

**Annual Report of Plan of Work**  
**Wisconsin Agricultural Experiment Station**  
**College of Agricultural and Life Sciences**  
**University of Wisconsin, Madison**

**Federal Fiscal Year 2003**  
**Research Activities**

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# **Annual Report of Plan of Work Wisconsin Agricultural Experiment Station**

## **Foreword**

### ***Choice of reporting***

The Wisconsin Agricultural Experiment Station, as an 1862 Land Grant Institution, has chosen to file a report on research activities for the Plan of Work at the University of Wisconsin (UW). University of Wisconsin-Extension will be reporting in a separate document on extension activities. Institutions involved with research work include the University of Wisconsin-Madison (College of Agricultural and Life Sciences, School of Veterinary Medicine, and School of Human Ecology) and the University of Wisconsin-Stevens Point. Programs included in this annual report of accomplishments are those funded by formula funds provided by Hatch Act, McIntire-Stennis Cooperative Forestry Research Program, and Animal Health and Disease Research Program.

### ***Point of contact***

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### ***Additional sources of reporting***

Reporting of project titles and objectives as well as human resources have been filed in the CRIS system at USDA by means of the AD-416 and AD-417s. Expenditure data and human resources have been filed with the USDA in the CRIS system by means of the AD-419s. Annual progress reports (including impacts) and final reports have been filed with the USDA-CRIS system using the AD-421s. Impact statements for FY03 have been filed by the Wisconsin Agricultural Experiment Station with the USDA-CSREES Impact database and are included here where appropriate.

Access to the CRIS system of reporting and search capabilities is available at  
<http://cris.csrees.usda.gov/>

The original Plan of Work for Wisconsin's research activities was filed July 15, 1999 and is available in pdf format at

<http://www.cals.wisc.edu/research/PlanofWork.pdf>

Highlights of research, extension and education programs are available at the following websites or print copies have been included with this report

2004-2005 Science Report - Appendix A

Title: "Asking the Right Questions"

Selected stories at

<http://www.cals.wisc.edu/sciencereport/index.html>

CALS Quarterly - 2 issues included in Appendix A

News releases and stories:

<http://news.cals.wisc.edu/stories/>

## **Background**

### ***Structure***

The Director of the Experiment Station is Dean Elton Aberle of the College of Agricultural and Life Sciences (CALs) who has designated an Executive Director, Margaret Dentine (Associate Dean, Research Division, CALs) to be responsible for research operations. An Associate Director, Kevin McSweeney is responsible for the McIntire-Stennis Program and other research involved in natural resources. The CALs Research Division is responsible for reviewing proposals, making funding decisions and administering grants in cooperation with the University of Wisconsin-Madison School of Veterinary Medicine, the University of Wisconsin-Madison School of Human Ecology, and the University of Wisconsin-Stevens Point College of Natural Resources.

CALS is composed of 21 departments with a large number of intra-college and inter-college centers, institutes and programs. CALs' mission is to improve the quality of life by discovering; critically analyzing and sharing knowledge in food and agriculture, the life sciences, natural resources and environmental stewardship, and rural community development and to offer strong, research-based education that is responsive to public needs and social, economic and environmental concerns. Additional information on the organization and personnel of UW-CALS is available on the college website at

<http://www.cals.wisc.edu/>

Within the College of Agricultural and Life Sciences, the Research Advisory Committee, a faculty committee of 12 members appointed by the Associate Dean for Research with ex-officio members of the Assistant Dean for Research and the Director of the School of Natural Resources meets regularly to discuss research issues. This committee recommends research

policy guiding distribution and use of formula funds and is the primary peer review committee for Hatch and McIntire-Stennis proposals. The committee recommends policies and procedures that have been implemented to distribute formula funds on a competitive process.

### ***Operating Philosophy***

The Wisconsin Experiment Station is committed to the concept of investigator-driven and peer-reviewed research activities. The general philosophy in allocating formula funds is to provide support for specific reviewed projects rather than to distribute block amounts to faculty or departments. At the University of Wisconsin, faculty appointments are funded with state appropriations thus releasing nearly all formula funding for project support. Expenditures are allowed under a series of guidelines annually reviewed by a faculty committee. Matching funds come primarily from state support of salaries for investigators and research staff.

Formula funds are distributed to approved projects with yearly budgets. Approximately 200 projects are funded with formula funds each year with budgets that include personnel (mainly graduate students) and supplies. Funding of capital equipment items, some of which may be shared by several projects, are prioritized by departments and funded in a separate exercise. Travel to multistate research meetings is provided for the official representative from a central pool of funds.

### ***Integrated Research and Extension***

Extension has its own Chancellor and is a separate “campus” within the University of Wisconsin System. CALS faculty with Extension specialist appointments are housed at the Madison campus with an annual Extension transfer of funding for portions of their appointments. These faculty are fully integrated into CALS departmental teaching and research programs and can apply for research project support under the formula-funded competitions listed above. County-based Extension faculty members are participants in research teams, but are not principal investigators for projects supported by formula funds. Thus the funding of integrated research-extension efforts is accomplished largely through salary support of Extension faculty and project support from competitive awards of research formula funds. In the following tables, the indication of integrated research/extension activities is based on projects where one or more of the principal investigators has an official extension appointment.

### ***Multistate Research***

We have adopted by reference the national Coordinated Multistate Research Framework for fulfillment of our obligations to the AREERA’s multistate and multidisciplinary activities. More details are available on the WWW at

<http://www.agnr.umd.edu/users/NERA/workshop/RPAFramework.html>

Reporting of Station accomplishments and impacts from multi-state projects are included in federal filing of the SAES-422 reports on these projects available on the CRIS system. Listing of states cooperating on these projects have already been filed with USDA Partnership office following the peer and merit review and approval by the Regional Directors multistate

committees. In the following listings under the Goal headings, these projects are designated as multi-state and their regional project designations are given. Financial statements of expenditures are directly from the Wisconsin Station reports filed as AD-419s. The National Information Management and Support System (NIMSS) is a web-based application that will allow participants of Multistate Research Projects and Activities to submit proposals and reports online. Interested parties, stakeholders and cooperators can also query the System for relevant and timely information. More details are available on the WWW at <http://www.lgu.umd.edu/login.cfm>

### ***Program Evolution***

Programs in the Wisconsin Research Plan of Work were composed of a number of projects with individual review and reporting. Program duration may be extended for multiple years, but the contributing projects are a constantly shifting portfolio that can be quickly redirected. Projects have been approved for periods of one to five years with the majority on a four-year cycle. Proposals for new projects require a discussion of the results from previous formula fund support, which is used as part of the criteria for ranking proposals and for evaluating the ability of the team to complete the research project successfully. Although some multistate projects have been continuing for more than 10 years, revised proposals are required for review and approval at least every 5 years. Each year, approximately 25 percent of the research portfolios are shifted in new directions.

This process of continual re-examination of our portfolio allows us to address short-term, intermediate term and long-term issues. A small number of approved projects may be started at mid-year as new faculty members are hired or emerging problems trigger an early start at the discretion of the Associate Dean for Research. These processes ensure that projects are pertinent to the CSREES national goals and focus on current state research needs. In the project listing under the goals, projects that have been added to the portfolio are printed in bold to highlight the new additions since filing of last year's annual report. Projects that have been completed are no longer listed.

## **Research Activity in Support of National Goals and Themes**

The five sections that follow relate a portion of the Wisconsin Agricultural Experiment Station research effort to the five national goals established by the U.S. Department of Agriculture for the national planning and reporting process. Between 500 and 600 research projects are underway in the College during the course of a year, ranging from the most basic of scientific studies to those that are highly applied. The reports that follow concentrate on those studies that are done as part of formula funded research (Hatch, McIntire-Stennis, and Animal Health). Most of these studies are of a more applied nature, and are significant sources of new science-based information for Wisconsin Cooperative Extension programs. Of the approximately 100 million in expenditures made through the College's Research Division, these formula funded research projects represent about \$5 million of the total.

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. In many instances, a research project relates to multiple goals and themes. These research projects are then listed in multiple goals. Research projects; like the agricultural, natural resource, and community issues they address; are frequently at the intersecting points of disciplines and interests. We view this interdisciplinary nature of our research efforts as a strength.

Of the studies selecting for reporting in this document, the largest number (123) relate to the goal of "An Agricultural System that is Highly Competitive in the Global Economy." This included 32 projects that were multistate interdisciplinary projects and 24 that were integrated research/extension projects. The concentration of projects in this goal area is expected for two reasons –1) the nature of the research funding sources being reported are directed toward such problem areas, and 2) the state's agricultural economy is large (between \$5 billion and \$6 billion cash farm receipts a year, with total economic impact near \$20 billion a year) and dependent on new research knowledge to keep it competitive not only with international trade but with other regions of the United States producing similar food and fiber commodities. Among the research titles presented in this section are a broad array of studies that address the extreme breadth of Wisconsin agriculture. We have a highly diverse livestock and plant agriculture that stresses limited research resources to the limit.

The second largest number of research projects is reported under the goal of "Greater Harmony Between Agriculture and the Environment." There are 44 project reported here, with 9 of them being multistate interdisciplinary studies, and 11 integrated research/extension projects. Producing agricultural commodities in ways that are sustainable and protective of the natural resource base and the broader environment is one of the largest challenges facing Wisconsin farmers. The state's cash farm receipts derive overwhelmingly from livestock enterprises, with dairying being by far the most important. Managing livestock wastes and cycling them safely and productively through the various cropping systems is the most urgent challenge. Non-point pollution regulations are increasing from both the state and federal levels. A large number of studies in this reporting section relate to the handling of waste streams from livestock and other state industries. Beyond the waste stream challenge are many other environmental challenges

relating to proper use of chemical fertilizers and reduced pesticide use. Because Wisconsin has a huge tourist industry that relies heavily upon quality land, water, air, landscapes, and fish and wildlife populations, the impacts of environmental protection through proper agricultural production practices go well beyond agriculture.

Under the goal of “Enhanced Economic Opportunity and Quality of Life for American” there are a total of 22 projects reported – the third largest number under a goal heading. Three of these were multistate interdisciplinary projects, and 7 were integrated research/extension projects. Although most of these studies are reported under Objectives 5.1 (Increasing Capacity of Communities and Families to Enhance Their own Economic Well Being) and 5.2 (Increasing Capacity of Communities, Families and Individuals to Improve Their own Quality of Life), a project not assigned to a particular objective heading is noteworthy. This project is a north central regional project (NC-208) that looks at agricultural research funding trends and impacts of those trends on agenda. One of its major conclusions is that as public sources of research funding (particularly in the agricultural sector) experience no real growth or declines in terms of inflation corrected buying power, researchers turn increasingly to non-governmental (industry and other private sources) funding.

Under the goal of “A Healthy, Well Nourished Population” are reported 14 projects, and under the goal of “A Safe and Secure Food and Fiber System” are reported 9 projects. If this report covered College research projects beyond those funded with formula research funds, there would be a much larger number of projects with relevance to human nutrition. Over half of the federal competitive grant funding coming to the College is provided by the National Institutes of Health, and a large portion of those studies relate to human nutrition and health. The food safety issue is also of great importance to the College in spite of the small number of research projects reported here. Much of the food safety research is funded through the College’s Food Research Institute, and nearly all of the Institute’s funding derives from private sources. Again, because this report concentrates on formula funding sources, this privately funded research effort is not captured here.

Finally, this report does not attempt to sort all of the research activity into key reporting themes. Instead, examples of research impacts are offered, and relevant themes addressed by the examples are listed along with focus areas from the CSREES budget.

# **Goal 1. An Agricultural System that is Highly Competitive in the Global Economy.**

## *Executive summary*

Under this goal, there were 123 projects including 32 that were multistate interdisciplinary projects, 9 were McIntire-Stennis projects, 6 were Animal Health projects, and 24 were integrated research/extension projects. Although the largest number of projects under the goals are classified as Goal 1, many of these projects address other goals as well. For instance, one of the McIntire-Stennis projects, WIS04505, "Cooperation Among Woodland Owners: A Case Study of Organizational Forms and Participant Motivations" has relevance to Goal 4.3 (To Improve Decision-Making on Public Policies Related to Agriculture and the Environment).

Wisconsin is committed to continually changing its portfolio of research. Use of more sophisticated analysis and molecular techniques has allowed agricultural and natural resources issues to be approached on a more basic science level. New understanding of the molecular basis of plant and animal systems can bring new strategies to improve performance, reduce risk, improve food quality and safety and preserve the environment. Stakeholders insist on a scientific basis for change and demand testing and evaluation of new varieties, management strategies and recommendations. Forty-three new projects have been added including those on hybrid alfalfa, reformulating dairy feeds to protect the environment, plant disease resistance genes, forest harvest techniques, new pests of trees and soybeans, and management of wildlife. Newly added projects indicate that faculty are responding to stakeholder needs and new technologies.

## *Updated project list for FY03*

New projects are printed in **bold**. Note that recent reclassification of projects has moved some projects into goals different from those previously listed in the Plan of Work. Projects falling under multiple goals are listed in each.

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
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**Goal 1: An Agriculture Production System that is Highly Competitive in the Global Economy**

**Objective 1.1: To Produce New and Value-Added Agricultural Products and Commodities**

WIS01599	Hartel, R. W.	Improvement of Thermal Processes for Foods (NC-136)	X	X				
WIS02229	Greaser, M. L.	Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation (NC-131)	X	X				
WIS03843	Roper, T. R.	Multidisciplinary Evaluation of New Apple Cultivars (NE-183)	X	X			X	
WIS04302	Thomas, D. L.	Comparison of East Friesian and Lacaune Dairy Sheep	X				X	
WIS04304	Attie, A. D.	Biochemistry and Genetics of Insulin Resistance and Diabetes	X					
WIS04438	Damodaran, S.	Thermodynamic Incompatibility and Phase Separation of Proteins at the Oil-Water Interface and its Effect on Emulsion Stability	X					
WIS04507	Denes, F. S.	Generation of Antifouling Layers from High Molecular Weight Liquid Phases Compounds Under Cold Plasma Conditions	X					
WIS04512	Richards, M. P.	Investigation into Inhibition of Hemoglobin-Mediated Lipid Oxidation in Cooked and Uncooked Muscle Foods	X					
WIS04531	Bleecker, A. B.	Mechanism of Action of 1-Methyl Cyclopropene (MCP), A Potent Inhibitor of Ethylene Responses in Plants	X					
WIS04590	Sarmadi, M.	New Technologies for the Utilization of Textile Materials (S-1002)	X	X				
WIS04596	Rankin, S. A.	Process Variables That Influence Whey Flavor and Function	X				X	
WIS04662	Amasino, R.	Identification and Characterization of Dwarfing Genes	X					
WIS04668	Lucey, J.	Understanding the Structure-Function Relationships That Control the Rheological and Sensory Properties of Stirred Type Yogurt	X					
WIS04669	Plhak, L.	Secoisolariciresinol Lignans in Cranberry Fruits	X					
WIS05233	Yandell, B.	New Approaches to Analysis of Microarray Data: Epigenetic Control of Maize Endosperm Gene Expression as a Model	X					
<b>Total:</b>			<b>323,679.71</b>	<b>64,699.60</b>	<b>0</b>	<b>0</b>	<b>60,506.42</b>	<b>21.24</b>

**Objective 1.2: To Increase The Global Competitiveness of the U. S. Agricultural Production System**

WIS00726	Bitgood, J. J.	Advanced Technologies for the Genetic Improvement of Poultry (NC-168)	X	X				
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Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
WIS02229	Greaser, M. L.	Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation (NC-131)	X	X				
WIS02366	Kosola, K. R.	Rootstock and Interstem Effects on Pome and Stone Fruit Trees (NC-140)	X	X				
WIS03094	Czuprynski, C. J.	Bovine Respiratory Disease: Risk Factors, Pathogens, Diagnosis and Management (NC-107)	X	X				
WIS03270	Albrecht, K. A.	Forage Protein Characterization and Utilization for Cattle (NC-189)	X	X				
WIS03442	Stoltenberg, D. E.	Biological and Ecological Basis for Weed Management Decision Support Systems to Reduce Herbicide Use (NC-202)	X	X				
WIS03455	Wedberg, J. L.	Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera (NC-205)	X	X			X	
WIS03717	Palta, J. P.	Freeze Damage and Protection of Fruit and Nut Crops (W-130)	X	X				
WIS03897	Nienhuis, J.	Genetic Improvement of Beans ( <i>Phaseolus Vulgaris</i> L.) for Yield, Pest Resistance and Food Value (W-150)	X	X				
WIS03911	Bamberg, J. B.; Spooner, D. M.; Simon, P.	Introduction, Preservation, Classification, Distribution and Evaluation of Solanum Species(NRSP-6)	X	X				
WIS04181	Wentworth, B.	Reproductive Efficiency of Turkeys (S-285)	X	X				
WIS04241	Benevenga, N.	Quantitative Aspects of Lysine Metabolism in the Pig	X					
WIS04244	Grau, C. R.	Endophytic Microorganisms and Latent Pathogens as Possible Agents Modifying Soybean Health and Productivity	X				X	
WIS04265	Hogg, D. B; Grau, C. R.; Undersander, D. J.; Doll, J. D.; Wedberg, J. L.	Development of Pest Management Strategies for Forage Alfalfa Persistence (NC-226)	X	X			X	
WIS04279	Doebley, J.	Molecular-Genetics of Plant Architecture in Maize	X					
WIS04290	Bohnhoff, D. R.	Load Distribution in Metal-Clad Wood-frame Diaphragms	X					
WIS04292	Shinners, K. J.	Integration of Hay and Forage Equipment into Site Specific Farming Systems	X					
WIS04297	Boerboom, C. M.	Variables Influencing Weed Interference on Corn and Soybean Yield	X				X	
WIS04298	Stoltenberg, D. E.	Ecophysiological Characterization and Modeling of Weed-crop Communities	X					
WIS04299	Tracy, W. F.	Rust Resistance in Sweet Corn: Vegetative Phase Change and Sources of Resistance (NE-124)	X	X				
WIS04301	Parrish, J.	Effect of Scrotal Insulation on the Ability of Bovine Sperm to Penetrate and Activate Oocytes, and Support Embryo Development	X					

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
WIS04302	Thomas, D. L.	Comparison of East Friesian and Lacaune Dairy Sheep	X				X	
WIS04305	Clagett-Dame, M.	Vitamin A and Sympathetic Neuronal Development	X					
WIS04308	Culbertson, M. R.	Role of mRNA Decay in Gene Expression	X					
WIS04309	Laughon, A. S.	CIS-element Selection: A Tool for Functional Genomics	X					
WIS04310	Masson, P. H.	Characterization of an Arabidopsis Thaliana Gene Involved in Root and Shoot Morphogenesis	X					
WIS04312	Susman, M.R.	Genetic Manipulation of Plasma Membrane Proteins Involved Mineral Transport	X					
WIS04316	German, T. L.	Exploiting the Specificity of Tospovirus-thrips Interactions to Control Virus Disease and Insect Damage	X					
WIS04318	MacGuidwin, A. E.	Population Attrition of the Soybean Cyst Nematode in the Absence of a Host (NC-215)	X	X				
WIS04322	Karasov, W. H.	Hydrophilic Toxin Absorption by Mammals and its Modulation	X					
WIS04344	Combs, D.	Environmental and Economic Impacts of Nutrient Management on Dairy Forage Systems(NE-132)	X	X				
WIS04361	Rutledge, J. J.	Germ Cell and Embryo Development and Manipulation for the Improvement of Livestock(W-171)	X	X				
WIS04369	Raffa, K. F.	Interactions Among Bark Beetles, Pathogens, and Conifers in North American Forests (W187)	X	X				
WIS04422	Kaeppler, H. F.	Genetic Engineering of Oat with Transgenes Encoding Antifungal Proteins and Resistance Pathway Regulators for Improved Disease Resistance	X					
WIS04425	Kaeppler, S. M.	Genetic Analysis of Phosphorus Nutrition and Mycorrhizal Interactions in Maize	X					
WIS04426	Coors, J. G.	Corn Silage: Germplasm and Technology Development	X					
WIS04429	Barclay, S. L.	Genes Expressed During Infection by Cryptosporidium	X					
WIS04430	Bednarek, S. Y.	Characterization of Arabidopsis Dynamin-Like Proteins	X					
WIS04431	Fricke, P. M.	Methods of Improving Reproduction in Dairy Heifers	X				X	
WIS04432	Grummer, R. R.	Elimination of the Transition Period to Enhance Dairy Cattle Health and Production	X					
WIS04441	Jiang, J.	Molecular Cytogenetics Analysis of the Potato Genome	X					
WIS04442	Jull, L. G.	Effect of Deicing Chemicals on Woody Ornamental Plants	X				X	
WIS04443	Vierstra, R. D.	Identification of Factors Responsible for Selective Protein Degradation in Plants	X					
WIS04446	Andrews, J. H.	The Colonization Pattern of Apple Leaves by Aureobasidium pullulans	X					
WIS04447	Allen, C.	Characterizing Bacterial Wilt Virulence Gene Expression in the Plant Host	X					
WIS04448	McManus, P. S.	Characterization of Agrobacterium spp. Isolated from Cranberry and Etiology of Cranberry Stem Gall	X				X	

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
WIS04451	Kung, K. S.	Quantifying the Soil Pore Spectrum to Minimize Chemical Leaching Through Field-Scale Preferential Flows Paths	X					
WIS04452	Albrecht, R. M.	Colloidal Metal Particles for High Resolution Biological Labeling	X					
WIS04455	Ginther, O. J.	Functional Two-Way Coupling Between FSH and Follicles	X					
WIS04503	Radeloff, V. C.	Landscape Fragmentation Due to Changes in Road Density in Northwestern Wisconsin from 1938 to 1992			X			
WIS04505	Rickenbach, M. G.	Cooperation Among Woodland Owners: A Case Study Of Organizational Forms and Participant Motivations			X			
WIS04508	Wattiaux, M. A.	Impact of Dairy Diet Formulation on Lactation, Nitrogen Utilization, Nutrient Excretion and Potential Ammonia Loss to the Environment	X					
WIS04521	Reinemann, D. J.	Investigation of Robotic Milking System Performance	X				X	
WIS04524	Kirkpatrick, B. W.	National Animal Genome Research (NRSP-8)	X	X				
WIS04528	Goodman, W. G.	A Genetic Analysis of a Juvenile Hormone Sensitive Mutant of Manduca Sexta	X					
WIS04529	Raffa, K. F.	Potential Roles of Symbiotic Fungi in the Population Dynamics of Bark Beetles			X			
WIS04535	Stanosz, G. R.	Sirococcus Shoot Blight of Conifers: Pathogen and Host Influences on Disease Development	X					
WIS04540	Silbernagel, J. M.	The Forest History and Spatial Patterning of American Indian and Euro-American Maple Sugaring Forests of the Upper Great Lakes Region			X			
WIS04541	Lane, M. B.	Democratic Planning at Multiple Scales in Plural Societies: Natural Resource Governance in Wisconsin	X					
WIS04542	Splitter, G. A.	Gene Enhancement of DNA Vaccines				X		
WIS04543	Czuprynski, C. J.	Cytokine-Mediated Enhancement of the Susceptibility of Bovine Leukocytes to Pasteurella Haemolytica Leukotoxin				X		
WIS04544	Santschi, E. M.	Bacterial Adhesion to Equine Bone and Cartilage; Effect of Surface, Fluid Environment and Selected Antibacterial Strategies				X		
WIS04554	Morshidi, M.	Assessment of Selected Hybrid Poplar Genotypes for Phytoremediation of Atrazine Contaminated Soil			X			
WIS04555	Thomas, C.	The Status of Black Bear Research in Northwestern Wisconsin Forests			X			
WIS04558	Keller, N. P.	Mycotoxins in Cereal Grains (NC-129)	X	X				
WIS04592	Kosola, K. R.	The Role of Soil Water Potential in Establishment of Cranberry Beds	X					
WIS04600	Weigel, K. A.	Genetic Improvement of Dairy Cow Longevity Using Survival Analysis Methodology	X				X	

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
WIS04605	Charkowski, A. O.	Genetic Exploration of the Diversity and Evolution of Pectobacterium Pathogenesis	X					
WIS04658	Osborn, T.	Developing a New Hybrid Breeding System for Alfalfa	X					
WIS04659	Escalante-Semerena, J.	Degradation of Trycarballyate, the Causative Agent of Grass Tetany in Ruminants	X					
WIS04660	Gourse, R.	Transcription Initiation Complexes in Diverse Bacteria	X					
WIS04661	Wasserman, K.	The Role of Ryea and Ryeb Small RNA Regulators in E. Coli	X					
WIS04662	Amasino, R.	Identification and Characterization of Dwarfing Genes	X					
WIS04663	Menon, A.	Phospholipid Flip-Flop in the Cell Membrane of Mycoplasma Bovis	X					
WIS04664	Martin, T.	Identifying Novel Chemical Inhibitors of Synaptic Neurotransmission with Potential Applications for Pesticide/Nematicide Development	X					
WIS04665	Sheffield, L.	Leptin Involvement in Mammary Development	X					
WIS04666	Wattiaux, M.	Dairy Cattle Diet Formulation on Performance, Nitrogen Utilization, Manure Excretion, and Potential Ammonia Loss to the Environment	X					
WIS04670	Goodwin, E.	3'UTR Control of TRA-2MRNA Export as a Paradigm for Understanding Regulated Export of Specific MRNAs	X					
WIS04671	Patterson, S.	Genetic, Physiological, and Molecular Characterization of DAB4-1, A CellSeparation Mutant in Arabidopsis Thaliana	X					
WIS04673	Bent, A.	Discovery of Plant Genes that Mediate Disease Resistance	X					
WIS04677	Collins, M.	Biosecurity: Field Evaluation of Best Management Practices				X		
WIS04678	Edwards, R.	Suspensory Ligament Desmitis in the Horse				X		
WIS04680	Bozek, M.	Development of a Dynamic Riparian Forest Management Model			X			
WIS04682	Field, D.	Demographic Change and Landowner Behavior in the Pine Barrens of Wisconsin			X			
WIS04683	Gower, S.	Net Primary Production and Carbon Allocation Pattern of Terrestrial Ecosystems: Global Analysis of Environmental and Land Use Change Effects			X			
WIS04684	Lorimer, C.	Dynamicx and Management of Multi-Cohort Northern Hardwood Forests: A New Ecosystem-Based Approach to Maintaining Diversity and Aesthetics			X			
WIS04685	Young, R.	High Performance Wood Composite Materials Through Activation Bonding			X			
WIS04689	Williamson, R.	Biology, Ecology, and Management of Linden Borer, A Serious Insect Pest of Shade Trees in Nurseries and Urban Landscapes in Wisconsin	X				X	

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
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WIS04702	Tracy, W.	Conservation, Management, Enhancement, and Utilization of Plant Genetic Resources (NC-007)	X	X				
WIS04703	Palmer, R.	Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises (NC-1119)	X	X			X	
WIS04704	Armentano, L.	Metabolic Relationships in Supply of Nutrients for Lactating Cows (NC-1009)	X	X			X	
WIS04705	Mathews, N.	Landscape Ecology of Whitetailed Deer in Agro-Forest Ecosystems: A Cooperative Approach to Support Management (NC-1005)	X	X				
WIS04706	Phillips, M.	The Impact of Exotic Buckthorns in Wisconsin			X			
WIS04708	Lehmkuhler, J.	Nutritional Strategies to Reduce Nutrient Excretion From Beef Animals	X				X	
WIS04718	Shook, G.	Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle (S-1008)	X	X				
WIS04719	Hogg, D., German, T., Grau, C., Boerboom, C.	Dynamic Soybean Pest Management for Evolving Agriculture Technologies and Cropping Systems (S-1010)	X	X			X	
WIS04726	Thomas, M.	Understanding the Biosynthesis of the Broad-Spectrum Antibiotic Streptothricin	X					
WIS04729	Shoemaker, D.	Effects of Wolbachia on Host MTDNA Evolution	X					
WIS04734	Ruegg, P.	Mastitis Resistance to Enhance Dairy Food Safety (NE-1009)	X	X			X	
WIS04735	Wiltbank, M., Fricke, P.	Methods to Increase Reproductive Efficiency in Cattle (NC-1006)	X	X			X	
WIS04736	Khatib, H.	Candidate Gene Approach for Identification of Genes Affecting Milk Production Traits in Dairy Cattle	X					
WIS05231	Shaver, R.	Starch Properties of Corn and Utilization by Dairy Cattle	X				X	
WIS05233	Yandell, B.	New Approaches to Analysis of Microarray Data: Epigenetic Control of Maize Endosperm Gene Expression as a Model	X					
WIS05234	Handelsman, J.	The Trojan Horse and the Gypsy Moth: Harnessing Killer Plasmids for Targeted Study of Microbial Communities	X					
WIS05235	McManus, P.	Trojan Horse in the Orchard: A Novel Strategy to Combat Erwinia Amylovora, the Fire Blight Pathogen	X				X	

Total: 2,590,368.63 660,601.10 307,734.37 145,713.36 610,870.42 195.15

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E
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**Objective 1.4: To Improve Decision-Making on Public Policy Related to Productivity and Global Competitiveness of the U. S. Agricultural Production System**

WIS04302	Thomas, D. L.	Comparison of East Friesian and Lacaune Dairy Sheep	X				X	
WIS04423	Fortenbery, T. R	Development of Basis Forecasting Tools for Wisconsin Agricultural Markets	X				X	
WIS04456	Buongiorno, J.	Effects of Economic Shocks, Trade Liberalization, and Recycling Policies on the Global Forest Sector			X			
WIS04519	Cropp, R. A.	Characterization of Markets and Implications of Price Risk Management for the Wisconsin Dairy Industry	X				X	
WIS04559	Buttel, F. H.	Impact Analysis and Decision Strategies for Agricultural Research (NC-1003)	X	X				
WIS04586	Stiegert, K. W.	Understanding Foreign Direct Investment in an Expandable Global Economic Arena	X					
WIS04589	Zeuli, K.	The Implications of Dairy Cooperative Mergers and Vertical Integration on Member Benefits	X				X	
<b>WIS04654</b>	<b>Chavas, J. P.</b>	<b>An Economic Analysis of Resource Mobility in Agriculture</b>	X					
<b>WIS04693</b>	<b>Bell, M.</b>	<b>Farm Family Success in Diversified Agriculture: A Comparative Study of Wisconsin Farm Families</b>	X					
<b>WIS04717</b>	<b>Kloppenburg, J.</b>	<b>Sustaining Local Food Systems in a Globalizing Environment: Forces, Responses, Impacts (NE-1012)</b>	X	X				
<b>WIS04748</b>	<b>Kleinman, D.</b>	<b>Where is the Social in the Regulation of Agricultural Biotechnology?</b>	X					
<b>Total:</b>			<b>148,740.20</b>	<b>39,872.00</b>	<b>28,281.95</b>	<b>0</b>	<b>66,134.48</b>	<b>10.41</b>
<b>Total Goal 1:</b>			<b>3,062,787.54</b>	<b>765,172.70</b>	<b>336,016.32</b>	<b>145,713.36</b>	<b>737,511.32</b>	<b>226.80</b>

## ***Impact Statements and Selected Results***

Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. A number of projects are reported as impacts on agriculture or natural resources. Some of the projects had funding from Hatch, McIntire-Stennis and Animal Health; others were funded from competitive federal programs and industry gifts and grants. Outputs described in the original Plan of Work are illustrated by example from the past year in the following projects.

### **Bacteria and Environmental Factors Cause Cranberry Disease**

***Key themes: Plant health, Agricultural profitability***

***Focus area: Water quality, Sustainability of agriculture and forestry***

The issue: Cranberries are Wisconsin's most important fruit crop. Tangy, tart and bright red, they accent the Thanksgiving dinner table and are used year round in everything from breads to salads. Last year, state growers produced more than half of the world's cranberries, and the industry contributes millions of dollars to Wisconsin's economy. Cranberry growers across the nation, but particularly in Wisconsin, are familiar with stem gall, a growth that crushes water-carrying vessels in the stem, killing the plant's fruit-bearing shoots. Weed problems often arise in places where shoots die from stem gall. Growers initially believed that the rough bumps were caused by fungal infection, or were wound callus tissue that formed after injury from field equipment. However the malady thwarted treatment with fungicide and the severity varied from year to year, suggesting that the problem was likely not caused simply by contact injury.

What's been done: When a UW-Madison researcher examined cranberry stem gall under a microscope, she realized that it does not resemble wound callus tissue. She also found large numbers of bacteria deep within the galls. These bacteria, which are commonly found in fields, produce a growth hormone called indole acetic acid (IAA). Under normal conditions, bacteria that produce IAA may promote root growth, but if they enter a plant—through an injury caused by field equipment or frequent freeze-thaw cycles—they may cause harmful growth. A UW-Madison research team has demonstrated that IAA-producing bacteria cause galls on cranberry in tissue culture, and is working to repeat the findings with woody plants. This research is the first to link cranberry stem gall, or any cranberry malady, to bacteria.

Impact: Stem gall has historically been sporadic in occurrence, but outbreaks in Wisconsin have become increasingly frequent in the past decade. In 2002, most cranberry farms in central Wisconsin were affected. Knowing that bacteria are the most probable cause of cranberry stem gall will put an end to the futile use of fungicides to control this disease. This is especially significant because cranberries are produced in environmentally sensitive wetlands, and the fungicides used on cranberries are toxic to fish. Furthermore, growers will benefit economically, since a fungicide application costs approximately \$30 per acre, plus labor and fuel.

More information at <http://news.cals.wisc.edu/stories/newsDisplay.asp?id=935>

This project has both immediate and long-term impacts. Presentations were made by Dr. McManus at Wisconsin Cranberry School in Wisconsin Rapids in January, Mini-Fruit clinics at Warrens WI and Manitowish Waters, WI in June, Master Gardener Training in three locations in October and the Cranberry Field Day in August for 2003. An extension publication was done on Cranberry Pest Management in Wisconsin and published in 2003. Dr. McManus also edited the 2003 Cranberry Pesticide Chart produced by the Cranberry Institute. Four articles were published in the Wisconsin State Cranberry Growers News. A Ph.D. student thesis was accepted in January 2004. Immediate changes in grower use of fungicides will have long-term impacts on water quality and environmental protection.

Funding: Wisconsin Hatch project #WIS04448, “Characterization of *Agrobacterium* spp. Isolated from Cranberry and Etiology of Cranberry Stem Gall”, Wisconsin Cranberry Board, and the Cranberry Institute.

### **Milk Quality**

*Key themes: Animal health, Agricultural profitability*

*Focus areas: Sustainability of agriculture and forestry*

The Issue: Milk-quality premiums allow dairy farmers to increase the marginal profit of their farms because they offer one of the few ways for farmers to increase the selling price of their milk. Many Wisconsin dairy farmers aren't getting premiums for quality milk.

What's been done: A UW-Madison/Extension milk quality specialist developed Milk Money, a team-based approach to improving milk quality and boosting profitability. Farmers themselves determine the goals for their operations, then choose a team of dairy experts that meets monthly to discuss the farmer's milk quality goals and how to meet them.

The team focuses on improving milk quality by reducing mastitis. Farmers can't sell milk from cows with clinical mastitis, but subclinical mastitis also robs profits. High rates of subclinical mastitis decrease farm income and increase the risk of antibiotic residues appearing in milk. Teams identify best management practices that will help to maximize those premiums, such as analyzing the milking system several times per year, performing bulk tank cultures, culturing and recording all cases of clinical mastitis, having and using a written milking routine, and regularly discussing milk quality with veterinarian and field representative.

Impact: Seventy-five herds completed the Milk Money program by mid-2003. These dairy farms increased their monthly milk income by more than \$152,000, an average of \$2,032 per farm. Monthly milk quality premiums increased \$1,188 per farm; monthly savings on costs of treating clinical mastitis averaged \$72 per farm, and higher monthly milk production due to less subclinical mastitis added \$572 per farm to monthly milk checks.

On average, each farm increased its milk quality premiums by 28 cents per hundredweight, cut its bulk tank somatic cell count by 20 percent, reduced rates of clinical mastitis by 28 percent, and cut monthly production losses from subclinical mastitis by 44 percent.

This project has both short and long-term impacts. Participating farms realized immediate profits from increased milk profits and decreased costs of treatment (at a time when milk prices were very low and increases particularly helpful). Extending the monthly increases to an annual basis shows an income increase of over one million dollars for these farms alone. Teams working on the farms include county extension agents as team leaders in many cases; experience with single farms are multiplied through the extension network to include whole counties. Dr. Ruegg presented results of the program in 32 state presentations and 3 other presentations including one in Spanish in Mexico in 2003. An extension website on the Milk Money program is available for producers at <http://www.uwex.edu/milkquality/Programs/index.htm>. The website receives almost 3000 visits per month and was listed as the #1 milk quality website by Google last year. Long-term impacts include the education of everyone on the team – veterinarians, extension, producers, farm equipment services and farm labor with implications for all the other producers that these professionals serve.

Funding: Wisconsin Hatch project #WIS04734, “Mastitis Resistance to Enhance Dairy Food Safety (part of multistate project NE-1009), and Wisconsin Milk Marketing Board.

### **Investigation of Robotic Milking System Performance**

***Key themes: Managing change in agriculture, Animal health, Innovative farming techniques***

***Focus areas: Sustainability of agriculture and forestry***

The Issue: Milking labor consumes about 50 million worker-hours per year in Wisconsin. Robotic milkers could lower the rate of repetitive-stress injuries and reduce the number of farm accidents caused by operator fatigue. Robotic milking machines are now available on the U.S. market, but there was no provision for unattended milking in the Pasteurized Milk Ordinance (national regulations for grade-A milk production).

What's Been Done: A group of state and federal regulators and researchers did a field study of robotic milkers. UW-Madison researchers did targeted studies on robotic milkers at the Arlington Agricultural Research Station and collected milk quality data from all robotic milker installations in the United States. The group proposed a change to the PMO to accommodate robotic milkers and presented that change, along with field data, to the National Conference on Interstate Milk Shipping.

Impact: This project has both short and long-term impacts. Results of this study showed no significant differences in milk yield or somatic cells score for a national survey of 12 herds using robotic milkers. Minor differences in milk yield (higher for robotic) and somatic cells (higher for robotic) were detected in a controlled trial at UW-Madison. State departments of agriculture voted on and approved the proposed change to allow automatic milking, and the U.S. Food and Drug Administration concurred, thus approving robotic milking systems for grade-A milk production in the United States. UW-Madison researchers also surveyed users of robotic milkers and investigated economic impacts and management priorities. Using these data, the researchers have developed guidelines for users of robotic milkers and plan to offer a two-day short course for potential users in fall 2004. Long-term impacts will be an inclusion of the option of robotic milking for dairies that may address labor issues of the prime constraints for small and moderate sized farms.

More info at <http://www.uwex.edu/uwmril/robot/rmain.htm>

Funding: Wisconsin Hatch project #WIS04521, “Investigation of Robotic Milking System Performance” and Equipment Manufacturers Institute.

### **A Bio-Economic Approach to Weed Management**

*Key themes: Innovative farming techniques, Plant health*

*Focus areas: Improved pest control and food quality and protection act implementation*

The issue: Each year, farmers in Wisconsin spend millions of dollars managing weeds. Weeds compete with crops for water, light and soil nutrients, and reduce yield and profits for farmers. Currently, weed management in the Midwest relies heavily on herbicide use, which has environmental and economic costs. Implementing more ecologically-based weed management practices requires greater understanding of the biological factors that drive weed-crop competition.

What’s been done: UW-Madison researchers examined the relative competitive ability of eight common weed species with corn by tracking early-season shoot growth, late-season shoot biomass, and corn grain yield. They found a wide range of abilities among the eight species, suggesting different competitive strategies. The weed species that were most competitive with corn produced large seeds, but relatively few of them. In contrast, one less-competitive species had prolific seed production, providing an explanation for why it is one of the most common weed species in the Midwest. The results suggest that weeds make tradeoffs between seed size and seed quantity, and sometimes produce more seeds at the cost of being less competitive with corn. Knowledge of the relative competitive abilities among weed species is important for improving short-term weed management decisions and protecting crop yield, whereas knowledge of the different competitive strategies among weeds may help farmers improve long-term weed management.

Impact: Assessing the competitive ability of weeds is an important part of ecologically based management strategies. Results of this research will increase understanding of weed-crop competition and weed population dynamics. They also help to improve bio-economic weed management support systems, which offer potential economic benefits to farmers by reducing reliance on herbicides. Reducing herbicide use helps prevent non-point source pollution by keeping chemicals out of waterways.

This project has both short and long-term impacts. Immediate impacts are the recommendations given to producers on herbicide applications or management changes to address weed communities. One outcome has been a policy recommendation endorsed by a number of WI farm organizations on use of “Round-up” as a part of weed management and the need for care in preserving this tool as long as possible. See [http://ipcm.wisc.edu/uw\\_weeds/](http://ipcm.wisc.edu/uw_weeds/), Glyphosate White Paper endorsed by the Wisconsin Corn Growers Association, Wisconsin Soybean Association and the Wisconsin Potato and Vegetable Growers among others. Longer-term results include looking at development of resistance to herbicides over longer periods and the changing ecology of weed/crop interactions that may impact decision-making on farms in the future.

Current advice on weed management based on CALS research results can be found at <http://ipcm.wisc.edu/wcm/>

Funding: Hatch project #WIS03442, “Characterizing Weed Population Variability for Improved Weed Management Decision Support Systems to Reduce Herbicide Use (part of multistate project NC202) and University of Wisconsin Foundation.

## **Goal 2. A Safe and Secure Food and Fiber System.**

### *Executive summary*

Under this goal, there were 9 projects including 2 that were multistate, interdisciplinary projects, and 1 integrated research/extension project. Wisconsin is committed to continually changing its portfolio of research.

Wisconsin has a strong livestock economy with the majority of milk producers selling milk for cheese manufacture and export from Wisconsin. Milk producers have indicated that their most pressing problems are support of the milk price and federal marketing structure in light of international economics. Project #4654, “An Economic Analysis of Resource Mobility in Agriculture” will address this problem. Animal diseases and the need for new antibiotics to replace those no longer effective will be addressed in project #4726, “Understanding the Biosynthesis of the Broad-Spectrum Antibiotic Streptothricin” and project #4660, “Transcription Initiation Complexes in Diverse Bacteria”.

### *Updated project list for FY03*

New projects are printed in **bold**. Note that recent reclassification of projects has moved some projects into goals different from those previously listed in the Plan of Work. Projects falling under multiple goals are listed in each.

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E.
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**Goal 2: A Safe and Secure Food and Fiber System**

**Objective 2.1: To Improve Access to an Affordable, Healthful, and Culturally Relevant Food Supply**

WIS04227	Gunasekaran, S.	Marketing and Delivery of Quality Cereals and Oilseeds (NC-213)	X	X				
WIS04519	Cropp, R. A.	Characterization of Markets and Implications of Price Risk Management for the Wisconsin Dairy Industry	X				X	
WIS04586	Stiegert, K. W.	Understanding Foreign Direct Investment in an Expanding Global Economic Arena	X					
<b>WIS04654</b>	<b>Chavas, J. P.</b>	<b>An Economic Analysis of Resource Mobility in Agriculture</b>	<b>X</b>					
Total:			46,980.20	20,361.00	0	0	1,778.28	1.65

**Objective 2.2: To Improve Food Safety by Controlling or Eliminating Foodborne Risks**

WIS04530	Kaspar, C. W.	Regulation of DPS - A Key Acid Tolerance Protein in E. Coli 0157:H7	X					
WIS04660	Grouse, R.	Transcription Initiation Complexes in Diverse Bacteria	X					
WIS04667	Yu, J.	Genetic Studies of Fungal Asexual Sporulation Signaling Pathway	X					
WIS04726	Thomas, M.	Understanding the Biosynthesis of the Broad-Spectrum Antibiotic Streptothricin	X					
Total:			77,806.81	0	0	0	0	4.03
<b>Total Goal 2:</b>			<b>124,787.01</b>	<b>20,361.00</b>	<b>0</b>	<b>0</b>	<b>1,778.28</b>	<b>5.68</b>

## ***Impact Statements and Selected Results***

Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. A number of projects have impacts on food processors and consumers. Some of the projects had funding from Hatch, McIntire-Stennis and Animal Health; others were funded from competitive federal programs and industry gifts and grants. Outputs described in the original Plan of Work are illustrated by example from the past year in the following project.

### **Dairy Cooperatives: Tackling Change Together**

#### ***Key themes: Food resource management***

#### ***Focus areas: Small farms and their contribution to local economies***

The issue: Dairy farmers face increasing milk price volatility and price risk. Cooperatives have long been a strategy for small farms to compete with larger units, but changing conditions have eroded the advantages of small cooperatives. The top 50 cooperatives account for almost 90 percent of farm level milk handled by cooperatives and number of dairy cooperatives is down by a factor of 10 from 50 years ago. Vertical integration is occurring with strategic alliances in marketing and production of dairy products.

What's been done: Investigations of additional cooperative ventures have included merger analyses, equipment cooperatives, newly organized specialty cooperatives (e.g. organic), and meeting the needs of large scale customers. Several publications have been produced to help cooperatives evolve with changing economics.

Impacts: Wisconsin cooperatives were found to be responsible for nearly 30,000 jobs in Wisconsin and close to \$1 billion in total income within the state, including contributions of 140 million dollars to state, federal, and local taxes.

Publications detailing the structural change and suggesting alternative strategies have been produced and are available on the WWW.

An analysis of machinery cooperatives for dairy farms in the Upper Midwest:

[http://www.wisc.edu/uwcc/info/supply/staff\\_09\\_02.html](http://www.wisc.edu/uwcc/info/supply/staff_09_02.html)

The historical role of dairy cooperatives:

[http://www.wisc.edu/uwcc/info/uwcc\\_pubs/topic.html#dairy](http://www.wisc.edu/uwcc/info/uwcc_pubs/topic.html#dairy)

The role of cooperatives in community government:

[http://www.wisc.edu/uwcc/info/uwcc\\_pubs/author.html#zeuli](http://www.wisc.edu/uwcc/info/uwcc_pubs/author.html#zeuli)

This project has both short and long-term impacts. Dr. Zeuli taught four sessions of training for Cooperative Board of Director members. These three or four day sessions are designed to provide cooperative leaders with business models leading to a certificate after the final workshop. A national satellite conference on forestry cooperatives had over 200 participants

from around the country (joint with Minnesota). Program participants carry the education and business planning publications back to their coops resulting in longer-term impacts as cooperatives change their business plans to cope with changing cooperative structures.

Funding: Hatch project #WIS04519, “Characterization of Markets and Implications of Risk Management for the WI Dairy Industry” and Hatch project #WIS04589, “The Implications of Dairy Cooperative Mergers and Vertical Integration on Member Benefits” as well as a USDA Fund for Rural America grant.

## **Goal 3. A Healthy, Well Nourished Population.**

### *Executive summary*

Under this goal, there were 14 projects including 1 that was a multistate interdisciplinary project, and 2 that were integrated research/extension projects. Some projects listed under Goals 1 and 2 also have relevance for Goal 3. For instance, project #4241, “Quantitative Aspects Lysine Metabolism in the Pig” examines the limiting amino acid in a non-ruminant and has applications to human nutrition especially for infants and children. Project #4422, “Genetic Engineering of Oat with Transgenes Encoding Antifungal Proteins and Resistance Pathway Regulators for Improving Disease Resistance” and #4558, “Mycotoxins in Cereal Grains” have implications for human food safety.

Wisconsin is committed to continually changing its portfolio of research. New projects this year include one aimed at nutrition of hospitalized patients, “Enterotrophic Effects of Insulin-like Growth Factor 1 and Growth Hormone during Parenteral Nutrition”. Another new project looks at the interactions of insects and their symbiotes, “Effects of Wolbachia on Host mDNA Evolution”.

### *Updated project list for FY03*

New projects are printed in **bold**. Note that recent reclassification of projects has moved some projects into goals different from those previously listed in the Plan of Work. Projects falling under multiple goals are listed in each.

Wisconsin Principal Title of Project  
Project No. Investigator

Hatch Total Hatch McIntire/ Animal Extension Total  
(Regular & Multistate Stennis Health Activity F.T.E.)

Goal 3: Healthy, Well Nourished Population

Objective 3.1: To Optimize The Health of Consumer By Improving the Quality of Diets, the Quality of Food, and the Number of Food Choices

WIS03967	Nitzke, S. A.	Using Stages of Change Model to Promote Consumption of Grains, Vegetables and Fruits by Young Adults (NC-219)	X	X			X	
WIS04306	Ntambi, J. M.	Conjugated Linoleic Acid (cla) in Fat Cell Differentiation and Metabolism	X					
WIS04315	Smith, S. M.	Functions of Vitamin A in Celiac Development and Function	X					
WIS04440	Eisenstein, R. S	Iron Regulation of Transferrin Synthesis & Secretion	X					
WIS04444	Groblewski, G. E	Calcium/Calmodulin Dependent Protein Kinase II and Digestive Exocrine Secretion	X					
WIS04525	Reed, J D.	Structure of Cranberry Proanthocyanidins That Protect Low Density Lipoproteins From CU2+ Induced Oxidation	X					
WIS04532	Goldman, I. L.	Biosynthesis of Tocopherols (Vitamin E) and Relationship to Provitamin A Carotenoids in Carrot	X					
WIS04533	Tanumihardjo, S. A.	Development of 13C Stable Isotope Techniques to Assess Vitamin A Status and Carotenoid Bioavailability	X				X	
WIS04672	Ney, D.	Enterotrophic Effects of Insulin-Like Growth Factor-1 and Growth Hormone During Parenteral Nutrition	X					
Total:			285,477.92	7,651.00	0	0	44,050.82	23.40

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/ Stennis	Animal Health	Extension Activity	Total F.T.E.
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**Objective 3.2: To Promote Health, Safety, and Access to Quality Health Care**

WIS04433	Jeanne, R. L.	Mechanisms of Communication Yellowjacket Wasps	X					
WIS04487	Lan, Q.	Isolation of Cuticle Protein Genes from Mosquito, Aedes Aegypti	X					
WIS04526	Chambliss, G.	Degradation of Explosive Compounds by Bacteria	X					
WIS04527	Landick, R.	Recognition of Pause and Termination Regulatory Signals By Diverse Bacterial RNA Polymerases	X					
WIS04729	Shoemaker, D.	Effects of Wolbachia on Host MTDNA Evolution	X					
Total:			116,375.14	0	0	0	0	11.00
<b>Total Goal 3:</b>			<b>401,853.06</b>	<b>7,651.00</b>	<b>0</b>	<b>0</b>	<b>44,050.82</b>	<b>34.40</b>

## ***Impact Statements and Selected Results***

Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. A number of projects listed under other goals have impacts on human health and nutrition. Some of the projects had funding from Hatch, McIntire-Stennis, and Animal Health; others were funded from competitive federal programs and industry gifts and grants. Outputs described in the original Plan of Work are illustrated by example from the past year in the following projects.

### **Vitamin A May Help Prevent Heart Defects in Unborn Children**

***Key issues: Human health, Human nutrition, Infant mortality***

***Focus areas: Modifying food intake behavior***

The issue: Congenital heart malformations are the most common birth defects in both humans and animals, affecting seven of every 1,000 live human births in the United States. Cardiac defects can range from mild to life threatening and treatment may require medication or surgery. The malformations occur during the first weeks of an embryo's development, and lack of proper nutrition is known to increase the likelihood of a defect. It is unclear whether inadequate Vitamin A intake in low-income mothers contributes to heart defects in children.

What's been done: Researchers at the UW-Madison examined the contribution of retinoids, a class of Vitamin A compounds, to heart development in mouse embryos. In mice that lack a protein that transports Vitamin A to target tissue, researchers found that cardiac problems are likely to occur. Moreover, when these mice grew to adulthood they had additional heart problems, suggesting that good Vitamin A nutrition is essential for healthy heart function in adults as well.

Impact: If researchers can identify nutritional inadequacies that pose a developmental risk to the fetus, measures can be taken to encourage pregnant women to obtain the necessary amounts of vitamins and nutrients from a healthy diet or from dietary supplements. Despite prenatal care and vitamin supplement use, Vitamin A insufficiency still remains a problem for certain populations in the U.S., particularly those women receiving inadequate prenatal care or who have limited access to nutritious foods. One recent study of WIC recipients suggested that 22% of those low-income women had limited Vitamin A status. However, women should not consume greater than the daily recommendation for Vitamin A, because too high a level can also be dangerous to the fetus.

This project has both short and long-term impacts. In the short-term, the publication of results (3 peer-reviewed papers in 2003) has raised the awareness of experts in the field to this new concern. This project resulted in an oral presentation at the Experimental Biology national meetings in 2003 as well as two poster presentations on cardiac hypertrophy and Vitamin A. Susan Smith is the organizer for a 2004 Mini-Symposium featuring Retinoids at the Experiment Biology meetings. Long-term impacts will result from incorporation of the research results into dietary recommendations for pregnant women and children.

Funding: Hatch project #WIS04315, “Functions of Vitamin A in Cardiac Development and Function and National Institutes of Health.

### **Biosynthesis of Tocopherols (Vitamin E) in carrot**

*Key issues: Human health, Nutraceuticals*

*Focus areas: Modifying food intake behavior*

The issue: Improving the nutritional content of common foods promises to be one of the easiest ways to insure nutritional health. Tocopherols (Vitamin E) are potent anti-oxidants that may confer a variety of health benefits. Vegetable oils and oilseeds are the most common sources of Vitamin E today. Very little research has focused on identifying Vitamin E or increasing Vitamin E content in the fleshy parts of vegetables.

What’s been done: Researchers at the UW-Madison studied a mutant white carrot that had very low levels of carotenoids (Vitamin A). The Vitamin A and Vitamin E production pathways in plants are closely related; both arise from the same compound. The researchers theorized that the white carrot, which didn’t produce Vitamin A, might produce Vitamin E instead. The white carrot didn’t produce high levels of Vitamin E, but while studying it, the researchers developed a process to detect Vitamin E in carrot roots. The process also detects Vitamin E content in sweet potatoes and tomatoes. The researchers have an ongoing screening program, examining carrot germplasm from around the world for increased Vitamin E content.

Impact: Dietary Vitamin E may promote anti-cancer activity in humans, as well as helping to fight aging-related degenerative disorders. The UW-Madison researchers are developing germplasm that produces carrots with increased levels of two types of tocopherols: alpha and gamma, both of which have strong anti-oxidant properties. The researchers aim to enhance the levels of a biological form that occurs right in the vegetable, rather than in a pill. Pill forms of vitamins and other nutrients have different absorption properties than biological forms, and can be toxic in high doses. Vitamin E enhanced carrots could also provide a "low-oil" alternative to deliver the vitamin in human diets.

This project has both short and long-term impacts. In the short-term, a patent has been issued on a reduced pigment gene of carrot and a high pigment beet. A new cultivar of beet is ready for release. A new protocol for detecting Vitamin E in foods has been developed and is in use. A brochure on the taste-tests of carrot varieties has been prepared using young adult preferences. Long-term impacts include education on the nutraceutical value of foods and development of improved vegetable cultivars for human health.

Funding: Hatch project #WIS04532, “Biosynthesis of Tocopherols (Vitamin E) and Relationship to Provitamin A in Carrot”, Phytocolorants LLC, and Midwest Food Processors Association.

## **Goal 4. Greater Harmony Between Agriculture and the Environment.**

### *Executive summary*

Under this goal, there were 44 projects including 9 that were multistate interdisciplinary projects, 2 were McIntire-Stennis projects, and 11 were integrated research/extension projects. Projects listed under Goal 1 have many aspects that address the interactions of agricultural production and protection of natural resources.

Wisconsin is committed to continually changing its portfolio of research. Rural areas are struggling with many land use issues including the conversion of farmland to housing and retail businesses. Stakeholder meetings have emphasized the need for research to support the decision-making of local county boards and townships particularly with respect to runoff from agricultural operations and developed land. New projects include “Fate of Phosphorus During Chemical Manure Treatment and Subsequent Land Disposal of Treated Solids”, “Evaluating the Influence of Slope Angle and Aspect in Soil-Landscape Development in the Driftless Area of Southwestern Wisconsin”, Effect of Urban Compaction on Soil Structure and its Restoration with Prairie Vegetation”, and “Quantifying the Effectiveness of Infiltration Trenches on Reducing Runoff Temperatures from Impervious Surfaces.

### *Updated project list for FY03*

New projects are printed in **bold**. Note that recent reclassification of projects has moved some projects into goals different from those previously listed in the Plan of Work. Projects falling under multiple goals are listed in each.

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E.
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**Goal 4: Greater Harmony Between Agriculture and the Environment**

**Objective 4.1: To Develop, Transfer, and Promote the Adoption of Efficient and Sustainable Agricultural, Forestry, and Other Resource Conservation Policies, Programs Technologies, and Practices that Ensure Ecosystems Integrity and Biodiversity**

WIS02846	Lowery, B.	Impact of Accelerated Erosion on Soil Properties and Productivity (NC-174)	X	X			X	
WIS03879	Bundy, L. G.	Characterizing Nitrogen Mineralization and Availability in Crop Systems to Protect Water Resources (NC-218)	X	X			X	
WIS04450	Helmke, P. A.	Mineralization of Soil Organic Phosphorus by Phosphatase and Phytase and Its Relation to Plant Nutrition	X					
WIS04451	Kung, K. S.	Quantifying the Soil Pore Spectrum to Minimize Chemical Leaching Through Field-Scale Preferential Flows Paths	X					
WIS04538	Barak, P. W.	Mining New Phosphorus Data From Old Soil Fertility Experiments	X					
WIS04539	Kruger, E. L.	Does Stomatal Closure Mediate Nitrogen Deprivation in Tress Exposed to Elevated Atmospheric CO2?	X					
WIS04541	Lane, M. B.	Democratic Planning at Multiple Scales in Plural Societies: Natural Resource Governance in Wisconsin	X					
WIS04555	Thomas, C.	The Status of Black Bear Research in Northwestern Wisconsin Forests			X			
WIS04592	Kosola, K. R.	The Role of Soil Water Potential in Establishment of Cranberry Beds	X					
WIS04606	Crooks, K. R.	Evaluating Landscape –Connectivity Through Radio-Telemetry and Simulation Modeling of Carnivore Movement	X					
WIS04607	Stone, B.	Urban Design and Ecosystem Stress: Quantifying the Relationship Between Development Design Standards and Impervious Land Cover in Madison, Wisconsin	X					
WIS04614	Balsler, T. C.	Microbial Community Structure and Soil Carbon Cycling in Old-Growth and Managed Forests of the Southern Lake Superior Uplands	X					
WIS05228	Cooperband, L.; MacGuidwin, A.; Goodman, R.; Stevenson, W.; Staub J.	Vegetable Production With Raw or Composted Paper Mill Sludge: Effects on Soil Quality in Wisconsin's Central Sands	X				X	
WIS04655	Karthikeyan, K.G.	<b>Fate of Phosphorus During Chemical Manure Treatment and Subsequent Land Disposal of Treated Solids</b>	X					
WIS04675	Bleam, W.	<b>Trace Metal Interactions with Soil Organic Matter: Defining the Role of Specific Ligands</b>	X					
WIS04679	DeVita, W.	<b>Evaluating Transpiration and Pesticide Uptake in Hybrid Poplars at the Active Phytoremediation Site</b>			X			

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/ Stennis	Animal Health	Extension Activity	Total F.T.E.
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WIS04680	Bozek, M.	Development of a Dynamic Riparian Forest Management Model			X			
WIS04681	Ribic, C.	Predator Activity and its Relationship to Grassland Bird Nesting Success in an Agricultural Landscape	X					
WIS04753	Stiles, C.	Evaluating the Influence of Slope Angle and Aspect in Soil-Landscape Development in the Driftless Area of Southwestern Wisconsin	X					
WIS04805	Balster, N.	The Effect of Urban Compaction on Soil Structure and its Restoration with Prairie Vegetation	X					
Total:			367,951.50	56,798.00	39,681.21	0	125,138.49	17.70

**Objective 4.2: To Develop, Transfer, and Promote Adoption of Efficient and Sustainable Agricultural, Forestry, and Other Resource Policies, Programs, Technologies, and Practices that Protect, Sustain, and Enhance Water, Soil, and Air Resources**

WIS03601	MacGuidwin, A. E.	Biocontrol of Soil-and Residue-Borne Plant Pathogens (NC-125)	X	X				
WIS03910	Wedberg, J. L.; Wyman, J.A.	A National Agricultural Program to Clear Pest Control Agents for Minor Uses (NRSP-4)	X	X			X	
WIS04265	Hogg, D. B.; Grau, C. R.; Undersander, D. J.; Doll, J. D.; Wedberg, J. L.	Development of Pest Management Strategies for Forage Alfalfa Persistence (NC-226)	X	X			X	
WIS04307	Wyman, J. A.	Biological Regulation of Aphid Populations in Wisconsin Potatoes	X				X	
WIS04317	Goodman, R. M.	Analysis of Microbiota Associated with Plant Roots in Compost-amended Farm Soil	X					
WIS04427	Goodrich-Blair, H.	Genetic and Biochemical Characterization of an Ant-Deterrent Produced by X. Nematophilus	X					
WIS04453	Mackay, D. S.	Distributed Parameter NonPoint Source Pollution Modeling in Nested Watersheds	X					
WIS04457	Lindroth, R. L.	Effects of Air Pollutants on Trophic Interactions			X			
WIS04534	Handelsman, J.	Microbial Communication in the Rhizosphere Community	X					
WIS04541	Lane, M. B.	Democratic Planning at Multiple Scales in Plural Societies: Natural Resource Governance in Wisconsin	X					
WIS04584	Luschei, E. C.	An On-Farm Assessment of Weed Management Decision Making Under Uncertainty	X					
WIS04595	Converse, J.; Karthikeyan, K. G.	Animal Manure and Waste Utilization, Treatment and Nuisance Avoidance for a Sustainable Agriculture (S-1000)	X	X			X	

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/ Stennis	Animal Health	Extension Activity	Total F.T.E.
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WIS04655	Karthikeyan, K.G.	Fate of Phosphorus During Chemical Manure Treatment and Subsequent Land Disposal of Treated Solids	X					
WIS04660	Gourse, R.	Transcription Initiation Complexes in Diverse Bacteria	X					
WIS04664	Martin, T.	Identifying Novel Chemical Inhibitors of Synaptic Neurotransmission with Potential Applications for Pesticide/Nematicide Development.	X					
WIS04680	Bozek, M.	Development of a Dynamic Riparian Forest Management Model			X			
WIS04683	Gower, S.	Net Primary Production and Carbon Allocation Pattern of Terrestrial Ecosystems: Global Analysis of Environmental and Land Use Change Effects			X			
WIS04689	Williamson, R.	Biology, Ecology, and Management of Linden Borer, A Serious Insect Pest of Shade Trees in Nurseries and Urban Landscapes in Wisconsin	X				X	
WIS04719	Hogg, D., German, T., Grau, C., Boerboom, C.	Dynamic Soybean Pest Management for Evolving Agriculture Technologies and Cropping Systems (S-1010)	X	X			X	
WIS04801	Thompson, A.	Quantifying the Effectiveness of Infiltration Trenches on Reducing Runoff Temperature from Impervious Surfaces	X					
WIS05232	Stier, J.	Vegetable Buffer Strips for Reducing Contaminated Runoff from Urban Areas	X				X	
WIS05235	McManus, P.	Trojan Horse in the Orchard: A Novel Strategy to Combat Erwinia Amylovora, the Fire Blight Pathogen	X				X	
Total:			344,762.35	73,383.30	75,619.63	0	180,404.42	27.68

**Objective 4.3: To Improve Decision-Making on Public Policies Related to Agriculture and the Environment**

WIS04289	Hickey, W. J.	Microbiological and Bio-physical Factors Controlling Bioavailability and Biodegradation of Polynuclear Aromatic Hydrocarbons (PAHS)	X					
WIS04451	Kung, K. S.	Quantifying the Soil Pore Spectrum to Minimize Chemical Leaching Through Field-Scale Preferential Flows Paths	X					
WIS04453	Mackay, D. S.	Distributed Parameter NonPoint Source Pollution Modeling in Nested Watersheds	X					
WIS04466	Hickey, W. J.	Soil Microbial Taxonomic and Functional Diversity as Affected by Land Use and Management (S-297)	X	X				
WIS04485	Wolkowski, R. P.	Integrating Biophysical Functions of Riparian Systems With Management Practices and Policies (NC-230)	X	X			X	
WIS04538	Barak, P. W.	Mining New Phosphorus Data From Old Soil Fertility Experiments	X					

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E.
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WIS04541	Lane, M. B.	Democratic Planning at Multiple Scales in Plural Societies: Natural Resource Governance in Wisconsin	X					
WIS04621	Pedersen, J. A.	Sorption of Sulfonamide Antibiotics to Soils and Clay Minerals	X					
WIS04661	Wasserman, K.	The Role of Ryea and RyeB Small RNA Regulators in E. Coli	X					
WIS04666	Wattiaux, M.	Dairy Cattle Diet Formulation on Performance, Nitrogen Utilization, Manure Nutrient Excretion, and Potential Ammonia Loss to the Environment	X					
WIS04693	Bell, M.	Farm Family Success in Diversified Agriculture: A Comparative Study of Wisconsin Family Farms	X					
WIS04748	Kleinman, D.	Where is the Social in the Regulation of Agricultural Biotechnology?	X					
Total:			140,013.25	9,414.00	0	0	10,756.66	10.41
Total Goal 4:			852,727.10	139,595.30	115,300.84	0	316,299.57	55.79

## ***Impact Statements and Selected Results***

Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. A number of projects are listed in other goals but have impacts on agriculture or natural resources. Some of the projects had funding from Hatch, McIntire-Stennis, and Animal Health; others were funded from competitive federal programs and industry gifts and grants. Outputs described in the original Plan of Work are illustrated by example from the past year in the following projects.

### **Alternatives to Pesticides for Potato Disease**

***Key themes: Biological control, Integrated pest management***

***Focus areas: Improved pest control and food quality and protection act implementation***

The issue: Potato early dying disease is a chronic problem in Wisconsin. Two soil-dwelling organisms, a fungus and a microscopic, worm-like creature called a nematode cause the disease. Either can invade a potato plant on its own and cause the disease, but when they occur together the levels of disease increase more than expected. Farmers can fumigate soil to control the nematode and fungus, but the pesticides used also kill beneficial organisms and can be hazardous to people. A possible alternative method is to add organic material to the soil, a technique that has been shown to reduce populations of pathogens with minimal impact on beneficial soil organisms.

What's been done: A research group at the UW-Madison is evaluating the effectiveness of adding organic matter to soil, growing pathogen-suppressive crops, and using solar energy to heat soil to temperatures that are lethal to pathogens. Organic amendments, such as buried plants or paper mill residuals, increase the soil's ability to retain water, creating a habitat more favorable for crops and the biological properties that promote crop growth. Some plants, like marigolds, emit chemicals while they are growing that are toxic to nematodes. Others, such as mustard, give off toxic vapors after they die and decompose. Wisconsin farmers already use some of these practices to control nematodes, and the research group is trying to identify which crops and organic materials give the best results. The researchers also want to understand the factors that cause variation in results from farm to farm. Another method, heating soil with plastic tarps, is still in the experimental stage, but has shown very promising results for reducing pathogenic fungi.

Impact: Growers treat almost 40 percent of the state's potato acreage for potato early dying disease. If left untreated, early dying causes the leaves of plants to wilt and ultimately the plant dies. If a field is infected and plants die prematurely, potatoes will remain small and farmers will lose a significant part of their crop. Pesticide applications cost about \$150 per acre; in comparison, alternative methods can cost significantly less. Disease-suppressive soil also poses no pollution risk and reduces harm to beneficial soil organisms.

Funding: Hatch project #WIS03601, "Biocontrol of Soil- and Residue-borne Plant Pathogens" (part of multistate project NC-125), Hatch project #WIS04318, "Persistence of Heterodera

Glycines and Other Regionally Important Nematodes” (part of multistate project NC-215) and Wisconsin Potato and Vegetable Growers Association.

**The Wisconsin Agricultural Stewardship Initiative: Improving Environmental and Economic Performance**

*Key issues: Nutrient management, Water quality, Riparian management*

*Focus areas: Water quality, Sustainability of agriculture and forestry*

The issue: There is a pressing need for greater coordination among research and outreach efforts directed towards improving the economic and environmental performance of agriculture in Wisconsin. Increasingly, farmers are challenged to meet environmental performance standards, while maintaining or increasing profitability. Developing and delivering state-of-the-art science-based information that meets producer needs in a timely and efficient manner has become an urgent priority. With a large number of animal enterprises and a network of watersheds, water quality is a pressing concern. Increasingly, stakeholders are demanding practical solutions and system approaches to management.

What’s being done: The Wisconsin Stewardship Initiative (WASI) was established in 2000 to facilitate coordination of research needs and priority setting for a series of activities related to environmental and economic issues of importance to Wisconsin agriculture. WASI involves representation from producer groups, environmental organizations, federal and state agencies, and universities. WASI has convened a series of meetings to prioritize research issues. The priority setting has helped guide research directions for the Discovery Farm Program (<http://www.discoveryfarms.org/>), an on-farm applied research program, and the University of Wisconsin-Platteville’s Pioneer Farm (<http://www.uwplatt.edu/~pioneerfarm/>). In addition, CALS researchers are contributing to this broad effort through individual Hatch projects and through other funding sources by targeting themes that fall under the umbrella of WASI research priorities. For example, research is being conducted to determine nitrogen mineralization rates in crop systems with the goal of optimizing fertilization and protecting water quality (WIS03879). Research is being undertaken to modify dairy cattle diet formulation with the goals of improving animal performance and reducing adverse impacts of nitrogen compounds in excreta on the environment. In both cases, the research is providing the science required to shape management practices that improve the environmental performance of agriculture in Wisconsin.

Short and long-term impacts: These collections of projects that relate to WASI have both immediate and long-term impacts. Controversy in the 2000-2001 legislative process concerning the role of buffers in the redesign of the Wisconsin non-point pollution control program led to the development of the Wisconsin Buffer Initiative. CALS, because of its research infrastructure and expertise, was asked by the Wisconsin Department of Natural Resources in March of 2002 to provide an overview of the science behind riparian buffers. This has led to a major research program to evaluate the design and efficacy of buffers that is being undertaken on select Discovery Farms and CALS Agricultural Research Stations. It is anticipated that one of the more important long-term impacts will be progressive improvement in research prioritization based on citizen input. Direct use of research will be in the guidelines on buffer requirements for the State of Wisconsin. In addition, we foresee much more involvement of CALS researchers in

developing the science that guides future policy development for water quality and other environmental issues that relate to natural resource management.

Funding: Wisconsin Hatch Project #WIS04666, “Dairy Cattle Diet Formulation on Performance, Nitrogen Utilization, Manure Nutrient Excretion, and Potential Ammonia Loss to the Environment.” Wisconsin Hatch Project #WIS03879 and Multistate Project NC-218, “Characterizing Nitrogen Mineralization and Availability in Crop Systems to Protect Water Resources.”

## **Goal 5. Enhanced Economic Opportunity and Quality of Life for Americans.**

### *Executive summary*

Under this goal, there were 22 projects including 3 that were multistate interdisciplinary projects, 2 McIntire-Stennis projects and 7 that were integrated research/extension projects. Included among these projects are those addressing the public perceptions and consumer behavior, literacy and democracy, rural economies, and applications of statistical methods for interpreting data.

Wisconsin is committed to continually changing our portfolio of research. Meetings with our stakeholders have emphasized the importance of understanding rural community vitality. New projects this year include “Family Farm Success in Diversified Agriculture: A Comparative Study of Wisconsin Family Farms”, “An Economic Analysis of Resource Mobility in Agriculture”, and Developing Indicators of Community Capacity and Documenting Community Capacity Benefits of Citizen Participation”. New molecular techniques and large-scale genomic screening tools have developed and scientific users have expressed the need for improved statistical methods. New projects include those on spatial analysis (for GIS and microscopy uses), analysis of microarray data (for genomics and proteomics use), and resampling techniques (for use in natural populations and ecology). Newly added projects indicate that faculty are responding to these stakeholder needs.

### *Updated project list for FY03*

New projects are printed in **bold**. Note that recent reclassification of projects has moved some projects into goals different from those previously listed in the Plan of Work. Projects falling under multiple goals are listed in each.

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E.
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**Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans**

**Objective 5.1: To Increase the Capacity of Communities and Families to Enhance Their Own Economic Well-Being**

WIS03858	Jasper, C. R.; Goebel, K.	Family Businesses: Interaction in Work and Family Spheres (NE-167)	X	X				
WIS04520	Deller, S. C.	Modeling the Spatial Changes of Wisconsin's Rural Economy	X				X	
WIS04536	Voss, P. R.	Smart Growth Requires Smart Demography!	X				X	
WIS04537	Collins, J. L.	Changing Technology and Apparel Service Jobs in Rural Labor Markets	X					
WIS04579	Bowe, S. A.	Adding Value: Environmentally Certified Secondary Wood Products			X			
WIS04654	Chavas, J. P.	<b>An Economic Analysis of Resource Mobility in Agriculture</b>	X					
WIS04693	Bell, M.	<b>Farm Family Success in Diversified Agriculture: A Comparative Study of Wisconsin Family Farms</b>	X					
WIS04725	Foltz, J.	<b>University Agriculture Innovation Under Intellectual Property Rights</b>	X				X	
Total:			140,089.78	19,480.00	26,731.83	0	80,893.45	7.49

**Objective 5.2: To Increase the Capacity of Communities, Families, and Individuals to Improve Their Own Quality of Life**

WIS03972	Barham, B. L.	Impacts of Structural Change in the Dairy Industry (NE-177)	X	X			X	
WIS04170	Ray, R. O.	Intentions and Outcomes: Education and Learning in State and National Forest in Wisconsin			X			
WIS04296	Hitchon, J. C.	Costly Charity or Smart Strategy? Impact on Consumers and Managers of Advertising with a Social Dimension	X					
WIS04522	Pingree, S.	Science Literacy, Science Information and the Internet	X				X	
WIS04541	Lane, M. B.	Democratic Planning at Multiple Scales in Plural Societies: Natural Resource Governance in Wisconsin	X					
WIS04607	Stone, B.	Urban Design and Ecosystem Stress: Quantifying the Relationship Between Development Design Standards and Impervious Land Cover in Madison, Wisconsin	X					
WIS04617	Thering, S.	<b>Developing Indicators of Community Capacity and Documenting Community Capacity Benefits of Citizen Participation</b>	X				X	

Wisconsin Project No.	Principal Investigator	Title of Project	Hatch Total (Regular & Multistate)	Hatch Multistate	McIntire/Stennis	Animal Health	Extension Activity	Total F.T.E.
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WIS04653	Deller, S.	Rural Communities, Rural Labor Markets, and Public Policy (NE-1011)	X	X			X	
WIS04657	Gunther, A.	Mechanisms of the Hostile Media Perception in the Debate over GM Foods	X					
WIS04693	Bell, M.	Farm Family Success in Diversified Agriculture: A Comparative Study of Wisconsin Family Farms	X					
Total:			150,221.70	35,615.00	17,825.13	0	75,933.14	7.68

Objective 5.3: Not Assigned

WIS04674	Clayton, M.	Applications of Statistics to Agriculture: Analysis of Spatially Autocorrelated Categorical Data	X					
WIS04676	Zhu, J.	Analysis of Spatial Data Using Multi-Scale Statistical Models	X					
WIS04686	Nordheim, E.	Using Statistical Resampling Methodologies to Provide Inference for Species Abundance and Measures of Similarity in Ecology	X					
WIS05233	Yandell, B.	New Approaches to Analysis of Microarray Data: Epigenetic Control of Maize Endosperm Gene Expression as a Model	X					
Total:			84,368.19	0	0	0	0	3.16

Total Goal 5: 374,679.67 55,095.00 44,556.96 0 156,826.59 18.33

**Grand Total:** 4,816,834.38 987,875.00 495,874.12 145,713.36 1,256,466.58 341.00

## ***Impact Statements and Selected Results***

Publications in refereed journals, books, and extension bulletins have been reported on projects using the AD-421 annual reports in the CRIS system. A number of projects are reported as impacts on agriculture or natural resources. Some of the projects had funding from Hatch, McIntire-Stennis, and Animal Health; others were funded from competitive federal programs and industry gifts and grants. Outputs described in the original Plan of Work are illustrated by example from the past year in the following projects.

### **Fighting Water Pollution with Urban Design**

***Key themes: Impact of change on rural communities, Community development***

***Focus areas: Water quality***

The issue: Global population will double by 2025, according to projections by the United Nations. This means there is a critical need to plan for ecologically sound urban growth that balances the requirements of an expanding population with the necessity of maintaining a healthy environment. One of the ways that population expansion affects ecosystems is by converting natural land—such as cropland, grassland and forests—to fabricated surfaces like concrete and asphalt. Impervious surfaces intensify stormwater runoff, which causes pollution by washing toxins into waterways. They also prevent rain from replenishing underground water reservoirs and trap warmth causing urban heat islands to form.

What's been done: In order to identify which aspects of residential developments are most associated with increasing impervious surfaces, a team of UW-Madison researchers collected digital photographs, tax records, parcel boundary data and street maps for 40,000 single-family residential parcels in the City of Madison, WI. They recorded street, driveway and sidewalk area, as well as the space occupied by houses, garages and storage sheds, and entered the information into a database. They then analyzed the database to identify land use strategies that minimize the area of impervious surfaces on a lot.

Impact: This project has both short and long term impacts. The Environmental Protection Agency identified non-point source pollution as the most significant threat to water resources. Using fewer impervious surfaces will help prevent pollutants from being washed into watersheds. Researchers found that builders can reduce impervious surfaces by more than 30 percent by making modest reductions in the area of a land parcel, the total amount of frontage and front yard setback, and the width of residential streets. Recommendations to communities for managing surface runoff and for setting building standards is already occurring based on study results. Long-term impacts on water quality will result from implementation of the recommendations to new developments and improvement to existing features.

Funding: Hatch project #WIS04607, “Urban Design and Ecosystem Stress: Quantifying the Relationship between Development Design Standards and Impervious Land Cover in Madison, Wisconsin”.

**New Tools Will Help Communities Balance Growth and Land Use**  
*Key themes: Community development, Impact of change on rural communities*  
*Focus areas: Small farms and their contributions to local economies*

The issue: As populations grow, communities face the challenge of protecting natural areas and farmland, providing affordable housing, and maintaining transportation systems. In response, a legislative trend among states nationwide is to mandate that county and local governments create comprehensive plans for land use. In Wisconsin, legislators passed the Smart Growth Act in 1999, which requires land use planning by 2010. In order to make these plans, communities require an accurate way to predict where populations will grow and by how much. However, no existing technology meets the forecasting requirements of Wisconsin's new planning law.

What's been done: A UW-Madison research group is working to create new models for local population forecasting in Wisconsin. One main objective is to examine the relationship between population growth and highway expansion, which is commonly asserted to be a growth-promoting activity. The group found that there is also a causal relationship in the opposite direction: that population growth is a predictor of local highway improvement. Other objectives are to study the relationship between population change and housing density, and to use different layers of data—such as the presence of water and sewage infrastructure, land use restrictions, and soil depth—in forecasting models.

Impact: This project has both short and long term impacts. A population forecasting computer program based on the new models is being made available to local agencies on a cost-recovery basis. Some local authorities have already indicated a willingness to adopt whatever new tools are produced. On-line web resources are already available that allow demographic data to be obtained for geographic or ethnic subgroups.

Chartbooks including Hmong and Hispanic population reports and maps:  
<http://www.ssc.wisc.edu/poplab/reports.html>

Census data by congressional districts (also towns and Indian reservation lands):  
<http://www.ssc.wisc.edu/poplab/sf3profiles.html#WisconsinCongressionalDistricts>

Use of this more precise and geographically referenced data will have long-term impacts on planning and development of new communities and public resources as well as social service programs.

Funding: Hatch project #WIS04536, "Smart Growth Requires Smart Demography" and State of Wisconsin.

## Understanding the Changing Dairy Industry

*Key themes: Adding value to new and old agricultural products, Diversified/alternative agriculture, Organic agriculture*

*Focus areas: Small farms and their contributions to local economies, Organic agriculture*

The issue: Dairy farming today isn't the same as it was 100—or even 10—years ago. While 80 percent of dairy farms are still of moderate size and use conventional methods, there is strong pressure to increase farm income via expansion, modernization, and finding new market niches. In the past ten years, the proportion of farms with more than 200 cows that use new technologies has grown from about one percent to nearly seven percent, and the proportion of farms with more than 100 cows has gone from under 10 percent to nearly 14 percent. Meanwhile, the proportion of farms using management-intensive rotational grazing or organic production practices has also increased. Overall, dairy farming has become more diverse in terms of farm size, production practices, and marketing. A complex web of interrelated factors—such as social, economic, technological and political environments, regional conditions, and entrepreneurial strategies—affects the patterns of dairy farms and their impacts across the state.

What's been done: A UW-Madison agricultural economist, and co-director of the Program on Agricultural Technology Studies, is exploring the evolution of farm structure in Wisconsin. He is involved in two multidisciplinary research groups that are examining expansion, modernization, and specialization strategies among Wisconsin dairy farms. In particular, these teams are focusing on the farming strategies that show the most growth: high-end confinement operations with parlors, management-intensive rotational grazing operations, and organic dairy farms. The groups are building their analysis on three different surveys: a statewide survey of farmers, a survey of dairy farms in three specific communities, and a survey of organic farmers and graziers who market their milk under eco-labels. Their goal is to understand the performance and impact of different styles of dairy farming.

Impact: It is important that policymakers and industry participants understand how dairy farming is evolving and what that means for farmers, their families and local communities. Although most people tend to assume that the rate of decline in farm numbers is primarily the result of farm exits, there is growing evidence from surveys by these researchers that the relatively rapid rates of net decline in farm numbers in the 1980s and 1990s are accounted for primarily by slow or declining rates of entry into farming, rather than by an increased rate of exit. This work provides teaching material for extension professionals, as well as state officials.

This project has both short and long-term impacts. The WI Legislature has included Dr. Foltz in a “Dairy Modernization Working Group”. Publications on the changing role of dairy farms is available on the www at <http://www.wisc.edu/pats/pubs.htm#di1>

One of the critical issues identified in producer surveys was access to health care in rural communities. In response, CALS sponsored a public issues forum on the topic in March 2003. See the summary at <http://www.wisc.edu/pats/hcf/summary.htm>

In response to a farmer survey identifying entry programs into dairying being a large problem,

CALS staff have initiated a “School for Beginning Dairy Farmers” that concentrates on low-input systems as an entry strategy. <http://www.wisc.edu/cias/schools/dairysch.html>

Over the last seven years the school has helped over ninety students earn their certificate in grass-based dairying. A survey of seventy-four of those graduates emphasized just how big an effect the program has had on their lives. School for Beginning Dairy Farmers has helped students establish fifty-three new farm businesses in less than a single decade. Even those students who haven't started their own businesses overwhelmingly report they've gone on to have highly successful careers in dairying, managed grazing, and other farm-related industries. Long-term impacts include the multiplier effect of these graduates returning to their communities and having positive effects.

Funding: Hatch project #WIS03972, “Impacts of Structural Change in the Dairy Industry” and State of Wisconsin.

## **Evaluation of Success of Multistate, Multi-institutional and Multidisciplinary Activities**

The College of Agricultural and Life Sciences and indeed the entire UW-Madison campus place a high value upon faculty-driven, multistate, multi-institutional, and multidisciplinary activities. This traditional value has served science and the state well for many years. For the most part, UW Madison administrators take pride in breaking down barriers to multistate, multi-institutional, and multidisciplinary work so that faculty can form effective teams to address pressing problems and issues.

Interdisciplinary tradition and enthusiasm on the UW-Madison campus received recent reaffirmation in the creation of a faculty hiring strategy called “cluster hiring.” This hiring strategy encourages and rewards creation of new faculty positions that are interdisciplinary, inter-college, and inter-departmental in nature. A recent example of a cluster is one where four faculty members were hired to address food safety problems, particularly those related to mycotoxin contamination. New faculty members have been hired in areas of mycotoxin biosynthesis, mycotoxin genomics, food microbiology and toxicology (surface coatings), and human medicine – all with a focus of reducing human health dangers posed by mycotoxin and other contaminants of foods. Similarly, cluster hires are underway in land use planning, structural biology, chemical biology, genomics, and a host of other areas across campus. Recent permission has been given for recruiting cluster hires in agroecology and symbiosis, which are likely to result in additional hires for College of Agricultural and Life Sciences.

Discussions under each of the goals previously presented in this report identify multistate, multi-institutional research projects, as well as those that have integrated research and extension objectives. Those data will not be cataloged again here. UW-Madison faculty members are heavily involved in North Central Regional research projects. Evaluation of multistate activities is done by the North Central Regional Experiment Station Directors at the midterm and end of each multistate project. Chairs and heads of departments are organized into fourteen North Central Administrative (NCA) committees. These committees meet annually and review proposals and midterm reports for multistate projects. Each project has an administrative advisor from the North Central region who also submits a written review at the same times. The North Central Multistate Review Committee meets three times a year to consider these reviews and make recommendations for new projects, continuing projects after midterm review, and terminating projects. Minutes of the meetings and review process are available on the NCRA website: <http://www.wisc.edu/ncra/>. Reviews and actions on NRSP projects are available on the NIMSS website: <http://www.lgu.umd.edu/login.cfm>

The UW-Madison College of Agricultural and Life Sciences participates in a UW System Consortium for Agricultural and Natural Resources Research, Extension, and Instruction. The purpose of the consortium is to conduct collaborative research among investigators at UW-Madison, UW-Platteville, UW-River Falls, and UW-Stevens Point, in addition to bringing better coordination to instructional and extension programs operated by the four Wisconsin universities. The Midwest Poultry Science Undergraduate Center of Excellence is yet another example of multistate programming in the instructional area that has great value in offering

students from a number of different institutions educational opportunities that otherwise would not be available to them. This program is organized through the UW-Madison. Multistate and multi-institutional programming in all three land grant functional areas (research, extension, and instruction) is a strategy that individual states and institutions adopt with increasing enthusiasm as budget constraints are imposed. New discussions on coordination of dairy production and Upper Mississippi watershed programs have been initiated in 2003.

User input and program response to that input is also referenced in each to the goals sections. It will not be repeated here, other than to stress that great amounts of energy are devoted to meeting with various user groups and incorporating their suggestions and needs into research and extension programming.

## *Serving the entire community*

The Wisconsin Agricultural Experiment Station makes sincere efforts to serve the needs of consumers, minority populations, small landowners, alternative agriculture, and non-traditional clientele. Below lists a number of research projects that relate to these special client groups. Note that six of the following projects are multistate, multidisciplinary projects.

Projects serving underrepresented and minority populations:

Population	Project	Principal Investigator(s)	Title
Rural communities	WIS04653	Deller, S.	Rural Communities, Rural Labor Markets, And Public Policy (NE-1011)
Young adults	WIS03967	Nitzke, S.	Using Stages Of Change Model To Promote Consumption Of Grains, Vegetables And Fruits By Young Adults (NC-219)
Green industry producers	WIS04689	Williamson, R.	Biology, Ecology, And Management Of Linden Borer, A Serious Insect Pest Of Shade Trees In Nurseries And Urban Landscapes In Wisconsin
Small farms, organic agriculture, graziers	WIS03972	Barham, B.	Impacts Of Structural Change In The Dairy Industry (NE-177)
Small producers, alternate producers	WIS04302	Thomas, D.	Comparison Of East Friesian And Lacaune Dairy Sheep
Small producers, alternate producers	WIS03717	Palta, J.	Freeze Damage And Protection Of Fruit And Nut Crops (NC-202)
Native Americans	WIS04540	Silbernagel, J.	The Forest History And Spatial Patterning Of American Indian And Euro-American Maple Sugaring Forests Of The Upper Great Lakes Region
Citizen involvement in government	WIS04541	Lane, M.	Democratic Planning At Multiple Scales In Plural Societies: Natural Resource Governance In Wisconsin
Rural communities	WIS04503	Radeloff, V.	Landscape Fragmentation Due To Changes In Road Density In Northwestern Wisconsin From 1938-1992
Families/women/small business owners	WIS03858	Jasper, C.; Goebel, K.	Family Businesses: Interaction In Work And Family Spheres (NE-167)
Small and medium sized farms	WIS04589	Zeuli, K.	The Implications Of Dairy Cooperative Mergers And Vertical Integration On Member Benefits
Small woodlot owners	WIS04505	Rickenbach, M.	Cooperation Among Woodland Owners: A Case Study Of Organizational Forms And Participant Motivations
Family farms – small and medium sized	WIS04693	Bell, M.	Farm Family Success In Diversified Agriculture: A Comparative Study Of Wisconsin Farm Families
Small growers, especially minority populations such as Hmong and Hispanic	WIS04717	Kloppenburg, J.	Sustaining Local Food Systems In A Globalizing Environment: Forces, Responses, Impacts (NE-1012)

Rural communities and minority populations	WIS04536	Voss, P.	Smart Growth Requires Smart Demography
Rural and low-income populations	WIS04170	Ray, R.	Intentions And Outcomes: Education And Learning In State And National Forest In Wisconsin
Citizens including minority populations	WIS04617	Thering, S.	Developing Indicators Of Community Capacity And Documenting Community Capacity Benefits Of Citizen Participation

Although formal evaluations have not been done to determine the effectiveness of these efforts, there is ample field experience and observations to support the contention that they do have significant impact on the problems and populations addressed. See earlier presented research impact statements.

Stakeholder groups include those from a wide diversity of backgrounds. For instance, members on the Board of Visitors; the College advisory committee; are recommended by chairs of departments and advisory groups for programs and centers. Current membership includes 5 women, owners of 6 family-owned businesses, the Secretary of DATCP and a leader in a minority inner-city youth program. Each year as members rotate, new nominations are solicited with a request to include diversity as a criteria for nomination.

Stakeholder input for the development and conduct of research relating to state needs has been accomplished in a tiered system. The College of Agricultural and Life Sciences has a central Advisory Board (CALS Board of Visitors) that meets twice a year with the Dean and Associate Deans. Members of this committee (see Appendix B for current list of members) are selected from a wide range of producer, industry, consumer, environmental groups, and state agencies. In addition to advisory groups, the Dean of CALS has been meeting with small groups of leaders representing Wisconsin organizations (see Appendix C) for roundtable discussions. These meetings include traditional and non-traditional stakeholders (invitees included in original Plan of Work).

## **Meeting Short, Intermediate and Long-term Needs**

In the stakeholder process, it is clear that our stakeholders are concerned about immediate needs (e.g. nutrient management to meet new regulatory requirement) and longer-term issues (e.g. the sustainability of agricultural and natural resource systems). In proposals written by faculty for funding, a justification for how the project will meet the CSREES goals and the identified Wisconsin needs is required. In the review process, the reviewers are asked to specifically address how the proposal will meet the issues and needs for Wisconsin and the nation and to characterize the project as meeting short, intermediate or long-term needs. These reviews are used by the Faculty Review Panel in prioritizing projects. In fall 2003, a review of 72 projects at UW-Madison resulted in funding of 35 projects with 6 characterized as meeting short-term needs, 17 as intermediate and 12 as long term. This review process has been successful at identifying outstanding proposals ranging from very basic (usually longer-term impacts) to very applied (often short-term impacts). Under the featured projects described in each goal, note that short and long-term impacts have been described.

## Stakeholder Input Process

The Dean and Associate Deans attend many meetings of organizations concerned with our research priorities. Faculty regularly attend national scientific conferences and are members of national and international scientific committees. Many attend national forums for research priority setting such as the FAIR 2002 (Food Animal Integrated Research Symposium) and CROPS 99 (Coalition for Research on Plant Systems). These national conferences include stakeholders and representatives from federal agencies. Many departments, centers, and institutes maintain advisory committees that meet periodically with researchers in the units. Additionally, faculty regularly attend events with agricultural, natural resource, and community service activities.

Wisconsin Cooperative Extension has developed 15 system and issue teams (comprised of University research and Extension professionals, other agency personnel, and producers) to develop educational programs directed at both farm and industry clientele. System teams conduct applied research and educational programming that address issues and problems specific to commodities (dairy, beef, swine, sheep, grain crops, forages, vegetable crops, fruit crops, and urban agriculture/horticulture). Issue teams deal with integrated issues across the agricultural systems (marketing and risk management, farm business management, nutrient management, land use and agriculture, food safety and quality, and new and emerging farm and agricultural markets). Principal investigators with Hatch, McIntire-Stennis, and Animal Health grants are members of both system and issue teams.

Implementation of research priorities in the formula funding process is accomplished through a compilation of the departments' research priorities based on their interactions with stakeholders. Department chairs were asked to provide a small number of research topics from each unit of CALS for use in annual Hatch and McIntire-Stennis calls for proposals. The Dean and Associate Deans assembled a list of common themes from this set that is included in this year's call for proposals. In 2001, a revised list of priorities was collected and issued with the call for proposals for 2005.

For the Animal Health process, every two years, the Association of American Veterinary Medical Colleges (AAVMC), with numerous co-sponsors, organize a two-day listening conference entitled "Critical Issues in Animal Health Research Conference." Representatives from major and minor commodity groups present their positions on the most critical area for research investment. The Associate Dean of the School of Veterinary Medicine (SVM) attends and helps organize this national conference. The SVM has a Board of Visitors, which meets twice a year with SVM administration and faculty to provide input on critical research issues. Faculty reviewers of proposals annually attend a meeting of a variety of stakeholder groups such as the American Veterinary Medical Association, the National Pork Producers, the Bovine Practitioners Association, and the National Turkey Growers Association.

At UW-Stevens Point, concurrent with the distribution of request for proposals, members of the UWSP Forestry Advisory Committee were contacted and asked to submit priority areas of forestry-related research needs in Wisconsin. The committee consists of 21 members who are recognized as leaders in the forestry and conservation community in the State of Wisconsin.

CALS administrative activities for planning and input:

October 2003 April 2003	CALS Board of Visitors (advisory committee, see Appendix B for current members)	CALS Executive Staff and Deans, Dept. chairs of departments
June 2003	All day administrative retreat	CALS Deans and chairs of departments
December 2003	CALS budget retreat	CALS Deans

## **Areas of Identified Research Need for Wisconsin**

Meetings with stakeholders, such as those listed above, are utilized to identify research needs specific to Wisconsin. 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 who are performing the research is used to help highlight areas of research need. Every other year, department chairs are asked to provide a small number of research topics from each unit of CALS for use in Hatch and McIntire-Stennis calls for proposals. The Dean and Associate Deans of the College of Agricultural and Life Sciences work on these needs to identify a set of goals for use in the Hatch and McIntire-Stennis call for proposals. Reviewers are provided these priorities as is the Research Advisory Committee that ranks the proposals for funding. The following is a compilation of common themes identified and published in the UW-Madison Call for Proposals in summer 2003.

1. Mechanisms of pest and pathogen resistance and safe and effective control, with minimal 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 use.
3. Identification of socioeconomic forces that shape the viability of Wisconsin industries and employment including agriculture, 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, and human well being. This need requires an understanding of basic life processes in order to manage biotic systems for human use.

# Program Review Process

Hatch, McIntire-Stennis, and Animal Health funds are used for specific projects solicited in an annual call for proposals. Animal Health proposals are reviewed at the School of Veterinary Medicine; Hatch and McIntire-Stennis proposals are reviewed in CALS.

CALS process:

The following is published in the call for proposals as guidance to the scientists requesting Hatch or McIntire-Stennis funding. This process occurred in December of 2003 for 72 new proposals. One additional call for proposals was made in Spring 2003 for scientists requesting multistate research funding.

## **The Faculty Review Panel (FRP):**

*The Associate Dean for Research will choose members of the FRP in consultation with the Research Advisory Committee (RAC). Each proposal will be reviewed by two members of the FRP and at least two other (ad hoc) reviewers. The CALS Research Division, in consultation with RAC members, will make the identification of the ad hoc reviewers. Where possible, ad hoc reviewers will be CALS faculty, though other reviewers both on and off campus may be appointed as necessary. The critical criteria for selection of FRP members and ad hoc reviewers will be scientific excellence, appropriate disciplinary expertise, and overall balance. No member of the FRP will have a proposal under review.*

## **Review Criteria for Reviewers:**

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

- *An evaluation of the scientific significance of the objectives and appropriateness of the research approach as indicated in the original Congressional Acts and CSREES Goals.*
- *A judgment of the potential usefulness to society of the research, in the short and/or long term. Problem solving is a key feature of the formula funding guidelines.*
- *An evaluation of the ability of the research team to accomplish the stated objectives and the match between the objectives and available resources. For teams with multiple investigators, please include a plan of coordination of the work across laboratories or departments.*

## **Review Process:**

- *Copies of the proposal will be sent to two members of the Faculty Review Panel (FRP) and at least two ad hoc reviewers. Each reviewer will prepare a written critique of the proposal and rank the proposal from excellent to unacceptable. The reviews will be submitted to the CALS Research Division and recorded anonymously upon receipt. The two FRP reviewers will receive copies of all reviews (anonymity maintained) on which they are primary or secondary reviewers prior to the FRP meeting so they may be prepared to lead the discussion on the proposals assigned to them.*
- *A meeting will be held of FRP to discuss proposals. Prior to the meeting, copies of all reviews will be provided to FRP members.*
- *At the meeting, the primary reviewer will give a short description of the proposal, the*

*principal investigator's background, and his/her own critique. The secondary reviewer will provide his/her own critique and raise any other points that have been overlooked. Where the FRP has insufficient expertise in the proposal area, an ad hoc reviewer may be brought in as primary or secondary discussant. Comments from ad hoc reviewers will be provided by the primary reviewer and confusing issues clarified.*

- *An approximate placement will be made with respect to proposals as discussion takes place. Obviously this placement will involve some degree of reconsideration of previously placed proposals. Because of this process, an inappropriately negative external review will not condemn a proposal. At the end of the process, FRP members will go over the list and look for any inappropriate placement. The prioritized list will be forwarded to the Associate Dean for Research.*
- *The primary reviewer of each proposal will prepare a summary of the written review comments and FRP discussion. The summary and reviews from individual reviewers will be returned to applicants.*

The Research Advisory committee of CALS (12 faculty including representation of the School of Human Ecology) approves the guidelines for Hatch proposals, review, and funding. The committee has changed the wording slightly from year to year, but no substantial change in the review process has occurred from the Plan of Work description submitted in July 1999.

#### SVM Process

Animal Health proposals are reviewed by a faculty committee appointed by James Tracy, Associate Dean for Research, UW-Madison School of Veterinary Medicine. Proposals for research grants from Animal Health Formula Funds are reviewed by the Research Committee of the School of Veterinary Medicine (SVM) in a dual peer review process. After receiving and reading all proposals, the Research Committee first meets to select two peer reviewers, experts in the area of each proposal. These experts are asked to comment both on the scientific merit as well as the relevancy to animal health and specifically to health of livestock in Wisconsin. The Associate Dean for Research of the School of Veterinary Medicine together with the Research Committee from the SVM reviews the overall portfolio of research projects sponsored by the Animal Health Formula Funds to make sure that the portfolio of projects is representative of the livestock health issues in Wisconsin.

#### UW–Stevens Point Process

The McIntire-Stennis Proposal Review Panel consists of five members, three from the College of Natural Resources and two from the forestry community in Wisconsin. Each review panel member is asked to rank the proposals using the following criteria: scientific and technical merit, ability of the principal investigators to perform the research potential for publishable results, and recommended research topics by the UWSP Forestry Advisory Committee. Decisions are made by the Victor Phillips, Dean of the College of Natural Resources, UW-Stevens Point.

## **Integrated Research and Extension Activities**

Our integrated research and extension activities are organized into projects that have been listed under the appropriate goals. Brief descriptions of activities on our Research Stations are included in Appendix D as examples of the integration.

**U.S. Department of Agriculture  
 Cooperative State Research, Education, and Extension Service  
 Supplement to the Annual Report of Accomplishments and Results  
 Multistate Extension Activities and Integrated Activities  
 (Attach Brief Summaries)**

**Institution** Wisconsin Agricultural Experiment Station, College of  
 Agricultural & Life Sciences  
**State** Wisconsin

**Check one:**  **Multistate Extension Activities**  
 **Integrated Activities (Hatch Act Funds)**  
 **Integrated Activities (Smith-Lever Act Funds)**

**Actual Expenditures**

<b>Title of Planned Program/Activity</b> <u>WI Integrated Research and Extension    Projects</u>	<b>FY 2003</b> <u>1,256,467</u> 26% of total Hatch spending
<u>Please see project lists under goals and    example descriptions</u>	
<b>Total</b>	<hr/> <b>4,816,834</b>

Form CSREES-REPT (2/00)

<hr/> Margaret Dentine <b>Executive Director</b>	<hr/> <b>Date</b>
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# Appendices

## *Appendix A – Science Report & CALS Quarterly*

Science Report

Additional news stories and electronic version of Science Report available at

<http://www.cals.wisc.edu/>

CALS Quarterly (2 issues)

(Above articles are not included in electronic version, hard copy by separate mailing)

*Appendix B – CALS Advisory Committee membership*

**CALS Board of Visitors. January 2004**

Will Allen  
Growing Power Inc.

Ms. Juelene S. Beck, CEO  
Douwe Egbert's Coffee Systems

Dr. James R. Behnke  
Retired, Advisor to the CEO  
Pillsbury Corporation

Ms. Linda Bochert  
Michael Best & Friedrich LLP

Ms. Kitty Clark Cole  
Independent Fundraiser and Marketing  
Specialist

Dr. Randall L. Dimond  
Promega Inc.

Mr. Gordon C. Foss  
Badgerland Farm Credit Services

Lou A. Holland  
Holland Capital Management

Daphne R. Holterman  
Rosy-Lane Holsteins LLC

Robert B. Horsch, Ph.D.  
Vice President, Monsanto Company

Dr. Peter J. Huettl  
Applied Sciences, Inc.

William "Butch" Johnson  
Johnson Timber Corporation

Mr. Pete Kappelman  
Dairy Farmer

Frank N. Kotsonis  
Retired, Monsanto Company

Mr. Terry A. Kurth  
Midwest Lawn Care LLC

Mr. John W. Mommsen  
Lazy A Ranch

Mr. Bliss C. Nicholson  
The Bruce Company of Wisconsin, Inc.

Rod Nilsestuen, Secretary  
Department of Agriculture, Trade and  
Consumer Protection

Mark Riechers  
Riechers Beef

Mr. Gary Siporski, President  
Citizens State Bank of Loyal

Frederick Usinger  
Fred Usinger, Inc.

Deborah Van Dyk, Vice President, Legal  
Affairs  
Schreiber Foods, Inc.

Hans Zoerb  
Cargill

***Appendix C – 2003 Stakeholder Meetings with CALS Dean and/or Associate Dean(s)***

January 8	Phosphorous Roundtable
January 13	Wisconsin Fertilizer Research Council
January 15	Wisconsin Agricultural Stewardship Initiative
January 22	Tom Lyon, Department of Ag. Trade & Consumer Protection (DATCP)
January 23-25	Wisconsin Fertilizer, Aglime & Pest Management Conference
January 23	Wisconsin Livestock & Meat Council Board
January 23	Wisconsin Pork Producers Taste of Elegance
January 24	Wisconsin Fertilizer Research Council
January 28	Wisconsin Farm Bureau Federation Meeting
January 29	Professional Dairy Producers of Wisconsin
January 30	Wisconsin Buffer Initiative
February 12	National Pork Producers Meeting
February 26-28	Wisconsin Potato & Vegetable Growers Assoc. conference (WPVGA)
March 5	Plant Production Roundtable
March 5	Phosphorous Roundtable
March 6	General Agricultural Roundtable
March 7	Center for Integrated Agricultural Systems – Citizens Advisory Council
March 17	Forestry/Green Industry Roundtable
March 19	Annual Ag. Leaders Breakfast
March 20	Meat and Dairy Production Roundtable
April 7	Farm Technology Days Luncheon
April 11	Wisconsin Agricultural Stewardship Initiative
April 23	Wisconsin Buffer Initiative
April 24	Wisconsin Agricultural Stewardship Initiative
May 1	Wisconsin Livestock & Meat Council
May 6	Phosphorous Roundtable
May 27	Dairy 2020 Council Meeting
June 10	World Dairy Expo Meeting
June 11	Interagency Surface Water Quality Committee
June 25-26	Wisconsin Association of Agricultural Educators (WAAE)
July 14	Center for Integrated Agricultural Systems – Citizens Advisory Council
July 14-15	Wisconsin Farm Technology Days
July 22	WPVGA Field Day at Hancock Agricultural Research Station
July 28	Livestock Industry Task Force
July 28	Public Input Forum at Lancaster Agricultural Research Station
July 29	Wisconsin Agricultural Stewardship Initiative
August 5	Governor's Sweepstakes Meat Products Show
August 7	Wisconsin Farm Bureau Federation Meeting
August 12	WI Turfgrass Association Field Day at O.J. Noer Ag. Research Station
August 16	West Madison Urban Horticulture Field Day
August 27-28	State Senator Dale Schultz visit to CALS
August 28-29	Wisconsin Buffer Initiative

September 9	Interagency Surface Water Quality Committee
September 19	Program on Agricultural Technology Studies – Advisory Council Meeting
September 24	Wisconsin Buffer Initiative
September 26	WCIA Germplasm Review
September 26	Governor’s Council on Forestry
October 1-4	World Dairy Expo
October 7-8	Farm Foundation Meeting
October 13	National Council of Farmer Cooperatives
October 20-21	NAAB Symposium
October 28	Professional Dairy Producers of Wisconsin Dairy Policy Summit
October 28	Wisconsin Agricultural Stewardship Initiative
November 1	Rural Leadership Meeting
November 5	Wisconsin Biotechnology Association Conference
November 11	Lunch with CALS Women Faculty
November 14	Wisconsin Farm Bureau Federation Meeting
November 19	WPVGA Grant Review
November 25	Foremost Farms
December 3	Dairy Business Association
December 6	Wisconsin National Farmers Organization
December 7-8	Wisconsin Farm Bureau Federation Meeting
December 9	Interagency Surface Water Quality Committee
December 10	Dairy Day at Arlington Agricultural Research Station
December 12	Center for Integrated Agricultural Systems – Citizens Advisory Council
December 12	World Dairy Expo Board Meeting
December 17	Agriculture and Natural Resources Conference
December 19	Governor’s Council on Forestry

## *Appendix D - Agricultural Research Stations 2003 Schedule of Events*

April 12	Wisconsin Club Lamb Sale	Arlington
April 17	WPPA Futurity Sale	Arlington
April 25	State FFA Livestock Judging	Arlington
April 28	Stray Voltage Seminar	Arlington
May 4	Saddle & Sirloin Lamb Show	Arlington
June 6	Mayor's Breakfast	Marshfield
June 24	Crops and Soils Field Day	Marshfield
June 26	Weed Science Field Day	Arlington
June 26	Home Fruit Production Field Day	Ashland
July 8	4-H Plant Science Day	Hancock
July 9	Agronomy Field Day	Arlington
July 21	4-H Livestock Judging Contest	Arlington
July 22	Central Wisconsin Potato Field Day	Hancock
July 29	Agronomy Crops Field Day	Hancock
August 11	Fruits, Flowers, and Vegetables Twilight Tour	Hancock
August 12	Wisconsin Turfgrass Association Summer Field Tour	O.J. Noer
August 13	Grazing Field Day	Lancaster
August 16	Homeowner Turfgrass Field Day	O.J. Noer
August 16	Trial & Demonstration Garden	West Madison
August 18	Commercial Fresh Vegetable Growers Field Day	West Madison
August 21	Spooner Potato Field Day	Spooner
August 23	Sheep Day	Spooner
August 27	Twilight Garden Tour	Ashland
September 7	Friends for International Student Picnic	Arlington
September 16	Beef Field Day	Lancaster
October 12	Columbia County Extension 4-H Awards	Arlington
October 19	Wisconsin Polled Hereford Sale	Arlington
October 28	Prairies Jubilee	Arlington
December 4	Dairy Day	Marshfield
December 10	Arlington Dairy Day	Arlington

Additional information on Research Station activities:  
<http://www.cals.wisc.edu/research/stations/index.html>

*Appendix E – 100 Year Anniversary Newsletter*

(Above article is not included in electronic version, hard copy by separate mailing)