

# 2010 University of Wisconsin Research Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

#### Program Overview/Operating Philosophy

The Wisconsin Agricultural Experiment Station (WAES) is committed to investigator-driven and peer-reviewed research activities. Our general philosophy in allocating Formula funding is to provide support for specific, peer-reviewed projects rather than to distribute block grants to departments. At the University of Wisconsin, the largest portion of our allocation is targeted for graduate student education using our formula funding. Expenditures on projects are allowed under a series of guidelines reviewed annually by a faculty committee. Matching funds come primarily from state support of salaries for investigators and research staff. As in prior years, a small percentage of our funds were administered based on emerging issues or critical needs.

Formula funds are managed via yearly budgets allocated to approved projects. Approximately 160 projects are funded using formula funds each year with budgets that include personnel (mainly graduate students) as well as supplies, student hourly help, and travel. Funding of capital equipment items is prioritized by departments and distributed in a separate exercise, with some capital equipment items shared by several projects. Funds for travel to multistate research meetings comes from a central pool of funds and is provided for one official representative per project.

The Research Program in this Plan of Work is composed of a number of projects with individual review and reporting. The Program may extend for multiple years, but the contributing projects are a constantly shifting portfolio that can be quickly redirected. Projects are approved for periods of one to four years with the majority on a three or four-year cycle. Proposals for new projects require an evaluation of productivity from previous Formula fund support; this is used as one of several criteria for ranking proposals and for evaluating the ability of the PI/team to complete the research project successfully. Multistate revised proposals are required to be reviewed and approved at least once every 4 years. Each year, approximately 20% of the research portfolio is redirected depending upon the priorities and needs of Wisconsin and the nation, as identified in the annual RFP.

The process of continual re-examination of our portfolio allows us to address short-term, intermediate term and long-term issues. A small number of new projects may be started at mid-year as new faculty members are hired or as emerging problems trigger an early start at the discretion of the Associate Dean for Research and the Assistant Director of the WAES, following discussion with the WAES/College of Agricultural and Life Sciences Administrative Leadership Group. These processes ensure that projects are relevant to the REE and NIFA national goals and emphasis areas and focus on current state research needs.

The WAES follows a general "logic model" process in which input is sought from diverse stakeholders, including both traditional and non-traditional agriculture, natural resource, human health and community groups, to establish a set of research priorities. Input is also sought via public meetings such as field day events held at our Agricultural Research Stations or through other Extension venues. Priorities are also solicited from Extension issue-based teams composed of University of Wisconsin/Extension faculty and county based educators. Five goals established by the USDA National Institute of Food and Agriculture (NIFA), include:

- 1) Global Food Security and Hunger

- 2) Climate Change
- 3) Sustainable Energy
- 4) Childhood Obesity
- 5) Food Safety

These revised goals will be identified as priorities for projects to be funded in the WAES Research program. In using the nationally devised goals and themes as the reporting framework, it also should be noted that research projects frequently do not fit neatly and exclusively into a single category. Research projects frequently intersect two or more disciplines, priorities and interests. We view this inter-disciplinary engagement of our researchers as an important feature of our program.

Within these national goals, states are asked to draw on stakeholder input to help direct use of Formula Grant funding. In Wisconsin, the CALS Leadership Group and faculty meet regularly with a number of college and departmental advisory groups, commodity organizations, state agencies, consumer groups, and private citizens. Input from these stakeholders, and from those performing the research, is beneficial to assist in highlighting areas of research need. Department Chairs are also asked to propose a small number of research topics from each unit of CALS for use in the Hatch, Hatch Multistate, and McIntire-Stennis Call for Proposals. Input from stakeholders is reviewed periodically and information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes derived from recent WAES Calls for Proposals for our Formula Grant program.

- 1) Mechanisms of pest and pathogen resistance as well as the safe and effective control of pests and pathogens, with minimum effects on environmental quality and human health.
- 2) Effects of change in global climate, human population pressures, and public policy on agricultural production, environmental resources, ecosystem management, and future land uses.
- 3) Identification of socioeconomic or other forces that shape the viability of Wisconsin industries and employment including agriculture, bio-based industry, forestry, wildlife management, recreation, and other land uses.
- 4) Research on food safety, nutritional health, environmental protection, and biotechnology and on providing information on dietary choices, lifestyle and community decisions.
- 5) Sustainable agricultural and forestry production and processing systems that provide improved food safety and security, environmental protection, economically viable communities, protection of public goods, and human well-being. This need requires an understanding of basic life processes and model plant/animal systems in order to manage biotic systems for human use.
- 6) Research and development related to agricultural processes with the potential to enhance the productivity and quality of livestock and food and bio-fuel crops in a sustainable manner.

These Wisconsin priorities along with the National Goals are provided to faculty to use in developing proposals for funding under the Formula Grant programs. They are also provided to the review panel that provides recommendations for funding. We feel that there is a strong relationship between the national goals and Wisconsin priorities. These priorities along with other criteria such as Extension/Integrated activity, Multistate, under-represented populations/groups and past Formula Grant productivity are also used in the merit evaluation of proposals subsequently submitted.

The Call for Proposals for projects to be supported beginning in FY12 ((beginning Oct. 1, 2011), was initiated in June, 2010, approximately 16 months prior to project initiation. Proposals were due September 10, 2010. A copy of the Call for Proposals, guidelines and merit criteria are available at <http://www.cals.wisc.edu/waes/application/proposals.html>.

Proposals are evaluated by an internal panel of faculty, called the Research Advisory Committee (RAC). The RAC is composed of 10 faculty, and the Associate and Assistant Directors of the Agricultural Experiment Station. Faculty are chosen to represent the broad cross section of the college and serve rotating three year terms. Proposals are assigned to primary and secondary reviewers from the RAC members and two other appropriate scientific reviewers not on the RAC. These reviewers may be either internal, external or a combination of both. The criteria for choosing the reviewers is the reviewer's ability/knowledge base to judge the merit of the proposals. The RAC convened in late November to rank the proposals based on the established criteria.

This process is detailed under "Nature of the Proposal reviews for Hatch, Hatch Multistate, and McIntire-Stennis Proposals" included at the end of the Call for Proposals document referenced above.

We monitor several outcomes/indicators to assess program effectiveness and impact, including peer-reviewed publications, workshops provided to client groups, patent disclosures and graduate students trained. Future indicators may be expanded to include other criteria. This information will be used not only to assess current program effectiveness and accomplishments, but also as a consideration in determining future Formula Grant funding priorities.

The College of Agricultural and Life Sciences (CALs) feels that Wisconsin accomplishments relate very well to high priority issues cited earlier. Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. UW-Madison-CALs was rated first among peer institution in the Scientific Impact Factor of its publications. We feel this is representative of our entire research portfolio including Formula Grants. Formula funding of research often leads to significant funding from other sources. CALs also rates very high in extramural funding awarded to land-grant universities and public institutions, as well as private universities. Representative projects are reported as impacts below.

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Title:Immigrant Farm Labor in the Wisconsin Dairy Industry

Impact nugget: Reports suggest that immigrant dairy workers often experience racial discrimination and rejection within their adopted local communities, yet no research has directly investigated their own experiences of community reception in Wisconsin.

Issue (who cares and why): Many U.S. farmers, including Wisconsin's dairy producers, depend on immigrant labor for their survival. Because these laborers are now and for the foreseeable future a permanent part of our economy and our communities, it is essential that we gather the data needed to improve understanding and help inform immigration policy.

What has been done: Most information gathered rested on confidential interviews with immigrant farmworkers at more than 83 dairy farms, as well as extensive interviews with county extension agents, farm labor advocates, immigrant advocates, education system representatives, elected officials, law enforcement representatives, and health clinic representatives. Immigrant worker interviews shed light on how they and their families experience social relationships within their rural communities as well as barriers they face to integration and upward mobility. Interviews with other groups provided a birds-eye perspective of the farm labor force and the social and economic impacts of its changing demographics. In addition to surveys, project personnel participated in conversations at immigrants' regular meeting groups (such as immigrant support groups and hometown associations) and observed behavior at public festivals and rallies.

Two top findings emerged. First, that Wisconsin dairy farms are rapidly increasing their reliance on immigrant hired workers. Forty percent of all hired workers on Wisconsin dairy farms are Latino, and most of those were hired in just the past 10 years. Second: At least half of those workers live in constant, debilitating fear of being apprehended by law enforcement, by virtue of the fact that they or a close family member lack legal status to be in the U.S. and because U.S. law enforcement has in recent years increased policing of suspected unauthorized immigrants.

Impact: First, this research has shown immigrant advocacy organizations and worker service institutions (including such state institutions as the Wisconsin Department of Workforce Development) that they need to direct resources toward the dairy sector because there are thousands of workers on dairy farms in need of their services. They previously had no resources directed to dairy workers, because they assumed that there were few hired workers on dairy farms. Second, this project--as well as investigator Harrison Pritikin's participation on the Wisconsin Governor's Council on Migrant Labor and on the board of the Wisconsin Migrant Coalition--has helped state policymakers realize that immigration reform is crucial to the future of Wisconsin's primary agricultural industry (dairy) and its rural communities, which pivot around

dairy farms and other industries that rely heavily on immigrant labor. Finally, these research findings have been showcased by numerous news outlets around the state and at several major immigration summits, thus helping to raise the visibility of immigrant worker issues among the broader public. Major outlets included: Milwaukee Journal-Sentinel (2/24/09), The Country Today (11/4/09 and 11/11/2009), The Capital Times (11/11/09), The Janesville Gazette (5/8/10), Isthmus (June 2010), Cheese Market News (June 2010), Wisconsin Watch (Nov 2009, Dec 2009, April 2010, May 2010, July 2010), Al Jazeera English television (September 2010), Grow magazine (UW-Madison College of Agricultural and Life Sciences, Summer 2009).

Funding: WIS01272

More information: Jill Harrison-Pritikin, 608-8920-1370, harrison@dces.wisc.edu

Knowledge area(s): 610, 803

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Title: Vitamin D Nutrition and Optimal Immunological Health

Impact nugget: The prevalence of Multiple Sclerosis decreases dramatically with increased exposure to sunlight. A better understanding of how this phenomenon works--particularly, how sunlight-derived vitamin D prevents disease at the molecular level--could lead to new prevention and treatment strategies for this disease.

Issue: Across the nation, around 500,000 people suffer from Multiple Sclerosis (MS), with 200 new cases diagnosed each day. This debilitating neurodegenerative disease causes a highly variable pattern of troublesome symptoms including weakness, loss of dexterity and balance, disturbances in vision, and difficulty thinking and remembering. People who suffer from this autoimmune disorder are commonly diagnosed around age 30, wheelchair bound within 15-20 years, and bedridden by age 60. First-line approved treatments are expensive, costing upwards of \$30,000 per year. Worse, they only reduce the frequency of periodic attacks about 35 percent in about one-third of sufferers. They have no effect on the insidious accumulation of disability and cause adverse side effects. Better and safer treatments are desperately needed. Vitamin D may reduce the attack rate 50% or more and decrease disability progression without safety concerns at a cost of less than \$100 per year.

What has been done: Previously, a team of UW-Madison researchers discovered that vitamin D can prevent the onset of MS in a mouse model of the disease, and, further, that a bioactive form of vitamin D, known as calcitriol, can actually reverse the course of disease--cure it--once started. In this Hatch project, the team explored how this works at the molecular level. They found that for calcitriol to fight disease, there must be adequate levels of Vitamin D Receptor (VDR) on the immune T cells circulating in the central nervous system, and that VDR levels are controlled by interferon-gamma, a small molecule. Through this important pathway--involving interferon-gamma, Vitamin D Receptor and calcitriol--the body ensures that autoimmune T cells that have infiltrated the central nervous system (to protect this important region from pathogens) are eliminated before they start attacking nervous system cells there, the "rogue behavior" that causes MS.

Impact: This work provides the first direct scientific evidence gathered entirely in vivo showing how calcitriol, a bioactive form of vitamin D, and the Vitamin D Receptor on autoimmune T cells function to prevent and treat Multiple Sclerosis in a mouse model of the disease. A portion of the research was published online in the European Journal of Immunology. Additional papers and talks are in the works. The project's principal investigator has strong ties to the Wisconsin chapter of the National Multiple Sclerosis Society, and she regularly shares research updates with the MS community through presentations at MS Society gatherings and through MS Society newsletters. This work is providing guidance to public health initiatives around the world seeking to optimize vitamin D nutrition to reduce the prevalence and severity of MS. These initiatives have the potential to significantly reduce the impact of MS on patients, their families

and health care systems. According to the principal investigator's estimates, health care savings in the U.S. could be as high as \$5 to \$10 billion annually.

Funding: WIS04143

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Knowledge area(s): 305

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Title:Improvement of Thermal and Alternative Processes for Foods

Impact nugget: Manufacturers of whole-muscle beef jerky must use heating and drying processes that attain government-mandated safety standards for destroying harmful bacteria that may be present on raw beef. However, validating the safety of those processes cannot currently be done in a meat plant because organisms needed for testing them, such as E. coli O157:H7 and Salmonella, cannot safely be brought into a meat plant. The investigators have developed a method in which safe starter culture bacteria are used as "stand ins" or surrogates for harmful bacteria in ground-and-formed beef jerky processing.

Issue (who cares and why): Food safety has become a top public health concern as recent outbreaks of illness caused by E. coli O157:H7, Salmonella, and other disease-causing bacteria have taken lives and shaken consumer confidence in the protection of food safety regulations. Beef and other meat jerky is a popular snack--the Nielsen Company estimates that the total sale of such meat snacks in the U.S. has grown 65 percent since 2003, reaching about \$1.2 billion in 2008. The inability of commercial jerky processors to prove that their processes are able to meet government-mandated safety standards for detstroying E. coli O157:H7, Salmonella, L. monocytogenes, and S. aureus is an important weakness in ensuring a safe food supply.

What has been done: Commercial lactic acid bacteria (LAB) starter cultures that might serve as surrogates for pathogenic E. coli O157:H7, Salmonella, L. monocytogenes, and S. aureus were evaluated for survival in beef jerky during three representative laboratory-based jerky-processing schedules. A surrogate LAB culture and necessary LAB population decrease for assuring safety were identified and used to evaluate six commercial processes for making whole-muscle beef jerky. Studies were done in the laboratory and in a commercial Biosafety Level-2 smokehouse facility in Lodi, Wisconsin (Alkar Rapid-Pak, Inc.).

Impact: Based on their findings, researchers are making recommendations and developing an in-plant protocol to evaluate the safety of whole-muscle and ground-and-formed jerky processed commercially. The LAB starter culture is in effect is used as a "crash-test dummy" in industrial jerky-making processes to ensure that they are safe.

Investigators will teach the validated LAB surrogate method to meat processors and regulators through multimedia extension materials, including web-based information, CDs/DVDs, and workshop presentations. Evaluations will be obtained from collaborating Wisconsin jerky processors and meat inspection personnel. Summative evaluation will consist of establishing the percentage of whole-muscle beef jerky manufacturers in Wisconsin that have used the LAB surrogate. The investigators will also attempt to track implementation of the LAB surrogate method nationwide.

Further studies will examine the use of the LAB surrogate to ensure destruction of newly recognized types of disease-causing E. coli in jerky-making. These types of E. coli, known as non-O157 STEC (Shiga-toxicogenic E. coli) are an emerging food safety hazard.

Funding: WIS01238

More information: Barbara Ingham, 608-263-7383, bingham@wisc.edu

Knowledge area(s): 712

Additional funding: This work was partially funded by a grant from the Wisconsin Beef Council.

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Title:Sustaining Local Food Systems in a Globalizing Environment: Forces, Responses, Impacts

Impact nugget: Our food system is turning into a polarized business structure in which firms are either very large or very small. This project explores strategies and initiatives being undertaken by farmers and food processors to reconstruct a "middle ground" in which mid-size firms can flourish.

Issue (who cares and why): More and more citizens are interested in "eating locally," i.e. purchasing food that is grown and marketed in their regions, in the interest of better nutrition, environmental sustainability, and supporting their local economies. They are motivated by increasing recognition in public health about the preventability of a number of chronic diseases through improved access to fresh produce and by acknowledging the carbon footprint and other damage done to our environment by transporting food from faraway places. A thriving layer of medium-size firms is needed to serve and strengthen this growing "locavore" movement.

What has been done: This project has involved implementation of many research, outreach, and capacity building activities. Project personnel supported the development and maturation of a local, nonprofit food system organization called Research Education, Action and Policy on Food Group (REAP). In cooperation with REAP and the UW Center for Integrated Agricultural Systems (CIAS), the project launched annual editions of an ongoing Farm Fresh Atlas listing farms, businesses, restaurants and farmers' markets that sell goods directly to customers. Project personnel worked with REAP and CIAS to maintain and expand the Wisconsin Homegrown Lunch (WHL) program, a farm-to-school project serving counties around Madison, and developed CHOW (Cooking Healthfully in Wisconsin), a program bringing chefs into middle schools. The project also initiated a Buy Fresh, Buy Local (BFBL) campaign intended to diversify production capacity by developing a market for fresh and locally produced products. Both WHL and BFBL involved extensive outreach to consumers, farmers, food service professionals, school administrators, and other stakeholders via a variety of channels including community meetings, media coverage, and presentations at professional and academic meetings. Project personnel also were involved in coordinating a national initiative on renewing an "agriculture of the middle."

Impact: This project has demonstrated the potential of local food systems to work together and serves as a model of effective cooperation between community groups and a university. The REAP Food Group has emerged as a visible, influential actor on community food issues in Southwestern Wisconsin. REAP's Food for Thought Festival has reshaped the way regional consumers think about and interact with food. Its Farm Fresh Atlas is used by more than 45,000 people each year, and REAP assisted organizations in five other regions of the state to develop their own versions. The Wisconsin Homegrown Lunch program has reached more than 10,000 students in over a dozen schools and has influenced curriculum, food service operations, school fundraising procedures, and school board policies. WHL has influenced the direction of farm-to-school programs nationwide, and an article about it by investigators Kloppenburg and Hassanein has been a major intervention in the debate over the value of such programs. Research based on the performance of WHL has provided guidance to many practitioners. The national stature of WHL is reflected in the appointment of CIAS-REAP as Regional Lead Agency for the Great Lakes Region for the Community Food Security Coalitions's national Farm-to-School Program, and project personnel were instrumental in creating a Dane County Food Council.

Funding: WIS04717

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Knowledge area(s): 604

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Title: West Nile Virus and Mosquito Control

Impact nugget: West Nile Virus and other diseases are transmitted by mosquitoes. Controlling these insect pests and understanding the mechanisms of disease transmission are keys to improved public health and safety.

Issue: West Nile Virus is carried and transmitted by mosquitoes in Wisconsin, with about 10-20 illnesses and a few deaths reported during an average year. At this point, researchers need to figure out how mosquitoes are transmitting the virus to humans so that effective control measures can be developed and deployed.

What has been done: A team of UW-Madison scientists discovered that the Culex mosquito species thought to be involved in the transmission of WNV on the east coast of the United States are not attracted to humans in southern Wisconsin. They are now in the process of pinpointing the species involved in disease transmission in the area. In another set of experiments, they found that, compared to natural wet sites, man-made storm water management features--ditches, retention ponds, etc.--are the primary breeding sites for WNV vectors. Working with staff at the Wisconsin Department of Natural Resources (WDNR), the team tried introducing fathead minnows into various ditches and catch basins in the Madison area in the hopes that the fish would eat the mosquito larvae growing in the water. The experiment worked, showing that fish can be deployed as a powerful biological control agent against mosquitoes. The team is also investigating the ability of micro-crustacea to perform a similar control function. In the course of their fieldwork, the team identified one species of mosquitoes never before seen in the state, including one that's a potential vector for several viruses, including LaCross virus and WNV.

Impact: Information gathered through this Hatch project is helping health officials better monitor and control the West Nile Virus in Wisconsin. In addition to working with WDNR staff, this project has led to several productive and ongoing collaborations with local, state and national agencies, including the National Wildlife Health Laboratory, the Wisconsin Department of Public Health, Dane County Public Health, and the health departments in Madison, Milwaukee and La Crosse. During mosquito season, the team reports their WNV test results on a weekly basis to county and state agencies, as well as the national Centers for Disease Control. After seeing promising results, Dane County Public Health has opted to support additional biological control experiments. Project findings have been shared via numerous scientific journals and conferences, as well as through news stories, public talks, a website and various local/state government channels.

Funding: WIS04968

More information: Susan Paskewitz, 608-262-1269, paskewit@entomology.wisc.edu

Knowledge area(s): 721

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Title: Unlocking the Secrets of Corn starch Digestibility by Dairy Cows

Impact nugget: Until recently, the effective use of corn to feed dairy animals was based as much on intuition as science. As the cost of using corn has increased, the need for specific means to reduce the quantity of corn used in the dairy ration, and to improve the return on the corn that is used, has increased.

Issue: Dairy cattle are regularly fed corn, but the starch in corn kernels is only partially digestible in these animals. Improving starch digestibility improves the efficiency of corn use, thereby leading to increased milk production and/or the ability to feed less corn, and thus helps dairy producers increase income or manipulate costs.

What has been done: University of Wisconsin-Madison scientists began the quest to understand corn starch digestibility by dissecting the corn kernel into its parts: pericarp, germ, and endosperm. Research uncovered a matrix of starch and protein in the endosperm that varied greatly in corn. One type of corn endosperm could have more or less "vitreousness," or hardness, than another. As the vitreousness increased, starch digestibility decreased. Further, corn kernels high in "prolamin-zein" had lower digestibility and were associated with greater hardness. However, there existed no practical means for testing or analyzing corn for the differences in prolamin-zein in corn on a commercial basis by feed testing labs. The scientists developed a chemical test to determine prolamin-zein content of corn that could be used in commercial feed testing labs, thereby enabling a scientifically-based means for assessing a major factor influencing starch digestibility and the energy value of corn in the dairy animal's diet.

Impact: A test to evaluate corn starch digestibility is now being widely adopted by the animal nutrition business community. Improved corn digestibility in the ration of a lactating dairy animal can easily boost milk production by 2.5 lb per cow per day, increasing milk revenues by about 40 cents per cow per day. Conversely, reducing the amount of corn fed proportionally can save about 25 cents per cow per day in feed costs for dairy producers, given current costs. Dairy producers and their nutrition consultants can now manage the corn they use for its greatest efficiency. An objective test for assessing corn starch digestibility also opens the door to selecting corn for specific purposes--for feeding dairy cattle, producing ethanol, making food products or serving the export market. What were once subjective decisions about how to use corn in dairy rations are now decisions made on the basis of objective, scientifically-based tests.

Funding: WIS01088

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Knowledge area(s): 206, 302

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Title:Anti-inflammatory Properties of Conjugated Linoleic Acid (CLA)-enriched Butter on Rodent Models of Inflammation

Impact nugget: Conjugated Linoleic Acid, a natural anti-inflammatory compound found in the milk and meat of ruminant animals, is a promising treatment option for people suffering from inflammatory diseases.

Issue: Numerous diseases are linked to problems of inflammation: rheumatoid arthritis, asthma, lupus, inflammatory bowel disease, atherosclerosis, heart attacks and some cancers. The associated medical costs are staggering. Rheumatoid arthritis, for one, affects around 3 million Americans, at the cost of \$60,000 to \$120,000 per year per patient. Many of the existing drugs used to treat these diseases are useful, but also have powerful and unpleasant side effects. Research and clinical studies show that Conjugated Linoleic Acid, a healthy fat known to prevent body fat accumulation, can also significantly dampen inflammation, raising the hope that this natural compound can be incorporated into various treatment regimens.

What's been done: A team of UW-Madison researchers found that a fat molecule present in milk, butter and cheese known as "c9,t11-CLA" has strong anti-inflammatory properties. In a mouse model of arthritis, they found that the level of CLA present in regular butter was enough to significantly dampen inflammation, if butter was the only fat source the animals received. Pure, synthetic CLA added to the diet also protected arthritic mice. Based on another group's finding that levels of c9,t11-CLA can be easily ramped up in milk fat--up to 5 percent or more--just by feeding cows on pasture, the UW-Madison team performed a set of experiments to see if this kind of CLA-enriched milk is also effective at reducing arthritic inflammation, and found that it is. These results suggest that dairy producers, using simple and natural



management tools, can generate CLA-enriched milk, butter and cheese that could function as medical foods without having to be a major part of the diet. The team partnered with a second research group to find the key biomarkers associated with healthy mice and, separately, arthritic mice. They went on to show that feeding CLA to arthritic mice restored their biomarkers to the healthy state, a promising finding that implies CLA may be able to treat inflammatory diseases without causing side effects.

Impact: This work shows that dairy products containing CLA help dampen inflammation, opening the door to a promising whole foods approach to treating inflammatory diseases--an approach that could reduce the use of expensive anti-inflammatory drugs, as well as their side effects. Already, this Hatch work, which has been featured in a handful of peer-reviewed journal articles and scientific talks, has inspired a number of medical doctors to conduct human clinical trials exploring CLA's ability to reduce inflammation in people suffering from asthma, allergies and heart attacks. The results have been very promising. In the regulatory arena, CLA was recently approved by the U.S. Food and Drug Administration for use in select human foods, paving the way for a new market for dairy processors who develop CLA-enriched medical foods.

Funding: WIS01508

More information: Mark Cook, 608-262-7747, mcook@wisc.edu

Knowledge area(s): 702, 724

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Title: Dissection and Enhancement of Soybean Resistance to Soybean Cyst Nematode

Impact nugget: A team of UW-Madison researchers pinpointed the key gene responsible for protecting a popular soybean variety from Soybean Cyst Nematode, a major pest of soybean. This finding opens the door for plant biotechnologists to try to manipulate this gene to further improve nematode resistance in this economically important crop.

Issue: Soybean Cyst Nematode (SCN) is the most economically damaging disease in soybeans in the U.S., causing more than \$700 million in lost production every year. Originally a problem only in Southern states, SCN has become common in America's North Central "soybean belt" region, and it continues to spread each year. Although resistant soybean varieties exist, they aren't 100 percent effective. Improved varieties with stronger SCN resistance could save growers millions of dollars each year.

What has been done: Over the past decade, industry and academic scientists have spent a lot of time and money studying a gene widely believed responsible for SCN resistance in a popular soybean variety known as PI88788. In this Hatch project, UW-Madison researchers set out to experimentally confirm the function of this gene, with the plan to then genetically tweak the gene to try to boost its SCN-killing properties. Surprisingly, they discovered that the much-studied gene does not in fact contribute to SCN resistance--not in a major way, at least. Next, using advanced gene silencing technology that they modified for use in soybean, the scientific team went on to pinpoint the real resistance gene, the one that functions to protect PI88788 soybeans from Soybean Cyst Nematode.

Impact: It's rare for "negative" scientific results to get published, but in this case the UW-Madison research team's negative findings were too important to ignore: They found that a well-studied gene believed to protect soybeans from the Soybean Cyst Nematode doesn't actually play a major role in protecting the plant. This finding frees industry and academic scientists working on this gene to redirect their time, energy and money to other, more fruitful projects. In the second phase of this Hatch project, the team discovered a powerful SCN resistance gene, which they are in the process of patenting. The patent application will also include information about how to tweak the gene to improve it. Patenting is important as it will encourage one or more large biotech seed companies to license the technology and use it to

further improve soybean. Starting in the project's second year, this Hatch-funded work helped the principal investigator leverage an additional \$100,000 per year in research funding from the United Soybean Board and the Wisconsin Soybean Board. Two papers have been published featuring the team's initial findings, and other papers are in the works. Findings have been presented at a handful of conferences and talks. Four graduate students and four undergrads were trained while helping to conduct experiments for this project.

Funding: WIS01070

More information: Andrew Bent, 608-265-3034, afbent@wisc.edu

Knowledge area(s): 201, 206, 212

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Title: Connecting Wisconsin Prairie Chicken Populations through a Private and Public Land Partnership

Impact nugget: By surveying landowners' views about preserving habitat for greater prairie chickens, a team led by wildlife ecologist David Drake has gained information that will help in designing a program to establish habitat on private lands to build "bridges" between isolated populations now living on four public wildlife reserves.

Issue (who cares and why): The greater prairie chicken's engaging nature and interesting behavior make it a favorite of wild bird enthusiasts. Unfortunately, Wisconsin now lists this native species as "threatened," mostly because its native grassland habitat is becoming relatively scarce and fragmented. Before settlement the bird was found in prairies across southern Wisconsin, and as land was cleared, its range expanded to every part of the state. But farming's decline in the north and development in the south have squeezed the prairie chicken into four central Wisconsin (public) reserves separated by inhospitable habitat. There's not much reproductive mixing across these populations, leading to shrinking genetic diversity. This is a concern not just for the bird's stake, but also because the prairie chicken's well-being is a proxy for the health of the prairie ecosystem, which is essential for many plant and animal species. In the mid-2000s, state wildlife biologists began an effort to translocate prairie chickens from western Minnesota to central Wisconsin, but this effort has been expensive and moderately successful at best.

What has been done: Drake is collecting information related to a new strategy aimed at encouraging preservation and expansion of grassland habitat on private lands. This would both expand the total amount of suitable habitat available and also provide grassland "bridges" between public reserves to make it easier for the isolated populations to intermix. He is conducting a survey of central Wisconsin landowners to identify parcels that contain suitable habitat and whose owners are amenable to preserving it. Drake's team surveyed central Wisconsin landowners to learn about attitudes and land use plans and goals. He found that while about 70 percent of respondents favored the idea of preserving or establishing habitat, only about a third had done so, and only a quarter had received information on the topic that might make them more amenable to doing so.

Impact: As they continue to analyze data, the researchers have embarked on an effort to share their findings with wildlife agencies and conservation groups. These efforts have included presentations at the annual Prairie Chicken Festival sponsored by the Golden Sands Resource Conservation and Development Council. The work has been featured in newspaper and broadcast media both in the Madison area and in central Wisconsin. The researchers plan to map their data in a GIS database, making it easier for wildlife managers to identify parcels that are suitable for prairie chicken habitat and are owned by people who are open to the idea. They also anticipate developing extension-style publications providing information on how to set up partnerships and how to best manage the habitat.

Funding: WIS01322

More information: David Drake, 608-890-0445, ddrake2@wisc.edu

Knowledge area(s): 131, 134, 136

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Title: Ecology and Management of European Corn Borer and Other Lepidopteran Pests of Corn

Impact nugget: U.S. corn producers benefit from Bt corn whether or not they use this product. Corn borer suppression achieved by planting Bt corn has been worth about \$6.9 billion to Midwestern corn growers from 1996 to 2009, and more than half of those benefits accrue to growers who didn't plant Bt corn. This underscores the importance of managing Bt corn use to avoid the evolution of insect populations that are resistant to its built-in pesticidal properties.

The issue (who cares and why): Over the past 15 years, agricultural biotech firms have released lines of corn that are genetically modified to produce the same toxin produced by the bacterium *Bacillus thuringiensis*, which is lethal to lepidopteron insect pests, including the industry's most devastating pests: European corn borer and western corn rootworm. These products are effective and very popular--they are planted on about 63 percent of corn acres nationwide in 2010--but they are more expensive. There's also a risk that a preponderance of Bt in the nation's cornfields will lead to the development of a Bt-resistant pest population. Therefore, farmers who plant Bt corn are required to plant a fifth of their corn ground with non-Bt corn. It's the seed companies' job to see that farmers comply, and they say that this rule is difficult to monitor and enforce. So the firms propose a different strategy: Allow farmers to plant only 5 percent of their corn acreage to non-Bt corn, but package Bt corn as a mix with non-Bt corn, so that there would be some non-Bt corn in every field. Many pest management experts worry that this won't be enough to prevent the development of resistant pests. For regulators to make an informed decision, they need more information about the effectiveness of various resistance management strategies, about the importance of such efforts, and about the costs and benefits of Bt corn in general.

What's been done: UW-Madison agricultural economist Paul Mitchell is part of a multi-state, multidisciplinary team of researchers that is working to provide answers to policy and management questions related to Bt corn. Part of Mitchell's role has been to incorporate the findings of the team's crop and insect specialists into an economic analysis--a dollars-and-cents measure of the costs and rewards of using these products. He says that all told, the combined economic value of the corn borer suppression attributed to Bt corn in five Midwestern states from 1996-2009 was worth \$6.9 billion to corn producers in those states. He also found that 62 percent of that economic benefit went to producers who did not use Bt corn, who benefit from an area-wide suppression of corn borers without paying the higher prices of Bt corn. These findings underscore not only the benefits of using Bt corn, but also the importance of sticking to an effective resistance management strategy in order to ensure the continued success of this valuable pest management tool.

Impact: The researchers have shared their findings via research articles, committee reports and informal contacts with university and USDA entomologists, EPA regulators and biotech companies. These research findings also have been disseminated widely across the nation and around the world, in the agricultural community and beyond. Much of the attention came after the researchers published an article on the findings in the Oct. 8, 2010 issue of *Science*. Well over 200 media outlets have featured the research.

Funding: WIS01426

More information: Paul Mitchell, 608-265-6514, pdmitchell@wisc.edu

Knowledge area(s): 211, 601

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	154.0	0.0
Actual	0.0	0.0	153.8	0.0

**II. Merit Review Process**

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

- Internal University Panel
- Expert Peer Review

**2. Brief Explanation**

Program Review Process:

Hatch, Hatch Multistate, McIntire-Stennis, and Animal Health funds support specific projects solicited in an annual Call for Proposals. These are reviewed and funded based on a peer-review system. Animal Health proposals are reviewed at the School of Veterinary Medicine; Hatch, Hatch Multistate, and McIntire-Stennis proposals are reviewed in CALS.

CALS Process:

The following is published in the Call for Proposals as guidance to the scientists requesting Hatch, Hatch Multistate, or McIntire-Stennis grants. This process occurred in November 2010 for 44 new proposals.

The Faculty Review Panel (FRP):

The Associate Director of the WAES selects members of the Research Advisory Committee (RAC). Two members of the RAC and ad hoc reviewers review each proposal. The two RAC members are designated primary or secondary reviewer. The RAC members select the ad hoc reviewers, and where possible, ad hoc members are CALS faculty. However, other reviewers, both on and off campus, may be appointed as needed. The selection criteria for RAC members and ad hoc reviewers are scientific excellence, appropriate disciplinary expertise, and overall balance. No member of the RAC may have a proposal being reviewed under this Call. When submitting a proposal, applicants may request an individual(s) be excluded from selection as a reviewer. Conversely, applicants may also suggest individuals for consideration as reviewers.

Review Criteria for Reviewers:

Reviewers are asked to critique and evaluate proposals in a constructive manner, identifying both strengths and weaknesses of the proposal(s) under review. Reviews should be concise and include comments addressing each of the following:

\*An evaluation of the scientific significance of the objectives and alignment of project goals and funding source. This appropriateness criterion is equally important to scientific merit and PI record of achievement.

\*A judgment of the potential for solving Wisconsin problems is a key element of the Formula Grant funding guidelines.

\*An evaluation of the research team's ability to accomplish the stated objectives, and the match between these objectives and available resources. For teams with multiple investigators, the PIs are to

include a plan of coordination across team members.

\*Multistate and integrated activity priorities.

### **III. Stakeholder Input**

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

- 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

#### **Brief explanation.**

Methods of collecting stakeholder input vary depending upon the type of meeting or activity around which the input process is organized. Most generally this involves personal contact with someone from the UW-Madison WAES/CALS Administrative Leadership Group meeting with a traditional or non-traditional stakeholder group or individual or meetings that are open to the general public or selected individuals. For example, in August 2007, the WAES/CALS Administration hosted a listening session at the West Madison Agricultural Research Station for input on the bio-energy/bio-economy initiatives that are emerging. Participants were invited from traditional agricultural/energy stakeholders such as the Farm Bureau, Farmers Union, commodity groups and various Wisconsin energy utilities. Also invited were representatives from non-traditional stakeholder groups such as the Audubon Society, Nature Conservancy and other environmental social interest groups. All groups or individual participants were asked to provide input to a broad set of questions related to the bio-energy/bio-economy and were given the opportunity to provide a general statement of interest.

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

1) Meeting with commodity related groups such as the potato and vegetable growers, cranberry producers, the grazing conference, specialty and bulk cheese producers, Wisconsin Swine Producers, Wisconsin Cattleman's Association, Farm Bureau, Federation of Cooperatives, and various dairy related groups. This is not meant to be inclusive, as a full list of contacts is given in our Annual Report.

2) A potato summit meeting, held in November, 2008, which brought together industry, public sector, government agency, and regulatory agency scientists, as well as farmers and university researchers, to discuss key issues relating to potato production in Wisconsin. This meeting had a number of significant outcomes, including strategic planning for potato research facilities and programs for 2009 and beyond.

3) Meetings with fruit industry personnel and commodity groups supporting fruit industry interests in 2008. These meetings were designed to solicit input on the ways we as a college can best support fruit industry interests and the interests of farmers in our faculty and staff hiring decision-making. One of the tangible results of these meetings was the release of a faculty position in fruit crops extension.

4) Input from participants at UW-Madison/CALS Agricultural field day events. These field days, whenever possible, are attended by representatives of the WAES/CALS Administrative Leadership Group to interact with participants and solicit input.

5) We routinely meet with representatives of traditional and non-traditional stakeholder groups or individuals with specific personal interests. Numerous examples are cited in our Annual reports.

**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

**Brief explanation.**

UW-Madison relies heavily on advisory boards to help identify stakeholders. The College of Agricultural and Life Sciences through its Administrative Leadership Group maintains a close relationship with stakeholders and through these face to face interactions obtains information on needs and on other potential stakeholders. Departments, department chairs and faculty can also recommend contacts.

To encourage participation across the broad groups identified above, we have used a very common strategy; reaching out to individuals and groups in a way that makes them feel that their input is welcomed. This means that there is a special invitation to that group or individual; that there is as much personal contact as possible, both before the actual invitation to cultivate the relationship and in follow-up: and that there is follow-up or follow through after their input to insure that they felt the message was heard and that we are seen as responsive. We also try to meet, to the extent possible, at their location, business or institution. This seems to be regarded as a "signal of importance" to the individual or group and is generally appreciated.

**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
- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

**Brief explanation.**

Almost all comments received from stakeholders are oral, but occasionally we receive electronic communications and even US mail that contains suggestions or comments from stakeholders interested in some facet of one or more of our more of our programs. Many individuals have very specific concerns, e.g. pest concerns with crops, or a need for information about management practices. Other stakeholders are more concerned with broader 'quality of life' issues and wish to remind us of our larger role here. We rely upon the essentially continuous engagement of deans, faculty, staff and others to listen for suggestions or ideas from clientele that would enable us to serve them better.

Stakeholders' input for the development and conduct of research relating to state needs is accomplished in a tiered system. Many departments, centers, and institutes maintain advisory committees that meet periodically with researchers in the units. Departments convey this input to the CALS Administrative Leadership Group. The College of Agricultural and Life Sciences has a central Advisory Board that meets twice a year with the Administrative Leadership Group. Members

of the committee are selected from a wide range of producers, industry, consumer, environmental groups, and state agencies. This Board not only advises on research and outreach needs, but also advises on contacts for constituency groups and individuals.

In addition to advisory groups, the CALS Administrative Leadership Group periodically meets with focus groups representing organizations within Wisconsin in a series of meetings called CALS Roundtables. Focus groups include traditional and non-traditional stakeholders. Input from these stakeholders is used to help identify areas of research need. A listing of these focus groups follows at the end of this section. The primary goal of the CALS Roundtable is to improve communication between the College and the individuals it serves and to provide feedback to the College. The Roundtable provides periodic opportunities for leaders of user groups to interact informally with CALS Administration and faculty to discuss: a) user group needs and opportunities; b) current CALS programs and program proposals and their effectiveness; and c) ways to increase cooperation among user groups, the university, and state and federal agencies. Discussions focus primarily on issues related to CALS research, education, and extension/outreach programs.

Focus Group List:

- General Agriculture
- Food Processing and Marketing
- Animal Agriculture
- Plant Groups
- Environmental and Natural Resources
- Green and Forestry
- Biotechnology
- Sustainable and Organic Food Produces
- Consumer and Non-Traditional Groups

The Administrative Leadership Group also participates in many public or stakeholder sponsored meeting/field days for public input. Normally, we would participate in 50-100 of these events per year, including field days at our Agricultural Research Stations.

Below is a list of Agricultural Research Station Field Days:

- Pest Management Field Day
- Agronomy / Soils Field Day
- 4H Planet Science Day
- WPVGA field Day
- Garden Tour
- Midwest Food Processors Field Days
- Wisconsin Wildlife Round Up
- Spruce Grouse in Wisconsin
- Discover Dragonflies & Damselflies
- Slowing the Spread of Gypsy Moth
- Wisconsin Grazing School
- WI Turfgrass Association Summer field Day
- WI Alumni Assoc. Grandparents Univ
- Effective Spraying of Orchards
- Growing Systems Under High Tunnels: Production and Construction
- Garden Door Open House
- Native Pollinators Classroom Day
- Taste of Garden Door and Pesto Festo
- Breeding Station Field Day
- Sheep Day

- Twilight Garden Tour
- Youth Tractor and Machinery Safety Training
- Youth Tractor and Machinery Safety Training
- Youth Tractor and Machinery Safety Training
- Family Horticulture Day
- West Madison Station Garden Staff, Walk Through the Gardens-new Annual Flowers and Vegetable Tour
- Perennials: New Peonies, Daylilies and Everything Else
- Insects in the Garden
- Vegetable Annual and Perennial Flowers, and Fruit Disease Identification - Hands on in the Garden
- Vegetable Cultivars: New and Heirlooms - How to Grow, Harvest, and Store
- Commercial Flower Growers Field Day
- Fruit Walk - Grapes, Raspberries, Blueberries, Apples, Strawberries , and all those little unknown fruits
- Urban Horticulture Day
- Vegetables, Fruits and Flowers
- Harvest Festival

Below is a list of Stakeholder meetings attending by the Administrative Leadership Team:

January

- 5 USDA Rural Development, Energy Grant Program, Madison, WI
- 12-13 Wisconsin Crop Management Conference, Madison, WI
- 14 Groundwater Conference, Madison, WI
- 15 Garden Talk Show, Madison, WI
- 19 WFTD Exhibitor Fact-Finding Forum, Wisconsin Dells, WI
- 20 Wisconsin Ag. Economic Outlook Forum, Madison, WI
- 21 Natural Resources Conservation Service State Technical Committee, Madison, WI
- 25 PBPG Meeting, Madison, WI
- 27 Wisconsin Agribusiness Council, Inc., Madison, WI
- 28 Corn and Soybean Expo, Madison, WI
- 28 Organic Valley, LaFarge, WI
- 28 People's Food Co-Op, LaCrosse, WI
- 28 Repr. Kind's Ag. Advisory Group, LaCrosse, WI
- 28 Gundersen Lutheran Hospital, LaCrosse, WI

February

- 1 Tom Lochner, Cranberry Growers, Madison, WI
- 6 WALSAA Board of Directors, Madison, WI
- 9 Economics of Sustainability & Dairy Industry Conference, Madison, WI
- 9 Bill Linton, Promega, Madison, WI
- 10 David Ryder, Miller/Coors Brewing, Madison, WI
- 16 Colin Scanes, Milwaukee, WI
- 16 Tom Barrett, Mayor of Milwaukee, Milwaukee, WI
- 16 Steven Becker, Milwaukee, WI
- 16 Hunger Task Force, Milwaukee, WI
- 18 Water Meeting, Arlington, WI
- 22-24 CARET Meetings, Washington, DC



25 Wisconsin Farm Bureau Board of Directors, Madison, WI

March

3 Wisconsin Farm Bureau/Extension Meeting, Madison, WI  
8-9 Climate Variability, Kansas City, KS  
11 External Meetings, Chicago, IL  
23 Seneca Foods, Clyman, WI  
28-4/1 NCR Visits, Washington, DC

April

6-7 Ag. Consortium, Stevens Point, WI  
6-7 NCRA Meeting, Lincoln, NB  
8 Colin Scanes, Madison, WI  
9 Hold for Afri Bioenergy Conference  
12 Ag. Coalition  
13 Fruit Industry Meeting, Arlington, WI  
14 WARM Program, Arlington, WI  
15 WFTD Annual Meeting, Madison, WI  
15-16 Board of Visitors, Milwaukee, WI  
20 CDR/Cheesemakers, Madison, WI  
28 APLU Region Meeting, Madison, WI  
28 Wisconsin Agribusiness Council, Inc., Madison, WI  
30 Monsanto, Middleton, WI  
30 Wisconsin Master Gardners Advisory Group, Madison, WI

May

14 Organic Valley, LaFarge, WI  
17 USDA Administrative Heads, Madison, WI  
18 Wisconsin Farm Bureau Federation/Extension Meeting, Madison, WI

June

11 Commencement Speaker at Chicago High School for Agricultural Sciences  
16 Reilley Memorial Foundation, Washington, DC  
18 Keynote speaker at Sowing Seeds Meeting, Washington, DC  
19 Susan Crane Barn Dance, Burlington, WI  
22 WACEC State Conference  
22 Dinner with Ann Bartuska, Deputy Chief for Research & Development in the U.S. Forest Service  
25 Either Bioenergy Workshop or DOJ Dairy Workshop  
27 Shawno County Breakfast  
28 John Phillips, potential donor for the FISC dorms  
28 Wisconsin Agricultural Education & Workforce Development  
28 Dinner with sustainability team  
29 Observer in a Federal Agency Exchange on Ecosystem Services between USDA and EPA

July

- 6 Bill Bruins, Farm Bureau
- 6 Midwest Poultry Consortium
- 12 Pat O'Brien, Stoner Prairie Dairy, South Seminole Highway
- 12-16 NCR Mini Land-Grant Meeting, Minneapolis, MN
- 15-16 Marshfield Clinic's National Advisory Council, Arbor Vitae
- 19-22 Farm Technology Days, River Falls, WI
- 22 Eli's Cheesecake World & Wright College, Chicago, IL
- 24 Monsanto, Madison, WI
- 28 Wisconsin Agribusiness Council, Madison, WI

#### August

- 1 Marshfield Clinic, Marshfield, WI
- 2 Organic Advisory Council Executive Committee, Arlington, WI
- 3 Dairy Management, Inc., Chicago, IL
- 9 Master Gardener Meeting, Madison, WI
- 10 Ag. Workforce Council, Madison
- 10 College of Menominee Nation, Keshena, WI
- 11 Wisconsin Sheep Festival, Jefferson, WI
- 11 Governor's Livestock Auction, West Allis, WI
- 13 Urban League of Greater Madison, Madison, WI
- 16 Milk Emergency - Homeland Security Event, Madison, WI
- 17-18 Seed Research meeting, Ames, IA
- 24 Monsanto
- 24-25 Biotech Visions Summit, Madison, WI
- 30-31 Mars visit, Madison, WI

#### September

- 3 Jackson Lab, Bar Harbor, ME
- 15 National Pork Producers/Dean's Policy Council, Washington, DC
- 16 Sustainability Meeting, Washington, DC
- 17 Nass National Conference, Milwaukee, WI
- 18 WALSAA Fireup, Madison, WI
- 19 Association for the Advancement of Industrial Crops, Fort Collins, CO
- 20 Dairy Management, Inc., Milwaukee, WI
- 24 Life Sciences Community Faculty Retreat, Lincoln, NB
- 28-30 NCR Meeting, Milwaukee, WI
- 29 Economic Impact of Bioscience on WI--BioForward, Madison, WI

#### October

- 5 Bio Industry Alliance, Madison, WI
- 5 Novazymes Biologic
- 6 Roundtable on Global Agriculture and Food Policy, Chicago, IL
- 7-8 Board of Visitors, Madison, WI
- 11-12 IGERT External Advisory Board
- 14 Wisconsin Bioenergy Summit, Madison, WI
- 14-15 World Food Prize, Des Moines, IA
- 18 Hausner Farms Foundation Annual Meeting
- 20-21 University-Industry Consortium, St. Louis, MO
- 31 Plant Breeding for Food Security Symposium, Long Beach, CA

### November

- 2 1862 Land Grant/1994 Tribal College Meeting
- 3 Meeting with John Phillips--potential FISC donors donor
- 5 Master Gardeners, Madison, WI
- 18 Workforce Development, Madison, WI
- 22-23 NCR Committee on Research Universities, Washington, DC
- 30 Dairy Business Association

### December

- 1 Wisconsin Farm Bureau/Extension Meeting, Madison, WI
- 3 Council for Strategic Change, Madison, WI
- 5 Farm Bureau Annual Meeting, Wisconsin Dells, WI
- 6 Vita-Plus, Madison, WI
- 8 Sustainability Report Review Panel
- 8 Arlington Dairy Day, Arlington, WI
- 10 PepsiCo's Human & Environmental Sustainability Goals, Rye Brook, NY
- 14 UWEX Bioenergy Team Meeting, Madison, WI
- 15 DATCP and Nutrient Management, Madison, WI
- 16 EAB Advisory Group, Madison, WI
- 15 Research, Development, & Knowledge Sharing Work Group, Washington, DC
- 20-21 Ag. Visioning Session, Whitehall, WI

### **3. A statement of how the input will be considered**

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

### **Brief explanation.**

Stakeholder input is considered in a variety of ways by the CALS Administrative Leadership Group. One of the most important ways it influences future direction is through the faculty-position allocation process. CALS Leadership makes use of this input in prioritizing faculty positions to be allocated to departments for hiring. These hires determine the capacity that will be available to meet current and emerging needs. A successful strategic hire will be able to address current needs as well as the ability to alter a course for newly emerging areas of need. In making these hires, we are setting priorities, and identifying emerging areas, setting new direction for research programs with the new hires, and making budget commitments.

While we are using this information to set a long-term course (in the case of faculty hires), we also use this information for making more immediate decisions. Examples include investing funding to direct current faculty and their research into emerging issues such as bio-energy and the bio-economy. One example would be our recent investment in support of sustainable agriculture by working closely with the Wisconsin Institute for Sustainable Agriculture (WISA) program. We also consider this input in other activities such as annual budget allocation, providing feedback to departments and faculty and most importantly in setting priorities in our Formula Grant research Call for Proposals and the making decisions on allocation of these funds.

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

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

Examples include:

1. Bio-energy: While many are excited about the prospects of greater energy independence and economic development, there are also many individuals and groups that are concerned about bio-energy's long-term sustainability, ownership, energy balance, environmental impact, risk, and quality of rural life. There are questions on how to move the cellulosic technology forward and how groups and communities can best take advantage of the potential.

2. Water quality and quantity: Competition of animal agriculture, cropping systems, irrigation, industrial and urban uses, and recreational often appear to be conflicting, yet all are concerned about the best strategy to use and protect this resource.

3. Quality of rural life, availability and affordability of health care, and economic rural development are issues on the minds of many rural Wisconsin citizens or organizations that represent them.

4. There are many interests in new, alternative, and value-added agriculture such as organic agriculture, local foods, grazing, bio-energy, and alternative animal cropping systems.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
0	0	5790209	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	0	0	5910662	0
<b>Actual Matching</b>	0	0	5910662	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	0	0	11821324	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	0	0	4481353	0

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Wisconsin Competitive Research Program
2	Global Food Security and Hunger
3	Climate Change
4	Sustainable Energy
5	Childhood Obesity
6	Food Safety

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

**Program # 1**

**1. Name of the Planned Program**

Wisconsin Competitive Research Program

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

**1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
102	Soil, Plant, Water, Nutrient Relationships			8%	
112	Watershed Protection and Management			8%	
131	Alternative Uses of Land			6%	
133	Pollution Prevention and Mitigation			5%	
135	Aquatic and Terrestrial Wildlife			8%	
136	Conservation of Biological Diversity			6%	
302	Nutrient Utilization in Animals			6%	
305	Animal Physiological Processes			5%	
307	Animal Management Systems			5%	
601	Economics of Agricultural Production and Farm Management			3%	
603	Market Economics			3%	
604	Marketing and Distribution Practices			3%	
608	Community Resource Planning and Development			3%	
609	Economic Theory and Methods			3%	
702	Requirements and Function of Nutrients and Other Food Components			11%	
723	Hazards to Human Health and Safety			3%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			3%	
805	Community Institutions, Health, and Social Services			5%	
901	Program and Project Design, and Statistics			3%	
903	Communication, Education, and Information Delivery			3%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	154.0	0.0
Actual	0.0	0.0	48.9	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1478868	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1478868	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

**1. Brief description of the Activity**

Formula funds are being used to address a number of state priority research activities that cannot be classified as 'Global Food Security', 'Climate Change', 'Sustainable Energy', 'Childhood Obesity', and 'Food Safety'. We have grouped these ongoing projects under the rubric of the "Wisconsin Competitive Research Program", but funds supporting these projects will be redirected to the new national priorities in the future. These projects do contribute to a variety of important state needs and are focused in several areas, including water resource issues, animal health, including wildlife and non-farm animals, applied statistics in support of agricultural research, policy analysis for use in land use planning and commodity programs, immigrant farm labor issues, management of invasive exotic organisms and bio-waste management.

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder information section provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Actual: 2

**Patents listed**

Title: Sperm-mediated chromosome transfer (SMCT)  
 Inventors: John Parrish, Lefric Enwall, Ricky Monson, Joshua Schindler  
 Hatch Grant: 06-CRHF-0-6055  
 Date reported to the federal Government: 11-30-2009

Title: Conservation Subdivision Ecological Design and Site Assessment Toolkit  
 Inventors: Zeynep Gocmen, Jing Gao  
 Hatch Grant: 10-CRHF-0-6055  
 Date reported to the federal Government: 6-1-2010

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

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
Actual	0	85	85

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

**Output Target**

**Output #1**

**Output Measure**

- Output measures for this project include patents, graduate students trained, and publications. This estimated output will be refined as we gain experience with this measure for Formula Grant supported work. Graduate Students Trained (Degrees Granted):  
 Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Output measures for this project include patents, graduate students trained, and publications. This estimated output will be refined as we gain experience with this measure for Formula Grant supported work. Graduate Students Trained:

Year	Actual
2010	41



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

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

O. No.	OUTCOME NAME
1	<p>Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. We will also rely on research methodology developed by two of our economics faculty members, Professors Brad Barham and Jeremy Foltz, which helps characterize and quantify the impact of federal formula-funded research outcomes. Their work will help us determine the ways in which our formula-funded projects are impactful in Wisconsin and beyond. Our target for these outcome measures is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:</p>

**Outcome #1**

**1. Outcome Measures**

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. We will also rely on research methodology developed by two of our economics faculty members, Professors Brad Barham and Jeremy Foltz, which helps characterize and quantify the impact of federal formula-funded research outcomes. Their work will help us determine the ways in which our formula-funded projects are impactful in Wisconsin and beyond. Our target for these outcome measures is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	150	85

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

**Issue (Who cares and Why)**

The Wisconsin Agricultural Experiment Station has a broad list of stakeholders who potentially benefit from the research and extension/outreach from the Wisconsin Formula Grant program.

This list of stakeholders includes:

- \*General agriculture
- \*Food processing and marketing industry
- \*Animal and dairy related agriculture
- \*Plant and cropping system interests including vegetables
- \*Green industry (turf, ornamentals, etc.)
- \*Biotechnology
- \*Bio-energy and bio-economy groups
- \*Sustainable and organic food producers
- \*Environmental groups and interests
- \*Consumer and non-traditional groups
- \*Governmental agencies and officials

\*Scientific community

**What has been done**

Each year through a competitive, investigator-driven, peer-reviewed process, the Wisconsin Agricultural Experiment Station funds approximately 160 research and integrated activity projects focused on national, regional, and local issues and priorities linked to stakeholder interests. In addition to serving stakeholder needs through these competitively funded projects (which address critical applied research as well as basic science questions), this program sets a priority on training our next generation of applied and science based professionals through its graduate student training mission.

**Results**

In fiscal year 2010, the Wisconsin Agricultural Experiment Station funded projects resulted in 226 publications, 12 patents, and 137 graduate students trained. The Wisconsin Agricultural Experiment Station also tracks the Thompson ISI Essential Science indicator as a measure of impact. Our goal is to remain in the top five. Examples of representative impacts resulting from individually funded projects within our portfolio are described, to the extent possible, in the Summary of this Annual Report.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
603	Market Economics
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
609	Economic Theory and Methods
702	Requirements and Function of Nutrients and Other Food Components
723	Hazards to Human Health and Safety
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
901	Program and Project Design, and Statistics
903	Communication, Education, and Information Delivery

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

#### **Brief Explanation**

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outputs would be completely disrupted unless there was some major natural, economic, or public policy disruption. A major change in Federal policy or appropriation affecting the Formula Grant program could affect our ability to produce our outcomes. UW-Madison has implemented a policy change regarding tuition remission. Formula Grants have previously been exempt from tuition remission charges in the UW-System, but will no longer be exempt in the near future. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our Formula Grant missions in order to continue training graduate students. We continue to make graduate student training the priority of our program.

### **V(I). Planned Program (Evaluation Studies and Data Collection)**

#### **Evaluation Results**

N/A

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

N/A

**V(A). Planned Program (Summary)****Program # 2****1. Name of the Planned Program**

Global Food Security and Hunger

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
102	Soil, Plant, Water, Nutrient Relationships			5%	
133	Pollution Prevention and Mitigation			2%	
201	Plant Genome, Genetics, and Genetic Mechanisms			10%	
202	Plant Genetic Resources			7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			3%	
204	Plant Product Quality and Utility (Preharvest)			7%	
205	Plant Management Systems			3%	
206	Basic Plant Biology			6%	
211	Insects, Mites, and Other Arthropods Affecting Plants			7%	
212	Pathogens and Nematodes Affecting Plants			16%	
213	Weeds Affecting Plants			4%	
215	Biological Control of Pests Affecting Plants			3%	
216	Integrated Pest Management Systems			8%	
301	Reproductive Performance of Animals			2%	
302	Nutrient Utilization in Animals			5%	
303	Genetic Improvement of Animals			3%	
304	Animal Genome			3%	
601	Economics of Agricultural Production and Farm Management			4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			1%	
721	Insects and Other Pests Affecting Humans			1%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2010	Extension		Research	
	1862	1890	1862	1890

Actual	0.0	0.0	54.7	0.0
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**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	2150106	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	2150106	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

**1. Brief description of the Activity**

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

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder section information provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010

Actual: 10

**Patents listed**

Title: RHG1 GENE FOR SOYBEAN RESISTANCE TO SOYBEAN CYST NEMATODE

Inventors: Andrew Bent, Brian Diers, Sara Melito, David Cook, Teresa Hughes, David Hyten, Myung-Sik Kim

Hatch Grant: 10-CRHF-0-6055, 06-CRHF-0-6055

Date reported to the federal Government: 9-10-2010

Title: Polyacrylamide hydrogels as a new platform for bacterial cell culture

Inventors: Douglas Weibel, Hannah Tuson, Connie Lipscomb

Hatch Grant: 11-CHRF-0-6055

Date reported to the federal Government: 10-2-2009

Title: A new approach to bacterial cell culture: encapsulation and growth in gel microparticles

Inventors: Douglas Weibel, Ye Jin Eun, Andrew Utada, Shoji Takeuchi, Sean Brady

Hatch Grant: 11-CRHF-0-6055

Date reported to the federal Government: 10-2-2009

Title: 4-Z1 is a potent antimicrobial agent against Bacillus cereus

Inventors: Douglas Weibel, Marie Foss

Hatch Grant: 11-CRHF-0-6055

Date reported to the federal Government: 10-21-2009

Title: A rapid technique for measuring the mechanical properties of the bacterial cell wall

Inventors: Douglas Weibel, Mariko Hasebe, Kerwyn Huang

Hatch Grant: 11-CRHF-0-6055

Date reported to the federal Government: 10-21-2009

Title: Developing antibiotics that target proteins involved in chromosome segregation in bacteria

Inventors: Douglas Weibel, Ye Jin Eun

Hatch Grant: 09-CRHF-0-6055

Date reported to the federal Government: 4-13-2010

Title: 534F6 IS A MEMBER OF A NEW FAMILY OF COMPOUNDS THAT INHIBITS DNA GYRASE

Inventors: Douglas Weibel, Jared Shaw, Marie Foss, Kelsey Thornton

Hatch Grant: 11-CRHF-0-6055

Date reported to the federal Government: 9/30/2010

Title: Replacing High Linoleic Acid Oils with High Oleic Acid Oils in Common Dairy Cattle Feeds

Inventors: Louis Armentano, Ming He

Hatch Grant: 08-CRHF-0-6055

Date reported to the federal Government: 7-12-2010

Title: A SET OF SINGLE NUCLEOTIDE POLYMORPHISM MARKERS FOR PREDICTION OF NON-COMPENSATORY FERTILITY IN BULLS

Inventors: Brian Kirkpatrick, Michelle Blaschek, Abdullah Kaya, Erdogan Memili

Hatch Grant: 09-CRHF-0-6055

Date reported to the federal Government: 2-16-2010



Title: A set of genetic markers for predicting twinning and ovulation rate breeding value in cattle

Inventors: Brian Kirkpatrick, Eui-Soo Kim, Chad Bierman

Hatch Grant: 08-CRHR-0-6055

Date reported to the federal Government: 10-15-2009

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

#### Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	80	80

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

##### Output Target

##### Output #1

##### Output Measure

- Output measures for this program include patents, graduate students trained, and publications.  
Graduate Students Trained

Year	Actual
2010	51

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

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

O. No.	OUTCOME NAME
1	<p>Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:</p>

**Outcome #1**

**1. Outcome Measures**

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	80

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

**Issue (Who cares and Why)**

The Wisconsin Agricultural Experiment Station has a broad list of stakeholders who potentially benefit from the research and extension/outreach from the Wisconsin Formula Grant program.

This list of stakeholders includes:

- \*General agriculture
- \*Food processing and marketing industry
- \*Animal and dairy related agriculture
- \*Plant and cropping system interests including vegetables
- \*Green industry (turf, ornamentals, etc.)
- \*Biotechnology
- \*Bio-energy and bio-economy groups
- \*Sustainable and organic food producers
- \*Environmental groups and interests
- \*Consumer and non-traditional groups
- \*Governmental agencies and officials
- \*Scientific community

**What has been done**

Each year through a competitive, investigator-driven, peer-reviewed process, the Wisconsin Agricultural Experiment Station funds approximately 160 research and integrated activity projects focused on national, regional, and local issues and priorities linked to stakeholder interests. In addition to serving stakeholder needs through these competitively funded projects (which address critical applied research as well as basic science questions), this program sets a priority on training our next generation of applied and science based professionals through its graduate student training mission.

**Results**

In fiscal year 2010, the Wisconsin Agricultural Experiment Station funded projects resulted in 226 publications, 12 patents, and 137 graduate students trained. The Wisconsin Agricultural Experiment Station also tracks the Thompson ISI Essential Science indicator as a measure of impact. Our goal is to remain in the top five. Examples of representative impacts resulting from individually funded projects within our portfolio are described, to the extent possible, in the Summary of this Annual Report.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
721	Insects and Other Pests Affecting Humans

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

#### **Brief Explanation**

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outputs would be completely disrupted unless there was some major natural, economic, or public policy disruption. A major change in Federal policy or appropriation affecting the Formula Grant program could affect our ability to produce our outcomes. UW-Madison has implemented a policy change regarding tuition remission. Formula Grants have previously been exempt from tuition remission charges in the UW-System, but will no longer be exempt in the near future. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our Formula Grant missions in order to continue training graduate students. We continue to make graduate student training the priority of our program.

### **V(I). Planned Program (Evaluation Studies and Data Collection)**

#### **Evaluation Results**

N/A

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

N/A

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

**Program # 3**

**1. Name of the Planned Program**

Climate Change

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			7%	
102	Soil, Plant, Water, Nutrient Relationships			21%	
112	Watershed Protection and Management			4%	
132	Weather and Climate			7%	
133	Pollution Prevention and Mitigation			15%	
136	Conservation of Biological Diversity			4%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			4%	
204	Plant Product Quality and Utility (Preharvest)			4%	
205	Plant Management Systems			4%	
213	Weeds Affecting Plants			4%	
307	Animal Management Systems			11%	
402	Engineering Systems and Equipment			4%	
403	Waste Disposal, Recycling, and Reuse			4%	
903	Communication, Education, and Information Delivery			7%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	9.1	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	179505	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	179505	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

**1. Brief description of the Activity**

The Climate Change Program is a new program that strives to support the best science relative national, regional, and state needs and priorities. To support the priorities of USDA-NIFA, Wisconsin will begin to direct proposals toward this priority as well as to the remaining four priority areas. This program will use the national goals and emphasis areas established by USDA-NIFA to develop strategic plans and areas of identified research needs for Wisconsin as priority areas of the process. Wisconsin is widely recognized as a leading center for research in climate change, across its diverse biological, physical and socio-economic dimensions, and new research initiatives will take advantage of those personnel and facilities.

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder section information provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

N/A

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

**Number of Peer Reviewed Publications**

<b>2010</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	8	8

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

**Output Target**

**Output #1**

**Output Measure**

- Output measures for this program include patents, graduate students trained, and publications.  
Graduate Students Trained

<b>Year</b>	<b>Actual</b>
2010	5



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

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

O. No.	OUTCOME NAME
1	<p>Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:</p>

**Outcome #1**

**1. Outcome Measures**

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	8

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

**Issue (Who cares and Why)**

The Wisconsin Agricultural Experiment Station has a broad list of stakeholders who potentially benefit from the research and extension/outreach from the Wisconsin Formula Grant program.

This list of stakeholders includes:

- \*General agriculture
- \*Food processing and marketing industry
- \*Animal and dairy related agriculture
- \*Plant and cropping system interests including vegetables
- \*Green industry (turf, ornamentals, etc.)
- \*Biotechnology
- \*Bio-energy and bio-economy groups
- \*Sustainable and organic food producers
- \*Environmental groups and interests
- \*Consumer and non-traditional groups
- \*Governmental agencies and officials
- \*Scientific community

### **What has been done**

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## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
132	Weather and Climate
133	Pollution Prevention and Mitigation
136	Conservation of Biological Diversity
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
213	Weeds Affecting Plants
307	Animal Management Systems
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
903	Communication, Education, and Information Delivery

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

### **Brief Explanation**

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outputs would be completely disrupted unless there was some major natural, economic, or public policy disruption. A major change in Federal policy or appropriation affecting the Formula Grant program could affect our ability to produce our outcomes. UW-Madison has implemented a policy change regarding tuition remission. Formula Grants have previously been exempt from tuition remission charges in the UW-System, but will no longer be exempt in the near future. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our Formula Grant missions in order to continue training graduate students. We continue to make graduate student training the priority of our program.

## **V(I). Planned Program (Evaluation Studies and Data Collection)**

### **Evaluation Results**

N/A

### **Key Items of Evaluation**

N/A

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

**Program # 4**

**1. Name of the Planned Program**

Sustainable Energy

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			6%	
104	Protect Soil from Harmful Effects of Natural Elements			6%	
125	Agroforestry			6%	
131	Alternative Uses of Land			6%	
205	Plant Management Systems			11%	
211	Insects, Mites, and Other Arthropods Affecting Plants			6%	
307	Animal Management Systems			6%	
401	Structures, Facilities, and General Purpose Farm Supplies			6%	
402	Engineering Systems and Equipment			11%	
601	Economics of Agricultural Production and Farm Management			6%	
604	Marketing and Distribution Practices			6%	
605	Natural Resource and Environmental Economics			12%	
608	Community Resource Planning and Development			6%	
723	Hazards to Human Health and Safety			6%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	13.0	0.0

Actual                      0.0                      0.0                      13.0                      0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	340448	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	340448	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**

Our engineering and life science faculty have become heavily involved in the development of sustainable energy systems for the upper Midwestern US. Projects are ongoing in the areas of energy efficient construction technologies for farm buildings, textile material development with energy conservation applications, bioconversion of cellulose to fuel ethanol, value-added uses of byproducts of biofuel production systems, capacity building in support of bio-fuels outreach development, evaluation and production of various new bio-feedstocks, and carbon sequestration issues on private and public lands.

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder section information provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

N/A

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

**Number of Peer Reviewed Publications**

<b>2010</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	14	14

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

**Output Target**

**Output #1**

**Output Measure**

- Output measures for this program include patents, graduate students trained, and publications.  
Graduate Students Trained

<b>Year</b>	<b>Actual</b>
2010	8

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

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

O. No.	OUTCOME NAME
1	<p>Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:</p>



**Outcome #1**

**1. Outcome Measures**

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	14

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

**Issue (Who cares and Why)**

The Wisconsin Agricultural Experiment Station has a broad list of stakeholders who potentially benefit from the research and extension/outreach from the Wisconsin Formula Grant program.

This list of stakeholders includes:

- \*General agriculture
- \*Food processing and marketing industry
- \*Animal and dairy related agriculture
- \*Plant and cropping system interests including vegetables
- \*Green industry (turf, ornamentals, etc.)
- \*Biotechnology
- \*Bio-energy and bio-economy groups
- \*Sustainable and organic food producers
- \*Environmental groups and interests
- \*Consumer and non-traditional groups
- \*Governmental agencies and officials
- \*Scientific community

### **What has been done**

Each year through a competitive, investigator-driven, peer-reviewed process, the Wisconsin Agricultural Experiment Station funds approximately 160 research and integrated activity projects focused on national, regional, and local issues and priorities linked to stakeholder interests. In addition to serving stakeholder needs through these competitively funded projects (which address critical applied research as well as basic science questions), this program sets a priority on training our next generation of applied and science based professionals through its graduate student training mission.

### **Results**

In fiscal year 2010, the Wisconsin Agricultural Experiment Station funded projects resulted in 226 publications, 12 patents, and 137 graduate students trained. The Wisconsin Agricultural Experiment Station also tracks the Thompson ISI Essential Science indicator as a measure of impact. Our goal is to remain in the top five. Examples of representative impacts resulting from individually funded projects within our portfolio are described, to the extent possible, in the Summary of this Annual Report.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
104	Protect Soil from Harmful Effects of Natural Elements
125	Agroforestry
131	Alternative Uses of Land
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
307	Animal Management Systems
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
723	Hazards to Human Health and Safety

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

#### **Brief Explanation**

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outputs would be completely disrupted unless there was some major natural, economic, or public policy disruption. A major change in Federal policy or appropriation affecting the Formula Grant program could affect our ability to produce our outcomes. UW-Madison has implemented a policy change regarding tuition remission. Formula Grants have previously been exempt from tuition remission charges in the UW-System, but will no longer be exempt in the near future. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our Formula Grant missions in order to continue training graduate students. We continue to make graduate student training the priority of our program.

### **V(I). Planned Program (Evaluation Studies and Data Collection)**

#### **Evaluation Results**

N/A

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

N/A

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

**Program # 5**

**1. Name of the Planned Program**

Childhood Obesity

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
302	Nutrient Utilization in Animals			17%	
304	Animal Genome			17%	
305	Animal Physiological Processes			17%	
701	Nutrient Composition of Food			17%	
703	Nutrition Education and Behavior			32%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	4.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	178814	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	178814	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

**1. Brief description of the Activity**

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

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder section information provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

N/A

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

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Actual</b>	0	5	5

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

**Output Target**

**Output #1**

**Output Measure**

- Output measures for this program include patents, graduate students trained, and publications.  
Graduate Students Trained

**Year**

**Actual**

2010

5

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

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

O. No.	OUTCOME NAME
1	<p>Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:</p>

**Outcome #1**

**1. Outcome Measures**

Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees, and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science Indicator for agricultural science as a measure of impact of our research program. Our target for this outcome measure is to be ranked in the top 5 institutions in the United States. We will continue to develop impact statements for individual projects which have shown exemplary and significant impact. Publications:

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	5

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

**Issue (Who cares and Why)**

The Wisconsin Agricultural Experiment Station has a broad list of stakeholders who potentially benefit from the research and extension/outreach from the Wisconsin Formula Grant program.

This list of stakeholders includes:

- \*General agriculture
- \*Food processing and marketing industry
- \*Animal and dairy related agriculture
- \*Plant and cropping system interests including vegetables
- \*Green industry (turf, ornamentals, etc.)
- \*Biotechnology
- \*Bio-energy and bio-economy groups
- \*Sustainable and organic food producers
- \*Environmental groups and interests
- \*Consumer and non-traditional groups
- \*Governmental agencies and officials
- \*Scientific community



### **What has been done**

Each year through a competitive, investigator-driven, peer-reviewed process, the Wisconsin Agricultural Experiment Station funds approximately 160 research and integrated activity projects focused on national, regional, and local issues and priorities linked to stakeholder interests. In addition to serving stakeholder needs through these competitively funded projects (which address critical applied research as well as basic science questions), this program sets a priority on training our next generation of applied and science based professionals through its graduate student training mission.

### **Results**

In fiscal year 2010, the Wisconsin Agricultural Experiment Station funded projects resulted in 226 publications, 12 patents, and 137 graduate students trained. The Wisconsin Agricultural Experiment Station also tracks the Thompson ISI Essential Science indicator as a measure of impact. Our goal is to remain in the top five. Examples of representative impacts resulting from individually funded projects within our portfolio are described, to the extent possible, in the Summary of this Annual Report.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
302	Nutrient Utilization in Animals
304	Animal Genome
305	Animal Physiological Processes
701	Nutrient Composition of Food
703	Nutrition Education and Behavior

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

### **Brief Explanation**

A variety of factors could affect the outcomes of this project including those listed above. However, the breadth of the program makes it unlikely that the outputs would be completely disrupted unless there was some major natural, economic, or public policy disruption. A major change in Federal policy or appropriation affecting the Formula Grant program could affect our ability to produce our outcomes. UW-Madison has implemented a policy change regarding tuition remission. Formula Grants have previously been exempt from tuition remission charges in the UW-System, but will no longer be exempt in the near future. Since these funds do not allow tuition remission, we continue to discuss alternatives to meeting our Formula Grant missions in order to continue training graduate students. We continue to make graduate student training the priority of our program.

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

N/A

**Key Items of Evaluation**

N/A

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

**Program # 6**

**1. Name of the Planned Program**

Food Safety

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife			2%	
211	Insects, Mites, and Other Arthropods Affecting Plants			2%	
212	Pathogens and Nematodes Affecting Plants			4%	
302	Nutrient Utilization in Animals			5%	
305	Animal Physiological Processes			9%	
308	Improved Animal Products (Before Harvest)			5%	
311	Animal Diseases			9%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals			2%	
315	Animal Welfare/Well-Being and Protection			2%	
403	Waste Disposal, Recycling, and Reuse			4%	
404	Instrumentation and Control Systems			2%	
501	New and Improved Food Processing Technologies			15%	
502	New and Improved Food Products			8%	
503	Quality Maintenance in Storing and Marketing Food Products			2%	
701	Nutrient Composition of Food			2%	
702	Requirements and Function of Nutrients and Other Food Components			7%	
704	Nutrition and Hunger in the Population			2%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources			2%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			14%	
723	Hazards to Human Health and Safety			2%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890

Actual	0.0	0.0	23.5	0.0
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**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1582921	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1582921	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

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

**1. Brief description of the Activity**

The development and evaluation of improved technologies in food processing, and on-farm food safety practices have received increasing attention from faculty in several departments. Research is being conducted on several important food toxins and their causal organisms (e.g. Asprgillus), mastitis resistance as a component of on-farm food safety, the development of new thermal food preservation technologies, biotoxins and food safety, nanotechnology applications in food sensors, residual pesticides in foods, symbiotic associations between antibiotic producing bacteria and honeybees, vitamin D deficiencies, and several other areas.

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

Integrated activity for our Formula Grant programs targets a broad group of stakeholder audiences in agricultural, natural resources, and the public. Examples can be seen in our stakeholder section information provided elsewhere in this report.

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

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

N/A

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

**Number of Peer Reviewed Publications**

<b>2010</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	34	34

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

**Output Target**

**Output #1**

**Output Measure**

- Output measures for this program include patents, graduate students trained, and publications.  
Graduate Students Trained

<b>Year</b>	<b>Actual</b>
2010	27

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

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

O. No.	OUTCOME NAME
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**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	34

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

**Issue (Who cares and Why)**

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

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

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- Government Regulations
- Competing Public priorities

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## **V(I). Planned Program (Evaluation Studies and Data Collection)**

### **Evaluation Results**

N/A

### **Key Items of Evaluation**

N/A