2011 University of Wisconsin Research Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

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. Our allocation for FY2009 was administered as described in this document, but some carryover is expected. 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 funded in a separate exercise, with some capital equipment items shared by several projects. Travel to multistate research meetings is provided for one official representative from a central pool of funds.

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-discipline 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 and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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 FY11 ((beginning Oct. 1, 2010), was initiated in June, 2009, approximately 16 months prior to project initiation. Proposals were due September 11, 2009. 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, the Assistant Director of the Agricultural Experiment Station and the Associate Dean for Research. 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: Acquisition, Classification, Preservation, Evaluation and Distribution Of Potato Germplasm

Impact nugget: The U.S. Potato Genebank plays a critical role in the collection, testing, storage and distribution of the world's potato germplasm, and, through this work, contributes to the improvement of potato varieties the world over.

Issue: Potato is the single most important vegetable crop in the world and is widely cultivated in both hemispheres. Global potato yields have improved dramatically over the past century, and half of the observed increase is believed to be due to improved genetic material. In the U.S. alone, experts estimate that improved genetic material has added somewhere between $10 and $25 million annually to the value of the potato crop. Despite these successes, there is an ongoing need for improved potato varieties that can withstand the ever-evolving diseases, insect pests, environmental conditions and management practices seen around the world. In the U.S., where potato is grown in all 50 states and accounts for 28 percent of the nation's vegetable consumption, potato breeders are keenly interested in boosting the vegetable's nutritional content by adding more minerals, antioxidants and other health promoting components.

What has been done: The U.S. Potato Genebank, located in Sturgeon Bay, Wisconsin, is the only facility of its kind in the United States and the premier potato genebank organization in the world. Over the past five years, supported in part by this Hatch-funded project, the genebank has acquired 148 new genetic sources, made 879 seed increases, maintained 32,625 tissue cultures, confirmed true parental type in 855 samples, done 3,900 disease tests, run more than 6,000 seed germination tests, and delivered more than 22,000 units of genetic material to plant breeders around the globe.

Impact: Over the past five years, the U.S. Potato Genebank has collected, tested, processed and distributed hundreds of thousands of potato seeds; all with the overarching goal of helping the world's potato breeders improve the crop. At present, more than 70 percent of the potatoes grown in the U.S. contain germplasm from the bank. This number is expected to rise, as each and every new potato variety released in the U.S. over the past five years includes genetic material from the bank. The genebank also continues to support research by evaluating germplasm, discovering new traits in exotic germplasm, and developing and sharing gerplasm-handling technology.

Funding: WIS03911

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Knowledge area(s): 202, 203, 204, 211, 212

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Title: Effects of Genetics on Early Embryonic Survival in Dairy Cattle

Impact nugget: A team of UW-Madison researchers identified and patented several genetic markers linked to fertility traits in the dairy cattle genome. Commercial breeding interests are now using these markers to help improve the fertility of dairy cattle around the world.

Issue: For decades, dairy cattle were bred with one purpose in mind: to produce more milk. Unfortunately, as milk production increased over the years, fertility waned. On the farm, modern fertility problems cost an estimated $2 - $4 per cow per day, mainly due to increased breeding costs and longer dry periods.

What has been done: Early embryo failure is known to contribute to declining fertility among dairy cows. Experts believe that genetics account for about one-third of these failures, but, until recently, it wasn't clear which genes were involved. Through this Hatch-funded project, a team of UW-Madison researchers was able to identify a number of genes-and their nearby genetic markers-that affect early embryonic survival/failure. In order to precisely separate the genetic component from the many variables found on dairy farms, the team developed a method of "in vitro" fertilization that could be used to study a known number of embryos from known donors under controlled conditions, thereby making it possible to isolate the genetic factors from everything else.

Impact: Several genetic markers related to embryonic survival/failure in dairy cattle were identified and patented, and are now licensed to commercial interests. These markers are now available to breeders interested in improving embryonic

survival and fertility in dairy cattle. Through this work, many more potentially useful genes have been and are being uncovered. In addition, the research team has published three scientific papers and started up two international collaborations-in Europe and Asia-based on this work.

Funding: WIS01332

More information: Hasan Khatib, 608-263-3484, hkhatib@wisc.edu

Knowledge area(s): 301, 304

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Title: Functional Analysis of Sterol Carrier Protein-2 in an Insect Model System

Impact nugget: After finding a molecular "Achilles' heel" inside the guts of mosquito larvae, a team of UW-Madison researchers discovered a number of promising insecticides, including one currently being formulated and tested by a company that specializes in mosquito control technologies.

Issue: Each year, there are 300 million cases of mosquito-borne diseases around the world, including cases of malaria, dengue fever, yellow fever, West Nile virus and several forms of encephalitis. Malaria is the biggest killer, claiming a million lives a year. There is an acute need for new and improved insecticides to control the world's mosquito populations, as many populations have developed alarming levels of resistance to the chemical compounds we currently use to kill them.

What has been done: Mosquito larvae need cholesterol to survive, but are unable to make this compound on their own. Instead, they have to absorb it from the foods they eat. A team of UW-Madison researchers discovered the key gene-and its associated protein-involved in the transport of cholesterol from the larvae's gut into its body. Next, they screened 16,000 compounds for their ability to interfere with this protein. In a subsequent Hatch-funded project, they screened another 40,000 compounds. In all, they found a dozen promising insecticidal compounds, some natural and some synthetic, that kill mosquito larvae by blocking their ability to absorb cholesterol.

Impact: The researchers discovered a new class of mosquito-killing insecticides that functions in a completely novel way. They patented their methods and discoveries, and then licensed this technology to Clarke Mosquito Control, a Chicago-based company that specializes in chemicals for mosquito control. The company is currently formulating and testing the project's most promising natural insecticide for various commercial applications. This project has resulted in nine papers and attracted significant additional funding, including $1.2 million from the National Institutes of Health and $650,000 from the U.S. Department of Defense, which has a vested interest in protecting American soldiers from mosquito-borne diseases.

Funding: WIS04963

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Knowledge area(s): 211, 315, 721

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Title: Effect of Cherry Leaf Spot and Copper-Based Fungicide on Photosynthesis in Tart Cherry

Impact nugget: Research shows that the benefits of using copper-based fungicides to control cherry leaf spot far outweigh the negatives, paving the way for Wisconsin's cherry growers-conventional and organic alike-to integrate this class of fungicides into their existing tart cherry disease management programs.

Issue: In 2009, Wisconsin grew around 8 million pounds of tart cherries. In addition to the value of the crop, Door County's cherry orchards help draw thousands of tourists to the area during bloom and harvest times. Each and every year, Wisconsin's tart cherry growers struggle with cherry leaf spot, a fungal disease that requires an extensive disease management program to keep it in check. Unfortunately, in recent years, a number of important fungicides have lost some of their power against the disease, making treatments both expensive and ineffectual. Copper-based fungicides are a promising option, with no known cases of fungal resistance associated with their use. Historically, however, tart cherry growers have shied away from using copper-based fungicides, as they can cause some leaves to turn bronze and drop prematurely, and it was unclear how these sprays were affecting fruit quality and tree health.

What has been done: Over the course of three years, a team of University of Wisconsin-Madison researchers studied the effects of spraying copper-based fungicides to control cherry leaf spot on tart cherry trees. They found that leaf bronzing does not significantly affect photosynthesis, cherry sweetness, cherry weight or the number of cherries produced.

Impact: It is now clear that copper-based fungicides are a good option for controlling cherry leaf spot in the state's tart cherry orchards. Already, two of Door County's 20 growers have added a copper-based fungicide to their cherry leaf spot spray regimen. Some others are experimenting with this option. In the near future, more and more growers are expected to fully embrace this option, as the standard synthetic fungicides continue to lose their power. The researchers have presented their findings at a handful of grower meetings and field days, as well as through a number of articles published in grower newsletters. Two scientific articles have been published describing this work, and another is on the way.

Funding: WIS01179

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Knowledge area(s): 206, 212, 216

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Title: Probing the Tissue-Specific Role of Stearoyl-Coa Desaturase-1 in Diet-Induced Obesity And Diabetes

Impact Nugget: Researchers discovered that skin tissue is involved in the regulation of whole body energy metabolism, a surprising finding that could lead to better weight-loss drugs to combat obesity and obesity-related diseases.

Issue: In America, fully one-third of the population is obese. An additional one-third is considered overweight, and many of those are on the path toward obesity, a destination with dire consequences. Although it doesn't kill directly, obesity plays a significant role in a number of life-threatening diseases, including diabetes, cardiovascular disease, atherosclerosis, hypertension and some cancers. Diabetes alone affects some 23 million Americans, costing the country around $113 billion to treat each year. By 2034, these numbers are expected to skyrocket to 44 million and $336 billion. Experts believe the disease shortens the average patient's lifespan by five to 10 years. Better weight loss treatments, including drugs, are desperately needed to save lives and mitigate this health care crisis.

What has been done: Previously, a team of UW-Madison researchers discovered that mice lacking a key fat metabolism gene-the scd-1 gene-throughout their bodies can gorge on high-fat and high-carbohydrate diets without becoming fat. In this Hatch-funded project, they set out to determine the specific organs involved in this phenomenon by "turning off" the scd-1 gene in various individual tissues, including the liver, fat, muscle, brain, pancreas and skin. They found that the liver controls the conversion of *excess dietary carbohydrates* into new body fat. More surprisingly, they discovered that the skin-a previously overlooked organ-controls the metabolism of *excess dietary fats* by increasing energy expenditure. The team

believes the skin produces some kind of factor-a small molecule or hormone-that gets secreted into the bloodstream and then directs the body's other metabolic tissues to burn the excess fat. They are now trying to identify this important factor.

Impact: It is now clear that the scd-1 gene works primarily in the skin, where it modulates whole body energy expenditure. This finding elevates skin to the status of major metabolic tissue. In the future, this information may help pharmaceutical companies develop new weight loss drugs and fine-tune existing ones. In particular, the unknown factor produced by the skin-when discovered-will make for a promising drug candidate, as its "job" is to tell the body to burn excess dietary fats. Previously, a major discovery by this research team led Merck, Pfizer, Novartis and Xenon Pharmaceuticals to launch new weight loss drug discovery programs.

Funding: WIS01182

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Knowledge area(s): 302

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Title: Impact of Fencerow Removal on Predators of Grassland Birds in SW Wisconsin

Research nugget: In a project aimed at bolstering declining populations of grassland birds, researchers investigated the impact of removing trees at the edge of grassy areas on bird density and predator activity. Removing the trees increased the density of birds and nests, but it also created more habitat and nest-raiding opportunities for predators that live in grasslands.

Issue: The increasing fragmentation of Wisconsin's rural landscape has made things difficult for species of birds that breed in grasslands, including Henslow's sparrow, bobolink and eastern meadowlark. As grasslands parcels become smaller, there are fewer potential nesting sites, and those sites are more likely to be close to tree-lined fencerows that offer cover for woods-dwelling predators. In order to increase habitat for grassland birds and decrease it for edge-dwelling predators, wildlife managers sometimes recommend removing fencerow trees. But there's concern that this may backfire. Researchers have found that one of the biggest predation threats comes not from the edge of the field, but from within the field, from animals that live in the grassland. To make informed conservation decisions, wildlife managers need to better understand the net effect of removing trees - whether it is to enhance or decrease the birds' chances of survival.

What's been done: A research team led by wildlife ecologist Christine Ribic designed a study to compare bird and predator activity in fields where trees had been removed with that in fields where fencerows remained in place. They identified six 40-acre sites in southwest Wisconsin, each of which was spanned by a tree-lined fencerow. During the first year, researchers collected baseline data on bird density and nesting and predator activity on the six sites. After the first year, they removed the trees at half of the sites. From April through June, the nesting season, they inventoried nests and used several strategies to monitor predatory activity. They set out track stations-areas layered with a sand/mineral oil mix that retains a clear imprint of animal tracks-near the tree rows and in the middle of the field. To monitor attacks, they used small cameras to keep round-the-clock surveillance of birds' nests. They found that removing the trees was related to a significant increase in density of Henslow sparrow (it almost quintupled) but only temporary increase for bobolinks and none for the meadowlarks. There was a significant increase in the number of nests for bobolink and sparrows, but not for the meadowlark. Before trees were removed, nest raids were likely to come from both generalist predators and grassland-dwelling animals. After trees were removed, the bulk of predator activity came from grassland animals-in particular, the 13-lined ground squirrel.

Impact: This study has added an essential component to a body of knowledge that will help managers make better decisions in their efforts to preserve endangered birds. It has also laid the groundwork for a follow-up study -basically a repeat of this experiment-to see if the impacts that were observed on both predators and grassland birds are long-term or ephemeral. Wildlife managers can use this information as they help property owners develop conservation plans targeted at grassland birds. It can also be used as a demonstration of the importance of taking a holistic approach to conservation management, since it demonstrates that changing one part of a natural system will affect all components of the system. Cooperators on the project include wildlife managers employed by the State of Wisconsin, the U.S. Fish and Wildlife Service and non-government conservation groups, so they have ready access to the results. The researchers have presented their findings at state, regional and national meetings and are currently preparing manuscripts for publication.

Funding: WIS01087

Additional information: Christine Ribic, 608-263-6556, caribic@wisc.edu

Knowledge area(s): 135

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Title: Improving the Quality of Natural/Organic Ham and Frankfurters by Investigating the Role of Microbial Starter Cultures in the "Natural Curing" Process.

Impact nugget: A UW-Madison research team has improved the process for manufacturing organic/natural ham and frankfurter processed meat products, creating significant quality improvements that will increase both consumer acceptance and manufacturer's profitability for these unique products.

Issue: In the U.S., the market for organic and natural foods is now estimated at $24 billion annually and has enjoyed 20-30 percent growth over recent years. Ham and frankfurter products, unfortunately, have not been able to fully participate in this expanding market. These products suffer from poor consumer acceptance caused by process problems related to following organic/natural processing rules.

What has been done: In the conventional food industry, sodium nitrite is added to cured processed meats to improve flavor, prevent rancidity, stabilize color and serve as an antimicrobial to prevent pathogens such as *Clostridium botulinum* from growing. Due to labeling restrictions, which consider nitrite a preservative, sodium nitrite is not allowed to be added to organic and natural products. To address this issue, the meat industry has devised a system called "natural curing," where the curing is accomplished indirectly and meets organic/natural labeling requirements. In natural curing, lactic acid starter culture is used to convert nitrate from celery powder into nitrite. Unfortunately, the current celery method can generate sub-optimal levels of nitrite for preservation and flavor, as compared to the conventional method, resulting in products with inconsistent quality. In this Hatch-funded project, a team of UW-Madison researchers optimized the amount of starter culture used in this procedure to maximize nitrite yield, with the ultimate goal of increasing the quality and consumer acceptance-and possibly the safety-of these products. Through this work, the team was able to increase nitrite generation by approximately 20 percent and reduce the process time by about 1 hour.

Impact: The results of this research will help food processors extend the shelf life, enhance the flavor and improve the color of organic/natural ham and frankfurter products, and will help them save time and money during processing. Armed with these findings, producers of natural and organic processed meat products are better prepared to develop foods with improved quality and safety for the lucrative and growing organic/natural market.

Funding: WIS01309

Additional information: Jeff Sindelar, 608-262-0555, jsindelar@wisc.edu

Knowledge area(s): 501

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Title: Characterizing Thermal Pollution in Urban Landscapes

Research nugget: A computer model predicts when a new urban development will raise the temperature of stormwater runoff enough to threaten the survival of fish and other inhabitants of streams that receive that water, and helps engineers design systems to mitigate the problem.

Issue: Urban stormwater is packing heat. As rainwater flows across rooftops, pavement and hard-packed sod, it picks up heat energy stored in those surfaces. This can be a serious problem in the watershed of a cold-water stream. Many of the species that dwell in coldwater habitats have very specific temperature preferences. Brook trout, for example, can tolerate temperatures into the upper 60-degree range. But runoff temperatures in a summer storm can exceed 100 degrees. The problem isn't just one of temperature, but also of volume. The stream might flow at as little as 2 cubic feet per second, while the stormwater emptying into the stream might be flowing at 10 times that rate, or more. When a large volume of warm water mixes with a small, cold stream, stream temperatures will inevitably rise. One area where problems occur is Dane County, Wisconsin. About two-thirds of this fast-growing metropolitan area lies in the watershed of thermally sensitive steams. The county wants to avoid thermal pollution, but it doesn't want to create insurmountable roadblocks to reasonable development projects.

What has been done: For several years, Anita Thompson has been refining Thermal Urban Runoff Model (TURM), a

software tool that predicts the thermal impact of stormwater from a given development. Her goal was to make the model more accurate, consistent and user-friendly. To do so, she has investigated the thermal characteristics of runoff from urban lawns and pavement. She has also studied the effectiveness of underground rock cribs that are often used to cool stormwater. To collect data, she set up plots of asphalt and sod, using sprinklers to simulate rainfall and probes to record runoff volumes, temperatures of surface material, rainwater and runoff, as well as meteorological data. She also ran experiments using a model rock crib in her lab. She incorporated data from both experiments into the computer model, which builders can use both to predict temperatures of runoff and, if need be, determine the size of rock crib needed to cool it down.

Impact: While Thompson continues to evaluate the model (she's now testing it in a 30-acre development), it is already seeing considerable use by developers and government agencies. Dane County's conservation department estimates that the model, which is posted on the county's website, was used in the county more than 100 times in the past year. The Ohio EPA in interested in using the model in their stormwater permitting process. The Southeastern Wisconsin Regional Planning Commission, which serves the most urbanized part of the state, intends to use the model to help municipalities understand the thermal impacts of urbanization. Additionally, Thompson has received requests to use the model from a number of private consulting firms and other government regulatory agencies, including La Crosse County's conservation department and the Minnesota Pollution Control Agency.

Funding: WIS04977

Additional information: Anita Thompson, 608-262-0604, amthompson2@wisc.edu

Knowledge area(s): 112, 133

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Title: Sustainable Biorefining Systems for Corn in the North Central Region

Impact nugget: Computer-aided tools are helping utility companies assess the potential for biomass as a feedstock for energy production, making the promise of field-to-fuel a reality.

Issue: Because of its proximity to agriculture, managed forests and natural grassland, the upper Midwest is considered a promising locus for the production of bioenergy-the generation of electricity, fuel and other forms of energy from non-edible plant material. Many Midwestern states have adopted incentives for the development of facilities that produce energy from agricultural crops, sparking interest among energy companies and communities in exploring whether to build and support a bioenergy production facility. But many factors-including access to transportation, distance from available feedstock, alternative land uses and environmental impacts-influence whether a site may be appropriate for bioenergy use. The goal of this project is to develop decision-making tools that give communities and energy companies the data they need to determine whether bioenergy can be produced economically and sustainably in their areas.

What has been done: The UW-Madison Land Information and Computer Graphics Facility has led the development of an online resource that collects and synthesizes important data for community decision-making. This web-based tool provides a series of maps that include multi-layered information on feedstock availability, transportation infrastructure, land use and demographic patterns. These maps include projections of cropping patterns through the region, as well as analyses of marginal lands that could be used for bioenergy crop production. There are also interactive mapping functions that allow users to customize reports for specific areas, such as lands within a specified radius of a production facility site. Still in development is a feature that would act as a "Craig's List" for biomaterial exchanges within a given region, allowing growers to market excess feedstock to energy utilities.

Impact: Although not all elements of the website are publicly available, the tools have already been put to productive use. In one case, a major electric utility operating in Wisconsin used bioenergy feedstock availability information provided by this project to evaluate the feasibility of constructing a new facility designed to burn large volumes of switchgrass. Also, the Wisconsin Department of Agriculture Trade and Consumer Protection has used analyses of marginal land potentially available for bioenergy crop production in the development of policy recommendations for the state's Working Lands Initiative and for recommendations on state energy response to the Governor's Office of Energy Independence.

Funding: WIS01250

Additional information: Stephen Ventura, 608-262-6416, sventura@wisc.edu

Knowledge area(s): 608

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Title: Evaluation of Management Strategies for White Grub Populations in Wisconsin Christmas Trees

Impact nugget: Research trials give Christmas tree growers more tools and information to battle a pernicious pest.

Issue: White grubs-a larval form of the common May/June beetle-are a persistent problem for Wisconsin's Christmas tree industry. About one-third of the state's 1,100 Christmas tree farmers have significant damage caused by grubs, which live underground for three years and feast on the roots of young trees, and the resulting damage can be devastating. If left untreated, grubs can cause fatal or crippling damage to as much as 90 percent of trees in an acre. But despite the insects' prevalence, few guidelines exist to help growers deal with them, and very little research has been done on the kinds of management strategies that are appropriate to the needs of tree farmers.

What has been done: Under the direction of UW-Madison entomologist Chris Williamson, graduate student P.J. Liesch has studied nearly 1,000 Fraser fir trees planted in trial plots on a Wisconsin tree farm to experiment with cultural, biological and chemical methods of dealing with the grubs. Part of Liesch's work examines insecticides used to ward off grubs in other systems, such as turfgrass. After testing several insecticides currently on the market, the data have shown that insecticides with the active ingredient imidacloprid can be effective in reducing grub populations around trees. In Liesch's trials, insecticides reduced tree losses to less than 15 percent in infested fields, compared to losses exceeding 90 percent without treatment. The research also attempted to evaluate product effectiveness in light of some of the unique circumstances of tree farming, such as the lack of irrigation and the large number of acres under management. Liesch has examined the effectiveness of introducing grub-eating nematodes to help suppress the insects' population, which he says shows modest results in certain circumstances.

Impact: The research has already given growers better data about the need for and timing of treatments, as well as alternative approaches that could supplant or reduce chemical applications. In the case of the grower who provided the land for the research trials, Liesch and Williamson have provided data about the grubs' population dynamics, highlighting years of critical intervention. The grower has since adopted a tiered strategy that employs three different insecticides at specific stages during his trees' growth, helping him cut losses significantly on his farm. This information is now being shared more widely within the Wisconsin Christmas tree growing community, and the researchers plan to publish their findings widely soon.

Funding: WIS01194

Additional information: Chris Williamson, 608-262-4608, rcwillie@entomology.wisc.edu

Knowledge area(s): 211

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Title: Evaluating the Environmental Merits of Conservation Subdivisions Using Spatial Data Analysis

Impact nugget: This project investigates open-space conservation subdivision design (often called conservation subdivision design) in order to determine whether these projects deliver on their promise of a more sustainable model for housing development. This project also provides planners a GIS-based toolkit for designing and evaluating proposed developments.

Issue: Like many states, Wisconsin has seen growth in the number of housing development projects that market themselves as more environmentally friendly than the typical development model that exists in most American suburbs and rural areas. Conservation subdivisions are among these developments promoted as an environmentally friendly alternative. In an effort to reduce the impact of development on the environment, conservation subdivision design clusters housing to preserve natural features in the landscape. Yet empirical research addressing whether conservation subdivisions have fulfilled their environmental goals is limited, leaving city planners, zoning boards, potential buyers and developers with almost no empirical information to assess the potential costs and benefits of a proposed conservation subdivision. This project

assesses the environmental merits of conservation subdivisions and provides a toolkit to evaluate future subdivision plans within an ecological framework.

What has been done: To assess the environmental merits of conservation subdivisions, Aslı Göçmen, an assistant professor of urban and regional planning, assembled data on conservation and conventional subdivisions built between 1990 and 2005 in Waukesha County, west of Milwaukee, Wisconsin. This geographic information systems (GIS)-based data was used to analyze subdivision features, including open space and environmentally sensitive and ecologically significant areas. Her analysis finds some evidence to support the environmental merits of conservation subdivision design in Waukesha County, but the evidence is not overwhelming. The analysis shows that when compared to conventional subdivisions, conservation subdivisions do protect more land, especially lands that are environmentally sensitive and ecologically significant; however, land management practices on the protected land do not differ and, in some cases, ecologically significant areas in conservation subdivisions are still compromised by development.

Impact: As a result of this study, Göçmen has identified many missed opportunities in the design and implementation of the conservation subdivisions she studied. She intends to share those recommendations widely with interested developers, planners, extension educators and academics. Accompanying these recommendations, she plans to share a hands-on, interactive GIS-based toolkit, which is currently in development. Practitioners will be able to use the toolkit to help design and assess proposed conservation subdivisions. This product will be programmed to provide feedback to developers and planners on whether environmental claims of development projects are being met, potentially easing the burden of local governments in the proposal review process and providing a means for ecological planning.

Funding: WIS01173

Additional information: Asli Göçmen, 608-265-0789, gocmen@wisc.edu

Knowledge area(s): 131

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Title: An Evaluation of Regional Food and Culture Tourism Projects in Wisconsin

Impact nugget: Researchers investigated the impacts, opportunities and challenges of tourism activities centered around local food and local food activities centered around tourism. They used surveys of food retailers, farmers and visitors to identify obstacles to successful culinary tourism and strategies to overcome them.

Issue: Rural communities are very interested in the idea of culinary tourism, in which an area's signature food products are used as a theme to attract recreational visitors. Done right, this could meet an increasing demand by tourists for higher quality dining experiences, build markets for locally raised farm products, create jobs and help build regional identities, or brands, based around local food culture. Many areas would like to emulate the kind of tourism success enjoyed by wine-producing regions in California and elsewhere. One travel industry group calculates that 17 percent of American leisure travels engaged in culinary activities between 2003 and 2006, and projects that this could increase to 60 percent in the near future. But while many rural communities have hopes for this approach, there has been little research to understand the current and potential economic impact, the obstacles involved and strategies for overcoming these obstacles.

What has been done: Community development specialist Gary Green helped Extension agents in three Wisconsin areas develop surveys aimed at farmers, food processors and operators of retail food establishments. Farmers and processors were asked about how much they targeted local markets and why, and what they saw as obstacles to doing more such business. Retailers were asked how much local food they purchased, and why, and what kept them from buying more. The three surveys allowed opportunities to study culinary tourism in three rather different contexts. One was done in Door County, where tourism has long been a dominant economic force and local food is an important part of the area's draw. The others were in southwestern Wisconsin counties that have signature food products but less tourism. Green County hopes to build, and each had its own unique mix of food products. Each survey turned up a different set of challenges and opportunities for culinary tourism, but there were also common findings. For example, in each case, both producers and retailers said they were motivated to participate in culinary tourism in large part to support each other and the local economy. In each case, much of the information about who had food to sell and who wanted to buy was passed by word of mouth. There was a clear need for more organized efforts to coordinate and share information about supply and demand.

Impact: The project has yielded several publications, including a journal article in the Journal of Community Economics and several reports specific to the findings in each county. More important, in each of the counties, the survey process has generated lively and fruitful discussions about how to boost culinary tourism. These conversations are spurring community

action. In Green County, for example, the survey pointed to a strong interest among food producers in having access to a commercial kitchen and to education about marketing, packaging and labeling, green/sustainable business and business plans. This led a group to secure a grant to develop a commercial kitchen incubator that would support emerging food businesses. The research has also created a research model that other areas can use to evaluate their own prospects for culinary tourism.

Funding: WIS01175

Additional information: Gary Green, 608-262-2710, gpgreen@wisc.edu

Knowledge area(s): 608

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	154.0	0.0
2012	0.0	0.0	154.0	0.0
2013	0.0	0.0	154.0	0.0
2014	0.0	0.0	154.0	0.0
2015	0.0	0.0	154.0	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- Expert Peer Review

2. Brief Explanation

Proposals for Formula Grant funding on the UW-Madison campus are reviewed by a 10 person faculty committee. This committee, the Research Advisory committee, is appointed by the College of Agricultural and Life Sciences Associate Dean for Research. Each proposal receives two reviews from the panel members (designated primary and secondary reviewers) and two reviews from outside the committee using established experts in the field from the Madison campus, other UW campuses, WI state agencies, non-governmental organizations and scientists from other states. Panel reviews are discussed by a primary and secondary reviewer from the campus committee and the entire group ranks the proposals using three criteria that include merit, quality of science, and ability of the researchers to complete the project.

Merit includes relevance to program guidelines and to National Goals and Emphases Areas, pertinence to state problems and priorities, relationship to multistate projects, and inclusion of integrated activity.

Recommendations of the Research Advisory Committee are used by the Assistant Director of the Wisconsin Agricultural Experiment Station and the Associate Dean for Research in making funding and programmatic decisions.

Some Wisconsin faculty are cooperators in multistate committees in the North Central, North East, Southern, and Western Region as well as a few National (NRSP) projects. Each region has a review process with slight modifications. Details on North Central projects, guidelines, review process and links to other regions are available online at http://www.wisc.edu/ncra/.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The planned programs rely on annual input from stakeholder groups to identify critical issues of strategic importance. These priorities are conveyed to faculty who competitively apply for project support from Formula Grant funds (along with national goals which have been established by USDA, NIFA). These priorities are also used by the Research Advisory Committee who evaluate the project proposals as described in the Merit Review section. These goals are then used by the WAES Assistant Director and the Associate Dean for Research in making final program funding decisions.

A small pool of Formula Grant funds (5-10% of total) are not allocated through the competitive process, but are used to meet critical needs which arise outside of the normal funding cycle.Usually about one half of this pool is ultimately used to provide capital support to ongoing projects. This amount will vary based upon the number of emerging issues needing attention.

2. How will the planned programs address the needs of under-served and under-represented populations of the

The University of Wisconsin - Madison campus is actively engaged in promoting a diversity initiative, Plan 2008 (see http://www.provost.wisc.edu/plan2008) charged to increase diversity of our students, staff and faculty and to create an awareness and understanding of diversity issues among our population. This plan is currently under review and redirection. A National Science Foundation funded program has promoted inclusion of more women in under-represented sciences. The College of Agriculture and Life Sciences has developed a memorandum of understanding with the Menominee Nation that is bringing college and pre-college students to both campuses for reciprocal visits and education.

We have also recently created an Office for Graduate Studies and Professional Development, whose role is to assist prospective graduate students in locating and investigating graduate programs suited to their interests, and to help current graduate students get the most out of graduate studies by highlighting opportunities to expand and enhance the training they already receive in their individual graduate programs. The Director and the Advisory Group work to guide graduate programs and graduate students toward a secure and bright future. Our efforts include securing institutional support for graduate education, addressing issues of professional development not currently addressed by individual programs, and implementing strategies to recruit and retain students of under-represented groups.

Part of this effort includes a new program entitled Graduate Research Scholars. This program strives to enhance the experiences of underrepresented graduate students in the College of Agricultural Sciences and the School of Medicine and Public Health. SciMed GRS coordinates professional development opportunities and community gatherings of graduate scholars.

We are using such broad based programs to promote awareness of needs of the under-served community. Many societal needs such as those related to health, nutrition and economic development often affect the under-served and under-represented disproportionately. Our portfolio currently addresses problems related to small farms, organic products, youth, nutrition, minorities, and rural communities. We are committed to continue to provide research results that will improve the lives of all of our population.

3. How will the planned programs describe the expected outcomes and impacts?

The planned programs will describe the outcomes and impacts in a number of ways. Initially, we will use three indicators to measure outcomes: Patents (as the single required outcome indicator), number of publications, and graduate students trained (degrees granted) based on the project portfolio. We believe that patent disclosures might be a better long term indicator, since the patent process may not come to completion until well after the active research project has terminated.

We are hopeful that the "One Solution" reporting system under development will allow us the flexibility to add

outcomes specific to our Plan of Work. Inclusion of such flexible fields would greatly help us track indicators on an annual basis as part of our required reporting process.

We will continue to develop impact statements on projects that we feel have contributed not only to the advancement of the Knowledge Areas, but which have had a greater impact in terms of Extension programming or societal benefits.

4. How will the planned programs result in improved program effectiveness and/or efficiency?

The planned program results in improved program effectiveness and/or efficiency in that it is annually being reviewed and being re-directed to issues that are newly emerged or considered most relevant to national and state needs. As part of the merit review and application process that is used, past output performance by the faculty/scientists is considered. Evidence of productivity is an important consideration in reviewing and rating projects for approval. The annual proposal process also allows for updating stakeholder input on a regular basis. These changes are published in the Call for Proposals and are presented to the proposal review panel for use in making recommendations on project proposals.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages 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 Conservatory 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 will be 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 will be 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.

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 the NC506 to address policy and sustainability of the corn ethanol system in the North Central states. 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.

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Wisconsin Competitive Research Program

2. Brief summary about Planned Program

Wisconsin Competitive Research Program

The Wisconsin Competitive Research Program is an evolutionary program that attempts to support the best science relative to national, regional, and state needs and priorities. The program process reallocates approximately 20% of the Hatch portfolio each year based upon a competitive process among our faculty. The program uses the national goals and emphasis areas established in the REE and CSREES agency strategic plans and areas of identified research needs for Wisconsin as priority areas for the process. This process allows us to continually update our portfolio, because projects are generally approved for 3-4 years. At the end of each project, faculty must re-apply documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships			7%	
112	Watershed Protection and Management			10%	
131	Alternative Uses of Land			5%	
133	Pollution Prevention and Mitigation			5%	
135	Aquatic and Terrestrial Wildlife			4%	
136	Conservation of Biological Diversity			5%	
201	Plant Genome, Genetics, and Genetic Mechanisms			4%	
206	Basic Plant Biology			5%	
211	Insects, Mites, and Other Arthropods Affecting Plants			6%	
212	Pathogens and Nematodes Affecting Plants			2%	
301	Reproductive Performance of Animals			4%	
302	Nutrient Utilization in Animals			7%	
307	Animal Management Systems			7%	
502	New and Improved Food Products			5%	
604	Marketing and Distribution Practices			5%	
610	Domestic Policy Analysis			4%	
701	Nutrient Composition of Food			5%	
702	Requirements and Function of Nutrients and Other Food Components			4%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			6%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

3. Funding of the program will continue in a stable manner.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	154.0	0.0
2012	0.0	0.0	154.0	0.0
2013	0.0	0.0	154.0	0.0
2014	0.0	0.0	154.0	0.0
2015	0.0	0.0	60.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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.

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2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:4 **2012:**4 **2013:**4 **2014:**5 **2015:**4

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	150	0	0
2012	150	0	0
2013	150	0	0
2014	150	0	0
2015	90	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:50	**2012:**50	**2013:**50	**2014:**50	**2015:**15

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Condition Outcome Measure

2011:	**2012:**	**2013:**	**2014:**	**2015:**
150	150	150	150	90

3. Associated Knowledge Area(s)

- 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
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 307 - Animal Management Systems
- 502 - New and Improved Food Products
- 604 - Marketing and Distribution Practices
- 610 - Domestic Policy Analysis
- 701 - Nutrient Composition of Food
- 702 - Requirements and Function of Nutrients and Other Food Components
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams. Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

The Global Food Security and Hunger Program is a new program that attempts to support the best science relative to national, regional, and state needs and priorities. To support the priorities of USDA, NIFA, Wisconsin will begin to direct proposals towards this priority as well as the other four priorities. 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 for the process. This process will allow us to continually update our portfolio. At the end of each project, faculty will be required to submit a new proposal, documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

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3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships			6%	
201	Plant Genome, Genetics, and Genetic Mechanisms			9%	
202	Plant Genetic Resources			7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			4%	
204	Plant Product Quality and Utility (Preharvest)			4%	
205	Plant Management Systems			5%	
206	Basic Plant Biology			6%	
211	Insects, Mites, and Other Arthropods Affecting Plants			4%	
212	Pathogens and Nematodes Affecting Plants			12%	
213	Weeds Affecting Plants			2%	
216	Integrated Pest Management Systems			4%	
301	Reproductive Performance of Animals			5%	
302	Nutrient Utilization in Animals			4%	
303	Genetic Improvement of Animals			12%	
304	Animal Genome			4%	
305	Animal Physiological Processes			3%	
601	Economics of Agricultural Production and Farm Management			2%	
608	Community Resource Planning and Development			2%	
609	Economic Theory and Methods			4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			1%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

3. Funding of the program will continue in a stable manner.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	57.0	0.0
2012	0.0	0.0	57.0	0.0
2013	0.0	0.0	57.0	0.0
2014	0.0	0.0	57.0	0.0
2015	0.0	0.0	57.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:7 **2012:**7 **2013:**7 **2014:**7 **2015:**7

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	90	0	0
2012	90	0	0
2013	90	0	0
2014	90	0	0
2015	90	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:15	**2012:**15	**2013:**15	**2014:**15	**2015:**15

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Condition Outcome Measure

2011:90	**2012:**90	**2013:**90	**2014:**90	**2015:**90

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 601 - Economics of Agricultural Production and Farm Management
- 608 - Community Resource Planning and Development
- 609 - Economic Theory and Methods
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams.

Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

The Climate Change Program is a new program that attempts to support the best science relative to national, regional, and state needs and priorities. To support the priorities of USDA, NIFA, Wisconsin will begin to direct proposals towards this priority as well as the other four priorities. 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 for the process. This process will allow us to continually update our portfolio. At the end of each project, faculty will be required to submit a new proposal, documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
132	Weather and Climate			25%	
133	Pollution Prevention and Mitigation			25%	
141	Air Resource Protection and Management			25%	
403	Waste Disposal, Recycling, and Reuse			25%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively

soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

3. Funding of the program will continue in a stable manner.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	2.0	0.0
2012	0.0	0.0	2.0	0.0
2013	0.0	0.0	2.0	0.0
2014	0.0	0.0	2.0	0.0
2015	0.0	0.0	2.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Our faculty have initiated several projects that anticipate the impacts of climate change on agricultural and wild ecosystems in the upper Midwestern US. Most of these projects are currently supported using McIntire-Stennis formula funds, but we anticipate that more Hatch funds will be directed here in the future. The State of Wisconsin has initiated a Wisconsin Climate Change Initiative (WICCI) group that brings together our faculty and interested clientele from other agencies and industries to discuss and plan for research on climate change. Current projects include work on development of monitoring systems for detecting changes in ecosystems structure and processes over time, soil carbon management practices, silvicultural practices to help ameliorate ecosystem changes resulting from anticipated climate change, remote sensing detection of insect and disease problems associated with climate change, and modeling of conservation practices and land use patterns that might result from climate change.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:0 **2012:**0 **2013:**0 **2014:**1 **2015:**1

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	0	0	0
2012	0	0	0
2013	1	0	0
2014	2	0	0
2015	2	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:0	**2012:**0	**2013:**1	**2014:**1	**2015:**1

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Knowledge Outcome Measure

2011:0	**2012:**0	**2013:**1	**2014:**2	**2015:**2

3. Associated Knowledge Area(s)

- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management
- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams. Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

The Sustainable Energy Program is a new program that attempts to support the best science relative to national, regional, and state needs and priorities. To support the priorities of USDA, NIFA, Wisconsin will begin to direct proposals towards this priority as well as the other four priorities. 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 for the process. This process will allow us to continually update our portfolio. At the end of each project, faculty will be required to submit a new proposal, documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships			16%	
104	Protect Soil from Harmful Effects of Natural Elements			11%	
125	Agroforestry			5%	
205	Plant Management Systems			16%	
206	Basic Plant Biology			16%	
211	Insects, Mites, and Other Arthropods Affecting Plants			5%	
401	Structures, Facilities, and General Purpose Farm Supplies			5%	
604	Marketing and Distribution Practices			11%	
608	Community Resource Planning and Development			11%	
723	Hazards to Human Health and Safety			4%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

3. Funding of the program will continue in a stable manner.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	9.0	0.0
2012	0.0	0.0	9.0	0.0
2013	0.0	0.0	9.0	0.0
2014	0.0	0.0	9.0	0.0
2015	0.0	0.0	9.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:0 **2012:**0 **2013:**1 **2014:**1 **2015:**1

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	15	0	0
2012	15	0	0
2013	15	0	0
2014	15	0	0
2015	15	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:3	**2012:**3	**2013:**3	**2014:**3	**2015:**3

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Condition Outcome Measure

2011:15	**2012:**15	**2013:**15	**2014:**15	**2015:**15

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 125 - Agroforestry
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 604 - Marketing and Distribution Practices
- 608 - Community Resource Planning and Development
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams. Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

The Childhood Obesity Program is a new program that attempts to support the best science relative to national, regional, and state needs and priorities. To support the priorities of USDA, NIFA, Wisconsin will begin to direct proposals towards this priority as well as the other four priorities. 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 for the process. This process will allow us to continually update our portfolio. At the end of each project, faculty will be required to submit a new proposal, documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

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			14%	
304	Animal Genome			14%	
305	Animal Physiological Processes			14%	
701	Nutrient Composition of Food			14%	
703	Nutrition Education and Behavior			44%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

3. Funding of the program will continue in a stable manner.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	4.0	0.0
2012	0.0	0.0	4.0	0.0
2013	0.0	0.0	4.0	0.0
2014	0.0	0.0	4.0	0.0
2015	0.0	0.0	4.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:0 **2012:**0 **2013:**0 **2014:**1 **2015:**1

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	5	0	0
2012	5	0	0
2013	5	0	0
2014	5	0	0
2015	5	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:2 **2012:**2 **2013:**2 **2014:**2 **2015:**2

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Condition Outcome Measure

2011:5	**2012:**5	**2013:**5	**2014:**5	**2015:**5

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 701 - Nutrient Composition of Food
- 703 - Nutrition Education and Behavior

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams. Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

The Food Safety Program is a new program that attempts to support the best science relative to national, regional, and state needs and priorities. To support the priorities of USDA, NIFA, Wisconsin will begin to direct proposals towards this priority as well as the other four priorities. 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 for the process. This process will allow us to continually update our portfolio. At the end of each project, faculty will be required to submit a new proposal, documenting not only need, relevance to program priorities (including integrated activity and multistate programs), and scientific merit, but also productivity of the project to date.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

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			1%	
211	Insects, Mites, and Other Arthropods Affecting Plants			6%	
212	Pathogens and Nematodes Affecting Plants			3%	
216	Integrated Pest Management Systems			4%	
302	Nutrient Utilization in Animals			3%	
304	Animal Genome			3%	
305	Animal Physiological Processes			4%	
308	Improved Animal Products (Before Harvest)			4%	
311	Animal Diseases			10%	
315	Animal Welfare/Well-Being and Protection			1%	
403	Waste Disposal, Recycling, and Reuse			10%	
404	Instrumentation and Control Systems			1%	
501	New and Improved Food Processing Technologies			12%	
502	New and Improved Food Products			4%	
702	Requirements and Function of Nutrients and Other Food Components			14%	
704	Nutrition and Hunger in the Population			1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources			1%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			12%	
721	Insects and Other Pests Affecting Humans			3%	
723	Hazards to Human Health and Safety			3%	
	Total			100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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 goals will be listed as priorities for projects to be funded in the Wisconsin 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 one and only one category. Research projects are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

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 provide 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 and discussed periodically as information is obtained at regularly scheduled meetings of the CALS Administrative Leadership Group. The following is a compilation of common themes established as the result of these discussions, reviews, and updates by College administration. The list below is provided to draw attention to needs currently of interest within the state, and is published annually as part of the WAES's Call for Proposals for our Formula Grant program.

1) Mechanisms of pest and pathogen resistance and safe and effective control, with minimum effects on environmental quality and human health.

2) Effects of change in global climate, population pressures, or 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.

2. Scope of the Program

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The following assumptions are made for this program:

1. The greatest advances in addressing national, regional, and state needs can be made by competitively soliciting the best science and research.

2. Graduate training efforts supported through the UW-Madison competitive Formula Grant opportunity will provide a sound basis for the future of the Formula Grant related sciences and issues.

2. Ultimate goal(s) of this Program

1. To address national and state issues with the science of the highest quality and greatest potential to have an effect in addressing the issues relevant to the Formula Grant mission.

2. Train graduate students to build the human resources needed to address current and future problems relevant to the Formula Grant mission.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	0.0	30.0	0.0
2012	0.0	0.0	30.0	0.0
2013	0.0	0.0	30.0	0.0
2014	0.0	0.0	30.0	0.0
2015	0.0	0.0	30.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Field Days)	● Web sites ● Other 1 (Press Releases)

3. Description of targeted 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(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	0	0	0	0

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

2011:3 **2012:**3 **2013:**3 **2014:**3 **2015:**3

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	50	0	0
2012	50	0	0
2013	50	0	0
2014	50	0	0
2015	50	0	0

V(H). State Defined Outputs

1. Output Target

- 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):

2011:10	**2012:**10	**2013:**10	**2014:**10	**2015:**10

V(I). State Defined Outcome

O. No.	Outcome Name
1	Outcome measures for this work are both qualitative and quantitative. We will rely on feedback from stakeholder groups, advisory boards, and individual constituents, as well as from UW Extension teams on the relevance, importance and impact of our research program. The output measures listed earlier will also serve as outcome measures in that patents graduate degrees and publications all include an element of critical review and assessment of uniqueness, originality, contribution to the science and knowledge base, or other performance criteria. Finally, we will use the Thomson ISI Essential Science for agricultural science as one of our measures of impact of our research program. 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:

Outcome # 1

1. Outcome Target

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.

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. Outcome Type : Change in Condition Outcome Measure

2011:50	**2012:**50	**2013:**50	**2014:**50	**2015:**50

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 404 - Instrumentation and Control Systems
- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 702 - Requirements and Function of Nutrients and Other Food Components
- 704 - Nutrition and Hunger in the Population
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 721 - Insects and Other Pests Affecting Humans
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

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 have begun discussing some 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Description

Evaluation studies planned include qualitative and quantitative methodology. We have already described a number of methods used to solicit stakeholder input. At the time input is being sought from these groups, boards, and individuals, we are also soliciting feedback on the pertinence and effectiveness of our current programs. This information is primarily qualitative, but provides important feedback on the program. Similar input will be sought from UW Extension's issue oriented teams.

In the competitive re-application process for WAES projects, project productivity (past performance) and impact are also evaluated. This occurs every 2-4 years and is an important factor in whether a scientist's new project will be approved.

Overall project success will be evaluated by monitoring the number of graduate students trained, peer reviewed publications, and our research impact based on the ISI Essential Science Indicators. While this is an indicator of our overall CALS research program, we believe that it is also representative of our Formula Grant research component.

2. Data Collection Methods

- Sampling
- Structured
- Unstructured
- Portfolio Reviews

Description

Data collection will include structured and unstructured interview information from stakeholder groups, advisory boards, and key individual constituents. We will ask Extension to solicit information annually from their issue-oriented teams. Data will be compiled annually on patents, graduate students trained, and number of publications. The Thomson ISI Essential Science Indicators will be monitored annually to assess impact of our research program.