2013 University of Wisconsin Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 04/30/2014

I. Report Overview

1. Executive Summary

Wisconsin agriculture is a $59.16 billion industry and provides 354,000 jobs. Agriculture remains a vital part of the economy in nearly all 72 Wisconsin counties, contributing both jobs and income. About one in ten state residents works in a job related to agriculture, including farmers, farm employees, veterinarians, crop and livestock consultants, feed, fuel and crop input suppliers, machinery and equipment manufacturers and dealers, barn builders, agricultural lenders, employees in food processing businesses and all of the businesses needed to support the processing of products produced on the farm. Every job in agriculture supports another 0.89 job elsewhere in Wisconsin. The Economic Impacts of Agriculture in Wisconsin Counties by Steven C. Deller and David Williams (March 2011), and 68 county Agriculture Value and Economic Impact brochures are online at: http://www.uwex.edu/ces/ag/wisag

Several factors forged the need for 2013 emergency forage programming. Severe drought decreased 2012 hay, corn silage and grain production, forcing many farmers to break into stored reserves. Compounded by alfalfa winter kill, the dairy industry was facing the lowest May 1 hay stock levels on record. Where the cold, wet spring delayed planting corn for silage until mid-June, that crop failed for the second year in a row, pasture growth dwindled and even alternative forages could not be planted for fall grazing. Toxic weeds proliferate in faltering forages and over-grazed pastures, and whorled milkweed (Ascelpias verticillata) is increasingly common. All these plus loss of 48% of the state's alfalfa acres left farmers and their advisors wondering how to manage forage supplies and feed needs for coming months.

In 2013, 124 extension-led meetings and field days addressed strategies to help alleviate reduced forage inventories, attended by 2,034 agricultural producers and professionals. Extension dairy nutritionist Randy Shaver and corn agronomist Joe Lauer, University of Wisconsin-Madison, reached 125 farmers, agronomists, nutritionists and custom operators on managing, harvesting and storing late-planted and stressed crops, and effects on quality, feeding value and pricing. In response to the increase in poisonous weeds in pastures and forage, several educators developed a field guide for scouting and controlling toxic plants in Midwest pastures and forages. Plant pathologist Damon Smith and colleagues reached another 800 crop advisors with research-based alfalfa recommendations at 8 district Pest Management Update meetings. Farmers who had never attended an extension event learned proper harvest management and impact on forage quantity and quality, factors affecting grain quality, when to consider harvesting for other than grain, nutritional effects of corn crop condition on dairy cow feeding, pricing alternative forages for corn grain such as corn silage, high moisture corn and earlage, how to assess the quality of the field and how this affects price.

Extension campus and county faculty and staff responded quickly to immediate feeding challenges. Planning for, coordinating and leading a longer-term response effort that focuses on the human/family, production and financial aspects of such challenges is one of extension's primary purposes -- to respond proactively initially and as extreme weather impacts unfold, making sure programs and resources are in place to continue responding appropriately. Simply counting educational contacts does not capture the extent of a program's reach. For example, the 1,525 agricultural professionals who attended the 2013 Wisconsin Crop Management Conference from Wisconsin, Minnesota, Iowa, Illinois, Indiana and Michigan

produce a large multiplier effect as Wisconsin research-based recommendations ultimately reach an increasing portion of the Great Lakes Region crop production sector including farmers. Extension Integrated Pest Management and other specialists reinforce this work through regional professional development trainings for Wisconsin's 620 Certified Crop Advisors who earn 40 hours of continuing education units every 2 years to remain certified.

The 2013 University of Wisconsin-Extension Annual Report of Accomplishments describes how interdisciplinary colleagues and partners provide research-based education and assistance to sustain and grow the state's vital agricultural economy -- and the $26.5 billion dairy industry supporting more than 146,000 jobs at its heart -- across seven planned programs including evaluation results for three programs as well as responding to severe drought, alfalfa winter kill and late planting feeding challenges during 2013:

1. Global Food Security Food Availability: Crops and Agronomic Plants
2. Global Food Security Food Availability: Dairy and Livestock
3. Global Food Security and Hunger: Food Accessibility
4. Food Safety
5. Childhood Obesity
6. Climate Change
7. Sustainable Energy

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

For 2013, University of Wisconsin-Extension reports collaboration among North Central Region colleagues and other agricultural professionals, farmers and educational partners providing timely research-based education and assistance to improve food availability. By managing and minimizing losses due to plant pests and diseases, extension is prolonging a valuable pest management tool. By enhancing economic and environmental sustainability of agribusinesses, Extension-trained Amish families improve their profitability. And as described in the evaluation section, a soil test study of 100 farms using nutrient management (NM) plans for 7 to 13 years shows they are reducing levels of phosphorus (P) in loamy soils from an average 40 to 30ppm -- moving toward optimum P levels for most crops on loamy soils with potential for improving water quality, and highlighting the value of reducing P in dairy rations and following NM plans.

Strengthening pest management: Researchers, farmers and their advisors acted quickly to prolong use of a valuable Corn Belt pest management tool -- transgenic Bt corn hybrids that produce insect-killing proteins from the soil bacterium Bacillus thuringiensis (Bt). Bt-resistant western corn rootworms (WCR) have been confirmed in 11 Iowa fields. Extension field reports from Minnesota, Nebraska and Wisconsin offered evidence of resistance, and Wisconsin WCR populations will be screened for resistance in 2014. Extension-trained grain producers and their advisors are responding to WCR resistance to Bt corn with integrated pest management (IPM) practices. In 2012, 375 Pest Management Update meeting survey respondents reported using what they learned to make decisions on more than 8 million acres, which they valued at an average $28.34 per acre -- more than $114 million of value that extension information provided, improving grower management decisions and consultant recommendations. Research data and outcomes help support regulatory and commercial processes to better define the extent of Bt resistance and take action to prolong efficacy of Bt corn traits for future use as described in the external factors section.

Training Amish families boosts profitability: Since founding the Tri-County Produce Auction in 2010, up to 75 Amish families have been getting vegetable production education and technical assistance tailored to their needs and culture from Green Lake County UW-Extension. A 2013 survey found that trained Amish families used extension education to grow better crops, producing 12% more vegetables.

Fresh market vegetable producers with 3 to 12 acres can earn an average net income of $4,679 per acre (CIAS, 2006). On average, the 12% increase in Amish growers' vegetable production adds $562 net income per acre, so those who responded to the survey increased their total net income by $97,226 on 173 acres -- and all 75 families could increase their income by $347,236, at least a 10-fold return on Green Lake County investment in extension agricultural education. The next generation are trained in the field side-by-side with their parents. And buyers can count on consistent competitive prices, food safety and quality: http://ifmwi.org/auctions.aspx

2. Global Food Security Food Availability: Dairy and Livestock

University of Wisconsin-Extension interdisciplinary teams, colleagues and partners provide research-based education and assistance to sustain and grow the $26.5 billion dairy industry supporting more than 146,000 jobs. The average dairy cow generates more than $20,000 a year in economic activity, which circulates throughout local communities (Deller and Williams, 2011). By enhancing the economic and environmental sustainability of agribusinesses, 3,281farmers and their advisors learned strategies to alleviate 2013 feeding challenges. Through innovations and increased efficiencies in production, 42 farms are improving dairy reproductive efficiency. As previewed in the evaluation section, Meat Animal Quality Assurance (MAQA) certification has a positive impact on around 4,500 MAQA-certified youth producing a quality meat animal each year. Impacts include:

Responding to feeding challenges: When severe drought cut hay, corn silage and grain production, winter kill took half of alfalfa acres and a cold, wet spring delayed planting, 124 extension-led meetings and field days provided emergency forage programming attended by 2,034 agricultural producers and professionals. UW-Extension agriculture agents and campus specialists held 5 area feeding strategies workshops reaching 125 nutritionists, agronomists and other consultants with alternative feed and forage options to help farmers and their advisors develop feeding and cropping plans through 2014. Consultants responding to a follow-up survey reported changing their advice to share what they had learned, working with their producers to stretch feed on hand, evaluate alternative crops, avoid high-priced feed and forages, and adapt feeding strategies to maintain herd health. Feed accounts for about half of dairy and livestock production costs. As prices of forages, corn and soybeans increase, farmers achieve savings through using alternative feeds (see also audience and external factors).

Improving dairy reproduction efficiency: As dairy herds produced more milk per cow over the past 50 years, their fertility decreased such that even a 5% improvement in the 21-day pregnancy rate could provide an economic benefit of about $75 per cow per year. Optimizing reproductive performance requires an integrated approach sharing information and expertise across dairy science disciplines as well as among all farm personnel and their advisors who manage animal health, nutrition, housing, and breeding. In 2012 and 2013, 32 UW-Extension Reproducing Profitability Workshops reached more than 850 dairy farmers, agricultural service providers and educational partners. So far, 42 farms use on-farm management teams of trained extension agent facilitators, artificial insemination consultants and technicians, veterinarians, nutritionists, key employees and others. Of the first 13 farms that finished the Repro Money Program as of August 2013, 85% achieved their goals including increasing 21-day pregnancy and conception rates, improving treatments and the timing of artificial insemination relative to ovulation -- yielding an estimated average $55 economic gain per cow per year (see also audience and use of eXtension).

3. Global Food Security and Hunger: Food Accessibility

Wisconsin is a top agriculturally productive state, yet nearly 12% of households are food insecure -- lacking access to enough food. The success of small-scale agriculture requires a successful stream of

micro-enterprises from the farm gate to small-scale processors, marketers, restaurants and local food system networks. More than 200 farmers' markets are critical outlets for many agricultural producers in Wisconsin. To create economic opportunities for farmers, markets must provide a consistent customer base and reliable income. For 2013, University of Wisconsin-Extension interdisciplinary campus and county faculty and staff, regional colleagues and educational partners report efforts providing timely research-based education and assistance to improve food accessibility. For strengthening local food markets and systems, regional extension specialists are collaborating to support the growth of Upper Midwest food systems. By building capacity for increasing healthy foods for vulnerable populations, more farmers' markets are redeeming electronic food assistance vouchers, providing access to healthy, local foods. Impacts include:

Strengthening local food markets and systems: Educators in Wisconsin and the Upper Midwest expressed need for food systems data to inform community planning and measure progress of initiatives. How could they achieve holistic planning that looks at food systems from production to processing to consumption to waste disposal? To augment existing agricultural production and food insecurity data, UW-Extension specialists developed the Regional Food Systems Indicators Profiles Project: Harnessing University Resources Through Collaboration, building an online food systems profile tool. With grant funding, regional colleagues collaborated to produce food system profiles for each county in the region, a workshop to help educators use the profiles, regional maps and a food systems resource list online. Based on early evaluation results, the research team is collaborating on further studies to support the growth of regional food systems. Their North Central Regional County Food Systems Profiles Portal is at: http://www.foodsystems.wisc.edu

Increasing access to healthy, local foods: As hunger and food insecurity have grown among Wisconsin families, so has need for food assistance. The Wisconsin Department of Health Services (DHS) allocated USDA funds for hand-held wireless point of sale (POS) devices to expand acceptance of Supplemental Nutrition Assistance Program benefits (SNAP, known as FoodShare in Wisconsin) at farmers' markets -- but was unable to provide technical assistance. UW-Extension Waukesha County commercial horticulture educator Kristin Krokowski has been training and supporting farmers' market managers since 2007 as described in the audience section. When DHS and the POS provider asked her for help, she created a 3-part webinar series for farmers' market managers and vendors interested in accepting SNAP benefits by electronic benefits transfer (EBT). Survey respondents valued the topics Attracting EBT Users to the Farmers' Market and Maintaining a Farmers' Market EBT Program at Least 5 Years -- both key to sustainability.

4. Food Safety

Maintaining Wisconsin's vibrant "buy local" economy requires strengthening and evaluating food safety from farm to table. And with nearly 500 licensed meat processing facilities creating around $4.9 billion of economic impact and more than 20,000 jobs, the Wisconsin meat industry consistently ranks among the state's top 5 manufacturing industries for economic output. For 2013, University of Wisconsin-Extension reports collaboration among campus and county faculty and staff, colleagues and partners providing timely research-based food safety education and assistance. For improving the safety of the food supply, extension specialists are training and supporting small-scale processors of acidified foods and certifying Master Meat Crafters. As previewed in the evaluation section, 4-H Youth Development Meat Animal Quality Assurance (MAQA) training supports around 4,500 MAQA-certified youth producing a quality meat animal each year for county and state fair projects and auctions. Impacts include:

Assuring safe local foods: As a group, canned foods such as pickles, salsas and tomato-based products are referred to as acidified foods. Processed incorrectly, such foods are potentially hazardous. Federal and state laws require processors of acidified foods to have attended an FDA-approved training

program. To provide proper training meeting processors' business needs while complying with regulations, research was needed to fill knowledge gaps in the safety and regulatory framework for acidified foods. In collaboration with University of Wisconsin-Extension food safety specialists, North Carolina State University faculty have developed scientific information validating critical points in manufacture for training small-scale processors of acidified canned foods vending primarily at farmers' markets. Training and supporting small-scale processors increases availability of safe local products while protecting public health. This integrated research and extension collaboration will develop national research-based certification training, evaluate its effectiveness, and share best practices among professionals, processors and regulators through a national eXtension Community of Practice.

Master Meat Crafters: Within a small margin of error, meat processors must thoroughly understand what pathogens must be controlled and how most effectively to control them. Initiated and directed by extension meat specialist Jeff Sindelar in partnership with the Department of Agriculture, Trade and Consumer Protection, the Master Meat Crafter Training Program addresses food safety with practical application throughout the program's 2 years, providing graduates the knowledge, skills and proper tools to process 100% safe food all the time. As of January 2014, 38 graduates have received the distinction of Master Meat Crafter, and the third class is on track for 2016. Graduates apply and share skills to improve the safety, consistency, quality and profitability of specialty meats -- pleasing customers while expanding sales. Their communities gain good jobs and other economic benefits. Long-term industry viability is ensured as plants grow, add on, and pass along the business for future generations.

5. Childhood Obesity

For 2013, University of Wisconsin-Extension reports efforts of Family Living and 4-H Youth Development campus and county faculty and staff, colleagues and partners providing timely research-based education and assistance for preventing childhood obesity. Diverse participants make informed, science-based decisions regarding nutrition, childhood obesity, health and physical activity -- and the inter-relationships that exist. By developing and implementing behavioral interventions that improve nutrition and increase physical activity, more than 2,275 youth and adults took action by making healthy food choices and increasing physical activity through 4-H healthy living initiatives. By increasing the capacity of community partners to address issues related to nutrition and childhood obesity, community coaching skills are enhancing the intervention coalition's effectiveness in addressing the community issue of low-income childhood obesity. Impacts include:

Solving the Problem of Childhood Obesity within a Generation: In response to growing concerns about childhood obesity, 4-H National Headquarters made healthy living a national priority. 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. More than 2,275 youth and adults took action by making healthy food choices and increasing physical activity through their participation in 4-H healthy living initiatives across the state. Evaluation documented individual knowledge gain and behavior change: participants reported that they learned new things about nutrition, healthy eating and exercise, and changed their eating and exercise habits because of their involvement in extension programs.

Community coaching skills enhance coalitions addressing childhood obesity: Preventing obesity in children is important to society due to the high health care costs associated with diabetes, high blood pressure, asthma and sleep apnea. Schools, health care providers, and families are all working together to address this crucial issue. While forming community coalitions to address this issue is a common strategy, sometimes coalitions struggle to be effective. Community coaching skills may enhance coalition effectiveness. In two project counties, UW-Extension educators are leading coalitions that have been conducting needs assessments and are planning to launch initiatives. Through community coaching,

the intervention coalition has shown increased coalition capacity to address the community issue of low-income childhood obesity.

6. Climate Change

For 2013, University of Wisconsin-Extension reports collaboration among campus and county faculty and staff, tribal, regional and national colleagues, partners and trained volunteers providing timely science-based education and assistance for climate change adaptation and mitigation through developing, implementing and evaluating outreach programs to reduce carbon, nitrogen, energy and water footprints in their communities. Supporting this work is the interagency Wisconsin Initiative on Climate Change Impacts: http://www.wicci.wisc.edu

As climate changes, tribal place-based culture and economies must adapt to changing conditions. Climate change research documents that local, place-based evidence of climate change gained through experiential learning is as or more effective to increasing climate change literacy than simply studying analytical climate change data (The Psychology of Climate Change Communication, Columbia University, 2009). In partnership with others described in the audience section, University of Wisconsin-Extension environmental outreach specialist Cathy Techtmann supported development of the Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) or "G-WOW" Changing Climate, Changing Culture model. This unique collaboration was honored with the Forest Service Eastern Region 2013 Connecting Citizens to the Land Award as an outstanding project that illustrates "courageous conservation."

Climate change directly impacts water resource quality and quantity in the Great Lakes Region. Water managers and environmental professionals need to understand anticipated climate change impacts in the region and help communities find ways to mitigate and adapt using sustainable practices. University of Wisconsin-Extension staff helped form the Regional Climate Education Team. Climate education experts from Land Grant universities, Sea Grant programs, the River Network, National Oceanic and Atmospheric Administration (NOAA) and the Ohio Department of Natural Resources provide regional coordination, input and guidance for the initiative. A sub-team of representatives from six states developed climate change core competencies for community outreach professionals. Distance education short courses include Sustainable Water Resources and Climate Change Planning, Sustainable Water Management in the Great Lakes Region, Climate Tools Café, and Climate Change Initiative. Participants reported they are more confident in their abilities to apply sustainability principles, engage stakeholders in water infrastructure planning, and lead education and community planning programs on climate change, and can do their jobs better. The short courses, presentations, videos, texts, decision-making tools and webinars in 5 key areas -- economic development, land use, water quality, ecosystem management and invasive species -- are housed on new regional climate web site: ClimateGreatLakes.com

7. Sustainable Energy

University of Wisconsin-Extension BioEnergy and the BioEconomy Team cross-program members and partners are conducting integrated research and extension programs, building capacity for developing sustainable energy and scalable conversion technologies among extension colleagues, communities, farmers and industry partners. Curriculum development teams are working on three courses: BioEnergy and Sustainability, On-Farm Energy Conservation and Efficiency, and Anaerobic Digestion -- a proven waste-to-energy technology. To develop biomass use for biofuels, the Lake Superior Woody Biomass Initiative is working toward a sustainable woody biomass supply chain. By building capacity to create, refine and implement scalable conversion technologies, 40 extension-trained biodigester owners and operators are improving their economic and environmental sustainability. Impacts include:

Lake Superior Woody Biomass Initiative: Increased interest in and funding for renewable energy sources may bring new economic opportunities to Northern Wisconsin. The region's forests and farmlands offer a rich supply of herbaceous and woody biomass for use in the emerging bioeconomy. A number of companies announced plans to establish or expand their use of woody biomass for energy production. Doing so would require significantly more woody biomass than is currently used, and raised concerns about long-term impact on native forestlands, pulp and paper markets. Little is known about how woody biomass crops such as hybrid poplar, larch or willow will perform in the climate and soils of Northern Wisconsin, nor are there agronomic or management recommendations for producers. Jason Fischbach, extension agriculture agent for Ashland and Bayfield counties, convened stakeholders to develop the Lake Superior Woody Biomass Initiative, outlining education, research, and outreach efforts to develop a sustainable woody biomass supply chain. These stakeholders recognize dedicated woody biomass crops as another important source of feedstock that could provide income.

Anaerobic digestion research and outreach: Wisconsin is the leading state for on-farm anaerobic digestion with more than 30 operational systems. Since large-scale implementation is relatively recent, training is needed for safe production and use of biogas. Maintaining the economic viability of large-scale anaerobic digestion systems requires optimizing operation, assessing feedstocks, and managing manure systems in accordance with nutrient management plans. Feedstocks are identified and evaluated in extension biowaste specialist Rebecca Larson's lab, then implemented in the field. New tools developed in the last year allow operators to evaluate the 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. The 40 trained large-scale operators have a greater understanding of their systems, can implement strategies outlined in the training, and are connected with their peers.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	95.0	0.0	0.0	0.0
Actual	105.0	0.0	0.0	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

Merit review is ongoing as statewide self-directed teams develop specifics for the duration of 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 report progress toward planned outcomes.

Merit reviews are conducted jointly by team leaders, program directors, and multi-state and regional partners. 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.

University of Wisconsin-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 also reviewed for cultural appropriateness and reading level. Scholarly peer review and cultural review assure the quality and relevance of educational materials and outreach scholarship.

At the county level, local programming addresses priority issues identified through strategic program planning and ongoing needs assessment. Local elected officials review county programs as part of their oversight of extension programming.

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.

University of Wisconsin-Extension's program development model provides the overall framework for soliciting, analyzing, and summarizing stakeholder input. The model includes situation analysis, priority-setting, inputs, outputs, anticipated outcomes and evaluation planning. For 2015-2019, University of Wisconsin-Extension is submitting a joint federal plan of work with the University of Wisconsin-Madison College of Agricultural and Life Sciences.

UW-Extension campus and county faculty and staff participate in regular grower, producer, consumer, network, agency, school, local, state and tribal government, business and community coalition meetings to stay informed of key stakeholders' changing needs. 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.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Stakeholder identification and involvement are key components of UW-Extension's program development process. While county offices have latitude in tailoring their planning process to their unique needs, they are strongly encouraged to use methods that solicit feedback from their communities' diverse populations and from both internal and external stakeholders of extension. Ongoing county civil rights reviews examine the methods used during the stakeholder identification phase and formulate recommendations intended to strengthen this aspect in future planning initiatives.

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.

Input has been gathered from diverse and under-represented audiences statewide through focus groups, interviews, listening sessions and case studies. When appropriate, teams develop culturally sensitive educational strategies; translate or interpret materials into appropriate languages; and partner with agencies and groups representing the needs of under-served and under-represented populations. In addition, statewide team efforts must be viewed in relation to the local

context, where all 72 of University of Wisconsin-Extension county offices have civil rights plans designed to reach those traditionally under-served.

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 which inform the work of statewide program area teams and are incorporated in budget and staffing decisions. For 2015-2019, University of Wisconsin-Extension is submitting a joint federal plan of work with the University of Wisconsin-Madison College of Agricultural and Life Sciences.

Brief Explanation of what you learned from your Stakeholders

Stakeholders from three American Indian tribes and Wisconsin's 72 counties identified more than 400 issues. An analysis of these issues identified the following themes:

Economic and Financial Capital: Improve individual/family financial security; Increase business profitability; Improve conditions that support local economy.

Human and Cultural Capital: Life skills development; Optimal conditions for child development created; Family relationships enhanced; Physical needs met; Diverse populations gain social, economic power; Diverse perspectives positively influence community.

Natural Capital: Individual actions conserve, protect, and enhance natural environment; Healthier natural environment results from community action.

Social and Organizational Capital: Skills developed for community benefit; Organizations developed to benefit community; Citizens act to improve community.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
8111291	0	0	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	5306434	0	0	0
Actual Matching	5306434	0	0	0
Actual All Other	0	0	0	0
Total Actual Expended	10612868	0	0	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	5306434	0	0	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security Food Availability: Crops and Agronomic Plants
2	Global Food Security Food Availability: Dairy and Livestock
3	Global Food Security and Hunger: Food Accessibility
4	Food Safety
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6	Climate Change
7	Sustainable Energy

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%			
133	Pollution Prevention and Mitigation	10%			
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%			
205	Plant Management Systems	10%			
216	Integrated Pest Management Systems	20%			
601	Economics of Agricultural Production and Farm Management	25%			
608	Community Resource Planning and Development	5%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	0.0	0.0
Actual Paid Professional	28.0	0.0	0.0	0.0
Actual Volunteer	344.0	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**
1481400	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1481400	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

For 2013, University of Wisconsin-Extension reports collaboration among North Central Region colleagues and other agricultural professionals, farmers and educational partners providing timely research-based education and assistance to improve food availability. By managing and minimizing losses due to plant pests and diseases, extension is prolonging a valuable pest management tool. By enhancing economic and environmental sustainability of agribusinesses, trained Amish families improve their profitability. And as described in the evaluation section, a soil test study of 100 farms using nutrient management (NM) plans for 7 to 13 years shows they are reducing levels of phosphorus (P) in loamy soils from an average 40 to 30ppm - moving toward optimum P levels for most crops on loamy soils with potential for improving water quality, and highlighting the value of reducing P in dairy rations and following NM plans.

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quality: http://ifmwi.org/auctions.aspx

2. Brief description of the target audience

University of Wisconsin-Extension reached an estimated 54,861 adults and 9,573 youth (actual 2013) through direct teaching methods. The audience includes North Central Region colleagues, agency scientists, agricultural professionals and other educational partners, grains, commercial vegetable and fruit crop growers and workers, 4-H youth and trained volunteer leaders, grower associations, food processors and entrepreneurs, regional economic development initiatives, food coalitions and cooperatives, seed dealers, agricultural service providers, agronomic retail and wholesale suppliers, farm lenders, rural insurance, local and tribal officials, planning commissions, state and federal rural development and regulatory agencies, and others.

Building regional capacity among agricultural professionals and service providers: Simply counting educational contacts does not capture the extent of a program's reach. For example, the 1,525 agricultural professionals who attended the 2013 Wisconsin Crop Management Conference from Wisconsin, Minnesota, Iowa, Illinois, Indiana and Michigan produce a large multiplier effect as Wisconsin research-based recommendations ultimately reach an increasing portion of the Great Lakes Region crop production sector including farmers. Extension Integrated Pest Management and other specialists reinforce this work through regional professional development trainings for Wisconsin's 620 Certified Crop Advisors who earn 40 hours of continuing education units every 2 years to remain certified.

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 and Western corn rootworm resistance to Bt corn during 2013. 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.

Through January 2014, extension field and forage crops entomology specialist Eileen Cullen chaired the North Central Coordinating Committee NCCC-46 - Development, Optimization, and Delivery of Management Strategies for Corn Rootworm and Other Below-ground Insect Pests - a multi-state group of independent university scientists working on aspects of corn rootworm biology and management. The 22 NCCC-46 entomologists working on corn rootworm suggested changes needed to prolong use of transgenic Bt corn in a letter to the Environmental Protection Agency posted March 7, 2012: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0922-0013

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	54861	0	9573	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	12	21	33

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	114000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Researchers, farmers and their advisors acted quickly to prolong use of a valuable Corn Belt pest management tool - transgenic Bt corn hybrids that produce insect-killing proteins from the soil bacterium Bacillus thuringiensis (Bt). As described in the external factors section, widespread planting of Bt corn creates intense selection pressure for target insects to develop resistance. Recognizing this threat, the Environmental Protection Agency (EPA) requires growers to plant an insect resistance management (IRM) refuge providing corn that allows target pest insects to develop without exposure to the Bt toxin, minimizing development of resistance. Yet Bt-resistant western corn rootworms (WCR) have been confirmed in 11 Iowa fields. Extension field reports from Minnesota, Nebraska and Wisconsin offered evidence of resistance, but Wisconsin WCR populations had not been screened for resistance.

What has been done
In 2012 and 2013, University of Wisconsin-Extension field and forage crops entomology specialist Eileen Cullen coordinated communication among colleagues in 6 neighboring states and the NCCC-46 multi-state committee of 22 independent university scientists researching, documenting, mapping and providing best practice recommendations for insect resistance management of western corn rootworm to Bt corn hybrids - reaching extension educators, IPM specialists and center directors, more than 1,614 crop consultants, agribusiness professionals and growers, 35 independent seed dealers and others through EPA, professional networks and meetings, news media, peer-reviewed extension and research publications including the Entomological Society of America's Journal of Integrated Pest Management with a comprehensive IPM resource for farmers making planting decisions: http://www.ingentaconnect.com/content/esa/jipm/2013/00000004/00000003/art00003

In 2013, Cullen partnered with UW-Extension Grant and Lafayette County agriculture agent Ted Bay, a farmer and crop consultant to collect more than 2,000 adult beetles from a Bt corn field

with higher than expected rootworm feeding damage. She reared these in her lab and sent 250,000 eggs to the USDA Agricultural Research Station at Brookings, SD for cold storage. USDA ARS and regional NCCC-46 colleagues will work with Cullen in 2014 to test larvae from these eggs on plants with Bt traits, and results will confirm Bt resistance status of the Wisconsin field.

Results
Strengthening pest management: Extension-trained grain producers and their advisors are responding to WCR resistance to Bt corn with integrated pest management (IPM) practices. In 2012, 375 Pest Management Update meeting survey respondents reported using what they learned to make decisions on more than 8 million acres, which they valued at an average $28.34 per acre - more than $114 million of value that extension information provided, improving grower management decisions and consultant recommendations. As trained farmers and their advisors plant corn in their fields, they have published extension IPM resources to guide their decisions. Research data and outcomes help support regulatory and commercial processes to better define the extent of Bt resistance and take action to prolong efficacy of Bt corn traits for future use.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Enhance the economic and environmental sustainability of agribusiness.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	347236

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Tri-County Produce Auction in Dalton is one of the largest public fresh market vegetable wholesale outlets in Wisconsin, managed by a 5-member auction committee in compliance with USDA grade standards. In 2013, 200 growers from within 100 miles supplied bulk quantities of local organic and conventional fruits, vegetables and starter plants 2 to 3 days a week May through October. Since founding this auction in 2010, up to 75 Amish families who use neither electricity nor motorized vehicles have received vegetable production education and assistance they need from Green Lake County University of Wisconsin-Extension. Amish couples and their teenage sons and daughters feel obliged to participate, and feel most comfortable learning at a grower's home.

What has been done

Working closely with the mainly Amish Tri-County Produce Auction Committee, UW-Extension agriculture agent Nav Ghimire has strengthened relationships and trust with the Amish community - tailoring fresh market vegetable production education and delivery to meet their needs based on evaluation results and feedback, respecting their cultural mandates. Ghimire conducts workshops, grower meetings and field days, provides the entire farming family one-on-one on-farm technical assistance on disease and insect control and nutrient management with follow-up contacts and soil testing, develops and delivers easy-to-read fact sheets, and coordinates trainings at the auction house such as Good Agricultural Practices with the Department of Agriculture, Trade and Consumer Protection certifying 30 growers in 2012-2013. He visits farms from June to October with a box of books, camera and lens, computer and wireless hot spot directly to the field where he shows both the Amish couple and their children the problem pest or disease and the recommended solution. In 2013, he reached 38% (n = 75) of all 200 auction growers with research-based education and on-farm technical assistance.

Results

Training Amish families boosts profitability: Of Amish growers surveyed in December 2013 who responded to knowledge items (n = 18), 78% reported higher understanding of diseases, insects and soil fertility after participating in programs during the growing season. Of the total survey respondents (n = 23), 91% reported producing 5% to 25% more vegetables on 173 acres by using extension information (average = 12% more vegetables per acre on 8 acres). Based on a 2006 UW-Madison Center for Integrated Agricultural Systems report, fresh market vegetable producers with 3 to 12 acres can earn an average net income of $4,679 per acre. On average, the 12% increase in Amish growers' vegetable production adds $562 net income per acre. So growers who responded to the survey increased their total net income by $97,226 on 173 acres - and all 75 could increase their income by $347,236, at least a 10-fold return on Green Lake County investment in extension agricultural education. The next generation are trained in the field side-by-side with their parents. And buyers can count on consistent competitive prices, food safety and quality: http://ifmwi.org/auctions.aspx

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

Outcome #3

1. **Outcome Measures**

Build the capacity of the agriculture service and support industry.

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Innovations and increased efficiencies in production.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Government regulations: Through January 2014, University of Wisconsin-Extension field and forage crops entomology specialist Eileen Cullen chaired the North Central Coordinating Committee NCCC-46 - Development, Optimization, and Delivery of Management Strategies for Corn Rootworm and Other Below-ground Insect Pests - a multi-state group of independent university scientists working on aspects of corn rootworm biology and management. The 22 NCCC-46 entomologists working on corn rootworm suggested changes needed to prolong use of transgenic Bt corn in a letter to the Environmental Protection Agency (EPA) posted March 7, 2012: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0922-0013

As described in the outcome 1 qualitative impact statement, widespread planting of Bt corn places intense selection pressure on target insects to develop resistance, and evolution of resistance erodes benefits associated with Bt corn, such as reduced reliance on conventional insecticides. Recognizing the threat of resistance, EPA requires seed companies to include an insect resistance management (IRM) plan when registering a Bt trait. The goal of IRM plans is to delay Bt resistance in populations of target insects. One

element of IRM is the presence of a non-Bt refuge to maintain Bt-susceptible individuals within a population, and growers are required to implement IRM on-farm by planting a refuge. Mating between susceptible insects from the refuge and resistant insects from the Bt corn minimizes the chance of resistance developing. Field-evolved resistance has not been detected for the European corn borer, Ostrinia nubilalis (Hubner), even though this species has been exposed to Bt proteins common in U.S. corn hybrids since 1996. The IRM situation is unfolding differently for Bt corn targeting the western corn rootworm, Diabrotica virgifera virgifera (LeConte).

Cullen and colleagues examine the scientific evidence for D. v. virgifera resistance to Bt rootworm traits and the cropping system practices that have contributed to the first reports of field-evolved resistance to a Bt toxin by D. v. virgifera. In their article titled Resistance to Bt Corn by Western Corn Rootworm (Coleoptera: Chrysomelidae) in the U.S. Corn Belt, authors Eileen M. Cullen, Michael E. Gray, Aaron J. Gassmann and Bruce E. Hibbard explain why this issue has developed and emphasize the necessity of an integrated pest management approach to address the issue, published September 1, 2013 in the Entomological Society of America's Journal of Integrated Pest Management as a comprehensive IPM resource for farmers making planting decisions: http://www.ingentaconnect.com/content/esa/jipm/2013/00000004/00000003/art00003

Database development: University of Wisconsin-Extension is replacing the legacy planning and reporting database, which was closed in 2012. For this report: The 2013 direct contacts for adults reported are the 4-year average of past performance of relevant statewide teams in 2008-2011. This is in alignment with previous years. The 2013 direct contacts for youth reported are 4-H enrollments in relevant projects reported on the ES-237 form for 2012-2013.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Monitoring changes in soil test phosphorus levels on farms using appropriate nutrient management strategies: University of Wisconsin-Extension has been monitoring soil test phosphorus (P) levels in cropland soils statewide for 50 years. Soil test data from more than 5 million samples collected from Wisconsin farmland and analyzed by both public and private certified soil testing laboratories have been summarized every 3 to 5 years since 1964. Summary of soil test data is useful not only for identifying broad fertility trends, but also for evaluating fertilizer and manure management practices, isolating areas of unique, localized fertility conditions requiring special management, and identifying soil areas having high environmental risk to water quality.

The optimum P for most agronomic crops planted on loamy soils ranges from 16 to 25ppm. Soil eroded into surface water bodies can reduce water quality in lakes and streams. As a result, having excess P in the soil will result in more P being transported to these water bodies if erosion occurs. Helping develop and fine tune proper strategies for managing nutrients from livestock manure and P in dairy rations, campus and county extension faculty, farmers and educational partners continue to expand and monitor best management practices on farms. Extension-trained farmers have been writing and following their own nutrient management plans based on research-based recommendations

for a decade or more. While extension researchers knew what changes there have been to the average and median soil test phosphorus levels by county, soil texture and even soil series, they did not have good information as to what is happening on individual farm fields: http://uwlab.soils.wisc.edu/soilsummary

Response: John Peters, extension soil scientist and director of UW Soil Testing Laboratories, set out to determine the change in soil test Bray-1 Phosphorus levels on farms that have followed nutrient management (NM) planning for up to 15 years. Supported by the Nutrient Management Team, Peters contacted crop consultants around the state who have worked with various farms for 10 or more years. Participants were asked to select 1 to 3 farms they have worked with and have soil test P data for an extended period of time. Six crop consultants representing most geographic regions of the state provided long-term soil test data from 100 fields under NM plans from across the state. This included 82 fields with loamy soils and 18 with sandy-textured soils.

Results: When averaged across all locations and soil types, the Bray-P soil test levels dropped from an average of 55ppm at the beginning of the evaluation period to 44ppm at the most recent soil test sampling date. When sorted out by texture, the loamy soils dropped from an initial 40ppm to 30ppm and the sandy soils from 110ppm to 95ppm. The time period represented by this summary for any given field ranged from 7 to 13 years. Assuming that the sandy soils largely represent irrigated potato and vegetable fields and just looking at the loamy soil data, this downward trend in soil test P from 40ppm to 30ppm is quite significant -- moving toward optimum P levels for most crops on loamy soils with potential for improving water quality, and highlighting the value of reducing P in dairy rations and following a nutrient management plan as described below.

Key Items of Evaluation

Monitoring changes in soil test phosphorus levels on farms using appropriate nutrient management strategies -- Comparison of dairy TMR total P levels with manure P content: University of Wisconsin-Extension soil scientist John Peters reports that soil tests from 100 Wisconsin farm fields under nutrient management plans for 7 to 13 years reduced phosphorus (P) levels in 82 fields with loamy soils an average of 10ppm from 40 to 30ppm -- moving toward optimum P levels for most crops on loamy soils with potential for improving water quality, and highlighting the value of reducing P in dairy rations and following a nutrient management plan. Since the National Research Council revised the NRC Nutrition Requirements of Dairy Cattle to reduce P in rations in 2001, extension soil scientists now track P levels from both dairy rations and from manure.

In 2011 under John Peters' direction, the UW Soil and Forage Analysis Laboratory reported results of a program conducted to thoroughly evaluate total mixed rations (TMRs) for dairies (Phosphorus Content of Dairy Rations and Manure Wisconsin Trends: 2002-2010). One outcome was the ability to monitor total P levels in TMR rations. During this same time period, extension put major effort into getting dairy farmers information on appropriate levels of total dietary P in rations. As a result, dairy ration surveys by extension specialists, agents and the USDA Dairy Forage Research Center found that P excretion by dairy cows decreased by 25% to 30%, land required for P excretion dropped by 0.6 acres per cow, and feed costs were cut by $10 to $15 per cow per year -- with the same dairy cow performance.

In general, many dairy rations originally contained significantly more P than was necessary for herd health and proper milk production. Over the 9 years studied, the UW Soil and Forage Analysis Laboratory measured a steady decline in the average total P content of dairy TMRs. There was also a downward trend in liquid dairy manure P levels over that same time period, and a similar decrease in solid dairy manure P levels as well in the last few years of that study. More information on P levels of TMR rations can be found by viewing the searchable database of the UW Soil Testing Labs at:
http://uwlab.soils.wisc.edu/foragedatabase

Peters is confident that follow-up studies to his 2013 evaluation described above will continue to show the downward trend in soil test P levels, reflecting widespread adoption of both ration balancing and good fertility management practices necessary for profitable crop production. Continuing to summarize soil test data can help educators and farm advisors develop strategies necessary for Wisconsin farmers to maximize crop production while recognizing and minimizing environmental problems. However, only good, representative sampling and testing of individual fields can provide growers with the data needed to make informed nutrient management decisions to achieve economically optimum yields while minimizing environmental concerns. The most recent 5-year soil test summary map showing decreasing P levels can be seen at:
http://uwlab.soils.wisc.edu/files/soilsummary/2009/miniP.pdf
http://uwlab.soils.wisc.edu/soilsummary/maps

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security Food Availability: Dairy and Livestock

☑ 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
205	Plant Management Systems	5%			
301	Reproductive Performance of Animals	10%			
307	Animal Management Systems	20%			
308	Improved Animal Products (Before Harvest)	5%			
311	Animal Diseases	5%			
315	Animal Welfare/Well-Being and Protection	5%			
601	Economics of Agricultural Production and Farm Management	20%			
602	Business Management, Finance, and Taxation	15%			
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%			
806	Youth Development	5%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	36.0	0.0	0.0	0.0
Actual Paid Professional	38.0	0.0	0.0	0.0
Actual Volunteer	5002.0	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**
1998410	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1998410	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

University of Wisconsin-Extension interdisciplinary teams, colleagues and partners provide research-based education and assistance to sustain and grow the $26.5 billion dairy industry supporting more than 146,000 jobs. The average dairy cow generates more than $20,000 a year in economic activity, which circulates throughout local communities (Deller and Williams, 2011). By enhancing the economic and environmental sustainability of agribusinesses, 3,281farmers and their advisors learned strategies to alleviate 2013 feeding challenges. Through innovations and increased efficiencies in production, 42 farms are improving dairy reproductive efficiency. As previewed in the evaluation section, Meat Animal Quality Assurance (MAQA) certification has a positive impact on around 4,500 MAQA-certified youth producing a quality meat animal each year. Impacts include:

Responding to feeding challenges: When severe drought cut hay, corn silage and grain production, winter kill took half of alfalfa acres and a cold, wet spring delayed planting, 124 extension-led meetings and field days provided emergency forage programming attended by 2,034 agricultural producers and professionals. UW-Extension agriculture agents and campus specialists held 5 area feeding strategies workshops reaching 125 nutritionists, agronomists and other consultants with alternative feed and forage options to help farmers and their advisors develop feeding and cropping plans through 2014. Consultants responding to a follow-up survey reported changing their advice to share what they had learned, working with their producers to stretch feed on hand, evaluate alternative crops, avoid high-priced feed and forages, and adapt feeding strategies to maintain herd health. Feed accounts for about half of dairy and livestock production costs. As prices of forages, corn and soybeans increase, farmers achieve savings through using alternative feeds (see also audience and external factors).

Improving dairy reproduction efficiency: As dairy herds produced more milk per cow over the past 50 years, their fertility decreased such that even a 5% improvement in the 21-day pregnancy rate could provide an economic benefit of about $75 per cow per year. Optimizing reproductive performance requires an integrated approach sharing information and expertise across dairy science disciplines as well as among all farm personnel and their advisors who manage animal health, nutrition, housing, and breeding. In 2012 and 2013, 32 UW-Extension Reproducing Profitability Workshops reached more than 850 dairy farmers, agricultural service providers and educational partners. So far, 42 farms use on-farm management teams of trained extension agent facilitators, artificial insemination consultants and technicians, veterinarians, nutritionists, key employees and others. Of the first 13 farms that finished the Repro Money Program as of August 2013, 85% achieved their goals including increasing 21-day pregnancy and conception rates, improving treatments and the timing of artificial insemination relative to ovulation -- yielding an estimated average $55 economic gain per cow per year (see also audience and

use of eXtension).

2. Brief description of the target audience

University of Wisconsin-Extension reached an estimated 163,887 adults and 34,032 youth (actual 2013) through direct teaching methods. In 2013, 2,120 of these youth were involved in 4-H engines, tractor, and field equipment projects, learning about farm equipment and safety from 65 trained volunteers. The audience includes extension colleagues, agricultural professionals and other educational partners, veterinarians, nutritionists, technicians, agronomists, crop consultants, youth and adult dairy and livestock producers and workers, farm managers and custom operators, 4-H youth and trained volunteer leaders, forage growers and grazing networks, producer associations, cheesemakers, meat and dairy food processors and entrepreneurs, cooperatives, agricultural service providers and industry field representatives, insurance agents, farm safety and health professionals, farm safety and design consultants, farm lenders, local and tribal officials, state and federal regulatory agencies. Integrated faculty and county extension agents are engaged in international and multi-state collaborations to increase sustainability of the global food supply.

Targeting neighborhoods: A time-tested teaching strategy for local extension agents, a farm call often helps build the trusting relationship needed to accomplish change. In 2013, 26 Team Forage members reported 1,159 individual contacts including farm calls. Scheduling more stops on the same day in the same neighborhood made better use of everyone's time and money. For example, UW-Extension agriculture agent Greg Blonde assisted with pricing forage, grain and alternative feed stuffs during the period of low inventory and record high prices, and worked with farmers affected by the 2012 drought and winter kill evaluating their alfalfa stands, cropping and pest control , forage inventory and feeding options including the extension feed exchange web site. University of Wisconsin-Extension educator Ken Barnett reports that the 69,716 page views from 11/30/12 to 11/30/13 were up 65% from the year before for the Weekly Hay Market Demand and Price Report for the Upper Midwest on the Buying and Selling Hay and Straw web site: http://www.uwex.edu/ces/ag/haybuying.html.

Building capacity among agricultural professionals and service providers: Simply counting educational contacts does not capture the extent of a program's reach. For example, early results demonstrate that by building on professional relationships, the Repro Money Program is having a positive impact in the dairy business community by changing knowledge, actions, and condition in dairy farms' reproductive efficiency. Enrolled farms also help train veterinary and dairy science students. More than 850 trained progressive dairy farmers, veterinarians, nutritionists, other dairy farm consultants and allied industry personnel extend the reach of Repro Money education, sharing research-based information, decision support tools and expertise across dairy science disciplines as well as among all farm personnel and their advisors. Professional meetings, the national dairy production eXtension Community of Practice, dairy industry events, social and news media reach many thousands more in English and Spanish.

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 feeding challenges due to drought, alfalfa winter kill and late spring planting during 2013. 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.

Repro Money Program -- An integrated approach to improving dairy cow fertility: Through a formal partnership with the University of Kentucky, University of Wisconsin-Extension dairy science specialists are contributing best practice webinars to the national dairy production Community of Practice within eXtension. DAIReXNET was launched in October 2007 at the World Dairy Expo in Madison, WI, to meet the educational and decision-making needs of dairy producers, allied industry partners, extension educators, veterinarians, private sector dairy advisors and consumers throughout the nation and worldwide. Through collaboration among extension and other dairy professionals, science-based and peer-reviewed educational resources are available in English and Spanish around the clock, including:

1. Live and archived webinars for veterinarians, allied industry partners and producers.
2. Webinars specifically designed as national dairy extension educator continuing education training.
3. Access to cutting edge resource materials in the form of written articles and computer decision aids.
4. Answers to users' questions through top experts in their fields of expertise.
5. Databank of frequently asked questions by producers and consumers.

As described under outcome 4 -- innovations and increased efficiencies in production -- a network of UW-Extension dairy scientists and researchers, county agriculture agents and other dairy professionals are helping farm owners and managers identify and make needed improvements through workshops and the on-farm, team-based Repro Money Program led by extension reproductive management outreach specialist Maria Constanza (Connie) Cordoba, building on professional relationships within the farm community. Extension Repro Money webinars highlighting best practices and outcomes in partnership with University of Kentucky DAIReXNET leadership are available nationally via eXtension: http://www.extension.org/pages/15830/archived-dairy-cattle-webinars#.Uy29TCiDOQI

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	163887	0	34032	0

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	3	8	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

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.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3281

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Several factors forged the need for 2013 emergency forage programming. Severe drought decreased 2012 hay, corn silage and grain production, forcing many farmers to break into stored reserves. Compounded by alfalfa winter kill, the dairy industry was facing the lowest May 1 hay stock levels on record. Where the cold, wet spring delayed planting corn for silage until mid-June, that crop failed for the second year in a row, pasture growth dwindled and even alternative forages could not be planted for fall grazing. All these plus loss of 48% of the state's alfalfa acres left farmers and their advisors wondering how to manage forage supplies and feed needs for coming months.

What has been done
In 2013, 124 extension-led meetings and field days addressed strategies to help alleviate reduced forage inventories, attended by 2,034 agricultural producers and professionals. University of Wisconsin-Extension held 5 area feeding strategies workshops reaching 125 nutritionists, agronomists and other consultants with alternative forages to help farmers and their advisors develop feeding and cropping plans through 2014. County extension agriculture agents Mike Rankin, Kevin Jarek and Richard Halopka compared forage options to get farmers through the growing season. Extension dairy nutritionist Randy Shaver and corn agronomist Joe Lauer addressed managing, harvesting and storing late-planted and stressed crops, and effects on

quality, feeding value and pricing. Others addressed nutritional needs of cattle, and alternative ways of meeting these needs such as byproduct feeds, their availability and cost. The extension Team Forage web site had 544,561 page views in 2013, up 19% from 2012. And the 69,716 page views for the Weekly Hay Market Demand and Price Report for the Upper Midwest were up 65% on the Buying and Selling Hay and Straw web site:
http://www.uwex.edu/ces/ag/haybuying.html

Results
Responding to feeding challenges: In 2013, 26 dairy agents reported that 3,281 dairy producers and agribusiness professionals improved their knowledge of strategies and resources to deal with drought, alfalfa winter kill and delayed spring planting feeding challenges. Workshop participants completing a survey represented more than 718 dairy farms, and reported they would be proactive, watch forage inventories closely, work with nutritionists, improve efficiencies, and adapt. The 6 consultants responding to a follow-up survey 6 months later represented 305 farms, 56,550 cows, and 127,300 acres of farmland. They reported changing their advice to share what they had learned, working with their producers to stretch feed on hand, evaluate alternative crops, avoid high-priced feed and forages, and adapt feeding strategies to maintain herd health. Feed accounts for about half of dairy and livestock production costs. As prices of forages, corn and soybeans increase, farmers achieve savings through using alternative feeds. In 2013, 26 Team Forage members reported 1,159 individual contacts including farm calls that help build the trusting relationships needed to accomplish change. Scheduling more stops on the same day in the same neighborhood made better use of everyone's time and money.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	177185

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Milk cow fertility decreased over the past 50 years while average milk yield per cow steadily increased. A 5% improvement in the 21-day pregnancy rate could provide an economic benefit of about $75 per cow per year, adding around $750 million annually to the U.S. dairy industry. Because poor reproduction in dairy cows includes aspects of physiology, genetics, management, health and nutrition, optimizing reproductive performance requires an integrated approach sharing information and expertise across dairy science disciplines as well as among all farm personnel and their advisors who manage animal health, nutrition, housing, and breeding. Veterinarians, nutritionists, and reproduction consultants must jointly consider potential factors when making management recommendations, while farmers must determine the most economical and efficient changes needed to ensure sustainability.

What has been done
University of Wisconsin-Extension reproductive management outreach specialist Connie Cordoba developed an on-farm survey and curriculum, tested these with colleagues, other dairy professionals and pilot farms, trained agricultural professionals in 20 private companies to participate and county extension agents to facilitate on-farm teams, referred qualified farms for grant funding, and promoted Repro Money locally, regionally and nationally. In 2012 and 2013, 32 Reproducing Profitability Workshops were attended by more than 850 dairy farmers, agricultural service providers and educational partners. So far, 42 farms use on-farm management teams of extension agents, artificial insemination (AI) consultants and technicians, veterinarians, nutritionists, key employees and others who meet at least 4 times over the course of the Repro Money Program. Farmers use Repro Money economic decision support tools to compare net returns of current and alternative reproduction programs, making informed decisions based on their needs: http://fyi.uwex.edu/repromoney

Results
Improving dairy reproduction efficiency: Early results demonstrate that by building on professional relationships, the Repro Money Program is having a positive impact in the dairy business community by changing knowledge, actions, and condition in dairy farms' reproduction efficiency. Farmers now set priorities and achievable goals, make changes identified by their extension-facilitated on-farm team and decision support tools, monitor progress, measure success and learn what to monitor to sustain improvements. All 13 farms that finished the Repro Money Program as of August 2013 were satisfied with the outcomes, with 85% achieving their goals including increasing 21-day pregnancy and conception rates, improving treatments and the timing of artificial insemination relative to ovulation. As herd pregnancy rates improve, farmers also better

manage freshening and lactation, making it easier for both cows and workers. Improvements among the first 13 of 42 farms participating so far yielded an estimated average $55 economic gain per cow per year totaling $177,185 per year. Best practices webinars in partnership with the University of Kentucky DAIReXNET are available nationally: http://www.extension.org/pages/15830/archived-dairy-cattle-webinars#.Uy29TCiDOQI

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Natural disasters: Several factors forged the need for 2013 emergency forage programming. Severe drought decreased 2012 hay, corn silage and grain production, forcing many farmers to break into stored reserves. Compounded by alfalfa winter kill, the dairy industry was facing the lowest May 1 hay stock levels on record. Where the cold, wet spring delayed planting corn for silage until mid-June, that crop failed for the second year in a row, pasture growth dwindled and even alternative forages could not be planted for fall grazing. Toxic weeds proliferate in faltering forages and over-grazed pastures, and whorled milkweed (Ascelpias verticillata) is increasingly common. All these plus loss of 48% of the state's alfalfa acres left farmers and their advisors wondering how to manage forage supplies and feed needs for coming months.

In 2013, 124 extension-led meetings and field days addressed strategies to help alleviate reduced forage inventories, attended by 2,034 agricultural producers and professionals. Dairy nutritionist Randy Shaver and corn agronomist Joe Lauer reached 125 farmers, agronomists, nutritionists and custom operators on managing, harvesting and storing late-planted and stressed crops, and effects on quality, feeding value and pricing. In response to the increase in poisonous weeds in pastures and forage, several educators

developed a field guide for scouting and controlling toxic plants in Midwest pastures and forages. Plant pathologist Damon Smith and colleagues reached another 800 crop advisors with research-based alfalfa recommendations at 8 district Pest Management Update meetings. Farmers who had never attended an extension event learned proper harvest management and impact on forage quantity and quality, factors affecting grain quality, when to consider harvesting for other than grain, nutritional effects of corn crop condition on dairy cow feeding, pricing alternative forages for corn grain such as corn silage, high moisture corn and earlage, how to assess the quality of the field and how this affects price.

Database development: University of Wisconsin-Extension is in the process of replacing the legacy planning and reporting database, which was closed in 2012. For this report, the 2013 direct contacts for adults reported are the 4-year average of past performance of relevant statewide teams in 2008-2011. Program participation is in alignment with previous years.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

2013 Meat Animal Quality Assurance Evaluation -- Part 1 of 2, see also Food Safety: Wisconsin benefits from a strong agriculture industry that often spans generations. Through the Meat Animal Quality Assurance (MAQA) program, University of Wisconsin-Extension 4-H Youth Development provides opportunities for youth to develop and practice positive animal agriculture behaviors, skills and abilities that improve animal projects and prepare them for careers in agriculture. MAQA certification meets the national Pork Quality Assurance (PQA) requirement. The Wisconsin State Fair and most counties require MAQA certification for 4-H and FFA beef, swine, sheep and goat project exhibitors at fairs, auctions, sales and shows.

Since founding MAQA in 2003, curriculum lead author Bernadette O'Rourke, extension youth livestock specialist, trains veterinarians, extension and other agriculture educators. University of Wisconsin-Extension livestock specialists, county educators and 4-H volunteer leaders train both youth ages 8 to 19 as well as new volunteer leaders. Once older youth are certified and able to show what they know, they can take on leadership roles and help teach younger youth. Roughly 4,500 youth are currently MAQA-certified. But in what ways do trained youth benefit? Other than results of a study in another state asking adults their perceptions of what youth had learned, very little was known about the benefits of Quality Assurance education for youth. After running this program for 10 years, the MAQA planning team decided to assess the impact of MAQA certification for youth, gather information directly from youth participants to guide the program, and add to the scholarly research.

Response: In 2013, UW-Extension county 4-H youth agents Deb Ivey and Alissa Grenawalt, youth livestock specialist Bernie O'Rourke and animal science specialist Pam Hobson worked with evaluation specialists Matt Calvert, David Trechter and the UW-River Falls Survey Research Center to design a retrospective self-assessment survey. To measure 8 expected outcomes including careers in agriculture, 2,164 youth Grade 6 and above in 58 of Wisconsin's 72 counties completed a questionnaire, rating their abilities and behaviors before and after their MAQA training. Changes from before to after MAQA training were statistically significant for all 29 pairs of questions.

Initial results: Almost all questions showed increased knowledge after MAQA educational sessions (this report focuses on preparing youth for agricultural careers, see also the Food Safety evaluation section):

- **Animal Management Practices:** The average of good and excellent ratings increased from 75% to 94%.
- **Animal Handling Skills:** The average of good and excellent ratings increased from 66% to 90%.
- **Agricultural Careers:** The average of good and excellent ratings increased from 55% to 81%.
- **Mentoring and Leadership:** The average of often and almost always responses increased from 76% to 89%.

Early results of this evaluation indicate that MAQA participation had a positive impact on participants' self-assessment of their abilities and increased their leadership and mentoring behaviors (see the following key items for NIFA attention). The Meat Animal Quality Assurance Participant Impact Survey Report, 2013 by James Janke and David Trechter, University of Wisconsin-River Falls Survey Research Center is due out in 2014.

Key Items of Evaluation

2013 Meat Animal Quality Assurance (MAQA) Evaluation -- Training the next generation: Youth involved in food production through 4-H projects learn industry concerns and guidelines for their projects, follow good animal husbandry procedures, articulate the reasons for specific care and management, and understand potential impact on their future careers and roles. Changes between pre- and post-MAQA ratings were statistically significant for all 29 pairs of questions in the survey. Early results indicate that MAQA participation had a positive impact on the 2,164 youth who increased their abilities and behaviors around 8 expected outcomes including careers in agriculture. Early results indicate the largest increases among respondents who reported good or excellent abilities included:

- Identify current issues in animal agriculture (+33%)
- Explain production agriculture practices to non-agriculture individuals (+32%)
- Identify reputable sources for animal agriculture information (+32%)
- Identify different segments of the food supply chain (+32%)
- Identify and understand flight zones and blind spots (+30%)

Animal Management Practices: Most respondents gave relatively high marks to their pre-MAQA abilities to provide proper feed and water and to observe animals daily. Even so, the MAQA program further increased these abilities, and nearly all respondents rated their post-MAQA abilities as good or excellent. The largest increase among these 4 questions was for monitoring weight gain. On average, 75% of respondents reported their ability as good or excellent prior to MAQA compared to 94% after MAQA.

Animal Handling Skills: More than 90% of respondents said their post-MAQA skills were good or excellent in properly moving, handling, and transporting animals, providing proper space and ventilation, ensuring animals do not transport disease, and identifying stress situations for their animals. Although majorities of respondents had rated these skills as good or excellent before MAQA, their post-MAQA skill levels were substantially higher. The largest increase among 8 animal handling skills was for identifying stress problems.

Agricultural Careers: MAQA had a positive impact on respondents' ability to identify career opportunities in agriculture, and to explore agricultural career opportunities. With respect to identifying career opportunities, 85% rated themselves as good or excellent after MAQA compared to 59% before MAQA. Prior to their participation in MAQA, half of respondents said they were good or excellent at exploring career opportunities through methods such as job sharing. Three-fourths rated themselves as good or excellent after MAQA.

Mentoring and Leadership: MAQA also had a positive impact on the frequency of mentoring and leadership behaviors by project participants (most youth completing the survey were 12 to 15 years old). With respect to sharing knowledge with others and helping others with animal care, about 9 in 10 said they did so often or almost always after MAQA compared to three-fourths of respondents who said they did so before MAQA.

See also early results for assuring a safe and wholesome food supply in the Food Safety evaluation section. The Meat Animal Quality Assurance Participant Impact Survey Report, 2013 by James Janke and David Trechter, University of Wisconsin-River Falls Survey Research Center is due out in 2014.

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
205	Plant Management Systems	5%			
601	Economics of Agricultural Production and Farm Management	5%			
602	Business Management, Finance, and Taxation	5%			
604	Marketing and Distribution Practices	15%			
607	Consumer Economics	10%			
608	Community Resource Planning and Development	30%			
703	Nutrition Education and Behavior	15%			
704	Nutrition and Hunger in the Population	15%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	0.0	0.0
Actual Paid Professional	14.0	0.0	0.0	0.0
Actual Volunteer	10621.0	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**
577392	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
577392	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 is a top agriculturally productive state, yet nearly 12% of households are **food insecure** -- lacking access to enough food. The success of small-scale agriculture requires a successful stream of micro-enterprises from the farm gate to small-scale processors, marketers, restaurants and local food system networks. More than 200 farmers' markets are critical outlets for many agricultural producers in Wisconsin. To create economic opportunities for farmers, markets must provide a consistent customer base and reliable income. For 2013, University of Wisconsin-Extension interdisciplinary campus and county faculty and staff, regional colleagues and educational partners report efforts providing timely research-based education and assistance to improve food accessibility. For strengthening local food markets and systems, regional extension specialists are collaborating to support the growth of Upper Midwest food systems. By building capacity for increasing healthy foods for vulnerable populations, more farmers' markets are redeeming electronic food assistance vouchers, providing access to healthy, local foods.

Strengthening local food markets and systems: Educators in Wisconsin and the Upper Midwest expressed need for food systems data to inform community planning and measure progress of initiatives. How could they achieve holistic planning that looks at food systems from production to processing to consumption to waste disposal? To augment existing agricultural production and food insecurity data, UW-Extension specialists developed the Regional Food Systems Indicators Profiles Project: Harnessing University Resources Through Collaboration, building an online food systems profile tool. With grant funding, regional colleagues collaborated to produce food system profiles for each county in the region, a workshop to help educators use the profiles, regional maps and a food systems resource list online. Based on early evaluation results, the research team is collaborating on further studies to support the growth of regional food systems. Their North Central Regional County Food Systems Profiles Portal is at: http://www.foodsystems.wisc.edu

Increasing access to healthy, local foods: As hunger and food insecurity have grown among Wisconsin families, so has need for food assistance. The Wisconsin Department of Health Services (DHS) allocated USDA funds for hand-held wireless point of sale (POS) devices to expand acceptance of Supplemental Nutrition Assistance Program benefits (SNAP, known as FoodShare in Wisconsin) at farmers' markets -- but was unable to provide technical assistance. UW-Extension Waukesha County commercial horticulture educator Kristin Krokowski has been training and supporting farmers' market managers since 2007 as described in the audience section. When DHS and the POS provider asked her for help, she created a 3-part webinar series for farmers' market managers and vendors interested in accepting SNAP benefits by electronic benefits transfer (EBT). Survey respondents valued the topics Attracting EBT Users to the

Farmers' Market and Maintaining a Farmers' Market EBT Program at Least 5 Years -- both key to sustainability.

2. Brief description of the target audience

University of Wisconsin-Extension reached an estimated 101,808 adults and 94,670 youth (actual 2013 4-H and SNAP-Ed) through direct teaching methods. The audience includes regional colleagues and partners, growers and grower associations, small-scale producers, producer associations, Midwest food processors, 4-H youth and trained volunteer leaders, urban farmers, their employees and community volunteers, gardeners and Master Gardener volunteers, community gardens and farmers' markets, regional farmers' market associations, regional economic development initiatives, food coalitions and cooperatives, hunger coalitions and task forces, food pantries and other community service providers, school boards, school food service directors, teachers and parents of school-age children, low-income women with infants and young children, local and tribal governments, state and federal agency personnel, and others.

Training and supporting farmers' market managers: Farmers' market managers play a vital role in the success and sustainability of small and medium-sized farms in Wisconsin. Providing successful markets for these growers to sell their products keeps them viable. Since 2006, UW-Extension county educators have been assessing the needs of farmers' market managers, providing training, resources and support to improve the mainly volunteer managers' marketing and promotion skills needed to realize their markets' full potential. In 2011, Waukesha County extension commercial horticulture educator Kristin Krokowski helped market managers establish the Wisconsin Farmers Market Association and develop a web site to support them and promote their markets, working with the Wisconsin Department of Agriculture, Trade and Consumer Protection so customers can locate each of more than 200 markets using a clickable map: http://www.wifarmersmarkets.org

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.

National Community, Local, and Regional Food Systems eXtension Community of Practice: Community, local and regional food systems (CLRFS) are increasingly important to individuals, families, businesses and communities as drivers of economic development and sustainable production of healthy food. In fall 2012, extension, university and non-profit colleagues initiated the eXtension Community, Local and Regional Food Systems Community of Practice, comprised of more than 260 extension professionals, university researchers and food systems practitioners, indicating widespread interest in this issue area. Purposes are to:

- Support information sharing and networking.
- Provide resource materials and training to extension and practitioner colleagues.
- Promote collaboration in work related to building sustainable, just and equitable food systems.

This Community of Practice is preparing a comprehensive, web-based resource that will provide relevant and timely information to extension educators, researchers, government, non-governmental organizations, non-profits and for-profit entities, and community members. This CoP will provide a unique online meeting place for these diverse groups and interests to share information and learn from one another. A call for proposals for articles from colleagues late in 2013 brought in 18 proposals and 12 were selected to be developed into articles now in review. Once approved, this new content will be sufficient to allow the CoP to go public with published articles.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	101808	0	94670	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

<u>Output #1</u>

Output Measure

- {No Data Entered}

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 food for vulnerable populations.
3	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
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Interest in the potential of food systems data to support community economic development tools has continued to grow in Wisconsin and the Upper Midwest. Educators have expressed the need for data to inform community planning and to measure the progress of local initiatives. While some data is available, for example on agricultural production and food insecurity, no comprehensive information tool existed for holistic planning that looked at food systems from production to processing to consumption to waste disposal.

What has been done
The "Regional Food Systems Indicators Profiles Project: Harnessing University Resources Through Collaboration" was developed in 2012 by University of Wisconsin-Extension specialists Laura Brown, Steve Deller, Anna Haines, Dan Veroff and Jim Beaudoin. Their goal was to build an online food systems profile tool to:
*Help county-based educators and community leaders in the North Central region better understand the local/regional food system in a systematic way.
*Understand how key indicators change over time.
*Identify opportunities and build capacity for expansion in regional food systems through the use of food and agricultural industry cluster analysis.

In 2012, the project received a $10,000 implementation grant from the Northern Central Regional Center for Rural Development. A project advisory committee was formed that included extension colleagues from a 12-state region to offer guidance and feedback.
Several important educational outputs were developed, including:
*The North Central Regional County Food Systems Profiles Portal at http://www.foodsystems.wisc.edu
*Food system profiles for each county in the region
*A workshop to help educators use the profiles

*Regional maps
*A food systems resource list

Results
Strengthening local food markets and systems: In September 2013, the research team evaluated the effectiveness of the online portal. Participants from seven Midwest states with varying levels of professional backgrounds and experience with the site were interviewed. Overall, participants said the information was easy-to-use and understand and that it provided an excellent starting point for understanding a location's food system environment. "In some ways, [my community] is not a food desert, but I still have to drive 20 miles to the grocery store. Some of the tools and maps helped with telling that story," said one respondent.

Participants said the portal provided a good selection of indicators and that they appreciated the regional views and "hotspot" analysis. "The data sets that are in here are pretty diverse. It was helpful," was one comment. "I wish I would've had [the portal] when I started out because it would've helped us to get focus more quickly," said one study participant.

Respondents recognized that continuous updates to the portal information would be crucial. They also highlighted the need for marketing so that more people become familiar with the site as a trusted source of information. Finally, participants expressed a desire for more training in how to use the portal effectively. Based on the positive first steps, the research team is collaborating on additional studies to support the growth of regional food systems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
704	Nutrition and Hunger in the Population

Outcome #2

1. Outcome Measures

Increase household access to food for vulnerable populations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nearly 12% of households are food insecure - lacking access to enough food. As hunger and food insecurity have grown among Wisconsin families, so has need for food assistance. When the Wisconsin Department of Health Services (DHS) received USDA funds to expand acceptance of Supplemental Nutrition Assistance Program benefits (SNAP, known as FoodShare in Wisconsin) at farmers' markets, DHS allocated those funds for hand-held wireless point of sale (POS) devices to process SNAP vouchers on site. This would remove a barrier and increase the number of farmers' markets accepting SNAP benefits, as the $1,200 cost was prohibitive for most of Wisconsin's more than 200 farmers' markets. Yet DHS was unable to provide any technical assistance to help interested market managers set up POS terminals. While more than a billion FoodShare dollars came into the state, only 0.01% were redeemed at farmers' markets.

What has been done

University of Wisconsin-Extension Waukesha County commercial horticulture educator Kristin Krokowski has been training and supporting farmers' market managers since 2007 while state SNAP participation has tripled. When DHS and the POS provider contacted her to help remove the technical barrier and connect more SNAP beneficiaries with healthy local foods, Krokowski created a 3-part webinar series for farmers' markets interested in accepting SNAP benefits by electronic benefits transfer (EBT). The three archived 90-minute sessions are titled EBT, FoodShare and Farmers' Markets, 8 Steps to Creating a Successful Farmers' Market EBT Program, and Long-Term Success for Your EBT Program, drawing on the expertise of extension poverty and food security specialist Amber Canto and Eau Claire County nutrition coordinator Nancy Coffee, facilitated by Master Gardener Volunteer director Mike Maddox. An average 30 market managers, vendors and others participated in each session with 64% attending all three, each receiving Krokowski's publication Creating a Successful EBT Program: A Guide for Wisconsin Farmers' Markets (A4013): http://learningstore.uwex.edu

Results

Increasing access to healthy, local foods: At the webinar series conclusion, attendees were asked to evaluate content and usefulness. Of 36% completing the survey, 57% were market managers or vendors, 29% government agencies, and 7% not for profit who rated the usefulness of each session as 8 out of 10. Survey respondents valued the topics Attracting EBT Users to the Farmers' Market and Maintaining a Farmers' Market EBT Program at Least 5 Years - both key to overcoming barriers. Krokowski's 2-year study Evaluating the Economic and Nutritional Benefits and Program Challenges of EBT Programs at Farmers' Markets found that 99% of SNAP beneficiaries ate more fruits and vegetables by shopping at farmers' markets, and she notes that a top market manager works with vendors to welcome SNAP beneficiaries as valued customers. Extension specialists and educators continue to work with DHS to improve food access for SNAP participants in Wisconsin. As Wisconsin representative, Krokowski collaborates with Illinois, Indiana, Michigan, Minnesota and Ohio farmers' market associations to expand access and increase sustainability of farmers' market EBT programs in the region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
704	Nutrition and Hunger in the Population

Outcome #3

1. **Outcome Measures**

Increase household access to healthy foods for vulnerable populations

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Database Development)

Brief Explanation

Appropriations changes: In fall 2012, USDA released funds to each state to expand acceptance of Supplemental Nutrition Assistance Program benefits (SNAP, known as FoodShare in Wisconsin) at farmers' markets. In Wisconsin, these funds were received by the Wisconsin Department of Health Services (DHS), which decided to allocate the funds for purchase of hand-held wireless point of sale (POS) devices that farmers' markets could use to process SNAP transactions on site. Purchasing a POS device (about $1,200) is cost-prohibitive for most farmers' markets. The goal of DHS was to remove this barrier for farmers' markets in order to increase the number of markets accepting SNAP benefits from beneficiaries. Although many managers were interested in taking part in this program, DHS was unable to provide technical support and sought help from University of Wisconsin-Extension Waukesha County commercial horticulture educator Kristin Krokowski, who has been training and supporting farmers' market managers since 2007 while state SNAP participation tripled. She created a 3-part webinar series for farmers' market managers and vendors interested in accepting SNAP benefits by electronic benefits transfer (EBT). Survey respondents valued the topics Attracting EBT Users to the Farmers' Market and Maintaining a Farmers' Market EBT Program at Least 5 Years -- both key to sustainability.

Database development: University of Wisconsin-Extension is in process of replacing the legacy planning and reporting database, which was closed in 2012. For this report: The 2013 direct contacts for adults reported are the 4-year average of past performance of relevant statewide teams in 2008-2011. Program participation is in alignment with previous years.

The 2013 direct contacts for youth reported include 4-H enrollments in relevant projects reported on the ES-237 form for 2012-2013.

SNAP-Ed 2013 food accessibility teaching contacts for children and youth are added to 4-H youth enrollments for the 2013 Food Accessibility federal report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	45%			
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	50%			
806	Youth Development	5%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	0.0	0.0
Actual Paid Professional	4.0	0.0	0.0	0.0
Actual Volunteer	153.0	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**
189966	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
189966	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

Maintaining Wisconsin's vibrant "buy local" economy requires strengthening and evaluating food safety from farm to table. And with nearly 500 licensed meat processing facilities creating around $4.9 billion of economic impact and more than 20,000 jobs, the Wisconsin meat industry consistently ranks among the state's top 5 manufacturing industries for economic output. For 2013, University of Wisconsin-Extension reports collaboration among campus and county faculty and staff, colleagues and partners providing timely research-based food safety education and assistance. For improving the safety of the food supply, extension specialists are training and supporting small-scale processors of acidified foods and certifying Master Meat Crafters. As previewed in the evaluation section, 4-H Youth Development Meat Animal Quality Assurance (MAQA) training supports around 4,500 MAQA-certified youth producing a quality meat animal each year for county and state fair projects and auctions. Impacts include:

Assuring safe local foods: As a group, canned foods such as pickles, salsas and tomato-based products are referred to as **acidified foods**. Processed incorrectly, such foods are potentially hazardous. Federal and state laws require processors of acidified foods to have attended an FDA-approved training program. To provide proper training meeting processors' business needs while complying with regulations, research was needed to fill knowledge gaps in the safety and regulatory framework for acidified foods. In collaboration with University of Wisconsin-Extension food safety specialists, North Carolina State University faculty have developed scientific information validating critical points in manufacture for training small-scale processors of acidified canned foods vending primarily at farmers' markets. Training and supporting small-scale processors increases availability of safe local products while protecting public health. This integrated research and extension collaboration will develop national research-based certification training, evaluate its effectiveness, and share best practices among professionals, processors and regulators through a national eXtension Community of Practice.

Master Meat Crafters: Within a small margin of error, meat processors must thoroughly understand what pathogens must be controlled and how most effectively to control them. Initiated and directed by extension meat specialist Jeff Sindelar in partnership with the Department of Agriculture, Trade and Consumer Protection, the Master Meat Crafter Training Program addresses food safety with practical application throughout the program's 2 years, providing graduates the knowledge, skills and proper tools to process 100% safe food all the time. As of January 2014, 38 graduates have received the distinction of Master Meat Crafter, and the third class is on track for 2016. Graduates apply and share skills to improve the safety, consistency, quality and profitability of specialty meats -- pleasing customers while expanding sales. Their communities gain good jobs and other economic benefits. Long-term industry viability is ensured as plants grow, add on, and pass along the business for future generations.

2. Brief description of the target audience

University of Wisconsin-Extension reached an estimated 12,303 adults and 13,478 youth through direct teaching methods. The audience includes interdisciplinary colleagues and partners nationwide, trained Master Food Preserver volunteers, individuals, family decision-makers, 4-H youth and trained volunteer leaders, school-age children and preschoolers, low-income women with infants and young children, fresh market vegetable and fruit growers, sellers and entrepreneurs, crop, dairy and livestock producers, producer associations, artisan cheesemakers, meat processors and Master Meat Crafters, large and small-scale processors of acidified foods, farmers' markets, local and tribal governments, state and federal regulatory agencies, and others preserving food safely and assuring safe, wholesome local foods.

Extension campus and county faculty and trained volunteer advisors address animal care and carcass quality issues through species-specific programs. Twenty county extension educators and state specialists are Beef Quality Assurance trainers, two Swine Team members are certified Transport Quality Assurance trainers and all four are Pork Quality Assurance (PQA) Plus Advisors who also help train certified 4-H youth and volunteer leaders in Meat Animal Quality Assurance (MAQA) required for participation in state and most county fair beef, swine, sheep and goat projects and auctions. MAQA training meets all PQA requirements as described in the evaluation section of this report.

Training the next generation: In 2013, 150 trained extension volunteer leaders provided direct instruction for 1,710 youth ages 8 to 19 in food preservation projects, requiring extension food science safety specialist Barbara Ingham's Safe Food Preservation series publications for county and state fair exhibition. Extension livestock specialists, county educators and trained 4-H volunteer leaders train both certified 4-H youth and new volunteer leaders in Meat Animal Quality Assurance (MAQA) required for participation in state and most county fair beef, swine, sheep and goat projects, auctions, sales, contests and shows. Around 4,500 4-H youth are MAQA-certified each year with the goal of producing a quality meat animal. Benefits to MAQA-certified youth are previewed in the evaluation sections of this report and Dairy and Livestock.

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 during 2013. 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.

Bridging the Gap: Integrated Research and Extension in Support of Small Processors of Acidified Canned Foods: Since September 2011, University of Wisconsin-Extension food science safety specialist Barbara Ingham has served as investigator in 4-year collaboration with faculty at North Carolina State University, generating research to inform, and training to support small-scale processors of acidified canned foods vending primarily at farmers' markets. This group is also developing a nationwide community of practice of extension specialists, researchers, processors and regulators who will help inform project design, support project implementation, and provide ongoing assistance to growers and processors of acidified canned foods as described under outcome 1 and external factors. A community of experts has begun meeting. Outcomes of this project will be shared with and supported by extension specialists, industry personnel and regulators through the community of practice.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12283	0	13478	0

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

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.
3	Improve the safety of the food supply - Master Meat Crafters

Outcome #1

1. Outcome Measures

Improve the safety of the food supply.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Where "buy local" economies are thriving, small food processors are benefiting from the economic momentum. Some farmers wishing to add value to their crops are delving into the sale of canned pickles, salsas and other family-favorite products. As a group, canned foods such as pickles, salsas and tomato-based products are referred to as acidified foods. Processed incorrectly, such foods are potentially hazardous. Federal and state laws require processors of acidified foods to have attended an FDA-approved training program, currently based on regulations focused on low-acid canning. To provide proper training meeting business needs of both large and small-scale processors, research was needed to fill knowledge gaps in the safety and regulatory framework for acidified foods.

What has been done
Scientific information validating critical points in manufacture are being developed for training small-scale processors of acidified canned foods vending primarily at farmers' markets. In collaboration with University of Wisconsin-Extension food safety specialists, North Carolina State University faculty have conducted research in support of process validation for acidified canned foods with pH 3.5 or 3.8 that are cold-filled into containers (Journal of Food Protection 2013. 76:1245-1249). They have also submitted data for publication in support of hot-filled products with pH 4.6 or below (manuscript in review). In a separate grant, North Carolina State University developed food safety training for FDA field staff on acidified canned foods, now being revised into a curriculum to pilot test with small processors in summer 2014 followed by formal evaluation. This group is also developing a nationwide community of practice of extension specialists, researchers, processors and regulators who will help inform project design, support project implementation, and provide ongoing assistance to growers and processors of acidified canned foods. A community of experts has begun meeting.

Results

Assuring safe local foods: Training and supporting small-scale processors of acidified canned foods increases availability of safe, wholesome products made locally while protecting public health. Research published as part of this collaboration indicates that products with pH 3.5 or 3.8 may be cold-filled when acidified with 2.5% acetic acid or 2.5% acetic acid with 0.1% benzoic acid, respectively - as long as the product is held for at least 4 days at 10°C prior to release into commerce. This research will allow processors to retain product quality while ensuring product safety. And the research submitted for publication establishes thermal processing conditions (time and temperature) necessary to ensure safety of acidified foods hot-filled with pH 4.6 or below. This research will fill the gap in knowledge of thermal processing required for products with pH 4.1 to 4.6. Integrated research and extension collaboration of Wisconsin and North Carolina food safety extension specialists will develop national research-based certification training meeting regulatory requirements, evaluate its effectiveness, and share best practices among professionals, processors and regulators through a national eXtension Community of Practice.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Improve the safety of the food supply - Master Meat Crafters

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	38

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The meat industry is a major contributor to Wisconsin's economy. With nearly 500 licensed meat processing facilities creating around $12.3 billion of economic impact and more than 20,000 jobs, Wisconsin's meat industry ranks among the state's top 5 manufacturing industries for economic output. The Wisconsin meat industry is both diverse and dynamic, resulting in a wide array of needs and requests. From small family businesses to very large multi-plant facilities, all are tasked with the daily challenge of producing safe, high-quality nutritious foods. Within a small margin of error, meat processors must thoroughly understand what pathogens must be controlled and how most effectively to control them. And to ensure that the industry remains sustainable and viable, an extension researcher identified the need for successful inter-generational transfer of expertise.

What has been done

In partnership with the Wisconsin Department of Agriculture, Trade and Consumer Protection, University of Wisconsin-Extension meat specialist Jeff Sindelar initiated and directs the one-of-a-kind, 2-year Master Meat Crafter Training Program at the University of Wisconsin-Madison Meat Science Laboratory. Training addresses food safety education and practical application throughout the program's 2 years. While food safety is significantly integrated into five of the program's short courses, the sixth titled Food Safety and Meat Microbiology School is fully food safety-focused - covering all facets of food safety taught by industry experts, coupled with hands-on microbiology laboratories. So far, 38 graduates have learned food safety from micro lab to meat plant, taking home a thorough and comprehensive understanding of pathogenic bacteria with the skills and tools to further develop and improve their own food safety programs: http://fyi.uwex.edu/meats

Results

Strengthening the meat industry - new Master Meat Crafters: The inaugural class of 17 graduated in 2012, another 21 met the requirements necessary to receive the distinction of Master Meat Crafter in January 2014, and the third class for 2016 was organized from applications submitted nationally and internationally. Graduates apply and share skills needed to improve the safety, consistency, quality and profitability of specialty meats - pleasing customers while expanding sales. Their communities gain good jobs and other economic benefits. Inaugural class graduates have also improved personally and professionally - making meat plant additions or renovations, expanding their array of product offerings and improving the quality of product offerings, receiving more meat product competition awards at state and national competitions. Half are the next generation in a family business. Each is tasked with producing every pound of product safely every day. Thus, the food safety elements of the Master Meat Crafter Training Program are critical to providing graduates the knowledge, skills and proper tools to process 100% safe food all the time. Long-term industry viability is ensured as plants grow, add on, and pass along the business for future generations.

4. Associated Knowledge Areas

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

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.)
- Other (Database Development)

Brief Explanation

Government regulations: As a group, pickles, salsas and tomato-based canned food products are referred to as **acidified foods**. Processed incorrectly, such foods are potentially hazardous. Processors who wish to manufacture these types of food must follow validated processes in order to protect public health. Federal and state laws require processors of acidified foods to have attended an FDA-approved training program, currently based on regulations focused on low-acid canning. To provide proper training meeting business needs of both large and small-scale processors, research was needed to fill knowledge gaps in the safety and regulatory framework for acidified foods. In collaboration with University of Wisconsin-Extension food science safety specialist Barbara Ingham, researchers at North Carolina State University have developed scientific information validating critical points in manufacture for training small-scale processors of acidified canned foods vending primarily at farmers' markets. This integrated research and extension collaboration will develop national research-based certification training meeting regulatory requirements, evaluate its effectiveness, and share best practices among professionals, processors and regulators through a national eXtension Community of Practice.

Database development: University of Wisconsin-Extension is in the process of replacing the legacy planning and reporting database, which was closed in 2012. For this report, the 2013 direct contacts for adults are the 4-year average of past performance of relevant statewide teams in 2008-2011. Program participation is in alignment with previous years.

The 2013 direct contacts for youth reported include 4-H enrollments in relevant projects reported on the ES-237 form for 2012-2013.

SNAP-Ed 2013 food safety teaching contacts for children and youth are added to 4-H youth food safety enrollments for the 2013 Food Safety federal report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

2013 Meat Animal Quality Assurance Evaluation -- Part 2 of 2, see also Dairy and Livestock: Through the Meat Animal Quality Assurance (MAQA) program, University of Wisconsin-Extension 4-H Youth Development provides opportunities for youth to develop

and practice positive animal agriculture behaviors, skills and abilities that improve animal projects and prepare them for producing a quality meat animal. Pork Quality Assurance (PQA) is required for swine production at the request of packing plants. As processors required Quality Assurance certification, UW-Extension youth livestock specialist Bernadette O'Rourke developed MAQA in 2003 to better implement this program for youth and their adult advisors.

MAQA certification meets the national PQA requirement. The Wisconsin State Fair and most county fairs require MAQA certification for beef, swine, sheep and goat project exhibitors at auctions, sales and shows. Extension livestock specialists, county educators and 4-H volunteer leaders train youth ages 8 to 19. Youth learn best production practices in managing and handling their animal projects as producers of a food product, and how their actions impact the wholesomeness of that product. But in what ways do trained youth benefit? Other than results of a study in another state asking adults their perceptions of what youth had learned, very little was known about the benefits of Quality Assurance education for youth. After running this program for 10 years, the MAQA planning team decided to assess the impact of MAQA certification for youth, gather information directly from youth participants to guide the program, and add to the scholarly research.

Response: In 2013, UW-Extension county 4-H youth agents Deb Ivey and Alissa Grenawalt, youth livestock specialist Bernie O'Rourke and animal science specialist Pam Hobson worked with evaluation specialists Matt Calvert, David Trechter and the UW-River Falls Survey Research Center to develop and conduct a statewide MAQA evaluation. They designed a retrospective self-assessment survey to measure 8 expected outcomes including producing a quality meat animal, and 2,164 youth Grade 6 and above in the MAQA program in 58 of Wisconsin's 72 counties completed a questionnaire, rating their abilities and behaviors before and after their MAQA training for 29 pairs of questions.

Initial results: Almost all questions showed increased knowledge after MAQA educational sessions. Changes from before to after MAQA training were statistically significant for all 29 pairs of questions (this report focuses on youth producing a quality meat animal, see also the Dairy and Livestock evaluation section). Early results of this evaluation indicate that participation in MAQA had a positive impact and increased their behaviors identifying meat quality problems caused by stress, reading antibiotic and feed labels, giving injections in correct locations, practicing proper withdrawal times, and keeping accurate written records as described in the following key items for NIFA attention. The Meat Animal Quality Assurance Participant Impact Survey Report, 2013 by James Janke and David Trechter, University of Wisconsin-River Falls Survey Research Center is due out in 2014.

Key Items of Evaluation

2013 Meat Animal Quality Assurance (MAQA) Evaluation -- Assuring a safe and wholesome food supply: In 2013, 1,452 adults advised the 8,377 youth who enrolled in 4-H beef, swine, sheep and goat projects, many with the goal of producing a quality meat animal. University of Wisconsin-Extension campus and county faculty and trained 4-H volunteer advisors address animal care and carcass quality issues through species-specific programs. Twenty county extension educators and state specialists are Beef Quality Assurance trainers, two Swine Team members are certified Transport Quality Assurance trainers and all four are Pork Quality Assurance Plus Advisors who also help train certified 4-H youth and volunteer leaders in Meat Animal Quality Assurance required for

participation in Wisconsin State Fair and most county fair beef, swine, sheep and goat auctions, sales, contests and shows.

Around 4,500 4-H youth are currently MAQA-certified. The 2,164 MAQA-certified youth from 58 of Wisconsin's 72 counties who completed retrospective evaluation surveys reported post-MAQA increases in all 29 measures in the survey and all were statistically significant -- indicating that participation in MAQA had a positive impact on youth participants' self-assessment of their abilities and increased their behaviors around 8 expected outcomes including producing a quality meat product. This report focuses on early results that relate to ensuring food safety and quality (see also the Dairy and Livestock evaluation section). The largest increases in the percentage of respondents who said their abilities are good or excellent in these areas included:

- Read antibiotic and feed labels (+38%)
- Identify meat quality problems caused by stress (+34%)
- Practice appropriate withdrawal times (+34%)
- Give injections in correct location of an animal with proper needles (+34%)
- Keep written, accurate records of feed and medications (+32%)

Animal Health Practices: More than 9 in 10 respondents rated their post-MAQA ability to contact a veterinarian and to ask a veterinarian about animal health as good or excellent. About three-fourths of respondents rated their ability to give correct injections as good or excellent after MAQA compared to less than half before MAQA. In all questions, there was an increase in the ability to practice these activities. The largest gain among this group of 6 questions was for the ability to read labels. With respect to reading antibiotic and feed labels and keeping accurate written records of feed and antibiotics, a large majority reported their ability as good or excellent after MAQA. This represents a substantial increase, since only about half of respondents said their abilities in these activities were good or excellent before MAQA.

The overall average of respondents who rated their abilities as good or excellent or who said they often or almost always practice desired behaviors increased by 22% after participation in MAQA. The Meat Animal Quality Assurance Participant Impact Survey Report, 2013 by James Janke and David Trechter, University of Wisconsin-River Falls Survey Research Center is due out in 2014.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	75%			
704	Nutrition and Hunger in the Population	10%			
724	Healthy Lifestyle	15%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	0.0	0.0
Actual Paid Professional	2.0	0.0	0.0	0.0
Actual Volunteer	812.0	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**
90972	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
90972	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

For 2013, University of Wisconsin-Extension reports efforts of Family Living and 4-H Youth Development campus and county faculty and staff, colleagues and partners providing timely research-based education and assistance for preventing childhood obesity. Diverse participants make informed, science-based decisions regarding nutrition, childhood obesity, health and physical activity -- and the inter-relationships that exist. By developing and implementing behavioral interventions that improve nutrition and increase physical activity, more than 2,275 youth and adults took action by making healthy food choices and increasing physical activity through 4-H healthy living initiatives. By increasing the capacity of community partners to address issues related to nutrition and childhood obesity, community coaching skills are enhancing the intervention coalition's effectiveness in addressing the community issue of low-income childhood obesity.

Solving the Problem of Childhood Obesity within a Generation: In response to growing concerns about childhood obesity, 4-H National Headquarters made healthy living a national priority. 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. More than 2,275 youth and adults took action by making healthy food choices and increasing physical activity through their participation in 4-H healthy living initiatives across the state. Evaluation documented individual knowledge gain and behavior change: participants reported that they learned new things about nutrition, healthy eating and exercise, and changed their eating and exercise habits because of their involvement in extension programs.

Community coaching skills enhance coalitions addressing childhood obesity: Preventing obesity in children is important to society due to the high health care costs due to diabetes, high blood pressure, asthma and sleep apnea. Schools, health care providers, and families are all working together to address this crucial issue. While forming community coalitions to address this issue is a common strategy, sometimes coalitions struggle to be effective. Community coaching skills may enhance coalition effectiveness. In two project counties, UW-Extension educators are leading coalitions that have been doing needs assessments and are planning to launch initiatives. Through community coaching, the intervention coalition has shown increased coalition capacity to address the community issue of low-income childhood obesity.

2. Brief description of the target audience

University of Wisconsin-Extension Cooperative Extension Family Living Programs and 4-H Youth Development campus and county faculty and staff provide research-based education directed at preventing childhood obesity for diverse children and youth, caregivers, parents and family members, public and private collaborating and community agencies and others in a variety of educational settings.

Primary emphasis is placed on reaching under-represented audiences including low-income; Latino/a, African American, American Indian and Hmong families and youth. Cooperative Extension reached an estimated 86,337 adults and 284,262 youth through direct teaching methods.

<u>UW-Extension SNAP-Ed staff made:</u>

35,714 educational contacts with adults and children to encourage eating whole grains, low-fat meats and beans.
After a lesson, 1,376 children were offered samples of dried beans; 86% of the children tried the sample and 60% said they would eat beans again.
After a lesson, 90% of 1350 adults asked if they were more likely to eat whole grain foods said yes.
33,781 educational contacts with adults and children on consuming recommended amounts of low-fat milk

and dairy.
8,158 educational contacts with adults and children on consuming foods with less fat.
14,472 educational contacts with adults and children encouraging physical activity and balancing it with food intake.
Following a lesson, 40% of adults said they would try to be more active each day.
9,201 educational contacts with adults on age-appropriate meals for family members, including infants.
95,830 educational contacts with adults and children on choosing healthful foods based on Dietary Guidelines.
119,379 educational contacts with children and adults promoting consumption of fruits and vegetables.

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 Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather and Western corn rootworm resistance to Bt corn during 2012. 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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	86337	0	284262	0

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

Patent Applications Submitted

Year: 2013
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop and implement behavioral interventions that improve nutrition and increase physical activity.
2	Build capacity among community partners to address issues related to nutrition and childhood obesity.
3	Develop community strategies to address factors influencing excessive weight gain.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2275

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In response to growing concerns about childhood obesity, 4-H National Headquarters made healthy living a national priority. 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: (1) empower parents and caregivers; (2) provide healthy food in schools; (3) improve access to healthy, affordable foods; and (4) increase physical activity. University of Wisconsin-Extension Youth Development and Family Living Programs educators and staff in 10 counties and 2 Native American Reservations are working in each of these areas by engaging youth, families and school and community leaders in programs that address access to healthy foods and the importance of fruit and vegetables consumption and physical activity on healthy youth development.

What has been done
Over 2,275 youth and adults took action by making healthy food choices and increasing physical activity through their participation in 4-H healthy living initiatives across the state. Educators in partnership with youth and adult community leaders worked to implement policy changes and completed service to improve physical environments that impacted the health of many more Wisconsin residents.

Healthy corner store initiatives, farm-to-school education programs, community gardens, pedestrian and bike path improvements, and out-of-school activity programs were achieved through Extension involvement in leveraging local resources.

Results
Public Impact: Nearly $150 billion per year is now being spent to treat obesity-related medical conditions. The Robert Wood Johnson Foundation reports if we invested in proven school and

community based programs that result in more physical activity or improved nutritional environments, within 5 years the Return On Investment (ROI) could rise to 5.6 for every $1 invested and rise to 6.2 within 10 to 20 years. This ROI represents just the medical cost savings. Significant gains can also be achieved in productivity, learning and enhanced quality of life (Robert Wood Johnson Foundation (2008). RWJF Commentary Regarding Social Factors' Influence on Variations in Health and Life Expectancy. [ONLINE] Available at: http://www.rwjf.org/en/research-publications/find-rwjf-research/2008/09/rwjf-commentary-regarding-social-factors-influence-on-variations.html)

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Preventing obesity in children is important to society due to the high health care 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 opportunities for physical activity. Developing healthy eating patterns and physical activity habits as children are likely to persist into adulthood. Schools, health care providers, and families care about reducing childhood obesity. While forming Community Coalitions to address this issue has been a common choice by Extension educators, sometime coalitions sturggle to be effective. Community coaching skills promise to enhance coalition effectiveness.

What has been done
In the two project counties, UW-Extension educators are leading coalitions that have been doing needs assessments and are planning to launch interventions. The intervention county receives the support of a "community coach" while the control county does not. Annual Coalition Self-assessments have been conducted to minotor changes over time in the effectiveness of both coalitions. Data from years one and two have been analyzed.

Results
Through community coaching, the intervention coalition has shown increased coalition capacity to address the community issue of low-income childhood obesity. The coalition effectively held regular meetings consisting of agendas and action summaries, routinely implemented a decision-making process; identified opportunities to link to key initiatives within the community; developed a coalition mission and community vision, and created a fremework - theory of change.

Coalition membership grew and strategically set out to connect with other community initiatives by building relationships and engaging in joint-outreach efforts. Coalition member participation has increased from 10% to 50% of members stating they were very involved in coalition activities, with all members agreeing that they have a voice in what the coalition decides, sense of loyalty to the group, and are satisfied with how the coalition operates. An increase from 45% to 90% of coalition members reported feeling very comfortable with the coalition's decision-making process from year one to year two.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Develop community strategies to address factors influencing excessive weight gain.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation: In the coming year, both counties will launch interventions by their coalitions that will address childhood overweight. An evaluation study will begin in 2015 that compares the functioning of both coalitions and the effectiveness of a community coach.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%			
133	Pollution Prevention and Mitigation	20%			
205	Plant Management Systems	10%			
601	Economics of Agricultural Production and Farm Management	10%			
605	Natural Resource and Environmental Economics	20%			
608	Community Resource Planning and Development	30%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	0.0	0.0
Actual Paid Professional	17.0	0.0	0.0	0.0
Actual Volunteer	498.0	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**
842145	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
842145	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

For 2013, University of Wisconsin-Extension reports collaboration among campus and county faculty and staff, tribal, regional and national colleagues, partners and trained volunteers providing timely science-based education and assistance for climate change adaptation and mitigation through developing, implementing and evaluating outreach programs to reduce carbon, nitrogen, energy and water footprints in their communities. Supporting this work is the interagency Wisconsin Initiative on Climate Change Impacts: http://www.wicci.wisc.edu

As climate changes, tribal place-based culture and economies must adapt to changing conditions. Climate change research documents that local, place-based evidence of climate change gained through experiential learning is as or more effective to increasing climate change literacy than simply studying analytical climate change data (The Psychology of Climate Change Communication, Columbia University, 2009). In partnership with others described in the audience section, University of Wisconsin-Extension environmental outreach specialist Cathy Techtmann supported development of the Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) or "G-WOW" Changing Climate, Changing Culture model. This unique collaboration was honored with the Forest Service Eastern Region 2013 Connecting Citizens to the Land Award as an outstanding project that illustrates "courageous conservation."

Climate change directly impacts water resource quality and quantity in the Great Lakes Region. Water managers and environmental professionals need to understand anticipated climate change impacts in the region and help communities find ways to mitigate and adapt using sustainable practices. University of Wisconsin-Extension staff helped form the Regional Climate Education Team. Climate education experts from Land Grant universities, Sea Grant programs, the River Network, National Oceanic and Atmospheric Administration (NOAA) and the Ohio Department of Natural Resources provide regional coordination, input and guidance for the initiative. A sub-team of representatives from six states developed climate change core competencies for community outreach professionals. Distance education short courses include Sustainable Water Resources and Climate Change Planning, Sustainable Water Management in the Great Lakes Region, Climate Tools Café, and Climate Change Initiative. Participants reported they are more confident in their abilities to apply sustainability principles, engage stakeholders in water infrastructure planning, and lead education and community planning programs on climate change, and can do their jobs better. The short courses, presentations, videos, texts, decision-making tools and webinars in 5 key areas -- economic development, land use, water quality, ecosystem management and invasive species -- are housed on new regional climate web site: ClimateGreatLakes.com

2. Brief description of the target audience

University of Wisconsin-Extension reached an estimated 46,953 adults and 1,593 youth through direct teaching methods. The audience includes Great Lakes Region colleagues and partners, tribal educators, elders and youth, youth and adult dairy and livestock producers and workers, producer associations, growers and grower associations, agronomists, crop consultants, professional nutrient applicators, coalitions and cooperatives, composters and recyclers, coastal and other community leaders, business owners, town, city, county and tribal governments, elected officials, planning and emergency management departments, planning commissions, economic development practitioners, school districts, 4-H youth and trained volunteer leaders, and others.

Serving under-represented communities: As climate changes, tribal place-based culture and economies must adapt to changing conditions. The Changing Climate, Changing Culture Teacher Institute and the Gikinoo'wizhiwe Onji Wabaan (G-WOW, Guiding for Tomorrow) educational exhibit at the Northern Great Lakes Visitor Center trained 57 tribal members to recognize climate impacts and adaptation strategies, and raised the awareness of around 3,300 other visitors about the effects of climate change on tribal lifeways. UW-Extension's role in planning and delivering the Institute for Tribal Environmental Professionals Climate Adaptation Planning Workshop in Oneida, Wisconsin, resulted in 21 representatives of 12 tribal nations building capacity to develop plans leading to climate adaptation and mitigation by the tribes: http://www.g-wow.org/en-us/default.aspx

As of 2013, the Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) or "G-WOW" Changing Climate, Changing Culture Initiative is building unique collaborations among tribal, regional and national climate change educational partners: Aldo Leopold Nature Center (Wisconsin), Apostle Islands National Lakeshore, Chequamegon-Nicolet National Forest, Fond du Lac Tribal Community College, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), Great Lakes Restoration Initiative, Lac Courtes Oreilles Tribal Community College, National Oceanic and Atmospheric Administration (NOAA), National Park Service and National Parks Foundation, Northern Great Lakes Visitor Center (NGLVC), University of Minnesota, University of Wisconsin-Extension, U.S. Department of Agriculture Forest Service, U.S. Environmental Protection Agency, Will Steger Foundation (Minnesota), Wisconsin Coastal Management Council, Wisconsin Department of Natural Resources, Wisconsin Initiative on Climate Change Impacts (WICCI), and the Wisconsin State Historical Society.

Wisconsin Initiative on Climate Change Impacts (WICCI): This statewide collaboration brings scientists and stakeholders together to find adaptation strategies to reduce potential negative impacts of climate change in Wisconsin as described in its first comprehensive report, Wisconsin's Changing Climate: Impacts and Adaptation (2011). WICCI's outreach program focuses on building capacity among Wisconsin decision makers to integrate climate projections into resource management decisions: http://www.wicci.wisc.edu

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, Stevens Point and Superior campuses and centers, working with 3 tribes, and at 11 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	46953	0	1593	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	6	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop, implement and evaluate outreach programs that reduce carbon, nitrogen, energy and water footprints in their communities.
2	Reduce atmospheric greenhouse gas emissions.
3	Maximize carbon sequestration potential in agriculture and forests.
4	Develop outreach programs that reduce carbon, nitrogen, energy and water footprints in communities.

Outcome #1

1. Outcome Measures

Develop, implement and evaluate outreach programs that reduce carbon, nitrogen, energy and water footprints in their communities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For Ojibwe people of the Great Lakes region, manoomin - "the food that grows on water"- or wild rice - is key to spiritual and community traditions, and provides income. What would happen if this mainstay of Ojibwe culture, along with other seasonal practices such as fishing, maple sugaring and birch bark harvesting, become scarce or vanish as a changing climate impacts the sustainability of key plant and animal species that support these lifeways? What do these changes indicate for people of all cultures? As climate changes, tribal place-based culture and economies must adapt to changing conditions. Climate change research documents that local, place-based evidence of climate change gained through experiential learning is as or more effective to increasing climate change literacy than simply studying analytical climate change data (The Psychology of Climate Change Communication, Columbia University, 2009).

What has been done
University of Wisconsin-Extension environmental outreach specialist Cathy Techtmann, in partnership with others, supported the development of the Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) or "G-WOW" Changing Climate, Changing Culture model. G-WOW increases climate literacy by evaluating the sustainability of key species that support Ojibwe cultural lifeways based on place-based evidence of climate change impacts, Native perspectives, and traditional ecological knowledge (TEK) integrated with scientific climate change research from sources such as the Wisconsin Initiative on Climate Change Impacts (WICCI).

G-WOW includes four components: (1) an educational exhibit that raises awareness of how climate change is affecting Lake Superior's environment, communities, and cultures - and what can be done to help reduce or adapt to the impacts of a changing Lake Superior climate; (2) a service learning curricula; (3) a 4-day train-the-trainer teacher institute; and (4) a network of trained community educators who completed culturally relevant climate change service learning projects with students in their communities. The G-WOW service learning

curricula is outreached on line for distance learning at www.g-wow.org.

Results
Techtmann established new tribal, regional and national partnerships among University of Wisconsin-Extension, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), tribal colleges, the U.S. Forest Service, National Park Service, Wisconsin State Historical Society and many others. More than 57 educators, most serving Native American student populations, have been trained using the G-WOW model and are encouraging their communities to adopt culturally relevant adaptation strategies through climate change service learning. Tribal elders, GLIFWC researchers, and WICCI scientists shared evidence of cultural and natural resource impacts of climate change on the Great Lakes region to create the G-WOW curriculum. Native Ojibwe and non-native youth learned from this mutual exchange. This unique collaboration was honored with the Forest Service Eastern Region 2013 Connecting Citizens to the Land Award as an outstanding project that illustrates "courageous conservation."

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Reduce atmospheric greenhouse gas emissions.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Maximize carbon sequestration potential in agriculture and forests.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Develop outreach programs that reduce carbon, nitrogen, energy and water footprints in communities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Climate change directly impacts water resource quality and quantity in the Great Lakes Region. Greater numbers of impaired waterways and pressure on aging stormwater infrastructure are also critical concerns. To address these issues, water managers and environmental professionals need to understand anticipated climate change impacts in the region and help communities find ways to mitigate and adapt using sustainable practices.

What has been done
University of Wisconsin-Extension staff members participated in the formation of the Regional Climate Education Team. Climate education experts from Land Grant universities, Sea Grant programs, the River Network, National Oceanic and Atmospheric Administration (NOAA) and the Ohio Department of Natural Resources provide regional coordination, input and guidance for the initiative. A sub-team of representatives from six states developed climate change core competencies for community outreach professionals. Educators and Sea Grant staff were surveyed to better understand their capacity to develop and implement climate adaptation education and outreach programs. The following distance education short courses were developed by the Regional Climate Education Team: "Sustainable Water Resources and Climate Change Planning"; "Sustainable Water Management in the Great Lakes Region"; "Climate Tools Café"; and "Climate Change Initiative." In addition to the short courses, the team and NOAA staff compiled a list of presentations, videos, texts, decision-making tools and webinars to include in Extension programming in 5 key areas: economic development, land use, water quality, ecosystem management and invasive species. Information was housed on new regional climate website: ClimateGreatLakes.com.

Results
After participating in the 2013 "Sustainable Water Management Course," respondents were significantly more confident in their abilities to apply sustainability principles and engage

stakeholders in water infrastructure planning, and to lead education and community planning programs on climate change. Ninety-six (96%) percent of 31 respondents reported they will use the knowledge they gained to expand stakeholder engagement, help community decision-makers address vulnerabilities and communicate to stakeholders, and work with communities to approve or include climate adaptation plans. Eighty-nine percent (89%) plan to get more involved in initiatives to address climate change.

Survey results from the 2013 "Climate Tools Café" showed that 86% of 83 post-webinar survey respondents said they gained information that will help them do their jobs better. Sixty-three percent (63%) said they feel more confident helping communities mitigate and adapt to climate change because of the webinar. Forty-one participants described actions they plan to take as a result of the webinar.

Results from the "Milwaukee's Climate Change Initiative" indicated that 82% of 52 attendees gained information that will help them do job their jobs better, and 59% said they planned to take action.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems
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
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%			
133	Pollution Prevention and Mitigation	10%			
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%			
403	Waste Disposal, Recycling, and Reuse	10%			
601	Economics of Agricultural Production and Farm Management	10%			
602	Business Management, Finance, and Taxation	10%			
605	Natural Resource and Environmental Economics	20%			
608	Community Resource Planning and Development	20%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	0.0	0.0
Actual Paid Professional	3.0	0.0	0.0	0.0
Actual Volunteer	1.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
126149	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
126149	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

University of Wisconsin-Extension BioEnergy and the BioEconomy Team cross-program members and partners are conducting integrated research and extension programs, building capacity for developing sustainable energy and scalable conversion technologies among extension colleagues, communities, farmers and industry partners. Curriculum development teams are working on three courses: BioEnergy and Sustainability, On-Farm Energy Conservation and Efficiency, and Anaerobic Digestion -- a proven waste-to-energy technology. To develop biomass use for biofuels, the Lake Superior Woody Biomass Initiative is working toward a sustainable woody biomass supply chain. By building capacity to create, refine and implement scalable conversion technologies, 40 extension-trained biodigester owners and operators are improving their economic and environmental sustainability. Impacts include:

Lake Superior Woody Biomass Initiative: Increased interest in and funding for renewable energy sources may bring new economic opportunities to Northern Wisconsin. The region's forests and farmlands offer a rich supply of herbaceous and woody biomass for use in the emerging bioeconomy. A number of companies announced plans to establish or expand their use of woody biomass for energy production. Doing so would require significantly more woody biomass than is currently used, and raised concerns about long-term impact on native forestlands, pulp and paper markets. Little is known about how woody biomass crops such as hybrid poplar, larch or willow will perform in the climate and soils of Northern Wisconsin, nor are there agronomic or management recommendations for producers. Jason Fischbach, extension agriculture agent for Ashland and Bayfield counties, convened stakeholders to develop the Lake Superior Woody Biomass Initiative, outlining education, research, and outreach efforts to develop a sustainable woody biomass supply chain. These stakeholders recognize dedicated woody biomass crops as another important source of feedstock that could provide income.

Anaerobic digestion research and outreach: Wisconsin is the leading state for on-farm anaerobic digestion with more than 30 operational systems. Since large-scale implementation is relatively recent, training is needed for safe production and use of biogas. Maintaining the economic viability of large-scale anaerobic digestion systems requires optimizing operation, assessing feedstocks, and managing manure systems in accordance with nutrient management plans. Feedstocks are identified and evaluated in extension biowaste specialist Rebecca Larson's lab, then implemented in the field. New tools developed in the last year allow operators to evaluate the 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. The 40 trained large-scale operators have a greater understanding of their systems, can implement strategies outlined in the training, and are connected with their peers.

2. Brief description of the target audience

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. Given Wisconsin's wealth of resources in forests and agricultural production, there is interest among state businesses and communities in producing alternative fuels and feedstocks from biomass. The audience includes municipalities, regional planning commissions, regional economic development initiatives, regulated and unregulated utilities, liquid biofuels, anaerobic digester and biomass conversion technology firms, biomass producers and aggregators, food processors, food services, school districts, loggers, procurement foresters, wood products professionals, haulers, farmers and their addvisors, business owners, woodland owners, recycling volunteers, public and private agencies, local and tribal government officials, 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, Stevens Point and Superior campuses and centers, 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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4341	0	0	0

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop biomass use for biofuels.
2	Build capacity to create, refine and implement scalable conversion technologies.
3	Design forestry and crops for bioenergy production.

Outcome #1

1. Outcome Measures

Develop biomass use for biofuels.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increased interest in and funding for renewable energy sources may bring new economic opportunities to Ashland and Bayfield counties. The region's forests and farmlands offer a rich supply of herbaceous and woody biomass for use in the emerging bioeconomy. A number of companies have announced plans to establish or expand their use of woody biomass for energy production. Xcel Energy is committed to converting the Bayfront Power Plant in Ashland to 100% biomass. Doing so would require significantly more woody biomass than is currently used and has raised concerns about the long-term impact on native forestlands and the pulp and paper markets. Little is known about how woody biomass crops such as hybrid poplar, larch or willow will perform in the climate and soils of Ashland and Bayfield counties, nor are there agronomic or management recommendations for producers.

What has been done
Jason Fischbach, Wisconsin Cooperative Extension agriculture agent for Ashland and Bayfield counties, convened stakeholders in 2009 to develop the Lake Superior Woody Biomass Initiative, which outlines education, research, and outreach efforts necessary to develop a sustainable woody biomass supply chain. Despite significant forest resources in the region and a considerable supply of harvest residues and mill waste, stakeholders recognize dedicated woody biomass crops as another important source of feedstock that could provide income opportunities for area farmers. Fischbach secured $35,000 in funding from Xcel Energy and the Wisconsin Office of Energy Independence to implement the Lake Superior Woody Biomass Trials.

The trials consist of 25 acres of woody biomass plantings with a series of formal research projects and demonstration plantings. The trials include work on hybrid poplar, hybrid willow, and native conifers. The first full production cycle data for the willow will be collected in 2013/2014.

Results

The primary focus of the Lake Superior Woody Biomass Trials is to evaluate and demonstrate production scenarios for potential biomass producers. After a successful establishment year in 2010, data collection began in late October. In the first year, the trials introduced people throughout Wisconsin to woody biomass crops at a production scale, and have inspired collaborations for further research and development work. Funding from the Focus on Energy program was obtained to conduct a nitrogen fertilization trial with hybrid willow. The Natural Resources Research Institute in Duluth, MN, has provided hybrid poplar for a replicated performance trial of their select hybrid poplar accessions. The USFS recently funded a trial planting at the Northern Great Lakes Visitor Center to demonstrate the use of woody biomass crops in commercially viable agroforestry plantings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Build capacity to create, refine and implement scalable conversion technologies.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Anaerobic digestion is a proven waste-to-energy technology. Wisconsin is the leading state for on-farm anaerobic digestion with more than 30 operational systems. The last decade created demand for knowledge of system components, processes and mechanisms, operation skills, safe

production and use of biogas. Maintaining the economic viability of large-scale anaerobic digestion systems requires optimizing operation, assessing feedstocks, and managing manure systems in accordance with nutrient management plans.

What has been done
University of Wisconsin-Extension biowaste specialist Rebecca Larson works with USDA, OSHA, campus, county and national colleagues, industry partners and farmers developing and sustaining safe, practical and economical anaerobic digestion. Throughout 2013, Larson and colleagues conducted research on operational trouble-shooting at on-farm anaerobic digesters as well as laboratory systems. Anaerobic digestion systems were investigated for biogas production optimization, feedstock degradation, co-digestates, use of end products, and other operational issues. Results were shared around the state to increase digester owner and operator efficiency, encourage advancement of the technology, and educate the public and other educators on basic digestion function and feasibility. Larson will also use results to update the Anaerobic Digester Operator Training Program curriculum to be offered again in fall 2014.

Results
Anaerobic digestion research and outreach: Research results are critical to provide additional guidance to operators, system owners and the industry on decreasing system failures and downtime, increasing biogas production and profitability, and reducing environmental impacts. Feedstocks are identified and various blends evaluated in Rebecca Larson's lab, then implemented in the field. As a result, many facilities are increasing biogas production and more importantly, avoiding feedstocks with high toxicity that cause catastrophic failures. Her recommendations have led to more efficient systems with greater economic sustainability. For example, when a scalable system constructed for 200 milking cows was producing much lower biogas than predicted, she worked with the operator and company owner to double biogas production. New tools developed in the last year allow operators to evaluate the impacts to emissions, nutrient use efficiency, and economics.

Anaerobic Digester Operator Training: The 40 extension-trained large-scale operators have a greater understanding of their systems, can implement strategies outlined in the training, and are connected with their peers. Additional materials have been developed over the last few years and are ready to be integrated into systems over the next year.

Digestion and solid-liquid separation: Tracking nutrients and pathogens through anaerobic digestion systems including solid-liquid separation has improved manure management, allowing producers to better manage manure streams in accordance with their nutrient management plans, reducing spreading costs and environmental impacts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

Outcome #3

1. **Outcome Measures**

   Design forestry and crops for bioenergy production.

   Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}