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

**Status: Accepted**

**Date Accepted: 07/25/2016**

## I. Report Overview

### 1. Executive Summary

Operating Philosophy/ Program Overview:
The Wisconsin Agricultural Experiment Station (WAES) and University of Wisconsin Cooperative Extension (CES) 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 the generation of 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.

Our capacity-funded research program consists of a number of projects, each reported and reviewed individually. While the program itself may extend for multiple years, the projects that comprise it are a constantly shifting portfolio that can be quickly redirected. Projects are approved for periods of one to four years, with most on a three- or four-year cycle. When we rank a new proposal, we consider, how successful the research team has been in completing previous capacity-funded projects. Multistate revised proposals must be reviewed and approved at least once every four years.

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 and assistant dean for research in the College of Agricultural and Life Sciences (CALS), of which WAES is a part. 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.

How we measure research 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.

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

One project showing the impact of research success is Dr. Francisco J. Arriaga's project. Dr. Arriaga has an integrated research-extension appointment.
Title: Enhancing Productivity and Environmental Stewardship of Dairy Forage Systems with Cover Crops and No-tillage

Issue:
Corn silage--fermented fodder made mainly from leaves and stems of corn plants--is a mainstay ingredient in the dairy cattle diet in Wisconsin's $26-billion-a-year dairy business. However, production of corn silage presents farmers with both environmental and long-term productivity challenges. Making corn silage means removing the entire corn crop from the field and leaving the underlying soil exposed to the weather and vulnerable to erosion, nutrient loss and water runoff. Farmers and researchers alike are now addressing these intersecting challenges of protecting soil quality, maintaining environmental sustainability, and upholding or improving dairy farm productivity.

What has been done:
Scientists at the University of Wisconsin-Madison aimed to find a way to reduce the amount of time that bare soil is exposed when corn is harvested to make silage for dairy cattle feed. They reasoned that this could be achieved by planting a cover crop after silage harvest and using forms of reduced tillage. They further hypothesized that the cover crop could have value for the dairy operation as an additional feedstuff for cows. After corn silage is harvested, the cover crop could be planted, grown over winter and then harvested in the spring as cow feed before the next crop is planted. In this manner, the cover crop still provides an environmental service and a potential feed source during a time of the year when feedstocks are low. Researchers are testing their hypotheses by adding a cover crop component to a commonly used crop rotation of corn and alfalfa. With this system, they can determine how well such methods will achieve farm goals of environmental protection and sustained productivity. They are finding that the use of cover crops and no-tillage in the corn silage growing system protects and improves soil health while adding an additional forage crop for use as cow feed.

Impacts:
Wisconsin farmers have begun to adapt these practices to their farming systems. Up to 15 percent of the land used for corn silage production in the state is now under some form of cover crop protection, and interest by farmers wishing to use cover crops in their forage management systems continues to grow. This ongoing research project is providing farmers with science-based information about how to

successfully incorporate a cover crop into their systems, while confirming many benefits of cover crops. Farmers can expect improved soil characteristics such as better water infiltration, nutrient retention and recycling, increased soil organic carbon and reduced erosion by providing cover on the soil surface. A cover crop's root system also has the added benefit of returning organic matter to the soil. At the same time, cover crops may actually increase corn silage yields, and cover crops themselves can be harvested and fed to cattle, increasing the overall productivity of the land.

Results of the research have been widely shared through seminars, stakeholder meetings, educational events and materials, and popular rural media outlets. The research also has supported graduate student work and attracted additional funding from both public and private interests.

As University of Wisconsin-Madison soil science state extension specialist, Francisco Arriaga is leading and contributing to extension education programs that focus on tillage systems to improve soil health and cover crops, and reduce soil erosion. His applied research including that described above informs extension education programs statewide. An example of this is the Red Cedar Demonstration Farm that is managed by the Dunn County Soil and Water Health Partnership, consisting of staff from four government agencies -- USDA Natural Resources Conservation Service, Dunn County Land and Water Conservation, Chippewa Valley Technical College and UW-Extension. Dr. Arriaga provided valuable assistance in planning this demonstration farm including soil compaction testing and extensive soil sampling (160 acres with per acre sampling) in support of successful cover crops tailored to local soils and weather.

Farmers and community members have expressed concerns regarding soil erosion as well as need for improving conservation practices and water management. National and local surveys have indicated steadily increasing interest from farmers in cover crops, but recommendations made from other regions are not all appropriate for Wisconsin climate and conditions. Interdisciplinary extension campus and county educators are providing local cover crops research-based demonstrations and hands-on learning experiences that farmers and agriculture professionals can use for adopting best management practices suitable for their region. The Cover Crops Work Group formed in 2014 to encourage adoption by strengthening new and existing relationships with agencies, farmers, farmer-led groups and their advisors. Together, they have established local and regional partnerships, secured funding and leases or agreements with farmers, designed on-farm research projects, assessed growing conditions and soils in northern and southern locations, identified proper seeds, planting, management and no-till methods in rotations following soybeans, wheat and corn silage, and with Michael Fields Agricultural Institute, were awarded a SARE Professional Development Grant for $75,000 for building capacity among agency staff and agriculture professionals to increase farmer adoption of cover crops in Wisconsin.

The Wisconsin work group is conducting research, hosting field days, demonstrating varieties at Farm Technology Days, writing articles, developing fact sheets, presentations, webinars and a web site to showcase cover crop projects extension is coordinating toward establishing an agricultural system that combines continuous cover crops with continuous reduced tillage. Research indicates that cover crops can build soil health, improve water quality and enhance long-term farmland performance and sustainability. Use of cover crops and reduced tillage practices may also reduce fertilizer and other input needs and add cash or forage crops for farmers. Farmers can protect their soil from erosion and improve soil health to protect or increase yields. They can address public concerns over water quality by reducing the movement of top soil and phosphorus into surface waters. In turn, community members can learn about modern agricultural practices.

How Extension educational initiatives are structured

Wisconsin 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.

Meeting NIFA Priorities

The 2015 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 WCE 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:

The Wisconsin 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 WAES incorporates research to benefit forest production, weed management, surface water quality, and promoting new farm based practices. Wisconsin 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 Wisconsin 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 Wisconsin 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 Wisconsin 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. In addition, Cooperative Extension partners with the Wisconsin Alumni Association and Wisconsin Public Television to engage campus researchers with adult, life-long learners.

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. Rural prosperity also requires critical reflection on a variety of community economic development strategies. Such research can inform decision-makers at multiple levels.

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: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 102.0 | {No Data Entered} | 133.0 | {No Data Entered} |
| Actual | 149.0 | 0.0 | 138.0 | 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 CALS 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 Wisconsin 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.

Other examples of such face-to-face stakeholder contacts include:

1) We hosted an information booth during the three-day, statewide Farm Technology Days Show held this year in Dane County, Wisconsin. The dean and other college leaders had the opportunity to meet producers and discuss issues of importance to them at a lunch-time reception.

2) The Department of Dairy Science held an all-day research showcase event in the fall, where industry leaders shared current challenges and also had the chance to review new research from assistant professors, post-docs, graduate students and undergraduates focused on dairy genetics, nutrition and business management practices.

3) For the third year in a row, the college is sponsoring a monthly science discussion series in Minocqua Wisconsin at a local microbrewery, with a companion event held at two regional public libraries. Nearly 800 northern Wisconsin residents participated in discussions with their neighbors and UW researchers on topics ranging from pollinator health to resurrecting extinct species

4) We also learn from stakeholders who come to CALS to learn. Several CALS units hold short courses for professionals in the industries they serve. For example, this year we graduated our third class of certified "Master Meat Crafters". As our scientists help these professionals address their problems, they always learn more about the challenges these industries face.

5) A number of CALS researchers often with extension appointments, connect with stakeholders by serving on advisory boards or similar bodies that are comprised primarily of leaders in specific industries or interest areas. For example, experts from our Department of Biological Systems Engineering serve on a State Department of Transportation task force charged with examining state laws related to agricultural equipment and vehicles on state roads, a controversial issue across the state.

**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.

Wisconsin Cooperative Extension county agents/educators have latitude in tailoring their planning process 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 WCE county 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 to discuss: a) user group needs and opportunities; b) current CALS programs and program proposals and their effectiveness; and c) ways to increase cooperation among user groups, the university, and state and federal agencies. Discussions focus primarily on issues related to CALS research, education, and extension/outreach programs.

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.

We also need stakeholder input to make more immediate decisions, such as where to invest funding to direct current faculty and their research into emerging issues such as bioenergy and the bioeconomy. We also consider this input in other activities such as annual budget allocation, providing feedback to departments and faculty, and most importantly, in setting priorities for our Formula Grant research Call for Proposals.

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

In meeting with stakeholders, we learned of their interest in many areas related to agriculture, natural resources and environment, food, energy, rural life and health issues and rural economic development. Examples include:

1) Pollinator protection. Wisconsin lost 60 percent of our managed honey bee hives in 2014 due to extreme cold and there is evidence that wild bees are also in decline. UW scientists in several disciplines are partnering with state officials to explore the causes and encourage all citizens to promote pollinator-friendly environments.

2) Agricultural education and training. In a year when our public education system in Wisconsin experienced a high-profile debate that led to significant reductions in funding for education, many stakeholders have expressed concerns about how this may make it even more difficult for them to hire qualified employees for a variety of agricultural related jobs.

## IV. Expenditure Summary

| 1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS) | | | |
|---|---|---|---|
| Extension | | Research | |
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 9132516 | 0 | 6512890 | 0 |

| 2. Totaled Actual dollars from Planned Programs Inputs | | | | |
|---|---|---|---|---|
| | Extension | | Research | |
| | Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| Actual Formula | 6027623 | 0 | 6903783 | 0 |
| Actual Matching | 9041435 | 0 | 6903783 | 0 |
| Actual All Other | 0 | 0 | 0 | 0 |
| Total Actual Expended | 15069058 | 0 | 13807566 | 0 |

| 3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous | | | | |
|---|---|---|---|---|
| Carryover | 6027623 | 0 | 5219436 | 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% | | 1% | |
| 111 | Conservation and Efficient Use of Water | 0% | | 1% | |
| 133 | Pollution Prevention and Mitigation | 15% | | 4% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | | 4% | |
| 136 | Conservation of Biological Diversity | 0% | | 1% | |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | | 15% | |
| 202 | Plant Genetic Resources | 5% | | 10% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 10% | | 5% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 0% | | 8% | |
| 205 | Plant Management Systems | 10% | | 5% | |
| 206 | Basic Plant Biology | 0% | | 4% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 0% | | 8% | |
| 212 | Pathogens and Nematodes Affecting Plants | 0% | | 15% | |
| 213 | Weeds Affecting Plants | 0% | | 1% | |
| 215 | Biological Control of Pests Affecting Plants | 0% | | 4% | |
| 216 | Integrated Pest Management Systems | 20% | | 7% | |
| 306 | Environmental Stress in Animals | 0% | | 1% | |
| 307 | Animal Management Systems | 0% | | 1% | |
| 601 | Economics of Agricultural Production and Farm Management | 10% | | 4% | |
| 608 | Community Resource Planning and Development | 10% | | 1% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 28.0 | 0.0 | 21.7 | 0.0 |
| **Actual Paid** | 28.0 | 0.0 | 38.6 | 0.0 |
| **Actual Volunteer** | 324.0 | 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** |
| 1219590 | 0 | 1905051 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1829385 | 0 | 1905051 | 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 livestock and crop food sources, especially in the upper Midwestern US, but many projects will have broad applications beyond our borders, including herbicide resistance, identification and application of genes of economic significance, practices for maintaining soil fertility, conservation and management of crop genetic resources, managing bee and potato beetle populations, 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.

Wisconsin 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

Integrated activity for our formula grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. The audience includes North Central Region colleagues, agricultural professionals and other educational partners, grains, commercial vegetable, fruit and specialty crop growers and workers, 4-H and FFA youth, grower associations, food processors and entrepreneurs, food coalitions and cooperatives, agricultural service providers, agronomic retail and wholesale suppliers, local and regional economic development initiatives, local and tribal officials, planning commissions, state and federal rural development and regulatory agencies, and others. Thousands of agricultural professionals from Wisconsin, Minnesota, Iowa, Illinois, Indiana and Michigan who attend the annual

Wisconsin Crop Management Conference produce a large multiplier effect as WAES and Wisconsin Cooperative Extension research-based recommendations ultimately reach an increasing portion of the Great Lakes Region crop production sector including growers.

**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**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 58211 | 0 | 9105 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 10 | 63 | 73 |

**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. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 115 |

**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2015 | 115 |

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

**Issue (Who cares and Why)**
Investigator: Amy Charkowski

Title: The US Potato Genebank: Acquisition, Classification, Preservation, Evaluation and Distribution of Potato (Solanum) Germplasm

Potato production is an important industry in Wisconsin and nationwide, with the U.S. industry valued at over $3 billion in 2014. Each year, farmers' yields and income are adversely affected by Pectobacterium carotovorum, the most common disease-causing plant pathogen of potato, which causes soft rot and stem rot in the crop. The potato industry considers P. carotovorum a widespread and serious problem. Affected farms can experience up to a 100 percent crop loss, in severe cases. Currently, disease-resistant commercial cultivars are not available, and there are few effective crop management options for controlling the plant pathogen. This study sought to develop a special group of easy-to-study potato plants in order to explore how the bacterium works and to identify and understand resistance genes seen in wild potato species, with the long-term goal of developing disease-resistant commercial varieties.

**What has been done**
Potatoes are tetraploid plants, meaning they have four of each chromosome-two from each parent plant. (By comparison, humans are diploid, with just two of each chromosome.) Tetraploidy makes studying the genetics of potato plants difficult. A single copy of a recessive or defective gene, for instance, can be hard to detect since there are three other copies that can "hide" or "overpower" its effects. In order to more easily explore the genetic basis of plant resistance to Pectobacterium carotovorum, a team of University of Wisconsin-Madison researchers developed a unique family of diploid potatoes with resistance to P. carotovorum. This family of plants, made

by crossing modern cultivars with pathogen-resistant species of wild potato, is the first such group of diploid plants ever made. This development has opened many doors for future research, with the promise of industry applications down the line. This group of potato plants, for instance, displays a range of resistance traits, and now the genes involved can be mapped and studied. At the same time, these new potatoes are being used to study the mechanisms the pathogen uses to infect host plants and how resistant plants manage to repel these attacks.

**Results**

Researchers established a unique family of easy-to-study diploid potato plants with a range of resistance traits to Pectobacterium carotovorum that can now be used to speed the exploration of plant susceptibility and resistance to this damaging bacterial plant pathogen. Work is now underway to identify and map resistance genes in this plant family, work that will enable plant breeders to one day incorporate these important resistance traits into commercial potato cultivars. Given their expertise on this topic, the researchers are also involved in a multi-state grant to address soft rot and stem rot in potatoes that has strong support from the potato industry. Results have been shared via a PLOS One paper, as well as through several presentations at scientific conferences and potato grower meetings.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 111 | Conservation and Efficient Use of Water |
| 133 | Pollution Prevention and Mitigation |
| 135 | Aquatic and Terrestrial Wildlife |
| 136 | Conservation of Biological Diversity |
| 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 |
| 306 | Environmental Stress in Animals |
| 307 | Animal Management Systems |
| 601 | Economics of Agricultural Production and Farm Management |
| 608 | Community Resource Planning and Development |

**Outcome #2**

1. **Outcome Measures**

   Enhance the economic and environmental sustainability of agribusiness.

   Not Reporting on this Outcome Measure

**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
- 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

**Public policy changes:** As an example of a public policy change that could have a positive affect, a significant portion of Wisconsin cropland is being planted to corn, which is ultimately used for ethanol production increasing the price per bushel of corn. If corn prices were lower, more fruit and vegetables might be available.

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

**Evaluation Results**

Evaluation studies planned include qualitative and quantitative methodology. We have previously 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four 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.

Its purpose is to determine the effectiveness of educational programming to change agricultural management practices of Wisconsin farms. The results will be used to refine educational programming to meet policy makers' goals.

**Key Items of Evaluation**

N/A

## 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% | |
| 301 | Reproductive Performance of Animals | 10% | | 9% | |
| 302 | Nutrient Utilization in Animals | 0% | | 18% | |
| 303 | Genetic Improvement of Animals | 0% | | 9% | |
| 304 | Animal Genome | 0% | | 9% | |
| 305 | Animal Physiological Processes | 0% | | 17% | |
| 307 | Animal Management Systems | 15% | | 15% | |
| 308 | Improved Animal Products (Before Harvest) | 10% | | 0% | |
| 311 | Animal Diseases | 5% | | 9% | |
| 315 | Animal Welfare/Well-Being and Protection | 5% | | 2% | |
| 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: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |

| | | | | |
|---|---|---|---|---|
| **Plan** | 35.0 | 0.0 | 21.0 | 0.0 |
| **Actual Paid** | 37.0 | 0.0 | 21.2 | 0.0 |
| **Actual Volunteer** | 2975.0 | 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** |
| 1526482 | 0 | 984519 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 2289723 | 0 | 984519 | 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 livestock and crop food sources, especially in the upper Midwestern US, but many projects will have broad applications beyond our borders, including ways to improve health and fertility in livestock, mastitis resistance and evaluating forage sorghum management for adequate livestock growth. 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 Wisconsin Cooperative Extension plans include collaboration 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.

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

The audience includes extension colleagues, veterinarians, agricultural professionals and other educational partners, trained volunteers, youth and adult dairy and livestock producers and workers, cheesemakers, current and potential dairy sheep producers and artisan cheesemakers using sheep milk, meat and dairy food processors and entrepreneurs, agronomists, forage growers and grazing networks,

agricultural service providers, farm lenders, local and regional economic development initiatives, local and tribal officials, state and federal regulatory agencies, 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. 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**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| Actual | 165913 | 0 | 13190 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| Actual | 17 | 74 | 91 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 113 |

**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.

Not Reporting on this Outcome Measure

**Outcome #2**

1. **Outcome Measures**

Enhance the economic and environmental sustainability of agribusinesses.

Not Reporting on this Outcome Measure

**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 |
|---|---|
| 2015 | 113 |

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

**Issue (Who cares and Why)**
Investigator: Randy Shaver, CALS Professor of Dairy Science and Extension Dairy Nutrition Specialist

Project: Potential role of kernel vitreousness and prolamin protein measurements in corn hybrid selection for dairy cattle feeding

Corn is an important and expensive ingredient in the diet of the modern dairy cow, but often it is not fully digested by the cattle eating it, meaning some of the potential nutrition goes to waste. When cows don't digest and use all of the corn, farmers often have to add more corn and other ingredients to the feed, spending extra money to get the expected milk production from the cattle. Improving the utilization of corn will improve the efficiency of cow feed and improve economic outcomes for the dairy business.

**What has been done**
Scientists at the University of Wisconsin-Madison set out to study whether corn hybrids could be selected for the best digestibility in dairy cattle diets. While they found little difference between corn varieties, they discovered that that processing and storage methods have a significant influence on the digestibility of corn. The researchers then turned to examining the processing and storage practices to help maximize the digestibility of corn and corn silage. Nutrient analysis of corn silage was done at timed intervals for up to eight months of storage. These analyses, along with feeding trials, confirmed that corn silage becomes more digestible the longer it is stored. Additionally, processing, or milling, the corn kernels to the proper size also enhanced digestibility. Different degrees of processing-from leaving kernels whole to breaking them into eight or more pieces-were compared. The researchers found that more aggressive processing tended to produce corn that was more easily digested by dairy cattle.

**Results**
Through this work, researchers developed a set of parameters for processing and storage of corn and corn silage that significantly increases the digestibility of corn in the dairy cattle diet. By adopting these practices, dairy farmers can increase milk production by as much as four pounds of milk per day per cow, depending on their original practices.

These findings were shared broadly with the dairy industry through meetings, publications, webinars, industry publicity and scientific conferences. Not surprisingly, farmers have quickly adapted to the new information. In many cases, they adjusted their harvesting schedules and storage inventories to take advantage of storing corn silage longer to improve digestibility. They also changed their processing practices to reflect the need to properly grind corn to achieve the best digestibility.

Thanks to this work, dairy farmers now have scientific data upon which to base decisions about how to treat corn at different harvest stages, how to best use feed stored for different periods of time, and how to manage inventories based on storage period.

Investigator Randy Shaver is a University of Wisconsin Cooperative Extension State Specialist in Dairy Science specializing in dairy nutrition. As indicated above, this research informs Dr. Shaver's Extension education programs. Wisconsin is the number one cheese production state in the nation. Feed costs represent a high proportion of the total cost of milk production and thus impacts profitability, sustainability of dairy farms and ultimately the cost of dairy products to consumers. Dr. Shaver's applied research and Extension education reach Wisconsin's dairy industry through UW-Extension County Agents, local and multi-county, and national Extension

programs, feed industry agriculture service providers, webinars, media and website.

Dr. Shaver's Extension collaboration with other Cooperative Extension Dairy State Specialists benefits the whole dairy industry through the on-farm dairy Repro Money program. As dairy herds produced more milk per cow, their fertility waned. Because reproduction includes physiology, genetics, management, health and nutrition, optimizing performance requires an integrated approach sharing information and expertise among all farm personnel and their advisors. University of Wisconsin-Extension built on herd management teams that improved milk quality to develop the farmer-directed Repro Money Program. On-farm teams of county extension team leaders (100%), farm owners (100%), veterinarians (100%), nutritionists (90%), herd managers (62%), artificial insemination consultants (60%), and others identified areas for improvement, set goals, developed action plans, assigned tasks and reviewed results. Of the 40 farmers completing the program, 77.5% achieved all their goals, improving their herd 21-day pregnancy rate by an average 2%-valued $31 per cow per year totaling $516,520 for all 40 farms (2010 to 2014, average herd size 414 cows and milk price $18.80 per hundred pounds). Most chose to continue their Repro Money Teams (80%), further enhancing improvements. Farmers, extension educators and other professionals are building trust and relationships for continued problem-solving among the dairy business community. National eXtension Repro Money webinars highlighting best practices and outcomes in partnership with University of Kentucky DAIReXNET are at: http://www.extension.org/pages/15830/archived-dairy-cattle-webinars#.Vg2eyt5gp0g

**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 |
| 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 |

## 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

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

### Evaluation Results

Evaluation studies planned include qualitative and quantitative methodology. We have previously 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four 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.

Its purpose is to determine the effectiveness of educational programming to change agricultural management practices of Wisconsin farms. The results will be used to refine educational programming to meet policy makers' goals.

### Key Items of Evaluation

N/A

## 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: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 12.0 | 0.0 | 2.0 | 0.0 |
| **Actual Paid** | 15.5 | 0.0 | 0.0 | 0.0 |
| **Actual Volunteer** | 44.0 | 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** |
| 550385 | 0 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 825578 | 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

Wisconsin 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 11 agricultural research stations.

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

### 1. Standard output measures

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 101683 | 0 | 60127 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 8 | 0 | 8 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 8 |

### 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.

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Condition Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2015 | 8 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Approximately 15% of the state's population participates in the Supplemental Nutrition Assistance Program (SNAP) and chronic disease is prevalent among Wisconsin's low-income population. Three in five low-income Wisconsinites are overweight or obese and one in ten has been diagnosed with diabetes. The number of individuals who rely on food pantries to meet their food needs has increased 64% in Wisconsin since 2007. As more Wisconsinites turn to food pantries to meet their food needs, it is more important than ever that food pantries consider their role in supporting the health and well-being of their clients by working to improve the nutritional quality and safety of the foods they offer.

**What has been done**
UW-Extension partnered with the Wisconsin Community Action Program Association (WISCAP) to develop the Safe & Healthy Food Pantries Project during 2013-2015. Funding for this project was originally provided by the University of Wisconsin School of Medicine and Public Health from the Wisconsin Partnership Program and was supported by UW-Extension in 2015.

The goal of the Safe & Healthy Food Pantries Project is to improve access to and availability of adequate, appropriate, safe & nutritious food for low-income people who utilize food pantries. This goal is accomplished through the development of an online guide for coordinators and volunteers of client choice food pantries to make improvements in the food pantry environment. In July 2015 a train-the-trainer module was developed and implemented for UW-Extension educators.

**Results**
Since being published online in late spring 2015, the Safe and Healthy Food Pantries Project site

has received 369 unique visitors in 530 sessions, over 1600 page views and a 44% return rate. Forty-five Extension educators and 2 community partners attended the train-the-trainer module in 2015. Nine county Extension offices reported advancing efforts to improve the food pantry environment by working with donors to increase safe and healthy food donations to pantries and encouraging the selection of healthy foods by clients.

**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 |

**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 |
|---|---|
| 2015 | 8 |

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

**Issue (Who cares and Why)**

The rate of food insecure households in Wisconsin (11.6%) fares better than the nation as a whole (14.6%) and yet masks considerable intrastate variation in food hardship and risks for food insecurity. In absence of sub-state estimates of food security, communities are left to assess a multitude of household risk factors alongside local resources and supports to better grasp the local food security infrastructure.

**What has been done**

To assist local planners and policy makers in assessing food security in their communities, an interactive data and mapping tool, The Wisconsin Food Security Project (www.foodsecurity.wisc.edu) was developed collaboratively between the UW-Extension Cooperative Extension Family Living Programs, UW-Madison School of Human Ecology, and UW-Madison Applied Population Laboratory. A framework developed by the Wisconsin Food Security Consortium was used to conceptualize relevant dimensions of the local food security infrastructure including economic security, extent of federal nutrition programs, emergency food, and the retail food environment. Secondary data were gathered to characterize these dimensions, as well as health outcomes, at the sub-state level. Food-related resources (food retailers accepting SNAP, food pantries, farmers markets, schools offering breakfast, etc.) were identified and geocoded. A cutting-edge interactive mapping and charting data portal was

**Results**

In 2015, the site received 8,111 unique visitors accounting for 17,204 visits. Ongoing feedback from site users suggests that the Wisconsin Food Security Project was utilized to identify community strengths and gaps with regards to food security, inform local community assessments, develop program plans, and educate community members on food security, and access data to include in grant applications.

### 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

## 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 sought from these groups, boards, and individuals, we also solicit feedback on the pertinence and effectiveness of our current programs.

**Evaluation purpose:** The purpose of planned evaluation is to determine the impact of Wisconsin Cooperative Extension efforts in community and youth gardens. The evaluation results will be used to inform future programming efforts, such as identifying best practices and enhanced networking with other organizations supporting community gardens.

### Key Items of Evaluation

**Evaluation questions and methods:** Case studies will provide the basis for a more comprehensive evaluation of Wisconsin Cooperative Extension community gardens programming. The case studies will:

(1) Capture in-depth descriptions of garden-based programming;
(2) Measure, assess, and describe programming impacts and outcomes; and
(3) Contribute to the design of a statewide evaluation of garden-based programming.

## 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% | | 11% | |
| 104 | Protect Soil from Harmful Effects of Natural Elements | 0% | | 3% | |
| 111 | Conservation and Efficient Use of Water | 0% | | 3% | |
| 123 | Management and Sustainability of Forest Resources | 0% | | 3% | |
| 131 | Alternative Uses of Land | 0% | | 3% | |
| 132 | Weather and Climate | 0% | | 5% | |
| 133 | Pollution Prevention and Mitigation | 15% | | 5% | |
| 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% | | 5% | |
| 205 | Plant Management Systems | 10% | | 3% | |
| 206 | Basic Plant Biology | 0% | | 9% | |
| 302 | Nutrient Utilization in Animals | 0% | | 3% | |
| 307 | Animal Management Systems | 0% | | 5% | |
| 401 | Structures, Facilities, and General Purpose Farm Supplies | 0% | | 3% | |
| 403 | Waste Disposal, Recycling, and Reuse | 5% | | 11% | |
| 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% | | 5% | |
| 608 | Community Resource Planning and Development | 25% | | 3% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 17.0 | 0.0 | 30.0 | 0.0 |
| Actual Paid | 9.9 | 0.0 | 23.0 | 0.0 |
| Actual Volunteer | 66.0 | 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 |
| 407400 | 0 | 1233664 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 611101 | 0 | 1233664 | 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 Wisconsin Cooperative Extension plans 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, energy and water footprints in local communities.

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 climate change research, and adaptive response to, climate change. Current projects include work on the development of 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 anticipated climate change, remote sensing detection of insect and disease problems associated with 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 can likewise reduce a harmful by-product of climate mediated excess soil moisture--emissions of the greenhouse gas nitrous oxide into the atmosphere.

### 2. Brief description of the target audience

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, 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 11 agricultural research stations.

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

**1. Standard output measures**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 40036 | 0 | 14389 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 8 | 41 | 49 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees, and publications all include an element of critical review and assessment of originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 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.

Not Reporting on this Outcome Measure

**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

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2015 | 73 |

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

**Issue (Who cares and Why)**
Investigator: Rebecca Larson, CALS Assistant Professor of Biological Systems Engineering and Extension Biowaste Specialist

Project: Impact Assessment of anaerobic digestion: Economic, environmental and operational relations

Wisconsin's $43 billion dairy industry produces a lot of manure: around 400 swimming pools per

day worth. This manure is often stored and then spread on fields to help fertilize crops, however-if too much is used or the conditions aren't right-the manure can pollute area streams and groundwater. To help deal with manure management issues, producers have begun to embrace anaerobic digestion as a promising waste-to-energy technology. By converting manure into biogas and other outputs, anaerobic digesters can help producers reduce negative environmental impacts, while reaping positive economic benefits-in the form of energy that farms can use and/or sell back to energy utilities. In making improvements to these systems, engineers and producers tend to focus on increasing the economic benefits, without considering the environmental impacts of the various alterations. Research can reveal win-win scenarios where anaerobic digesters and partner technologies-like solid-liquid separators-can be optimized to maximize both economic and environmental benefits.

**What has been done**

Researchers at the University of Wisconsin-Madison performed Life Cycle Analysis assessments to understand the economic and environmental impacts of various advanced manure treatment systems-including anaerobic digesters, solid-liquid separators and the two together-in the context of various farming operations. These complex analyses rely on massive amounts of data about how farms are run, how the various systems work, what outputs these systems create and how those outputs will be used. The researchers found that each of the aforementioned systems helps reduce the "Global Warming Potential" of dairy operations. The best first step to cut a dairy farm's greenhouse gas emissions, they found, is to install an anaerobic digester, which can cut emissions from their manure system by around 50 percent. For operations that can't afford a digester, they can invest in a solid-liquid separator, which can help cut emissions by around 25 percent. They also identified other "next steps" to help reduce environmental impacts of dairy operations, such as cutting ammonia emissions from manure lagoons, and they are now exploring economical mitigation options for this.

**Results**

The results of the Life Cycle Analysis assessments can now be used by dairy producers, equipment designers, government officials and investors to make decisions about purchasing, improving and regulating anaerobic digester and solid-liquid separator systems for dairy operations. Researchers and extension agents are using the findings to further study and improve these systems, as well as to make equipment recommendations tailored to individual farms-based on farm size, budget and other factors. They are also in the process of developing an easy-to-use, online "decision tool" for dairy producers interested in these systems. The findings have been shared via multiple papers and talks, and the Life Cycle Analysis data have been added to a public database. The data are also being incorporated into a much larger dairy sustainability computer model being developed for the "Dairy CAP" project, a $10 million USDA grant that seeks to boost the resilience and sustainability of dairy production systems in the Great Lakes region in the context of a changing climate.

Investigator Rebecca Larson is a University of Wisconsin Cooperative Extension State Specialist in the Department of Biological Systems Engineering. Dr. Larson's applied research such as that described above informs her Extension education programs. An example of this is the Midwest Manure Summit which Dr. Larson is a regular contributor. The Midwest Manure Summit was started in 2008 by a group of UW-Extension County Agriculture Agents. More than 850 persons from 15 different states and two Canadian provinces have attended the Summit in 2009, 2011, 2013 and 2015. The audience includes dairy producers, agribusiness and manure industry professionals, government agency professionals and educators. A Manure Summit digester training pre-conference provided critical training on installing and operating digestion systems at livestock facilities. Trained digester owners and operators and industry professionals are benefiting from her Extension anaerobic digestion research and outreach. New tools allow

operators to evaluate impacts to emissions, nutrient use efficiency, and economics. As a result, facilities are increasing biogas production and more importantly, avoiding highly toxic feedstocks that cause catastrophic failures. Her recommendations have led to more efficient systems with greater economic and environmental sustainability. And her evaluation of technology and economic constraints has been critical in guiding producers who are evaluating new anaerobic digestion projects.

States: AR, IL, IN, MA, MD, MI, MN, NC, NY, OH, PA, WA, WI

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 104 | Protect Soil from Harmful Effects of Natural Elements |
| 111 | Conservation and Efficient Use of Water |
| 123 | Management and Sustainability of Forest Resources |
| 131 | Alternative Uses of Land |
| 132 | Weather and Climate |
| 133 | Pollution Prevention and Mitigation |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |
| 206 | Basic Plant Biology |
| 302 | Nutrient Utilization in Animals |
| 307 | Animal Management Systems |
| 401 | Structures, Facilities, and General Purpose Farm Supplies |
| 403 | Waste Disposal, Recycling, and Reuse |
| 511 | New and Improved Non-Food Products and Processes |
| 601 | Economics of Agricultural Production and Farm Management |
| 605 | Natural Resource and Environmental Economics |
| 608 | Community Resource Planning and Development |

## 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

**Competing public priorities:** Given Wisconsin's wealth of resources in forests and agricultural production, there is great interest among state businesses and communities in producing alternative fuels and feedstocks from biomass. Outreach and extension collaborations need further development. Professional training and cross-discipline sharing of research and information need additional collaboration to effectively and efficiently bring new technology to application. A new collaboration was formed among Wisconsin Cooperative Extension, the University of Wisconsin-Madison College of Agricultural and Life Sciences and Wisconsin Bioenergy Initiative to develop the curriculum for USDA Farm Service Agency Biomass Crop Assistance Program education. Acres of farmland being used for biomass/fuel are not available for food production - commodities or locally foods that support communities

## 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 reapplication process for WAES projects, project productivity (past performance) and impact

are also evaluated. This occurs every two to four 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.

Its purpose is to determine the effectiveness of educational programming to change agricultural management practices of Wisconsin farms. The results will be used to refine educational programming to meet policy makers' goals.

**Key Items of Evaluation**

N/A

## 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% | | 4% | |
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | | 4% | |
| 112 | Watershed Protection and Management | 0% | | 4% | |
| 123 | Management and Sustainability of Forest Resources | 0% | | 14% | |
| 131 | Alternative Uses of Land | 0% | | 4% | |
| 132 | Weather and Climate | 0% | | 14% | |
| 133 | Pollution Prevention and Mitigation | 0% | | 4% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | | 18% | |
| 136 | Conservation of Biological Diversity | 0% | | 18% | |
| 205 | Plant Management Systems | 0% | | 4% | |
| 213 | Weeds Affecting Plants | 0% | | 4% | |
| 301 | Reproductive Performance of Animals | 0% | | 4% | |
| 307 | Animal Management Systems | 0% | | 4% | |
| 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: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 2.0 | 0.0 | 22.0 | 0.0 |
| **Actual Paid** | 14.3 | 0.0 | 7.0 | 0.0 |
| **Actual Volunteer** | 5.0 | 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** |
| 551282 | 0 | 347775 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 826923 | 0 | 347775 | 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 on-going research project investigates the increased use of cover crops to promote environmental enhancement. Wisconsin Cooperative Extension plans collaboration among the cross-program area BioEnergy and the 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.

Working with ThinkWater colleagues across the U.S., Wisconsin Cooperative Extension Program Development and Evaluation staff continue to train natural resources educators in effective methods of engaging students in water education and to launch the ThinkWater website.

### 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. The interdisciplinary BioEnergy and the BioEconomy Team is addressing statewide emerging bioenergy education needs. 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.

ThinkWater is targeting water educators and parents by providing an online forum for water educators (both formal and informal) to visually map, analyze, present, share, adapt, rate and discuss lesson plans.

### 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, the Institute for Environmentally Integrated Dairy Management at the UW-Madison Marshfield Agricultural Research Station, 10 other agricultural research stations and the USDA Dairy Forage Research Center.

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

**1. Standard output measures**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 4602 | 0 | 0 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 4 | 4 | 8 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 16 |

### 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. |

**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 |
|---|---|
| 2015 | 16 |

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

**Issue (Who cares and Why)**
Investigator: Doug Soldat, CALS Associate Professor of Soil Science and Extension Turfgrass and Urban Soil Specialist

Project: Response of Turfgrass to Simulated Treated Wastewater in the Upper Midwest

As urban areas get larger and people plant more lawns of turfgrass, the demand on water resources increases. In Wisconsin, urban landscapes account for over 3,000 square kilometers. To limit the effects of turfgrass and urban landscapes on water availability and quality, the EPA initiated the Water Sense program in 2008. The program aimed to limit the use of water on turfgrass. However, there was little information available about how much water different turfgrasses use and, therefore, there was no indication whether the limits set by the program would be feasible. This study aimed to evaluate turfgrass water use and determine which grasses use the least water while still remaining green, with the goal of helping homeowners and turf professionals select low-water varieties for their purposes.

**What has been done**
While a team of University of Wisconsin-Madison researchers initially set out to study the effects of wastewater on turfgrass, the composition of the wastewater made that part of the project untenable. Instead, researchers compared the water use of 20 different turfgrass varieties under drought and non-drought conditions with no additional irrigation water applied. To quantify water use, researchers developed a novel, indirect method that involves measuring the surface temperature of a turfgrass and comparing it to the air temperature above, specifically on a small-plot scale that allows for testing of more grasses. This method is based upon the observation that as water evaporates, it cools the plant. Researchers expected that turfgrasses that used the least amount of water would stay green the longest without additional irrigation. Instead, they found the opposite -the grasses that stay green the longest are those that use the most water. These "long-lasting" grasses likely have deeper and more extensive root systems able to locate below-ground water. Moving forward, researchers plan to incorporate the use of unmanned aerial vehicles (drones) into the process to help speed the acquisition of temperature data.

**Results**
Scientists developed a new, simpler way to measure water use by turfgrass and used the new approach to test and compare water consumption by 20 common turfgrass varieties. Researchers can now go on to compare hundreds of different varieties of grasses-in a fast and economical way-with the goal of identifying low-water varieties that can help states meet their Water Sense limits. This information will also help turfgrass breeders select promising materials to develop even more sustainable, low-water varieties. The findings of this project are applicable to the cooler states of the Midwest and Northeast-from Minnesota to Maine-where more than one-third of the nation's turfgrass is grown.

Findings from this study, including method development and water use data, have been presented to scientific audiences at conferences, and journal articles are currently in production. The lead investigator has also shared this work with growers and sod producers at field days, including the annual field day at the UW-Madison's O.J. Noer Turfgrass Research and Education Facility, which draws around 300 turfgrass professionals each year.

As University of Wisconsin-Extension specialist in turfgrass and urban soils, investigator Doug Soldat has helped the green industry address challenges of turf and soil management with research-based solutions and resources. Dr. Soldat's applied research such as that described above informs his extension education programs. Through his extension work, he has assumed

leadership and advisory roles with groups including the Wisconsin Department of Agriculture, Trade and Consumer Protection, Wisconsin Department of Natural Resources, Wisconsin Golf Course Superintendents Association, Wisconsin Sod Producers Association, Wisconsin Sports Turf Managers Association, Wisconsin Turfgrass Association and others- training and advising professionals in support of Wisconsin's $5 billion green industry.

For the past 5 years, Doug Soldat has been working with diverse groups and green industry professionals to solve specific problems, identify research priorities, and advise on big picture issues related to policy affecting managed turf areas. For example, taking a complicated administrative rule, he developed a training program to help turf managers affected by this rule become compliant. Turf managers first learned basic skills needed to use the Web Soil Survey, a complex online database of soil information, as most had no experience with computers. Leading this comprehensive training program, he met turf managers all over the state and better understands their nutrient management issues. Those trained re-evaluated how they manage nutrients, and developed plans that help protect the environment.

In addition, Soldat has been a regular contributor to education for commercial horticulture professionals such as the Landscape & Grounds Maintenance Short Course held annually in three locations in SE Wisconsin. In 2015, he presented on the topic "Seeding for Success: Seeds, Coatings, and Establishment Techniques for Getting Results." From the study "Economic Contributions of the Green Industry in the United States in 2013," the green industry contributed $5.1 billion to Wisconsin's economy (industry output) and generated 43,452 jobs. In 2013, southeast Wisconsin short course participants were asked to complete a short questionnaire at the end of each of four weekly sessions (N=601), and at the end of the last session participants received a separate questionnaire to provide overall course feedback (N=129). Participants consistently reported substantial increases in their knowledge levels after the short course compared to their knowledge prior to the course.The short course will produce a large multiplier effect in the green industry - nearly all trained participants indicated they would share course information with other horticulturalists/co-workers.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 101 | Appraisal of Soil Resources |
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 112 | Watershed Protection and Management |
| 123 | Management and Sustainability of Forest Resources |
| 131 | Alternative Uses of Land |
| 132 | Weather and Climate |
| 133 | Pollution Prevention and Mitigation |
| 135 | Aquatic and Terrestrial Wildlife |
| 136 | Conservation of Biological Diversity |
| 205 | Plant Management Systems |
| 213 | Weeds Affecting Plants |
| 301 | Reproductive Performance of Animals |
| 307 | Animal Management Systems |
| 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

## 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four 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.

### Key Items of Evaluation

N/A

## 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% | | 4% | |
| 206 | Basic Plant Biology | 0% | | 4% | |
| 302 | Nutrient Utilization in Animals | 0% | | 4% | |
| 305 | Animal Physiological Processes | 0% | | 20% | |
| 501 | New and Improved Food Processing Technologies | 0% | | 4% | |
| 502 | New and Improved Food Products | 0% | | 20% | |
| 607 | Consumer Economics | 0% | | 4% | |
| 701 | Nutrient Composition of Food | 0% | | 4% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 0% | | 24% | |
| 703 | Nutrition Education and Behavior | 75% | | 4% | |
| 704 | Nutrition and Hunger in the Population | 10% | | 0% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 0% | | 4% | |
| 724 | Healthy Lifestyle | 15% | | 4% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 2.0 | 0.0 | 7.0 | 0.0 |
| **Actual Paid** | 2.8 | 0.0 | 11.6 | 0.0 |
| **Actual Volunteer** | 901.0 | 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** |
| 106759 | 0 | 679186 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 160138 | 0 | 679186 | 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 Animal Sciences, Biochemistry, Food Science, Genetics, and Nutritional Sciences are assessing the causes and consequences of childhood obesity and poor health and nutrition. On-going WAES projects include research about the health status in urban and rural populations and the affects on environmental outcomes, promotion of healthful eating campaigns, dietary markers of human health and nutrition, obesity prevention, and related studies.

Wisconsin Cooperative Extension plans collaboration among Family Living Programs 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 productive workforce in the future.

Wisconsin Cooperative Extension nutrition education programs such as the Supplemental Nutrition Assistance 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**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 87494 | 0 | 67968 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 3 | 11 | 14 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 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

Not Reporting on this Outcome Measure

**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 |
|---|---|
| 2015 | 26 |

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

**Issue (Who cares and Why)**
Investigator: Ann L. Keim, Extension - Associate Academic Program Specialist (Interim State Program Director, Family Living Programs)

More than one-third of adults and 17% of youth in the United States are obese resulting in increased health concerns including diabetes and hypertension. In Wisconsin, the adult obesity rate is 29.8%, ranking 22/51 amongst states and the childhood obesity rate is 14%, 21/41 states reporting. Preventing obesity in children is important to society due to the high health costs treating diabetes, high blood pressure, asthma and sleep apnea. Rural low-income children are at elevated risk due to lack of healthy food choices and reduced access to affordable physical activity.

**What has been done**
Two Wisconsin County Extension offices are part of a 7-state AFRI project, Communities Prevention Childhood Obesity, which supports coalitions in developing plans and conducting activities to prevent obesity in rural, low-income children. The purpose of the project is to examine the effectiveness of community coalitions in creating healthier environments for rural,

low-income children. Both counties have received informational and financial resources to support the work of the coalitions. One county received the support of a Community Coach to assist them in planning and implementation. Ongoing data collection instruments have measured coalition effectiveness (annually), parent perceptions of the supports and barriers to healthy activity and eating (Year 1 and 5), community resources (1 and 5) and Ripple Effect Mapping in the final year to determine improvements in the socio-ecological environments.

**Results**

The missions of the coalitions are to create a culture of wellness and promote healthy living across the lifespan for all people. When the groups conducted the Ripple Effect Mapping evaluation activity, three outcomes were clear:

1. Increased engagement with public officials
2.Greater sense of community connection
3.Increased knowledge and understanding of health amongst community residents.

Within each of these outcomes were number of "ripples" highlighting both strategies and results. Evidence that the coalition is moving forward towards working in a Collective Impact framework include: meetings are consistent in format and members set the future agendas. Communication is open and discussions are focused upon activities to meet common goals. The coalitions self-assessment conducted in August 2015 reveals a change in attitude toward meeting as a coalition. Members agreed that the coalition makes good decisions, that they opinions are heard and considered and that the group respects the points of view of the memberships. As a result, engagement in shared activities has increased with better outcomes. Future work includes selection of shared measures to show coalition effectiveness.

One of the coalitions developed their own "brand" of Healthy Roots. As a result, they worked on developing a shared and consistent public image. Promotional materials were developed, purchased and utilized throughout the county in order to increase shared visibility. In 2015, Healthy Roots developed a connector model, which is a method of strengthening the connections between the coalitions and various partners.

Currently, Healthy Roots is managing three different funding streams and an Americorps VISTA to support their shared agendas and efforts. Each project has been built on shared activities and outcomes all working together in support of the Healthy Roots mission.

Examples of projects conducted include:

Day Care Garden project- 18 low income families participated in the care of a family garden at a day care center.

Healthy Lunchrooms-seven schools received mini-grants to assess their cafeteria, identify strategies to improve the food quality.

Healthy Grocery Stores project-four grocery stores in participated in training to develop ways to feature healthy foods and snacks.

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

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

Nearly $150 billion per year is now being spent to treat obesity-related medical conditions. 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 and healthy living: (1) empower parents and caregivers; (2) provide healthy food in schools; (3) improve access to healthy, affordable foods; and (4) increase physical activity. The goal of the action plan, developed by an inter-agency task force, is to reduce childhood obesity to a rate of just 5% by 2039 [ URL:http://www.letsmove.gov/tfco_fullreport_may2010.pdf]

## 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

Assessments of Quality of CPCO Coalitions in terms of functioning and outcomes.
Effectiveness of interventions/educational programs in improving the diets and activity levels of rural low-income 4 Year olds.
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% | | 3% | |
| 212 | Pathogens and Nematodes Affecting Plants | 0% | | 6% | |
| 216 | Integrated Pest Management Systems | 0% | | 3% | |
| 311 | Animal Diseases | 0% | | 11% | |
| 501 | New and Improved Food Processing Technologies | 0% | | 3% | |
| 502 | New and Improved Food Products | 0% | | 17% | |
| 503 | Quality Maintenance in Storing and Marketing Food Products | 0% | | 3% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 0% | | 3% | |
| 703 | Nutrition Education and Behavior | 0% | | 3% | |
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources | 50% | | 6% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 50% | | 36% | |
| 723 | Hazards to Human Health and Safety | 0% | | 3% | |
| 903 | Communication, Education, and Information Delivery | 0% | | 3% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 3.0 | 0.0 | 17.0 | 0.0 |
| **Actual Paid** | 7.2 | 0.0 | 19.3 | 0.0 |

| | | | | |
|---|---|---|---|---|
| **Actual Volunteer** | 133.0 | 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** |
| 290511 | 0 | 993160 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 435767 | 0 | 993160 | 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 CALS departments. Research is being conducted on several important food toxins and their causal organisms (e.g. Aspergillus and Clostridium botulinum), mastitis resistance as a component of on-farm food safety, the development of new thermal food preservation technologies, biotoxins and food safety, residual pesticides in foods, symbiotic associations between antibiotic producing bacteria and honeybees, and several other areas. A current research project is developing a nanobiosensor to detect E. coli and Salmonella enterica in fresh produce and other foods.

The WAES and Wisconsin 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 all 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 formula grant programs 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**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 14067 | 0 | 12989 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 5 | 33 | 38 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 59 |

### 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.

Not Reporting on this Outcome Measure

**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 |
|---|---|
| 2015 | 59 |

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

**Issue (Who cares and Why)**
Investigator: Barbara Ingham, Professor, CALS Department of Food Science and Extension Food Science Specialist

Project: Control of Food-Borne Pathogens in Pre- and Post-Harvest Environments

Cheese is a significant part of the $89 billion agriculture industry in Wisconsin, the nation's leading cheese producer. Federal food safety standards limit the amount of time that cheese can be displayed unrefrigerated at the grocery store or in other retail settings. Studies have shown that extending the time for unrefrigerated display of certain cheeses from four hours to several days can increase retail sales by 1000 percent or more. This research will aid industry and regulatory personnel in safety assurance by evaluating the growth of pathogens on hard and semi-hard cheeses during unrefrigerated storage for up to 15 days. The results will be used to inform industry and regulatory practices and to establish factors critical in ensuring the safety of cheeses stored at room temperature and in protecting public health.

**What has been done**

Researchers evaluated the survival and growth of multiple strains of Listeria monocytogenes, Staphylococcus aureus, Escherichia coli O157:H7, and Salmonella spp. on more than 100 cheeses during extended, unrefrigerated storage. All cheeses were purchased at retail and made from pasteurized cows' milk. In each trial, a multi-strain cocktail of one of the four pathogens was applied to a cheese and the cheese was stored unrefrigerated for up to 15 days. The ability of each of the four pathogens to grow on each cheese during the storage period was evaluated. Researchers also determined the level of native bacteria in each cheese and measured any changes during storage. In addition, they evaluated cheese characteristics such as pH, water activity, and percent moisture and changes, if any, during storage.

**Results**
Researchers at the University of Wisconsin-Madison found that certain cheeses are safe to store unrefrigerated for 15 days, given certain starting conditions (related to initial pH, water activity or percent moisture of a given cheese). These 87 "safe" cheeses, which are all pasteurized cow's milk cheeses, didn't support the growth of the four pathogens tested in this study's rigorous experimental set-up. Based on this new data, a recommendation was made to the U.S. Food and Drug Administration (FDA) to allow these safe cheeses to be held unrefrigerated for up to 15 days as long as the manufacturer states that the cheese composition meets food safety requirements at shipment and as long as the cheese is handled according to the FDA Food Code between shipment and retail display. In addition to helping to develop the new FDA recommendation, researchers involved in this study are also helping the cheese industry communicate study findings with decision makers. Study findings have been presented to the National Cheese Society, the Wisconsin Association for Food Protection, the Wisconsin Milk Marketing Board science committee, the Center for Dairy Research forum, key state and federal food safety personnel, and industry groups at conferences and other gatherings. A journal article covering the study was published in 2014 in the Journal of Food Protection, and a second manuscript was submitted in January 2016.

Review planned program Global Food Security and Hunger: Food Accessibility, for the contribution of food safety research toward Extension's Safe and Healthy Food project.

## 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 212 | Pathogens and Nematodes Affecting Plants |
| 216 | Integrated Pest Management Systems |
| 311 | Animal Diseases |
| 501 | New and Improved Food Processing Technologies |
| 502 | New and Improved Food Products |
| 503 | Quality Maintenance in Storing and Marketing Food Products |
| 702 | Requirements and Function of Nutrients and Other Food Components |
| 703 | Nutrition Education and Behavior |
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |
| 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

**Government regulations**: The current situation requires educational efforts that focus on continued safety and adequacy of the food supply. As a critical infrastructure, the food and agriculture sector constitutes one-sixth of the U.S. gross domestic product (GDP) - more than a trillion dollars a year. A food and agriculture security event would have economic, social and psychological impacts. A mishandled emergency could undermine consumer confidence in the safety of the food supply. External political factors and animal diseases could threaten both the food supply and economic viability of animal agriculture industries. National efforts to monitor and detect potentially devastating diseases, identify and track potentially infected animals along marketing channels, and pinpoint the disease source and premises origin within a timeframe is of importance for all animal species. Premises and individual animal identification, combined with food quality and safety, become major programs of emphasis.

## 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four 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.

### Key Items of Evaluation

N/A

## 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 |
|---|---|---|---|---|---|
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 0% | | 50% | |
| 806 | Youth Development | 100% | | 0% | |
| 903 | Communication, Education, and Information Delivery | 0% | | 50% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 1.0 | 0.0 | 2.0 | 0.0 |
| **Actual Paid** | 10.0 | 0.0 | 2.0 | 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** |
| 373370 | 0 | 55019 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 560055 | 0 | 55019 | 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 incorporates research projects to address the needs of Wisconsin farmers and landowners and to educate them to improve agricultural, 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, the Institute for Environmentally Integrated Dairy Management at the UW-Madison Marshfield Agricultural Research Station, 10 other agricultural research stations and the USDA Dairy Forage Research Center.

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

**1. Standard output measures**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 30025 | 0 | 21303 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Actual** | 2 | 0 | 2 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 4 |

### 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. |
| 3 | To increase the general public's knowledge of current research generated by campus-based faculty. |

**Outcome #1**

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #3**

1. **Outcome Measures**

To increase the general public's knowledge of current research generated by campus-based faculty.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2015 | 4 |

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

**Issue (Who cares and Why)**
Investigator: Erika Washburn, Extension, Outreach Program Manager - Lake Superior National Estuarine Research Reserve Manager
Patrick Robinson, Environmental Resources Center Co-Director and Extension Environmental Studies Specialist

Title: Lake Superior National Estuarine Research Reserve

The Lake Superior National Estuarine Research Reserve (Reserve) was established in 2010 as a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the state of Wisconsin through UW-Extension. UWEX works closely in partnership with the Reserve's host campus, UW-Superior. The Reserve seeks to improve the understanding of Lake Superior estuaries and coastal resources and to address the issues affecting them through an integrated program of research, education, outreach and stewardship. The Reserve's education and outreach programs target pre-K through elders, modeling unique K-12 programming in local school districts and offering community decision maker training on such topics as green infrastructure and resiliency planning.

The Reserve's research focuses on coastal estuarine and watershed resources the uniqueness of the Lake Superior ecosystem and the communities it supports. Research priorities include long-term water quality monitoring, impacts of climate change, invasive species, and restoration, as well as the human and community dimensions related to these and other topics within the St. Louis River watershed and western Lake Superior. A sentinel site research module has also been constructed to study how ecosystems are responding to climate change. The Reserve's research, monitoring, education, outreach and stewardship programs are conducted in active collaboration with a wide nexus of public and private partners in both WI and MN as well as with Tribal Governments.

**What has been done**

The Reserve, in consultation with its NOAA program specialist, tracks performance measures, developed in FY12*, and associated 5-year targets. The performance measures, supported with baseline data or research, relate to either the Reserve Management Plan and/or one of the NERR System?s performance measures. The following measures have been submitted to and approved by NOAA?s National Policy and Evaluation Division. Performance Measure 1: Number of visitors to the Lake Superior Reserve?s Learning Center Target 1: Between 2012-2017, 33, 487 visitors to the Reserve?s Learning Center Performance Measure 2: Number of outreach events or publications developed and led by Reserve staff related to sharing research on economic benefits, ecosystem services and environmental and social values of Great Lakes water quality and coastal resources. Target 2: Between 2012-2017, at least 10 outreach events or publications are developed and led annually by Reserve staff related to sharing research on economic benefits, ecosystem services and environmental and social values of Great Lakes water quality and coastal resources. Performance Measure 3: Number of sites established and used as intensive monitoring and field research areas. Target 3: By 2017, three sites are established and used as intensive monitoring and field research areas. (* New performance measures will be drafted to accompany the Reserve's new five year management plan for 2016-2021). The Reserve uses programmatic work responsible for meeting NOAA's approved performance metrics as the basis for any reporting metrics supplied to UWEX or UW-Superior rather than developing additional or separate metrics.

**Results**

Since designation in 2010, the Reserve's operations brought over $7.6M into the local community in support of our mission and programs and successfully competed for more than $627K in additional grant funding. Since designation the Reserve has provided over 16,600 contact hours of educational programming to over 3300 students in 13 regional schools. The Reserve provided over 2800 hours of professional development for 86 teachers across northwest WI, northeast MN and the Fond Du Lac Band of Lake Superior Chippewa Reservation. In one 6 month time span of 2015, the Reserve reached over 900 members of the public in community educational programming. Over three dozen paid undergraduate internships have provided students at UW-Superior and other campuses with hands-on learning opportunities in field and lab research, educational programming and outreach and general environmental career mentoring.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities |
| 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
- 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

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

### Evaluation Results

N/A

### Key Items of Evaluation

N/A

## 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% | | 10% | |
| 136 | Conservation of Biological Diversity | 0% | | 10% | |
| 307 | Animal Management Systems | 0% | | 10% | |
| 601 | Economics of Agricultural Production and Farm Management | 60% | | 20% | |
| 604 | Marketing and Distribution Practices | 0% | | 20% | |
| 605 | Natural Resource and Environmental Economics | 0% | | 10% | |
| 610 | Domestic Policy Analysis | 0% | | 10% | |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 40% | | 10% | |
| | **Total** | 100% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 1.0 | 0.0 | 3.0 | 0.0 |
| **Actual Paid** | 25.5 | 0.0 | 4.8 | 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** |
| 1001844 | 0 | 251981 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1502765 | 0 | 251981 | 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.

### 2. Brief description of the target audience

Integrated activity for our formula grant programs targets a broad group of stakeholder audiences in agricultural, 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, webinars and eXtension Communities of Practice to efficiently and effectively address critical and emerging issues.

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

### 1. Standard output measures

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 33061 | 0 | 0 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 10 | 14 | 24 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 29 |

### 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 | Inform community leaders on economic development strategies |

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Inform community leaders on economic development strategies

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2015 | 29 |

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

**Issue (Who cares and Why)**
Investigator: Steven Deller, Professor, CALS Agriculture and Applied Economics and Extension Community Development Economist

Project: The Changing Role of the Local Foods Movement in Rural Community and Economic Development

"Eat local" has become the buzz phrase of a popular movement to choose foods that are grown near the place of consumption. It would appear, however, that many advocates have overpromised the viability of local foods as a community economic development strategy. This applied research effort serves to put realistic parameters on expectations of some of the claims being made around local foods so that communities do not rely on inadequate strategies.

**What has been done**
While efforts of academic and popular press to look at local foods have exploded over the past 10 years, much of the work has been speculative and/or advocacy-oriented. This applied study lays a foundation upon which to better understand the potential role local foods may or may not play in

community economic development. Researchers drew upon secondary data from the USDA Census of Agriculture and other federal sources and used advanced spatial econometric methods to analyze the potential impacts of local foods activity on community economic development. The key findings are 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.

**Results**

This research is being used by the Community Food Systems Team at UW-Extension Cooperative Extension in their efforts to help communities around the state with local food projects. Previously, the team was promoting local foods as a community economic growth strategy. Because this research did not support those claims, team members have since adjusted their message and used the findings as they developed a successful series of educational materials and workshops addressing the business side of local foods. Communities are still moving forward with local food efforts, but those efforts are now based on a solid research foundation with the understanding that if the "economics" of local foods is not sustainable, then local food-focused businesses are not sustainable. Researchers have also informed federal policy makers and staff about the relationship between local foods, public health and poverty through a national conference hosted by the Federal Reserve Bank. Finally, researchers are helping with a USDA-supported multi-university effort to develop a manual for communities, farmers and local food managers that covers how to assess local markets potential and economic impacts. In addition to these activities and presentations, research findings have been included in six publications including staff papers, magazine stories and journal articles.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 131 | Alternative Uses of Land |
| 136 | Conservation of Biological Diversity |
| 307 | Animal Management Systems |
| 601 | Economics of Agricultural Production and Farm Management |
| 604 | Marketing and Distribution Practices |
| 605 | Natural Resource and Environmental Economics |
| 610 | Domestic Policy Analysis |
| 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

## 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four 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.

**Purpose of the evaluation:** Early outcome measures document short- and med-term changes in learning and action at the community level. Continued evaluation will be conducted to determine if the intended long-term outcome of reversing a community's population decline will occur. While additional research is necessary, the asset-based approach shows promise for communities of all sizes.

### Key Items of Evaluation

N/A

## 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% | | 5% | |
| 134 | Outdoor Recreation | 0% | | 5% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | | 15% | |
| 136 | Conservation of Biological Diversity | 0% | | 10% | |
| 301 | Reproductive Performance of Animals | 0% | | 10% | |
| 303 | Genetic Improvement of Animals | 0% | | 10% | |
| 305 | Animal Physiological Processes | 0% | | 5% | |
| 306 | Environmental Stress in Animals | 0% | | 5% | |
| 311 | Animal Diseases | 0% | | 5% | |
| 312 | External Parasites and Pests of Animals | 0% | | 5% | |
| 501 | New and Improved Food Processing Technologies | 0% | | 5% | |
| 502 | New and Improved Food Products | 0% | | 5% | |
| 721 | Insects and Other Pests Affecting Humans | 0% | | 5% | |
| 722 | Zoonotic Diseases and Parasites Affecting Humans | 0% | | 5% | |
| 902 | Administration of Projects and Programs | 0% | | 5% | |
| | **Total** | 0% | | 100% | |

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

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

| Year: 2015 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 0.0 | 0.0 | 7.3 | 0.0 |
| **Actual Paid** | 0.0 | 0.0 | 9.7 | 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 | 453428 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 0 | 0 | 453428 | 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**

Formula funds 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, animal health, including wildlife and non-farm animals, and applied statistics in support of agricultural research.

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

Integrated activity for our formula grant programs 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**

| 2015 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 0 | 0 | 0 | 0 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2015 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2015 | Extension | Research | Total |
|---|---|---|---|
| Actual | 0 | 35 | 35 |

**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. The output measures listed earlier will also serve as outcome measures in that patents, graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

| Year | Actual |
|---|---|
| 2015 | 44 |

### 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. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. |

## 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. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria.

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2015 | 44 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Investigator: Denise Ney, Professor, CALS Department of Nutritional Sciences

Project: Improved phenylalanine concentrations and bone development in mice with phenylketonuria fed glycomacropeptide from cheese whey

People born with a rare metabolic disorder known as phenylketonuria (PKU) suffer brain damage if they eat regular protein. Instead, they must "get their protein" by drinking an unpleasant-tasting cocktail of amino acids (the building blocks of protein) that lacks phenylalanine, an amino acid their bodies can't process correctly. Starting in 2010, medical foods became available for PKU patients that contain glycomacropeptide (GMP), a unique, natural protein that contains only trace amounts of phenylalanine. Early studies in mice and humans show this natural protein is safe to eat, at least in the short-term. Longer studies are needed to assess long-term safety and to determine other benefits of this natural protein. For instance, people with PKU suffer from weak bones. Could GMP help support bone development and bone health in PKU patients?

**What has been done**
Working with a mouse model of PKU that parallels the human disorder, researchers at the University of Wisconsin-Madison fed mice a life-long diet of GMP and measured the impact on bone development and other health-related outcomes. They found that GMP is safe to eat in the long-term, and mice fed the GMP diet had improved bone development and strength compared to mice that were fed a life-long diet of the standard amino acid formula consumed by most PKU patients.

**Results**
GMP-based medical foods first became commercially available in 2010. Since then, the number of American families purchasing these products has grown to over 800, and interest in these products continues to grow domestically and abroad. These foods look and taste like regular foods, offering PKU patients an alternative to the unpleasant amino acid formula that can drive people to eat damaging, off-limit foods. Now, with new data showing that GMP helps support bone health in PKU mice, demand for GMP medical foods will grow, helping additional patients adhere to their strict dietary rules and gain the additional health benefits of the GMP diet.

The head scientist leading this study is heavily involved in education and outreach related to GMP research. She and her team have shared the findings of this project through more than 10 talks and posters at national and international PKU conferences, and via more than six scientific publications. This work has helped the head scientist earn additional funding from the FDA Orphan Products Development Program and the National PKU Alliance to continue pursuing this line of research.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 123 | Management and Sustainability of Forest Resources |
| 134 | Outdoor Recreation |
| 135 | Aquatic and Terrestrial Wildlife |
| 136 | Conservation of Biological Diversity |
| 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.

Further, as we submit this report, the Governor has signed an authorization bill leading to a substantive base cut in state funding to the UW System. Leaders of CALS and UWEX are in the process of determining how best to implement these cuts.

## 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 reapplication process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every two to four years and is an important factor in whether a scientist's new project will be approved.

### 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. |