Tech Wizards program. Youth in the program tour university campuses, as well as companies and organizations that employ STEM-competent individuals. Youth are also engaged in a formal, research-based mentoring program funded by the U.S. Department of Justice's Office of Juvenile Justice and Delinquency Prevention. These opportunities ready them for their future and help them envision themselves in the STEM careers that will help them succeed personally and professionally.

Results
In 2016, 55 youth and 12 adults participated in the Wisconsin 4-H Tech Wizards program. More than 50 percent were from underserved populations. The program has been one of the most successful STEM initiatives in terms of generating dollars, personnel capacity-building and developing internal and external partnerships.

On the national level, Wisconsin 4-H STEM Specialist Joanna Skluzacek served on a curriculum development team for a partnership between NASA and Wisconsin 4-H to help create lessons for developing soft skills like teamwork, self-care, team-care, cultural competency and leadership/followership.

NASA's 'Expeditionary Skills for Life' teaches competencies that they require in their highly trained astronauts to be mentally and emotionally ready for space voyages. Thirty-six free sets of curriculum, paired with video, are available online for elementary, middle and high school students. These activities guide youth through various education expeditions that help them learn and practice skills that they can apply in almost every aspect of life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under outcome number 1 and outcome number 2.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Rural Prosperity

☑ 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
131	Alternative Uses of Land	0%		5%	
135	Aquatic and Terrestrial Wildlife	0%		5%	
136	Conservation of Biological Diversity	0%		5%	
307	Animal Management Systems	0%		5%	
315	Animal Welfare/Well-Being and Protection	0%		5%	
601	Economics of Agricultural Production and Farm Management	60%		17%	
603	Market Economics	0%		5%	
604	Marketing and Distribution Practices	0%		11%	
605	Natural Resource and Environmental Economics	0%		5%	
608	Community Resource Planning and Development	0%		5%	
609	Economic Theory and Methods	0%		5%	
610	Domestic Policy Analysis	0%		11%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	40%		11%	
805	Community Institutions and Social Services	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	3.0	0.0
Actual Paid	20.0	0.0	9.0	0.0
Actual Volunteer	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**
1056894	0	550257	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1056894	0	550257	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

Cooperative Extension's Community Food Systems Team works with communities across the state in designing and implementing local food systems projects. The team has promoted local foods as a community economic growth strategy. Hatch-funded research found that while the growing market for local foods may provide new business opportunities for a handful of farmers and food processors, the markets remain too thin to have a significant impact on the larger community economy. Other ongoing research projects pertain to wolf impacts on the Wisconsin deer population and a study on how to retain young people in local communities.

2. Brief description of the target audience

Integrated activity for our capacity grant program targets a broad group of stakeholder audiences in agriculture, natural resources, and the public. The audience includes colleagues and other professionals, growers and grower associations, land owners, policy makers, Certified Crop Advisors, agricultural service providers, coalitions and cooperatives, community leaders, business owners, local elected officials, town, city, county and tribal governments, state and federal agencies, local planning departments and regional planning commissions, utilities, school districts, economic development practitioners, the news media, and families.

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls and Stevens Point campuses, working with 3 tribes, and at 11 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	103	0	0	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	30	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	41

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	To develop and implement programs to improve succession planning, grazing strategies and land management.
2	To develop and implement programs to improve succession planning, farm management, tax policy, health and well-being in rural communities

Outcome #1

1. Outcome Measures

To develop and implement programs to improve succession planning, grazing strategies and land management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Project: Estimating landowner responses to conservation tax law

Around 40 million acres of private land in the United States are protected from future development through conservation easements, legal agreements between landowners and land trust organizations (or other entities) to protect -in perpetuity- the valuable natural resources on the land. They are the fastest-growing form of land conservation in the U.S. and represent the largest form of charitable giving on a per-donation basis. The federal government and many states use tax incentives to motivate landowners to make conservation easements, yet little empirical research has been done to assess the impacts of these incentives. Research is needed to understand if and how tax incentives impact the quantity and quality of conservation easements.

What has been done
Researchers at the University of Wisconsin-Madison developed a tax calculator that generates an accurate "after-tax price of conservation"-a measure of the financial cost of donating a parcel of land, factoring in tax savings-for hypothetical donors of conservation easements in any state, for any year from 1985 to 2012. The calculator incorporates pertinent parts of federal and state tax code, as well as information about conservation easements that were donated during the time period. Their analysis revealed that generous tax incentives significantly increase the number of easements donated, but had no measurable effect on the overall quality of donations (with "high quality" parcels considered those that fall within a land trust organization's targeted conservation zone or strategic conservation plan).

Results

This project was the first to quantify the price of conservation across different states and across time, as well as the first to estimate the effects of that price on the number and quality of donations. These findings were shared at the 2015 annual meeting of the Agricultural and Applied Economics Association, and via a working paper titled, "Tax Incentives and the Price of Conservation." The information is valuable for land trust organizations, providing them the first empirical evidence that more generous tax incentives actually do increase donations. The head researcher has shared these findings with key contacts at the Land Trust Alliance and the Nature Conservancy, and hopes to present these findings at the next annual meeting of the Land Trust Alliance. The tax calculator could also benefit state and federal revenue agencies, as it offers a way to quantify and compare the fiscal impacts of various tax incentive options-in the form of foregone tax revenue.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management
603	Market Economics
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
609	Economic Theory and Methods
610	Domestic Policy Analysis
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions and Social Services

Outcome #2

1. Outcome Measures

To develop and implement programs to improve succession planning, farm management, tax policy, health and well-being in rural communities

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Title: Developing farm resiliency during challenging economic times

Depending on their enterprise, Wisconsin farmers have faced low commodity prices for the past year or the past several years. Dairy farm revenues are greatly impacted by market conditions and in 2016 milk prices hit lows that were half of what they had been less than two years ago. Due to the cyclical nature of agriculture and the recent low margins for dairy and grain farmers, education focusing on financial management and resiliency was in demand. Added to these issues are the long-range impacts of maintaining farm enterprises by transitioning the business from one generation to the next or even to other partners. Whether these issues are viewed separately or together, there is often an underlying and overlooked element of stress that can have a negative impact on rural communities.

What has been done
Extension specialists and agents shared best practices that can help farmers have control during challenging economic times through workshops, one-on-one sessions, and using social and traditional media, including collaborating with colleagues from seven universities to develop materials for Dairy Markets website (https://dairymarkets.org/) that hosts podcasts, bulletins, and decision tools.

Programming focused on efforts to help farmers deal with low commodity prices and tight margins; implement best management of farm's cash flows by anticipating the directions, timing and magnitude of price changes; improving their financial record-keeping; and developing strategic and long-range goals, including transitioning farm operations to the next generation.

In workshops focusing on resiliency, participants were provided with information on the agriculture cycle and tools/methods for focusing on specific challenges in each cycle. Participants learned the importance of focusing on building business resilience when profit margins improved.

According to USDA Ag Census data, women farm operators are growing in numbers and are increasingly playing a role in the strategic and long-range decisions of the enterprise, such as expansion and other large capital investment decisions. Extension educators reached this target audience through programming such as the Women's Summit, Heart of the Farm workshops and Annie's Project workshops. In addition to providing farm women support in financial management and financial decision making, these workshops help connect them with agricultural resources, and to create a support network with other individuals who face the same experiences, challenges and roles they do.

Rural health care professionals was another target audience. A statewide series of five workshops focused on farm health stress and safety.

Results

Whether through workshops, face-to-face meetings, or digital resources, Extension programming was relevant and accessible. The video podcast series posted on the Dairy Markets website has been viewed by more than 2,500 unique IPs each month.

Farmers participating in financial workshops took steps to implement improved record keeping systems based on the recommendations provided in the program. One agent reports that evidence of impact came in the form of several follow-up calls and emails from producers, lenders, and in one case an employee of Organic Valley Cooperative.

Another agent met with 23 farms individually on farm succession and estate planning issues; meeting with some of the farms multiple times for a total of 32 farm meetings with 103 farm members. Farm members used the time in farm meetings to learn about tax consequences, business entities and ways to gradually transfer assets. These facilitated meetings also provided farm members perhaps their first opportunity to discuss difficult, yet critical issues of the farm succession. Learning how to separate the business from family issues is one key to developing a farm management team that recognizes each member as a partner rather than a parent or as a child.

In the presentations for rural healthcare professionals, 88 percent indicated increased knowledge of rural healthcare. In the workshops focused on farm stress, 70 percent of audience members indicated they learned of "positive strategies to help clients that are based on the brain/stress research." Respondents indicated they learned about the effects of short term and long term stress and positive strategies to help clients. They listed the new strategies or approaches they would use as a result of the training, such as helping clients consider options but not overwhelming them with too many options. Sixty-eight percent of the respondents feel they can question, persuade and refer someone expressing ideas of suicide; and 79 percent said the workshop provided them with resources they could use to help their clients as they face tight margins and other stressors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
603	Market Economics
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Please refer to summaries under outcome number 1 and outcome number 2.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Wisconsin Competitive Research Program

☑ 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
123	Management and Sustainability of Forest Resources	0%		8%	
134	Outdoor Recreation	0%		8%	
301	Reproductive Performance of Animals	0%		8%	
303	Genetic Improvement of Animals	0%		8%	
305	Animal Physiological Processes	0%		8%	
306	Environmental Stress in Animals	0%		8%	
311	Animal Diseases	0%		8%	
312	External Parasites and Pests of Animals	0%		8%	
501	New and Improved Food Processing Technologies	0%		8%	
502	New and Improved Food Products	0%		8%	
721	Insects and Other Pests Affecting Humans	0%		8%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		4%	
902	Administration of Projects and Programs	0%		8%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	7.3	0.0
Actual Paid	0.0	0.0	5.0	0.0
Actual Volunteer	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	332809	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	332809	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

Capacity grants are being used to address a number of state priority research activities that cannot be classified in the nine priorities. We have grouped these ongoing projects under the rubric of the "Wisconsin Competitive Research Program," but funds supporting these projects will be redirected to the new national priorities in the future. These projects do contribute to a variety of important state needs and are focused in several areas, including water resource issues, applied statistics in support of agricultural research, policy analysis for use in land use planning and commodity programs, management of invasive exotic organisms and bio-waste management.

2. Brief description of the target audience

Integrated activity for our capacity grant program targets a broad group of stakeholder audiences in agricultural, natural resources, and the public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2016	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:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	16	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW-Extension teams on the relevance, importance and impact of our research program.

Year	Actual
2016	22

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program.

Outcome #1

1. Outcome Measures

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Investigator: Benjamin Zuckerberg

Project: Do climate and land cover interact to create refugia for wintering birds inhabiting agricultural landscapes?

Climate change and the fragmentation of natural habitats are widely considered two of the most important influences on species and communities. Throughout the Midwest, many forested areas now persist within a sea of agricultural lands. Many birds rely on these forest fragments for food, shelter and sustenance through the winter months. Many of these wintering birds are considered "canaries in the coal mine" as they are known to be sensitive to a rapidly changing winter climate. A better understanding of how the forest fragmentation creates and modifies "microclimates" for different forms of wildlife-including birds and pests-could have substantial economic implications for land use and environmental stewardship in agricultural landscapes.

What has been done
Researchers at the University of Wisconsin-Madison established a network of 12 "smart" bird feeders throughout Dane County, Wisconsin, on woodlots ranging from densely forested to fragmented agricultural landscapes. These bird feeders are equipped with an antennae and record when individual birds banded with unique transponders visit the feeders. Researchers banded more than 700 individual birds from eight species (including the black-capped chickadee and American goldfinch) and logged more than two million individual feeder visits during three winters of study. At the same time, researchers deployed dozens of automated temperature sensors through the woodlots to continuously collect data on temperature and light intensity.

Researchers found that woodlot characteristics can have a powerful effect on microclimates that

influence the feeding and survival of individual birds. They also determined that growing degree-days (a measure of heat accumulation) varied by almost a month across forested landscapes and were strongly modified by fragmentation and agriculture.

Results

Growing degree-days are often used to determine planting dates for crops and may influence the emergence times of crop pests. If results hold for other biological thresholds, understanding the interaction between land use and microclimates could have significant economic implications.

Conducting this research involved the participation of private landowners and citizen scientists, with results shared through regular interaction and conversation. Findings were presented at conferences including the American Ornithologists Union, the International Association of Landscape Ecology, and The Wildlife Society (both state and national). They were also shared with the general public through presentations at the Madison Audubon Society, local Rotary clubs, the University of Wisconsin-Madison Arboretum Field Day, and the Institute of Electrical and Electronics Engineers. The project supported one PhD student and three undergraduate mentees.

Findings were published in a recent scientific article: Latimer, C. and B. Zuckerberg. 2016. Forest fragmentation alters winter microclimates and microrefugia in human-modified landscapes. Ecography | DOI: 10.1111/ecog.02551.
http://onlinelibrary.wiley.com/doi/10.1111/ecog.02551/full

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
311	Animal Diseases
312	External Parasites and Pests of Animals
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
721	Insects and Other Pests Affecting Humans
722	Zoonotic Diseases and Parasites Affecting Humans
902	Administration of Projects and Programs

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

Brief Explanation

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outcomes would be completely disrupted unless there was some major natural, economic, or public policy disruption.

A major change in federal policy or appropriation affecting the Capacity Grant program could affect our ability to produce our desired outcomes. Training graduate students is a priority of our program. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our capacity grant mission, while continuing to train graduate students for the next generation of agricultural science.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

N/A

Key Items of Evaluation

N/A

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
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.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.