

UPDATE

April 1, 2004

**University of Minnesota
Plan of Work for Research (AREERA)
Agricultural Experiment Station**

2005 – 2006



**Minnesota
Agricultural
Experiment
Station**

UNIVERSITY OF MINNESOTA

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A. Background

The Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA) requires that each Agricultural Experiment Station (AES) develop a Plan of work (POW), in addition to the system of Hatch and regional projects.

The University of Minnesota Agricultural Experiment Station (MAES) is comprised of research contributions from five colleges: College of Agricultural, Food and Environmental Sciences (COAFES); College of Natural Resources (CNR); College of Human Ecology (CHE); College of Veterinary Medicine (CVM); and College of Biological Sciences (CBS). Research funding is distributed among these five colleges based on their research activity. Management of research is decentralized to each collegiate dean, who also serves as an assistant or associate director of the Agricultural Experiment Station. The dean of COAFES serves as Director of the MAES. The director, deputy director, assistant and associate directors meet on a monthly basis as the MAES Executive Committee, which provides overall policy development and planning for the MAES.

The MAES contacts are:

Charles C. Muscoplat, director
Agricultural Experiment Station
277 Coffey Hall
1420 Eckles Ave.
University of Minnesota
St. Paul, MN 55108

Sarah J. Greening, deputy director
Agricultural Experiment Station
120 Biosystems & Ag. Engineering
1390 Eckles Ave.
University of Minnesota
St. Paul, MN 55108

B. Operating Philosophy

The mission of the MAES is to organize and support scientists to conduct research on the production, harvesting, processing, quality and marketing of food and agricultural products, forests and forest products, and to improve human nutrition, family and community life, tourism and environmental quality. All research projects are mission oriented and range from very basic thrusts to highly applied activities. The emphasis is on maintaining research quality and serving both long-range and short-range needs of Minnesotans.

We are committed to serve all sectors of the population and believe the roles of participants within our programs should be structured to promote collaborations and change.

Five pervasive values for our projects in each of the five GPRA goals include:

1. To integrate research, education and outreach efforts in a comprehensive program
2. To engage in research and educational practices that do not deplete our renewable resources or negate quality of life

3. To derive synergy from multidisciplinary research and collaborative learning partnerships
4. To support and encourage experiential knowledge and the co-learning role of citizens
5. To encourage diversity of ideas and people within a learning environment

Stakeholder Input

Continuous stakeholder input is sought from key constituents and the general public appropriate to the research goals—i.e., peers, advisory councils, commodity groups, and racial and ethnic minorities. In addition, a system of five Regional Sustainable Development Partnerships have been developed throughout Minnesota to address and engage in research critical to each region.

The MAES has instituted “listening sessions” around the state during the summer months to solicit comments and suggestions for our research program. These comments are then forwarded to the appropriate collegiate dean or the MAES Executive Council for consideration and future planning of the research agenda.

Equal Opportunity

We adopt the University of Minnesota’s Affirmative Action Program for procedures for reporting Civil Rights compliance and Equal Employment Opportunity requirements.

Funding Resources

Funding resources for the MAES include federal funding (Hatch) and state contributions at the approximate ratio of 1:7. Thus, the state contributes far more than the match required to receive federal funding. In addition, special state research initiatives address critical issues such as wheat scab, rural economic viability and the Rapid Agricultural Response Fund, which a recurring source of funding from the state legislature to address ongoing and evolving critical issues in Minnesota. Funding from the Rapid Agricultural Response Fund involves a competitive process of proposal submission and review.

Other funding comes from commodity check-offs in such agricultural products as canola, wild rice, and barley. Considerable funding for research derives from federal funding agencies, i.e., NSF, NIH as well as local industry.

Scientific Merit and Peer Review Process

The MAES engages in a scientific merit and peer review process for all research projects. Peer review involves both reviewers internal and external to the University.

At the University of Minnesota, each college engages in a strategic planning process on a yearly basis. The result is a “compact” for each college that serves as a basis for strategic planning and negotiations with central administration.

Identification of Multi-State, Multidisciplinary Research Programs

Minnesota engages in multi-state projects through the regional research programs as well as an extensive program with adjacent states. An important criterion for Minnesota to

engage in multi-state research is that projects be multi-disciplinary as well. For example, the University of Minnesota has joint projects and faculty appointments with North Dakota State University that involve collaboration on sugar beet management production, potatoes management and production, and cropping systems, with the University of Wisconsin, Madison on dairy research, and with Iowa State University on agricultural drainage.

The College of Agricultural, Food, and Environmental Sciences has sponsored multi-institutional meetings to stimulate collaboration on potato and dairy research. Planning is underway to facilitate sustainable collaboration in these areas.

Identification of Research Integrated with Extension Outreach Programs

Appendix 1 indicates the extensive listing of University of Minnesota faculty with joint appointments, including both research and outreach components. This listing exceeds the federal requirement for integration and will serve to provide evidence of the integrative efforts for federal funding at the University of Minnesota.

In addition to meeting funding requirements, there are many other evidences of programs initiating research and carrying through to dissemination through outreach. The University of Minnesota Extension Service has instituted a yearly reporting system that matches Extension/outreach programs with specific AES researchers.

Allocation of Resources

Appendix 2 includes the allocation of funding resources for each Hatch project, listed by goal, in the MAES.

C. Plan of Work

The MAES Plan of Work is organized around the five national REE goals and the following information is reported under each goal for each program:

- Statement of issues
- Performance goals
- Key program components
- Internal and external linkages
- Target audiences
- Program Duration

Goal 1: Through research and education, empower the agricultural system with knowledge that will improve competitiveness in domestic production, processing, and marketing.

Goal 1, Program 1: Agricultural Production and Farm Business Management

Statement of Issue

The 1996 Farm Act quickly and dramatically changed the decision-making environment for farmland operators, owners, and managers. The emergence of the Farm Act with its production flexibility contract payments (PFCs) and its almost complete elimination of planting restrictions jolted many engaged in agriculture. Some of the primary issues Minnesota agricultural producers will need to address as a result of the changes in the agricultural industry and policy include: strategic positioning, transferring management capabilities, frequent performance monitoring, evaluating new technology, monitoring external factors, managing information, and accountability.

The Center for Farm Financial Management within COAFES was established to conduct research and develop educational tools for farmers, agricultural lenders and educators to apply the principles and concepts of farm planning, financing and analysis in a practical manner. These educational tools are usually in the form of computer software that we develop and support to help improve the decision-making ability of farmers. To remain competitive in agriculture, Minnesota producers and agriculture businesses must be able to develop sound production and business management plans.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer review publications
- Industry applications of findings

Key Program Components

- Conduct research to support improved decision-making in farm planning and financing for farmers and lenders.
- Conduct research to support improved decision-making in financing for agricultural business owners.

Internal and External Linkages

- Internal collaborations
 - Agronomic and animal related departments in COAFES
 - USDA/ARS
 - University of Minnesota Extension Service
- External collaborations
 - Farm lenders
 - Farm credit institutions
 - Farm service agency

Target Audiences

- Farmers and ranchers
- Extension educators
- University/technical college educators
- Agricultural lenders

- Veterinarians
- Other public agencies
- Private businesses and consultants

Program Duration: Five years

Goal 1, Program 2: Agricultural Marketing and Distribution

Statement of Issue

The livestock industry is the highest value economic enterprise in Minnesota's agricultural economy. Improvements in economic efficiency affect many people involved in production, distribution and marketing of livestock and meat products—impacts are likely to be long-term in nature (10-20 years). The greatest economic value is likely derived from the price risk management. Improved price risk management can result in substantially improved profitability in any given year.

The production and distribution of food and fiber in Minnesota have changed dramatically during the last decade. Food in the supermarket and restaurant is likely to come from another state or continent as it is from Minnesota, thereby creating a disconnect between producer and consumer.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer review publications
- Industry applications of findings

Key Program Components

- Conduct research to support improved decision making in farm planning and financing for farmers and lenders
- Conduct research to support improved decision making in financing for agricultural business owners

Internal and External Linkages

- Internal Collaborations
 - Agronomic and animal related departments in COAFES
 - USDA/ARS
 - University of Minnesota Extension Service
- External Collaborations
 - Farm lenders
 - Farm credit institutions
 - Farm service agency

Target Audiences

- Farmers and ranchers
- Extension educators
- University/technical college educators
- Agricultural lenders
- Veterinarians
- Other public agencies
- Private businesses and consultants

Program Duration: Five years

Goal 1, Program 3: International Economic Competitiveness

Statement of Issue

Minnesota agriculture has become much more affected by global conditions. Economic decline in Southeast Asia affects the ability to market commodities in that part of the world. Growing conditions in Brazil and Canada affect the price of Minnesota products. And, trade agreements affect what can be bought and sold in countries around the world.

The Center for International Food and Agricultural Policy in COAFES was established to analyze the forces that underlie international trade restrictions; describe the dynamic interdependence of farmers' production and investment decisions and governments' agricultural and trade policy decisions; and look at the economic effects of policy decisions in other countries on agriculture in Minnesota and the U.S. With its interdisciplinary approach, the center uses its research and education activities to increase international understanding about food, agriculture, nutrition, natural and human resources, and the environment, and to positively impact the policies of both developed and developing countries.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry applications of findings

Key Program Components

- Conduct research on the economic interrelationships in both the domestic and foreign food and agricultural industries
- Develop and maintain an analytical support system that facilitates research and analysis on food, agricultural and trade policy issues
- Evaluate supply, demand and policy factors in the United States and abroad that influence both short-term and long-term trade prospects and patterns
- Provide information to help public policy participants and decision makers evaluate trade and policy issues and increase public understanding of these issues

- Explore renewable energy production and conservation options in agriculture and forest based industries

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Food Science and Nutrition; Applied Economics; Rhetoric; Soil, Water, and Climate
 - Hubert H. Humphrey Institute of Public Affairs (University of Minnesota)
 - Economics Department (University of Minnesota)
 - College of Natural Resources (University of Minnesota)
 - Law School (University of Minnesota)
 - Carlson School of Management (University of Minnesota)
 - Political Science Department (University of Minnesota)
 - University of Minnesota Extension Service
- External Collaborations
 - 30 international affiliates in countries such as Poland, Germany, Italy and Argentina

Target Audiences

- State legislators
- Farmers
- Extension educators
- University/technical college educators
- Agricultural lenders
- Private businesses and consultants

Program Duration: Five years

Goal 1, Program 4: Physiological Processes Impacting Production and Quality Traits in Agricultural Animals

Statement of Issue

Increasing the efficiencies of producing food from animals is a primary concern for Minnesota livestock producers. Research is needed to increase the understanding of the physiologic mechanisms affecting reproduction, growth and performance. These understandings will be vital for production efficiency and promotion of a healthy and competitive livestock industry in Minnesota. Reproduction is of major economic importance to producers of ruminant animals because it greatly impacts overall production efficiency. A better understanding of their reproductive mechanisms will give rise to strategies and technologies to enhance production.

Performance Goals

- CRIS reports
- MN Impacts

- Number of refereed journal articles and other peer reviewed publications
- Industry applications of findings

Key Program Components

- Improve production efficiency through reproductive strategies and research
- Increase research on lean growth and alternative animal products for consumer driven markets

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Animal Science; Food Science and Nutrition; Applied Economics; Agronomy and Plant Genetics
 - USDA/ARS
 - College of Veterinary Medicine
 - University of Minnesota Extension Service
- External Collaborations
 - Minnesota Cattleman’s Association
 - Minnesota Turkey Growers Association
 - National Turkey Federation
 - Minnesota Pork Producers
 - National Pork Board
 - U.S. and Minnesota feed industry

Target Audiences

- Farmers
- Extension educators
- University/technical college educators
- Minnesota feed industry
- Private businesses and consultants

Program Duration: Five years

Goal 1, Program 5: Animal Production and Management Strategies

Statement of Issue

Minnesota livestock producers are challenged with integrating knowledge from diverse disciplines into production practices suitable for their individual operation. Research on animal production systems must address the interactions between nutrition, genetics, reproduction, physiology, microbiology, immunology, and molecular biology, and also related effects on animal health, productivity, and impacts to the environment.

In Minnesota, large amounts of land (including 2,000,000 acres of conservation reserve land) are suited for beef cow/calf operations, but the cost of production is high due to

feed costs and inefficient use of available forage. Research is needed to develop grazing and forage systems to reduce feed costs and improve profitability.

Research leading to applications in production efficiency, sustainability, animal and environmental well being, and high quality products are imperative if Minnesota animal agriculture is to remain economically viable.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry applications of findings
- Ability to obtain external funding

Key Program Components

- Nutrition and management factors affecting the biologic and economic efficiency of animal production systems
- Evaluation of alternative feeds and feeding and management strategies to improve economic efficiency
- Determination of nutrient requirements to enhance economic and environmentally sustainable animal production
- Improved definition of dietary nutrient needs for food animals
- Providing information on improved sources of nutrients

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Animal Science; Food Science and Nutrition; Applied Economics; Soil, Water, and Climate; and Agronomy and Plant Genetics
 - Minnesota Institute for Sustainable Agriculture
 - USDA/ARS
 - College of Veterinary Medicine
 - University of Minnesota Extension Service

- External Collaborations
 - Minnesota Cattleman's Association
 - Minnesota Turkey Growers Association
 - National Turkey Federation
 - Minnesota Pork Producers
 - Minnesota Soybean Growers Association
 - National Pork Council
 - U.S. and Minnesota feed industry

Target Audiences

- Farmers
- Extension educators

- University/technical college educators
- Minnesota feed industry
- Other public agencies
- Private businesses and consultants

Program Duration: Five years

Goal 1, Program 6: Genetic Enhancements in Animal Systems

Statement of Issue

Minnesota meat producers face the challenge of minimizing their production costs while supplying leaner, more visually appealing meats to various consumer markets. Research is being conducted to identify genetic differences in animals that impact economically important traits or inherited diseases related to that industry. The results of this research would assist producers in their efforts to accelerate the genetic improvement of meat-bearing animals.

Meat producers are interested in increasing their competitiveness by offering leaner, juicier meats. With new genetic technology, the end product quality improves in relation to costs involved with raising the animals as producers realize an average daily gain of weight with better feed efficiency.

In addition to meat quality, research is also needed on improving breeding conception rates and the possibility of cloning of high quality breeding stock. A research program in reproductive physiology of beef and dairy stock has been established to enhance our research capacity in this area. Specific emphasis will be placed on embryo manipulation and transfer technology.

Additionally, the advent of genetic markers will result in products that maintain a generally higher visual appeal to the consumer. For producers and packers, this is where much of the end value comes from so they can cater towards different global markets by managing the visual presentation of their products. While the overall economic impact is still difficult to determine, our goal is to make Minnesota producers more competitive. If we can transfer technology effectively to producers, it will naturally have an improved job effect on both family businesses and corporations. As such, producers will be able to get contracts with packing plants that guarantee higher prices based on quality. While this process does not directly affect consumer prices, the packers will eventually be able to offer better prices as that quality becomes more consistent.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industrial applications of findings
- Ability to obtain external funding

Key Program Components

- Identify major animal genes that affect growth and development, reproductive performances, lactation, and disease resistance characteristics
- Identify genetic differences in animals that impact economically important traits or inherited diseases
- Identify biotechnology that would assist producers in their efforts to accelerate the genetic improvement of meat-bearing animals
- Construct linkage maps of the animal genomes (total nuclear DNA) through the application of highly informative markers called micro-satellites. By analyzing the inheritance of these markers in various reference families and clinical cases, we will help define those areas of the genome where genetic differences affect observable traits and diseases. Markers of specific regions, which have a major impact on economic traits or genetic diseases, can then be incorporated into marker-assisted selective breeding programs.
- Develop advanced technology for bovine embryo manipulation and transfer

Internal and External Linkages

- Internal Collaboration
 - Researchers and extension faculty in the departments of Animal Science and Food Science and Nutrition
 - University of Minnesota Extension Service
 - USDA/ARS
 - College of Veterinary Medicine
 - Center for Bovine Reproductive Biotechnology
- External Collaborations
 - Minnesota Cattleman's Association
 - Minnesota Turkey Growers' Association
 - National Turkey Federation
 - Minnesota Pork Producers
 - National Pork Producers' Association
 - U.S. and Minnesota feed industry

Target Audiences

- Livestock producers
- Veterinarians
- Consumers
- Researchers

Program Duration: Five years

Goal 1, Program 7: Understanding Physiological Processes Impacting Production and Quality Traits in Cropping Systems

Statement of Issue

Increasing efficiencies of producing crop plants is a primary concern for Minnesota producers. Research is needed to increase the understanding of component biological responses that determine crop yield and quality parameters at a range of levels from the biochemical to the physiological. Emphasis will need to be placed on the basis of adaptability to stresses caused by high temperature, water storage, malnutrition and competition from weeds, pests and diseases. The intention is to learn how to manipulate these responses through genetic and agronomic means.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Program Components

- Increase knowledge of biological components of crop yield
- Adaptability of crop plants to environmental stresses
- Understanding of the role of genetics in production and quality traits

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water, and climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - USDA/ARS
 - Minnesota Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Wheat and Barley Growers
 - Minnesota Soybean Growers Association
 - Minnesota Corn Growers Association
 - Minnesota Wild Rice Growers Association

Target Audiences

- Producers
- Extension educators
- Crop consultants
- Seed industry

Program Duration: Five years

Goal 1, Program 8: Genetic Enhancement in Plant Production Systems

Statement of Issue

Germplasm is the key element of successful plant breeding programs. Germplasm development involves research to improve the yield, adaptability, disease resistance and product quality. Evaluation, development, and enhancement require long-term commitments to develop superior germplasm sources.

New sources of genetic variation to improve the germplasm resource base of Minnesota's field crops, and new information on the inheritance of commercially important traits is essential. Research in the program is linked directly to conventional breeding programs undertaken by the Minnesota Agricultural Experiment Station.

More effective procedures for manipulating germplasm via marker-assisted selection, elucidating genetic bases of traits with complex inheritances, identifying and characterizing novel heterotic groups and quantitative trait loci, identifying optimal germplasm for specific breeding programs will be needed to insure genetic diversity of Minnesota's plant production systems.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings
- Operational seed orchards and plant propagation methods for forest tree species

Key Components

- Germplasm development, genetic transformation and the development and application of molecular markers
- Crop improvement for the introduction of new genes to increase resistance to pests and diseases; and improvement of productivity and crop quality
- Development of new technologies to develop more rapid and efficient methods of identifying useful properties of genes and for manipulating genetic material
- Development of new approaches in the characterization and classification of genetic material and in the application of new biotechnologies will support the development of new crops
- Development of new approaches for breeding and genetic improvement utilizing molecular technologies

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water, and Climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - University of Minnesota Extension Service
 - USDA/ARS
 - Center for Microbial and Plant Genomics

- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Wheat and Barley Growers
 - Minnesota Soybean Growers Association
 - Turf Organizations
 - Minnesota Corn Growers Association
 - Potato Growers
 - Minnesota Wild Rice Growers Association
 - MClA
 - Minnesota Tree Improvement Cooperative
 - Aspen/Larch Genetics Cooperative

Target Audiences

- Producers
- Extension educators
- Crop consultants
- Seed industry

Program Duration: Five years

Goal 1, Program 9: Crop Production and Management Strategies

Statement of Issue

Production capacity, production efficiency and crop protection are major factors supporting Minnesota crop productivity. Minnesota agriculture is relatively diverse with production in corn, soybeans, spring wheat, barley, alfalfa, sugarbeets and sunflower ranking in the top four nationally. Minnesota producers are seeking ways to minimize their inputs in the areas of pesticides and fertilizers with the adoption of new crop technologies, diversifying their crops, minimizing soil erosion with less tillage operations, and taking advantage of new alternative crop markets.

New technologies, including plant transformation, genomics, and computer assisted biology will help provide the necessary tools needed to understand and later modify plants for improved production characteristics.

Production of high quality food and fiber is an important industry in Minnesota and sustaining this high level of production and quality if is imperative. However, to remain viable in an increasingly global and competitive agriculture market, Minnesota producers must have access to novel approaches that reduce production risks while protecting the natural resource base of the state.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Components

- Farming systems that maximize profitability while protecting the natural resource base
- Research to identify and overcome constraints to crop production
- Research focusing on soil health, tillage systems, crop rotations, pest management, and decision support systems that will accelerate the adoption of research results on farms by demonstrating the benefits of research in terms of the whole farm
- Development and subsequent transfer to customers of efficient crop production and sustainable cropping systems. Overall challenges are to substantially increase the knowledge base of sustainable technology for crop production and cropping systems; to improve the delivery of technology generated; and to promote the use of these systems.

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water, and Climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - University of Minnesota Extension Service
 - USDA/ARS
 - Minnesota Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Wheat and Barley Growers
 - Minnesota Soybean Growers Association
 - Minnesota Canola Growers
 - Minnesota Corn Growers Association
 - Turf, forage growers
 - Minnesota Wild Rice Growers Association

Target Audiences

- Producers
- Extension educators
- Crop consultants

Program Duration: Five years

Goal 1, Program 10: Value Added Agriculture

Statement of Issue

Minnesota agriculture faces increasing, intense competition in the global marketplace. Worldwide, agricultural production has increased faster than demand in many areas, resulting in current commodity surpluses, low prices, and unreliable profitability. Recent shifts in U.S. farm policy to remove price supports emphasize the need for Minnesota producers to move beyond production of ever-larger quantities of ever-cheaper commodities. Producers must be able and willing to produce higher quality products that can be differentiated from lower value commodities; commodities and co-products must be converted into useful value-added food and nonfood products; and products must be protected from contamination or loss of quality after harvest to ensure marketability. These applications could include traditional uses such as food and feed, or nontraditional applications in nonfood products such as adhesives, plastics, composite products, fuels, and lubricants. Other uses could include nutraceuticals, pharmaceuticals, biopesticides, or other high value uses.

The Center for Plants and Human Health was formed to facilitate collaborative research between COAFES and the Academic Health Center in the development of health related plant materials.

Our country must reduce its reliance upon petroleum-based sources of energy. Agriculture can play a major role in this transition through research on biomass production, biofuels, biorefining, solar and wind energy. The Colleges of Agricultural, Food and Environmental Sciences; Biological Sciences; and Natural Resources participate in a University-wide initiative on Renewable Energy and the Environment, which was formed to focus research expertise on hydrogen, bioenergy and bioproducts, conservation and energy efficient systems, and energy policy and economics. Also, COAFES has recently formed an interdisciplinary Center for Biorefining to address research related to development of biofuels and bioproducts from various plant materials.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Components

- Research to develop knowledge and technology for crop and animal product quality measurement and maintenance or enhancement during processing and marketing
- Commodity and co-product processing into value-added materials; and new specialty products from crops and animals
- Research to identify the role of product composition, molecular structure, and physical state in determining end-use quality
- Applied research will develop new processes to maintain or enhance product quality during harvest, storage, transport, and marketing
- Innovative processes for the extraction and purification, or manufacture, of superior products from agricultural commodities
- Application of these innovative technologies will expand the range and value of agricultural products and reduce the cost of their production
- Identify alternative sources and create technology leading to an expanded, diverse range of value-added food and nonfood products from commodities and undervalued byproducts of agriculture
- Development of high value “designer” crops

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water, and Climate; Horticulture; Entomology; Plant Biology; Plant Pathology; Biosystems and Agricultural Engineering; Animal Science; and Food Science and Nutrition
 - University of Minnesota Extension Service
 - USDA/ARS
 - Minnesota Institute for Sustainable Agriculture
 - Initiative for Renewable Energy and the Environment
 - Center for Biorefining
 - The Biotechnology Institute
 - Center for Plants and Human Health
- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Wheat and Barley Growers
 - Minnesota Soybean Growers Association
 - Minnesota Corn Growers Association
 - Minnesota Wild Rice Growers Association
 - Minnesota Pork Producers
 - Minnesota Beef Producers
 - Minnesota Turkey Growers Association

Target Audiences

- Producers
- Extension Educators
- Crop consultants

Program Duration: Five years

Goal 1, Program 11: Green Industry

Statement of Issue

The Green Industry is one of the fastest growing segments of Minnesota agriculture economy. The Green Industry is defined as firms involved in the production, design, installation, maintenance and sale of plant products to enhance human environments. As such, the industry consists of three major components: landscape services, nursery/greenhouse production and distribution, and florists. Within landscape services, there are three basic activities: design, installation and maintenance. Within the nursery sector, there are also three basic activities: production of plant materials, wholesale distribution and retail distribution of nursery products. Production of plant materials includes field production, specialized rose and sod farms, and container and greenhouse production of plants. In the industry, production and wholesaling often go hand in hand.

The turfgrass industry is an important component of the Green Industry. There is a significant need for research on golf course and athletic field, residential, and commercial turfgrass areas. In addition to the cosmetic value of turfgrass, it provides positive environmental benefits through reduction of air pollution and heat absorption properties. The establishment and maintenance of turfgrass areas creates a large number of employment opportunities in areas such as the turf equipment, fertilizer, pesticide, and irrigation industries. COAFES recently opened a new turfgrass research facility to address the research needs of this industry.

The Green Industry's growth is closely tied to increases in population and subsequent increases in construction. Consequently, the Industry grew at a phenomenal rate during the 1970's and 1980's. Corporate outsourcing of landscape services also fueled part of the growth in the 1980's. Between 1974 and 1987, the industry increased fourfold in employment and eightfold in nominal payroll. Between 1987 and 1994, employment in the industry increased by 30% and payroll increased by 22%.

Research is still needed to develop new technologies and strategies that increase profitability while minimizing the environmental impact from urban agriculture. The aesthetic, functional and economic impact of ornamental plants in our working and living environment has a profound positive impact on the quality of life.

Performance Goals

- CRIS reports
- MN Impacts

- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Components

- Development of nursery products that will enhance the ethical and economic progress of the industry.
- Improvement of nursery products and techniques.
- Research to develop new technologies and strategies that increase profitability while minimizing the environmental impact from urban agriculture.
- Development of new turfgrass varieties and management practices for turfgrass.

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Horticulture; Agronomy and Plant Genetics; Soil, Water, and Climate; Horticulture; Entomology; Plant Biology; Plant Pathology; and Biosystems and Agricultural Engineering
 - University of Minnesota Extension Service
 - USDA/ARS
 - Minnesota Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Commercial Flower Growers Association
 - Minnesota Horticultural Society
 - Society of American Florists
 - Professional Plant Propagators Association
 - Minnesota Nurserymen's Research Corporation
 - Minnesota Turf and Grounds Foundation
 - Minnesota Golf Course Superintendents' Association
 - Minnesota Nursery and Landscape Association

Target Audiences

- Landscape industries
- Extension educators
- Nursery industries
- Public
- Land use planners
- State and local government
- Master Gardeners
- Sod producers
- Golf course superintendents

Program Duration: Five years

Goal 1, Program 12: Food Crops

Statement of Issue

The production, marketing, and selling of fruit and vegetable crops is a growing industry in Minnesota. Minnesota commercial food crop production is relatively diverse with production in sweet corn, processing peas, potatoes, and apples, which rank in the top four nationally.

To remain competitive in our rapidly changing global economy, these commercial food crop producers must adopt new cultivars/rootstocks that are more tolerant to environmental stresses affecting plants, cultural systems that improve production efficiency and promote sustainability, and post harvest handling practices that improve crop utilization and product safety. Before new cultivars, production systems, or post harvest practices can be recommended, they must be thoroughly evaluated under Minnesota's environmental conditions.

Performance Goals

- CRIS reports
- Minnesota Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Components

- Research assists commercial food crop producers in the adoption of new cultivars/rootstocks that are more tolerant to environmental stresses.
- Research cultural systems that improve production efficiency and promote sustainability.
- Research on post harvest handling practices that improve crop utilization and product safety.

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Horticulture; Agronomy and Plant Genetics; Soil, Water, and Climate; Horticulture; Entomology; Plant Biology; and Biosystems and Agricultural Engineering
 - University of Minnesota Extension Service
 - USDA/ARS Fruit Lab
- External Collaborations
 - Minnesota Department of Agriculture
 - Minnesota Apple Growers Association
 - Minnesota Fruit and Vegetable Growers Association
 - Dwarf Fruit Tree Association
 - Minnesota Grape Growers Association
 - North American Strawberry Growers Association

Target Audiences

- Producers
- Extension Educators
- Public
- Food processors
- Master Gardeners

Program Duration: Five years

Goal 1, Program 13: Agricultural Information Technology

Statement of Issue

The information revolution is having profound impacts on agricultural producers and businesses, including the forest products industry. Changes in information collection, processing, and technology is causing dramatic changes in the structure of agriculture. Everything from precision farming to electronic markets will impact the sector.

The adoption and widespread use of information technology in agriculture and forest resources management is constrained by a number of factors. First, many of the technologies are not yet profitable within current production systems. Second, land managers and producers lack objective information on new equipment, training on how to operate and use the information hardware, software, data systems, and decision tools, and the necessary private infrastructure for efficient operation of systems.

Research is needed to provide the necessary information to producers, professionals and businesses to make informed decisions on the purchase and use of information technology.

Performance Goals

- CRIS reports
- Minnesota Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Components

- Research on information technology purchase and use for producers and agri-businesses.
- Research on the data management analysis.

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Rhetoric; Horticulture; Agronomy and Plant Genetics; Soil, Water, and Climate;

Horticulture; Entomology; Plant Biology; Plant Pathology; and Biosystems and Agricultural Engineering.

- University of Minnesota Extension Service

- External Collaborations
 - Minnesota Department of Agriculture
 - USDA Forest Service North Central Research Station
 - Minnesota Department of Natural Resources
 - Minnesota County Land Departments
 - Forest Products Industry landowners

Target Audiences

- Producers
- Extension Educators
- Public
- Consultants
- Natural resource management professionals

Program Duration: Five years

Goal 2: To ensure an adequate food and fiber supply and food safety through improved science based detection, surveillance, prevention, and education

Statement of Issue

Though we have the most plentiful and the safest food supply in the world, Minnesota consumers are anxious about real and/or perceived hazards that affect food safety and quality. Improper food production and processing practices and subsequent handling has recently been implicated in outbreaks of food borne illness. Fiber supplies are also considerable and could be greatly increased.

Food safety and animal health are major issues confronting viability of the livestock industry. Accordingly, the College of Veterinary Medicine and the College of Agricultural, Food and Environmental Sciences will collaborate on research related to animal health and food safety and have formed a new Center for Animal Health and food Safety to focus research expertise on this important area.

Key Program Components

- Use existing and develop new methodologies to analyze food demand behavior
- Create the basic knowledge to permit the food industry to develop safe and flavorful food products
- Reduce incidence of pathogens by incorporating natural anti-microbials in ready-to-consume foods
- Controlled release flavoring systems
- Reduce food spoilage by using naturally occurring chemicals from edible plants
- Optimize product quality by evaluating food component interactions

- Increase understanding of the structural characteristics that proteins bring to food products
- Develop a combined theoretical and experimental approach to conventional and microwave heating
- Application of pasteurization and minimum thermal inactivation process in ground beef
- Develop a polymer science approach to study lipid replacement in cereal-based systems
- Increase the production of fiber on forest acres through the application of research showing the gains from more intensive management
- Reduce insect and disease losses by optimizing the choice of plant materials and growing systems to address such threats
- Evaluate the farm to table movement of food and determine where contamination may occur

Performance Goals

- CRIS reports
- MN Impacts
- Peer reviewed publications
- Industry and landowner applications of findings

Internal and External Collaborations

- Internal Collaborations
 - University of Minnesota faculty; undergraduate and graduate students
 - Retail Food Industry Center
 - Food Marketing Institute
 - Center for Animal Health and Food Safety
- External Collaborations
 - Minnesota Dairy Foods Research Center
 - North Central Cheese Industries Association
 - Dairy Council
 - Turkey Growers
 - Beef Producers
 - Minnesota Association of Meat Processors
 - International Meat and Poultry HACCP Alliance
 - State Restaurant Associations
 - Minnesota Department of Agriculture
 - Minnesota Department of Health
 - Agriculture Utilization Research Institute
 - Food and Drug Administration
 - Commodity/ Trade Associations
 - Minnesota Pollution Control Agency
 - Department of Natural Resources
 - Department of Transportation
 - National Food Processor's Institute

- Minnesota Tree Improvement Cooperative
- Minnesota Department of Natural Resources

Target Audiences

- Department of Health
- Food Product Development Industry; Food Processing Industry
- Food Fermentation Industry
- Forest Products Industry
- Small private to large forest landowners
- Public
- Professionals such as teachers, veterinarians, managers
- Mass media employees
- Livestock producers

Program Duration: Five years

Goal 3: Through research and education on nutrition and development of more nutritious foods, it enables people to make health-promoting choices

Statement of Issue

Nutrition and optimal food intake is a fundamental physical building block and important to the well being of Minnesotans. Research has established the link between adequate nutrition in the early years and adult productivity, between adequate nutrition and risks of disease and disability, and between adequate nutrition education and nutritional intake. Research in Minnesota focuses upon such issues as food, consumption for optimal health, food chemicals in processing and storage, and product characteristics of foods grown in the mid-west. In Minnesota, 16% of the population is estimated to lack adequate food each day.

Performance Goals

Performance goals will include CRIS reports, MN Impacts, number of refereed journal articles and other peer reviewed publications as well as industrial application of findings.

Key Components

Dietary research efforts underway focus on the relationship between vivo lipid oxidation and its protection against heart disease, diabetes, and cancer, on measuring the physiological effects of dietary fiber, investigating foods that help in the treatment for diabetes, the potential of phyto-estrogens as cancer preventatives, developing new sources of dietary antioxidants and fibers, understanding the link between fat, salt, and hypertension, and on a variety of dietary influences of colon cancer. Specific research issues include:

- Optimal food consumption for health of colon, cardiovascular disease, specifically diet, cancer, and diabetes
- Physiological effects of various dietary fibers
- Sensory factors affecting the acceptability of foods

- Loss of food chemicals in processing and storage
- Mixing properties of flours grown in various locations in the mid-west and evaluation of bread quality based upon ingredient interactions

Internal and External Linkages

- Internal Collaborations
 - University of Minnesota Extension Service
 - Research and extension faculty in the colleges of Human Ecology; Agricultural, Food and Environmental Sciences (Departments of Food Science and Nutrition, Applied Economics, Horticulture, Biosystems and Agricultural Engineering, Animal Science); School of Public Health; Medical School (Departments of Microbiology, Physiology, Biochemistry and Molecular Biology, Surgery, and Radiology); Veterinary School (Center for Animal Health and Food Safety)
- External Collaborations
 - American Beef Council, American Soybean Association, National Dairy Promotion Council
 - Food Scientists, food technologists, microbiologists, dairy food industry, mid-western cereal scientists
 - American Institute of Nutrition, Minnesota Obesity Center, Minnesota Association of Community Mental Health Programs, Minneapolis Veterans Administration Medical Center, National Center for Occupational Safety and Health, National Farm Medicine Center, Minnesota Department of Health, Minnesota Department of Human Services, Mayo Clinic, Hennepin County Medical Center, local HMOs University of Wisconsin—Extension and Madison campuses

Target audiences

- Nutraceutical companies
- Medical Industry

Program Duration: Five years

Goal 4: Enhance the quality of CNR/COAFES of the environment through better understanding of and building on the agriculture’s and forestry’s complex links with soil, water, air and biotic resources.

Goal 4, Program 1: Maintaining Forest and Natural Resources

Statement of Issue

Minnesota has nearly 17 million acres of forests that provide a wide variety of goods and services to residents of the state. The use, management and protection of these resources that range from intensive management for fiber production to wilderness designation are dependent on wise and informed decisions by policy makers, citizens, landowners, and

the many resource managers who have been asked to ensure the continued productivity and sustainability of state's forest resources. If such decisions are to further the landowner and the public's interests, they must be advised by accurate, authoritative scientific and technological information.

Agriculture in Minnesota must be kept strong while also protecting the state's considerable soil, water, and biodiversity resources. For example, the Minnesota River has been labeled as one of the top 20 non-point source polluted rivers in the U.S. with 92% of the lands within the basin in agricultural land uses. Solutions are sought to reduce the negative impacts and maintain our natural resources for fishing, recreation and tourism.

Performance Goals

- CRIS reports
- MN Impacts
- Number of refereed journal articles, other peer reviewed publications, and information made available on the web via the internet
- Evaluation of current management systems for risk and environmental impact and balancing tradeoffs in agriculture and natural resource management

Key Components

Research in natural resources sponsored by the Agricultural Experiment Station is carried out via three departments in the College of Natural Resources: Forest Resources, Wood and Paper Science, Fisheries and Wildlife, and Conservation Biology. Other departments addressing forest resource questions include entomology, plant pathology, horticulture, plant biology, soil, water and climate, and applied economics.

Specific research issues in Minnesota are as follows:

- Improve understanding of controls on forest composition, diversity and function;
- Improve understanding of northern MN forest ecosystems and develop improved management techniques
- Investigate the biology and control of forest microbes and determine their importance to forest health and sustainable ecosystem functioning
- Better understand the decisions that affect the integrity and biological diversity of the ecosystem, and linkages between biosphere, microclimate and global climate.
- Minimize undesirable human/wild animal interactions and impacts
- Develop tools for assessing the fish communities of lakes to manage growth and reproduction rates of species and environmental factors for setting harvest regulations

Internal and External Linkages

- Internal Collaborations
 - Campus faculty in five colleges, support services and county extension educators; Bell Museum of Natural History; Research and Outreach Centers; MN Institute for Sustainable Agriculture; Center for Integrated Agriculture and Natural Resources Management; the Center for

Environment and Natural Resources Policy; and the Environmental Resources Spatial Analysis Center;

- Graduate and undergraduate students through education and student organizations
- External Collaborations
 - Departments of Agriculture, Health, Natural Resources
 - USDA: Farm Services Agency; Natural Resources Conservation Service; Animal, Plant, Health Inspection Service, Forest Service
 - USDI: Fish and Wildlife Service, Minnesota Valley National Wildlife Refuge, National Park Service, Bureau of Land Management
 - Board of Water and Soil Resources
 - MN Pollution Control Agency, EPA, U.S. Army Corps of Engineers, Department of Transportation, Minnesota Office of Tourism
 - Forest Service, Canadian and U.S. pulp and paper industries, Minnesota Forest Industries, Minnesota Timber Producers Association, Minnesota Forest Resources Council, Plant Molecular Genetics Institute, Monsanto Co., Cargill, 3M
 - National Park Service, Bureau of Land Management
 - MN Waterfowl Association, Wildlife Society, Animal Rights Coalition; City Nature Centers and County Wildlife Section, Minnesota Forestry Association, Ruffed Grouse Society, Minnesota Deer Hunters Association
 - Associations of National Rifle, Archery

Target Audiences

- Primary audiences include Minnesota farmers and the businesses that serve them, those interested in agriculture and impacts and environment, policy makers, e.g. rural communities, sport anglers and fisheries managers, resource agencies, ecologists, Sustainable Farming Association Chapters

Program Duration: Five years

Goal 4, Program 2: Integrated Pest Management

Statement of Issue

Pest control represents approximately 34 percent of a farmer's variable crop production costs and pests continue to cause losses of 10 to 30 percent using current pest control strategies. In addition to existing pests, new pests such as wheat and barley head scab and new races of potato late blight continually challenge Minnesota producers. These and other pests not only reduce profitability but also often threaten export markets. Pests are also an important factor in reducing the harvest potentials of Minnesota's forestlands.

Pesticides are important tools used by farmers and forest landowners to control pests. However, environmental regulations, pest resistance to pesticides and consumer concerns

have reduced the use and availability of pesticides and have dramatically limited the introduction of new pest control chemicals.

Integrated pest management is a science-based strategy that provides answers to important pest control problems by identifying and introducing new pest control tools for farmers and forest landowners, with an emphasis on biologically based IPM products and ecological principles.

On-going and additional research is needed to provide producers with chemical pesticides, biological control products or cultural tactics to replace agricultural chemicals which are under regulatory consideration, providing alternatives where pest resistance limits IPM options, and to provide biologically based and other sustainable strategies for management of existing and new pests in cropping systems.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer review publications
- Industrial application of findings

Key Components

- Increase Minnesota producer profitability and competitiveness
- Provide consumers with a safe, high quality food supply
- Reduce environmental and human health risks associated with pesticide use
- Support new business opportunities in consulting and production of new IPM products
- Identifies new pest management tools through fundamental research and moves this science from the laboratory to the farm to solve priority pest control problems identified by farmers

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water and Climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - University of Minnesota Extension Service
 - Center of Alternative Animal and Plant Products (COAFES)
 - USDA/ARS
 - MN Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - MN Wheat and Barley Growers
 - MN Soybean Growers Association
 - MN Corn Growers Association
 - MN Wild Rice Growers Association

- MN Independent Crop Consultants
- MN Vegetable Growers Association
- Minnesota Department of Natural Resources

Target Audiences

- Producers
- Forest landowners
- Extension educators
- Crop consultants
- Crop Protection Chemicals Industry
- Fertilizer Industry
- Consumers

Program Duration: Five years

Goal 4, Program 3: Increasing and Maintaining Diversity in Agricultural Systems

Statement of Issue

Diversity is an element of the complex system of interactions that provide resilience and long-term stability in the natural world. In our current agricultural systems we have replaced interactive systems with a reliance on technology fixes to both biological and environmental problems associated with these systems.

Formerly, many Minnesota crop rotations included a mix of perennial and annual crops. In southern and southwestern Minnesota, crop diversity has declined in recent decades, leaving approximately 75 percent of the land area in a simplified corn and soybean rotation. In northern Minnesota, diseases associated with continuous small grain production have hard hit the small grain production systems. Livestock farms have become larger, fewer and more specialized. The diversified livestock farm that included multiple species and a diversified cropping system has also declined.

Current emphasis on the large-scale growing of a few crops and animal species has consequences in terms of disease susceptibility, environmental and ecological degradation, and economic limits. Increasing the species diversity of Minnesota's agriculture will help ensure a viable future.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industrial applications of findings

Key Components

- Identify and develop new plant traits, new cropping systems, and new rotations that will increase diversity

- Identify and develop new animal traits, new animal species, and new production systems for livestock to improve diversity

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water and Climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - University of Minnesota Extension Service
 - USDA/ARS
 - MN Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - MN Wheat and Barley Growers
 - MN Soybean Growers Association
 - MN Corn Growers Association
 - MN Wild Rice Growers Association
 - MN Independent Crop Consultants
 - MN Vegetable Growers Association
 - MN Pork Producers
 - MN Cattleman's Association

Target Audiences

- Producers
- Extension Educators
- Crop Consultants
- Consumers

Program Duration: Five years

Goal 4, Program 4: Sustainable Agriculture

Statement of Issue

Agriculture is a system in which the land, the people and the production of food are interwoven. One aspect of the system cannot be changed without influencing all of it. Efforts to improve agriculture should take care to balance the long-term economics, ecological and social effects.

The Minnesota Institute for Sustainable Agriculture (MISA) is a unique partnership between the College of Agricultural, Food, and Environmental Sciences at the University of Minnesota and the Sustainer's Coalition, a group of individuals and non-profit organizations. The purpose of MISA is to bring together the diverse interests of the agricultural community with interests from across the University community in a

cooperative effort to develop and promote sustainable agriculture in Minnesota and beyond.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Component

- Facilitate the internalization of sustainable agriculture into the university so that the concepts permeate teaching, research and extension
- Work with rural communities in discovering and implementing the values of sustainability
- Develop a method for defining the sustainability of agricultural systems and for assessing their impacts on rural communities
- Promote sustainable community development principles throughout Minnesota

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water and Climate; Horticulture; Entomology; Plant Biology; and Plant Pathology
 - University of Minnesota Extension Service
 - USDA/ARS
 - MN Institute for Sustainable Agriculture
- External Collaborations
 - Minnesota Department of Agriculture
 - MN Wheat and Barley Growers
 - MN Soybean Growers Association
 - MN Corn Growers Association
 - MN Wild Rice Growers Association
 - MN Independent Crop Consultants
 - MN Vegetable Growers Association

Target Audiences

- Producers
- Extension Educators
- Crop Consultants
- Consumers

Program Duration: Five years

Goal 4, Program 5: Water Resource Management

Statement of Issue

Today, many farmers are aware that their farming practices can have a far-reaching effect on Minnesota's rivers and streams. The evidence that some practices were detrimental has been clear for some time: agriculture runoff was one of the major factors in the pollution of the Minnesota River Basin. Others among Minnesota's thousands of lakes and streams also suffered from runoff. Responding to this problem, many farmers have adopted methods of production and management to minimize soil erosion and runoff from nutrients and pesticides—thus working to improve the quality of Minnesota's rivers and lakes.

However, the Minnesota River is considered one of the 20 most endangered waterways in America. A report by the Minnesota Pollution Control Agency (MPCA) entitled Minnesota River Assessment Project (MRAP) documented frequent violations of federal or state standards for bacteria, phosphorous, turbidity, and dissolved oxygen at several monitoring stations along the Minnesota River or its tributaries. MRAP suggested several possible sources for these pollutants, including feedlots, septic systems, wastewater treatment plants, stream and ditch erosion, and runoff or erosion from agricultural lands. MRAP presented both an agency and a citizens advisory group plan for implementation of practices to control pollution in the Minnesota River basin.

To address these issues, research is being conducted to develop a systematic, comprehensive, and scientific approach for addressing agricultural profitability and non-point source pollution reduction in the Minnesota River basin.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications

Key Component

- Develop a framework for describing and taking inventory of characteristics of the Minnesota River basin that affect non-point source pollution, agricultural management practices and their potential for reducing non-point source pollution
- Develop an inventory for research on the risk associated with adopting crop management practices that can reduce non-point source pollution
- Identify knowledge gaps and research needs for non-point source pollution
- Develop an educational outreach program for disseminating information about the Minnesota River basin and to accelerate the adoption of farming practices to reduce agricultural NPS pollution
- Develop agroforestry practices that mitigate non-point pollution problems
- Describe and evaluate the performance of various simulation models used for estimating the impact of farm management practices on NPS pollution in the Minnesota River basin

Internal and External Linkages

- Internal Collaborations
 - Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water and Climate; Biosystems and Agricultural Engineering
 - University of Minnesota Extension Service
 - USDA/ARS
 - MN Institute for Sustainable Agriculture
 - MN Water Resources Research Institute
 - University of Minnesota Water Resources Center
 - College of Natural Resources
 - University of Minnesota Earth Resources Spatial Analysis Center (ERSAC)

- External Collaborations
 - Minnesota Department of Agriculture
 - National Institutes of Water Resources
 - MN Board of Water Resources
 - State and local governments
 - MN Wheat and Barley Growers
 - MN Soybean Growers Association
 - MN Corn Growers Association
 - MN Wild Rice Growers Association
 - MN Independent Crop Consultants
 - MN Vegetable Growers Association

Target Audiences

- Producers
- Extension Educators
- Crop Consultants
- MN State Agency Personnel
- Consumers

Program Duration: Five years

Goal 4, Program 6: Animal Waste Management

Statement of Issue

A strong livestock industry is essential to Minnesota's economic stability, the viability of many rural communities, and the sustainability of a healthful and high quality food supply for the American public.

Manure management is becoming a critical component in the planning and operation of livestock and poultry production in the state. Manure must be collected, stored, and utilized on animal production operations in an environmentally friendly manner to meet

state regulations and exist in an increasingly environmentally conscious society. Major environmental issues center on water quality (surface and groundwater) and gaseous emissions including odors.

Odors from livestock production systems pose significant nuisances to surrounding communities, including the producers themselves, as well as residential neighbors and farmers. However, there is concern that some compounds may possess some human health hazards, particularly that of hydrogen sulfide. Some livestock systems are believed to generate this substance to areas within one or two miles of its source.

If the odor problems aren't dealt with, Minnesota's livestock producers may not be able to remain viable long term. The emergence of odor control regulations and systems will force management practices to change. Technological changes may also occur to minimize odor generated from manure storage. This may become so cost prohibitive that Minnesota could experience a dislocation of its livestock producers. From a consumer standpoint, the costs of odor control technology may increase the cost of animal or meat products by a slight margin. However, this would be preferable to an industry exodus from Minnesota, which could otherwise occur if sudden, stringent regulations were to take effect.

Ultimately, the livelihoods of 40,000 livestock producers could be helped across the state over the next 10-20 years. By proactively minimizing the odor problem, the livestock industry will be more inclined to stay in Minnesota, and thus jobs in this sector will be maintained. However, we expect a neutral economic improvement overall. The introduction of odor-control technology will add to production costs, but these will be offset by lower legal, social, and real costs of dealing with odor issues over the long term.

Other long-term environmental impacts such as ammonia release and greenhouse gas production from animal production systems, and policy questions surrounding change and uncertainty in the livestock industry, are among the most important facing agriculture today.

Performance Goals

- CRIS Reports
- MN Impacts
- Number of refereed journal articles and other peer reviewed publications
- Industry application of findings

Key Component

- Waste management and cropping systems research and education to minimize environmental costs associated with animal agriculture
- Improved animal manure handling, storage, and application management systems
- Improve design of animal production systems

Internal and External Linkages

- Internal Collaborations

- Research and extension faculty in the departments of Agronomy and Plant Genetics; Soil, Water and Climate; Biosystems and Agricultural Engineering; and Animal Science
- College of Veterinarian Medicine
- University of Minnesota Extension Service
- USDA/ARS
- MN Institute for Sustainable Agriculture

- External Collaborations
 - Minnesota Department of Agriculture
 - MN Pollution Control Agency
 - MN Associate of Counties
 - MN Soybean Growers Association
 - MN Corn Growers Association
 - MN Turkey Growers Association
 - MN Pork Producers
 - MN Beef Producers

Target Audiences

- Producers
- Extension Educators
- State and local governments
- Public

Program Duration: Five years

Goal 5: Empower people and communities, through research-based information and education, to address the economic and social challenges facing our youth, families, and communities

Statement of Issue

Social, environmental, and economic social issues are becoming increasingly complex, especially in rural communities. These communities are challenged to address issues that often involve sharply divergent views, problems and solutions that are unclear, stakeholders that are newcomers and/or have not previously been involved in these issues, and public policy implications that require attention by all facets of the community to reach acceptable solutions. While these demands are growing, many rural communities are also experiencing population declines and a lack of individuals willing to step forward to take on leadership roles in their communities. Preparing citizens and communities to be entrepreneurial and make use of new technologies that capitalize on unique local and regional resources is critical to continuing economic development.

Local communities and local governments are facing an increasingly complex set of challenges and problems. In many cases, revenues are not growing as rapidly as service

demands from the public. Communities dominated by agricultural interests are in the process of economic and demographic change. Poverty is increasing. Many communities are struggling with the availability of affordable health care, particularly for the elderly. In addition, in rural Minnesota, the ethnic and racial demographics are changing dramatically. All of these changes are frequently accompanied by community conflict, paralysis, and polarization around such issues as urban/rural and race, when cooperation and collaborative problem solving are needed to address community problems.

Families in Minnesota face many challenges. Even those families labeled as "thriving," face daily challenges. Other families lack the resources, assets, or skills they need to be healthy as a family unit. Quality childcare issues will increase in importance as the Welfare-to-Work transition continues to take place. Programs that respect individual and cultural differences build strengths in the people they serve. Many families and individuals are increasingly challenged in meeting their financial needs because of reduced incomes due to unemployment and underemployment. This is particularly true for low-income families.

Economic opportunities in both rural and urban areas depend on the health of existing businesses, on the availability of affordable housing and on the organization, delivery and finance of local government services. To remain healthy and viable, businesses in rural communities increasingly need information about local labor markets and employment trends and assistance in market evaluation, new product development, and improved small business decision-making.

Global economic changes require rapid changes in rural economies and diversification of local economic bases. Economic opportunities in both rural and urban areas depend significantly on the health of existing businesses, on the availability of affordable housing, and on the organization, delivery and finance of local government services. To remain healthy and viable, businesses in rural communities increasingly need information about local labor markets and employment trends, and assistance in market evaluation, new product development, and improved small business decision-making.

Performance Goals

- CRIS Reports
- MN Impacts
- Peer reviewed publications
- Ability to obtain external funding
- Invited presentations
- Peer reviewed presentations
- Number of students finished in the program
- Dissertations written
- Outreach activities
- Agency reports
- Local economic development
- Community planning initiatives

Key Components

The focus is on empowering people and communities through research based information to address the economic and social challenges facing youth, families, and communities. Research examines characteristics of family systems to identify impact of environment and decision-making on quality of marriage and family life. Healthy lifestyles include the ability to cope with financial strain and at the same time, coping with the reduction of programs and support for families. Specific research addresses positive family development, effective services that aim at security for the individual and family unit, relationships between the viability of rural family businesses and family functioning, the relationship of supply and demand for housing in rural communities, understanding family businesses as a vehicle for economic development, improving management decision-making of small business owners relative to business structures, product development and market evaluation. Research efforts include study of processes and patterns of community adaptation, acceptance of youth and frail elders and various minority groups in Minnesota, i.e., Hispanic, Hmong, Vietnamese, Native American, Somalian.

Internal and External Linkages

- Internal Collaborations
 - College of Human Ecology, College of Agriculture Food and Environmental Sciences, University of Minnesota-Crookston Campus, University of Minnesota-Morris Campus, Hubert H. Humphrey Institute of Public Affairs, the College of Natural Resources, the College of Architecture and Landscape Architecture, the College of Education and Human Development, Medical School, Center for Urban and Regional Affairs, the Children, Youth and Families Consortium, Irving Harris Institute for Early Childhood Development, University Migrant Project, and the Student Legal Service.
 - Federal CYFAR Initiative, including the National Network for Family Resiliency, National Network for Child Care, National Network for Health, National Network for Collaboration, CYFERNet, Irving Harris Institute for Early Childhood Development
 - Tourism Center and Center for Environment and Natural Resources Policy, College of Natural Resources
- External Collaborations
 - Minnesota Department of Trade and Economic Development, Minnesota Department of Agriculture, Minnesota Office of Tourism
 - Minnesota Supreme Court, Minnesota Association of Legal Aid Lawyers, Local judges, family law and estate planning attorneys, Minnesota Bar Association, court administrators, police departments, Minnesota Department of Corrections, divorce and custody mediators, family support and advocacy groups
 - Minnesota Department of Children Families and Learning, Child Care Resource and Referral Early Childhood/Family Education Programs, high school teachers, community education professionals, US Department of

Education, Early Childhood Family Education, Minnesota Coalition for Family Policy, Search Institute, professional associations of clergy, local child care provider associations

- Minnesota Department of Health, county public health, social services and workforce centers, family non-profit agencies
- Minnesota Department of Human Resources, U.S. Department of Health and Human Services
- Internal Revenue Service, the Minnesota Department of Revenue, the Council of Churches, United Way agencies, the Minnesota Alliance for Children, a range of local social service agencies, domestic abuse programs, violence prevention programs, Minnesota Board of Aging
- Ethnic advocacy groups including Asian Media Access, Vietnamese Social Services, United Cambodian Association of Minnesota, Hmong American Partnership
- Minnesota Rural Futures, Minnesota Agri-Women
- County and city officials, Minnesota State Auditor, League of Cities, Association of Minnesota Counties
- The Minnesota Academic Excellence Foundation, the Minnesota Association of School Administrators, the Minnesota Association of School Principals, regional initiative funds, School to Work Partnerships, Family Service Collaboratives
- Other land grant universities
- Family businesses, local community action groups, local leaders and advocates

Target Audiences

- Parents, family therapists, psychologists, social workers, human service providers, early childhood professionals, child care providers, public health staff, child protection workers, violence prevention specialists, criminal justice professionals, lawyers, family educators, law enforcement professionals, other family professionals
- Families, especially low income families and young people of all ages, especially those at risk
- Migrants and immigrants, communities of color, local agencies and advocacy groups for communities of color
- Researchers, Extension Educators, undergraduate and graduate students
- State development agency staff, local economic development officers and regional planners, housing professionals
- Local elected officials, county, city and township officials, public
- policy makers and active citizens, policy advocates, local school officials and teachers, youth as community resources
- Farm and main street business people, agricultural processors, small business employers and employees
- Health care professionals and providers, health consumers

Program Duration: two years

Appendix 1 – Faculty with Joint Appointments

College / Department	Research	Extension	Teaching	Total
COAFES				
NWROC - Crookston				
Marx,George Donald	82%	18%	0%	100%
Hollingsworth,Charla R	70%	30%	0%	100%
Macrae,Ian Vance	51%	49%	0%	100%
Wiersma,Jochum Jan	52%	48%	0%	100%
WCROC - Morris				
Johnston,Lee Jay	80%	20%	0%	100%
Rudstrom,Margaretha V	67%	33%	0%	100%
NCROC - Grand Rapids				
Lamb,Graham Clifford	77%	23%	0%	100%
SROC - Waseca				
Fritz,Vincent A	70%	30%	0%	100%
Baidoo,Samuel Kofi	80%	20%	0%	100%
Zhu,Jun	80%	20%	0%	100%
BioSystems & Ag Engineering				
Jacobson,Larry Dean	25%	75%	0%	100%
Janni,Kevin A	45%	35%	20%	100%
Morey,R Vance	35%	35%	30%	100%
Wilcke,William F	25%	75%	0%	100%
Shutske,John M	25%	75%	0%	100%
Sands, Gary R	35%	65%	0%	100%
Agronomy & Plant Genetics				
Becker,Roger Lee	25%	75%	0%	100%
Durgan,Beverly R	26%	71%	3%	100%
Gunsolus,Jeffrey L	30%	70%	0%	100%
Hicks,Dale Ray	8%	92%	0%	100%
Naeve,Seth	25%	75%	0%	100%
Peterson,Paul	25%	75%	0%	100%
Applied Economics				
Olson,Kent D	35%	25%	40%	100%
Parliament,Claudia	15%	49%	36%	100%
Open Position	37%	54%	9%	100%
Buhr,Brian L	40%	40%	20%	100%
Fruin,Jeremiah E	50%	50%	0%	100%
Lazarus,William Frankl	20%	80%	0%	100%
Stinson,Thomas F	47%	44%	9%	100%
Taff,Steven James	25%	75%	0%	100%
Hurley,Terrance M	35%	56%	9%	100%
Kalambokidis,Laura TJachim	30%	70%	0%	100%
Animal Science				
Linn,James Gary	15%	75%	10%	100%

Noll,Sally	15%	75%	10%	100%
Seykora,Anthony	5%	17%	78%	100%
Shurson,Gerald C	5%	30%	65%	100%
Dicostanzo,Alfredo	19%	71%	10%	100%
Endres,Marcia Ines	25%	75%	0%	100%
Entomology				
Hutchison,William Dale	60%	40%	0%	100%
Ostlie,Kenneth R	40%	60%	0%	100%
Ragsdale,David Willard	59%	15%	26%	100%
Krischik,Vera	28%	72%	0%	100%
Spivak,Marla S	57%	14%	29%	100%
Cannon, Colleen	40%	60%	0%	100%
Food Science & Nutrition				
Addis,Paul B	40%	15%	45%	100%
Feirtag,Joellen	3	94	3	100
William Schafer	2	95	3	100
Horticultural Science				
Hoover,Emily Esther	17%	24%	59%	100%
Rosen,Carl Jay	16%	81%	3%	100%
Erwin,John E	55%	45%	0%	100%
Meyer,Mary H	15%	85%	0%	100%
Tong,Cindy BS	41%	59%	0%	100%
Horgan, Brian	40%	60%	0%	100%
Plant Pathology				
Jones,Roger Kent	20%	80%	0%	100%
Powell,Jon F	69%	31%	0%	100%
Soil, Water & Climate				
Anderson,James L	1%	88%	11%	100%
Lamb,John Alexander	55%	20%	25%	100%
Moncrief,John F	12%	88%	0%	100%
Rehm,George W	18%	79%	3%	100%
Robert,Pierre C	50%	30%	20%	100%
Rosen,Carl Jay	24%	57%	19%	100%
Schmitt,Michael A	20%	80%	0%	100%
Seeley,Mark W	21%	79%	0%	100%
CHE				
Family Social Science				
Bauer,Jean W	35%	51%	14%	100%
Danes,Sharon M	40%	60%	0%	100%
Stum,Marlene Sue	30%	70%	0%	100%
Design, Housing & Apparel				
Bruin,Marilyn J	40%	60%	0%	100%
Food Science & Nutrition				

Hassel,Craig Alan	29%	64%	7%	100%
Reicks,Marla M	23%	69%	8%	100%

CNR

Fisheries & Wildlife

Perry II,James A	62%	5%	33%	100%
Oberhauser,Karen	10%	35%	55%	100%
Blair,Bob	11%	69%	20%	100%

Forest Resources

Blinn,Charles Robert	27%	69%	4%	100%
Ek,Alan Ryan	47%	9%	44%	100%

Wood & Paper Science

Massey,Joseph	96%	1%	3%	100%
Ramaswamy,Sridharan	75%	5%	20%	100%

VET Med

Clinical & Population Sciences

Ames,Trevor R	29%	9%	62%	100%
Fetrow,John P	32%	52%	16%	100%
Dee,Scott Allen	64%	27%	9%	100%

Veterinary Pathobiology

Halvorson,David A	42%	48%	10%	100%
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Appendix 2 – Allocation of Resources

**AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS**

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFede- ral	Total Funds
Goal 1								
01-022 HOST PLANT CONTROL RESISTANCE TO AND BEST MANAGEMENT PRACTICES FOR KARNAL BUNT OF WHEAT	0	1,186	0	0	0	0	0	1,186
03-017 METHODS TO INCREASE REPRODUCTIVE EFFICIENCY IN CATTLE	0	836	0	0	0	0	0	836
05-015 MANAGEMENT SYSTEMS TO IMPROVE THE ECONOMICS AND ENVIRONMENTAL SUSTAINABILITY OF DAIRY ENTERPRISES	0	531	0	0	0	0	0	531
12-028 DEVELOPMENT AND TESTING OF DRY FERTILIZER SENSORS AND MACHINERY FOR PRECISION AGRICULTURE	2,218	0	0	0	51,703	0	29,933	83,854
12-092 ADVANCED SENSING, PROCESSING AND CONTROL TECHNOLOGY FOR BIOLOGICAL, AGRICULTURAL AND FOOD ENGINEERING	31,113	0	0	0	93,580	107,278	182,499	414,470
13-019 OAT BREEDING AND GENETICS	49,004	0	0	0	67,010	0	97,812	213,826
13-020 CHARACTERIZING WEED POPULATION VARIABILITY FOR IMPROVED WEED MANAGEMENT DECISION SUPPORT SYSTEM TO REDUCE HERBICIDE USE	37,951	83,937	0	0	38,819	5,710	10,205	176,622
13-022 MOLECULAR CYTOGENETICS IN PLANT IMPROVEMENT	50,399	0	0	0	146,025	664,822	68,387	929,633
13-026 FORAGE PROTEIN CHARACTERIZATION AND UTILIZATION FOR CATTLE	0	54,700	0	0	17,194	0	17,981	89,875
13-030 BARLEY BREEDING AND GENETICS	54,026	0	0	0	50,510	107,576	49,496	261,608
13-033 LEGUMES IN CROPPING SYSTEMS	59,051	0	0	0	64,992	0	51,842	175,885
13-067 DECISION MAKING FOR DIVERSIFIED CROPPING SYSTEMS	1,476	0	0	0	22,184	0	945	24,605
14-022 ENHANCING THE FINANCIAL VIABILITY OF MINNESOTA FAMILY FARMS	4,515	0	0	0	16,795	0	2,064	23,374
14-034 PROFITABILITY AND ADOPTION OF NEW TECHNOLOGY AND IMPLICATIONS FOR AGRICULTURAL POLICY	6,196	0	0	0	17,684	31,810	6,101	61,791
14-035 MANAGEMENT INFORMATION SYSTEMS FOR FIRMS IN THE FOOD SYSTEM	50,881	0	0	0	15,891	43,018	47,861	157,651
14-040 ECONOMIC ANALYSIS OF LIVESTOCK INDUSTRY MARKETING, PRICES, PRODUCTION AND POLICY	19,754	0	0	0	18,812	0	0	38,566
14-046 COMPETITIVENESS AND VALUE-ADDED MARKETS IN THE U.S. GRAIN AND OILSEED INDUSTRY	0	51,661	0	0	16,166	0	0	67,827

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
14-055 IMPACTS OF STRUCTURAL CHANGE IN THE DAIRY INDUSTRY	31,556	0	0	0	4,529	0	0	36,085
14-056 FINANCING AGRICULTURE AND RURAL AMERICA: ISSUES OF POLICY, STRUCTURE AND TECHNICAL CHANGE	12,722	6,008	0	0	34,654	0	0	53,384
14-057 AN ECONOMIC ANALYSIS OF U.S. LIVESTOCK SECTOR FACING DEMAND AND SUPPLY STRUCTURAL CHANGES	10,169	0	0	0	41,762	12,029	0	63,960
14-064 ENVIRONMENTAL AND TRADE COMPETITIVENESS ISSUES IN AGRICULTURE	66,213	0	0	0	56,253	0	79,078	201,544
16-017 ADVANCED TECHNOLOGIES FOR THE GENETIC IMPROVEMENT OF POULTRY	0	58,133	0	0	98,973	0	15,538	172,644
16-018 BIOPHYSICAL MODELS FOR POULTRY PRODUCTION SYSTEMS	0	734	0	0	0	0	0	734
16-019 INTERPRETING CATTLE GENOMIC DATA: BIOLOGY, APPLICATION, OUTREACH	35,718	661	0	0	194	115,926	2,772	155,271
16-020 GENETIC SELECTION AND CROSSBREEDING TO ENHANCE REPRODUCTION AND SURVIVAL OF DAIRY CATTLE	0	36,664	0	0	942	0	1,099	38,705
16-025 GENETIC AND FUNCTIONAL GENOMIC APPROACHES TO IMPROVE PRODUCTION AND QUALITY OF PORK	0	1,787	0	0	0	0	0	1,787
16-027 METABOLIC RELATIONSHIPS IN SUPPLY OF NUTRIENTS FOR LACTATING COWS	34,628	31,340	0	0	6,020	0	117,424	189,412
16-034 IMPROVING TURKEY PRODUCTION PERFORMANCE THROUGH NUTRITION AND MANAGEMENT	108,556	0	0	0	29,796	0	128,462	266,814
16-043 DEVELOPMENT OF THEORY, METHODS AND COMPUTATIONAL TOOLS FOR QUANTITATIVE ANALYSIS IN ANIMAL GENOMICS	4,552	0	0	0	42,646	23,427	76,303	146,928
16-064 EVALUATION OF NEW NUTRITIONAL TECHNOLOGIES FOR SITUATION DEPENDENT DIET FORMULATION IN SWINE	20,854	0	0	0	34,866	0	125,013	180,733
16-073 REPRODUCTIVE PERFORMANCE IN DOMESTIC RUMINANTS	0	547	0	0	0	0	0	547
16-080 THE EFFECT OF GROWTH FACTORS ON THE PROCESSES OF SKELETAL MUSCLE GROWTH IN MEAT-PRODUCING ANIMALS	26,623	0	0	0	80,419	0	15,669	122,711
16-084 MOLECULAR MECHANISMS REGULATING SKELETAL MUSCLE GROWTH AND DIFFERENTIATION	0	43,395	0	0	77,542	66,815	1,450	189,202
16-087 REPRODUCTIVE PERFORMANCE OF TURKEYS	95,942	142,869	0	0	94,589	81,483	99,928	514,811
17-032 ECOLOGY AND MANAGEMENT OF EUROPEAN CORN BORER AND OTHER STALK-BORING LEPIDOPTERA	3,524	57,457	0	0	33,517	28,262	48,666	171,426

AREERA

Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
17-034 MANAGEMENT STRATEGIES FOR EUROPEAN CORN BORER, CORN ROOTWORMS, AND STAND-REDUCING INSECTS IN CORN	13,675	0	0	0	22,983	0	30,214	66,872
17-039 DYNAMIC SOYBEAN PEST MANAGEMENT FOR EVOLVING AGRICULTURAL TECHNOLOGIES AND CROPPING SYSTEMS	0	598	0	0	0	0	0	598
17-042 POTATO INSECTS: BIOLOGICAL AND CULTURAL CONTROL	18,766	0	0	0	67,070	42,470	73,184	201,490
17-049 MANAGEMENT OF INSECTS AND INSECT VECTORS OF PLANT PATHOGENS	6,158	0	0	0	50,937	12,343	208,764	278,202
17-056 SOURCES, DISPERSAL AND MANAGEMENT OF STABLE FLIES ON GRAZING BEEF AND DAIRY CATTLE	0	330	0	0	0	0	0	330
17-060 DEVELOPMENT OF MOLECULAR APPROACHES TO PREDICTING AND MONITORING INSECTICIDE RESISTANCE	4,293	0	0	0	60,687	558,523	686	624,189
17-062 REGULATION OF ECDYSIS-PRODUCING NEURONS IN INSECTS AND OTHER INVERTEBRATES	3,994	0	0	0	43,320	141,470	0	188,784
17-067 DEVELOPMENT OF PEST MANAGEMENT STRATEGIES FOR FORAGE ALFALFA PERSISTENCE	0	14,187	0	0	0	0	0	14,187
18-018 IMPROVED STABILITY OF DRY FOOD FLAVORINGS	18,857	0	0	0	28,447	815	210,692	258,811
18-024 PHYSICO CHEMICAL PROPERTIES OF DAIRY MACROMOLECULES IN FOOD SYSTEMS	18,648	0	0	0	29,290	0	28,982	76,920
18-062 APPLICATION OF GENETIC ENGINEERING TECHNIQUES FOR DAIRY STARTER CULTURE IMPROVEMENT	63,724	0	0	0	61,406	28,203	18,609	171,942
21-028 CHANGES IN QUALITY OF HORTICULTURAL CROPS DURING GROWTH AND STORAGE	33,984	0	0	0	34,288	0	958	69,230
21-050 BREEDING AND GENETICS OF FLORICULTURAL CROPS: OLD, NEW CROP DEVELOPMENT, GERMPLASM ENHANCEMENT, INVASIVENESS POTENTIAL	31,165	0	0	0	59,622	0	24,969	115,756
21-054 THE BIOLOGY AND UTILIZATION OF TURFGRASSES	31,336	0	0	0	44,141	0	19,495	94,972
21-055 BREEDING, EVALUATION & SELECTION OF HARDY LANDSCAPE PLANTS	111,863	0	0	0	88,989	0	126,031	326,883
21-064 MOLECULAR ANALYSIS OF FLORAL GENE EXPRESSION	36,665	0	0	0	71,949	20,345	39,118	168,077
21-082 PLANT AND ROOT RESPONSE TO ENVIRONMENTAL STRESS	32,201	0	0	0	26,033	0	0	58,234
22-015 COMPARATIVE GENOMICS OF LEGUMES	19,072	0	0	0	67,482	348,848	63,177	498,579

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
22-026 MANAGEMENT AND CONTROL OF DISEASES OF SOYBEANS	2,939	0	0	0	36,071	0	61,512	100,522
22-079 IDENTIFICATION, CHARACTERIZATION AND BIOLOGY OF PLANT PARARETROVIRUSES	22,994	0	0	0	58,027	35,774	11,673	128,468
25-064 IMPACT CLIMATE AND SOILS ON CROP SELECTION AND MANAGEMENT	3,670	65,046	0	0	61,048	109,459	48,607	287,830
25-085 MANAGEMENT OF NUTRIENT SOURCES IN MINNESOTA CROPPING SYSTEMS	2,000	0	0	0	51,446	5,416	143,870	202,732
60-015 PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS): MECHANISMS OF DISEASE AND METHODS FOR THE DETECTION, PROTECTION AND ELIMINATION	20,000	35,874	0	0	5,342	0	0	61,216
63-032 AVIAN RESPIRATORY DISEASES: PATHOGENESIS, SURVEILLANCE, DIAGNOSIS AND CONTROL	0	549	0	0	0	0	0	549
63-036 EVOLVING PATHOGENS, TARGETED SEQUENCES, AND STRATEGIES FOR CONTROL OF BOVINE RESPIRATORY DISEASE	19,976	25,165	0	0	9,338	0	0	54,479
63-056 NATIONAL ANIMAL GENOME RESEARCH PROGRAM	5,018	24,607	0	0	2,535	0	0	32,160
63-060 CONTROL OF ANIMAL PARASITES IN SUSTAINABLE AGRICULTURAL SYSTEMS	0	8,688	0	0	1,722	0	0	10,410
70-030 MOLECULAR ANALYSIS OF THE VIRULENCE GENES OF AGROBACTERIUM TUMEFACIENS	25,177	0	0	0	0	0	0	25,177
70-042 ENZYMOLOGY OF FORAGE PROCESSING	4,819	0	0	0	4,597	0	0	9,416
Total Goal 1	1,368,635	747,490	0	0	2,260,837	2,591,82	2,387,069	9,355,853
Goal 2								
12-020 MANAGEMENT OF GRAIN QUALITY AND SECURITY FOR WORLD MARKETS	0	2,460	0	0	41,950	0	31,588	75,998
18-037 CHARACTERIZATION AND CONTROL OF THE ACID RESISTANCE OF ENTEROHEMORRHAGIC ESCHERICHIA COLI	18,553	0	0	0	47,073	21,472	34,847	121,945
18-054 ELIMINATION OF ESCHERICHIA COLI AND SALMONELLAE FROM READY TO CONSUME ACID FOODS	2	0	0	0	44,056	34,148	4,790	82,996
18-072 PROCESSING AND STORAGE EFFECTS ON STABILITY OF NUTRACEUTICALS	17,640	0	0	0	30,068	0	48,998	96,706
18-074 APPLICATION OF CHEMILUMINESCENT ANTIBIOTICS AS PLATFORM TECHNOLOGY FOR DEVELOPMENT OF RAPID PATHOGEN DETECTION	6,694	0	0	0	6,278	0	20,733	33,705

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
22-043 MYCOTOXINS IN CEREAL GRAINS	0	1,886	0	0	0	57,878	240	60,004
62-017 MASTITIS RESISTANCE TO ENHANCE DAIRY FOOD SAFETY	14,000	1,053	0	0	91,000	0	0	106,053
Total Goal 2	56,889	5,399	0	0	260,425	113,498	141,196	577,407
Goal 3								
18-047 THE IMPACT OF NATURAL CHEESE CHARACTERISTICS ON PROCESS CHEESE FUNCTIONAL PROPERTIES	18,553	0	0	0	41,165	0	114,616	174,334
18-055 ANALYSIS OF BACTERIOPHAGE RESISTANCE AND BACTERIOCIN PRODUCTION OF LACTOCOCCI, AND PROBIOTIC CHARACTERISTICS OF BIFIDOBACTERIA	18,858	0	0	0	51,186	9,923	70,417	150,384
18-066 STRUCTURE/FUNCTION RELATIONSHIPS IN WHOLE GRAINS AND THEIR INFLUENCE ON PROCESSING AND NUTRITIONAL QUALITY	10,396	0	0	0	26,741	0	233,551	270,688
54-026 IDENTIFICATION OF FACTORS PREDICTING CONSUMPTION OF SELECTED DIETARY CONSTITUENTS	24,400	0	0	0	27,399	29,189	2,270	83,258
54-028 PARENT AND HOUSEHOLD INFLUENCES ON CALCIUM INTAKE AMONG PREADOLESCENTS	0	610	0	0	0	0	0	610
54-030 SYSTEMS ANALYSES OF THE RELATIONSHIPS OF AGRICULTURE AND FOOD SYSTEMS TO COMMUNITY HEALTH	0	1,047	0	0	0	0	0	1,047
54-058 N-3 POLYUNSATURATED FATTY ACIDS AND HUMAN HEALTH DISEASE	18,858	0	0	0	21,045	0	176,080	215,983
54-064 DEFINING A DESIRABLE DIETARY FIBER INTAKE	11,904	0	0	0	48,846	0	47,244	107,994
Total Goal 3	102,969	1,657	0	0	216,382	39,112	644,178	1,004,298
Goal 4								
12-040 INVESTIGATING DRAINAGE DESIGN AND MANAGEMENT ALTERNATIVES FOR MEETING BOTH ENV. AND AGRO. OBJECTIVES	18,042	0	0	0	52,494	53,271	605	124,412
12-044 IMPROVED CHARACTERIZATION AND QUANTIFICATION OF FLOW AND TRANSPORT PROCESSES IN SOILS	8,038	643	0	0	60,017	0	65,903	134,601
12-084 ANIMAL MANURE AND WASTE UTILIZATION, TREATMENT AND NUISANCE AVOIDANCE FOR A SUSTAINABLE AGRICULTURE	40,313	23,744	0	0	14,055	18,964	8,439	105,515
14-029 DECISION MAKING FOR AGRICULTURAL FIRMS CONSIDERING RISK AND THE ENVIRONMENT	318	0	0	0	17,094	27,932	0	45,344

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
14-073 U.S. AGRICULTURAL AND ENVIRONMENTAL POLICY	50,379	0	0	0	26,770	22,265	0	99,414
14-089 EXAMINING POLICIES AND INSTITUTIONS FOR LAND AND WATER RESOURCE PROTECTION IN MINNESOTA	55,452	0	0	0	69,513	11,150	0	136,115
22-044 PLANT NEMATODES INHABITING THE SOILS OF A PORTION OF MINNESOTA'S CENTRAL LAKES REGION: THEIR OCCURRENCE & POTENTIAL SIGNIFICANCE	2,401	0	0	0	23,352	0	0	25,753
22-069 BIOLOGY, CONTROL, AND BIOTECHNOLOGICAL USES OF FOREST MICROBES	51,939	0	0	0	156,005	56,850	59,598	324,392
22-074 ATMOSPHERIC DEPOSITION: AIR POLLUTANTS AND THEIR EFFECTS ON CROPS	11,284	0	0	0	59,417	0	5,060	75,761
25-019 REDUCING THE POTENTIAL FOR ENVIRONMENTAL CONTAMINATION BY PESTICIDES AND OTHER ORGANIC CHEMICALS	0	8,631	0	0	50,103	22,437	0	81,171
25-020 SOIL RESOURCE ASSESSMENT AND INTERPRETATIONS FOR MINNESOTA LANDSCAPES	13,434	0	0	0	163,420	695,487	260,740	1,133,081
25-022 ASSESSING NITROGEN MINERALIZATION AND OTHER DIAGNOSTIC CRITERIA TO REFINE NITROGEN RATES FOR CROPS AND MINIMIZE LOSSES	0	530	0	0	0	0	0	530
25-034 TILLAGE AND NUTRIENT SOURCE INTERACTIONS ON NON-POINT SOURCE POLLUTION FROM SURFACE AND SUBSURFACE DRAINAGE SYSTEMS	2,000	0	0	0	78,822	146,605	40,534	267,961
25-035 MANAGEMENT OF ERODED SOILS FOR ENHANCEMENT OF PRODUCTIVITY AND ENVIRONMENTAL QUALITY	0	944	0	0	26,247	0	60,213	87,404
25-083 BIOGEOCHEMISTRY AND ECOLOGICAL RISK MANAGEMENT OF TRACE CHEMICAL CONSTITUENTS	10,285	0	0	0	236,552	114,714	56,136	417,687
25-084 IMPROVING PLANT NUTRIENT USE EFFICIENCY	2,562	0	0	0	89,694	150,101	331,321	573,678
41-070 IDENTIFICATION AND FUNCTIONAL CHARACTERIZATIONS OF SEX PHEROMONES IN CYPRINID FISH	33,121	0	0	0	15,715	109,262	120,333	278,431
41-086 RELATIONSHIPS BETWEEN WILD UNGULATES & NATURAL VEGETATION: ECOLOGICAL & MANAGEMENT ASPECTS	13,759	0	0	0	4,256	0	0	18,015
42-037 REMOTE SENSING OF LAND, VEGETATION, AND WATER RESOURCES	36,922	0	0	0	23,527	661,932	90,155	812,536
42-074 NET PRIMARY PRODUCTIVITY AND CARBON SEQUESTRATION POTENTIAL OF LAKE STATES FORESTS	18,843	0	0	0	26,780	194,130	0	239,753
43-068 LIGNIN BIOSYNTHESIS, BIODEGRADATION AND DERIVATIVE PLASTICS	18,622	0	0	0	58,611	48,997	47,863	174,093

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
53-065 DEVELOPMENT OF AN INTERIOR MATERIAL RATING SYSTEM FOR ENVIRONMENTAL CONSERVATION	4,691	0	0	0	28,144	0	0	32,835
Total Goal 4	392,405	34,492	0	0	1,280,588	2,334,09	1,146,900	5,188,482
Goal 5								
12-027 INJURY PREVENTION AND HEALTH PROMOTION RESEARCH FOR PRODUCTION AGRICULTURE	17,624	0	0	0	11,918	248,445	0	277,987
13-015 SUSTAINING LOCAL FOOD SYSTEMS IN A GLOBALIZING ENVIRONMENT, FORCES, RESPONSES, IMPACTS	0	649	0	0	0	0	0	649
14-082 RURAL COMMUNITIES, RURAL LABOR MARKETS, AND PUBLIC POLICY	0	6,290	0	0	0	0	0	6,290
14-094 RURAL LABOR MARKET BEHAVIOR AND OUTCOMES: THE ROLE OF WORK SUPPORT POLICIES AND ECONOMIC CHANGES	107	0	0	0	9,343	24,550	51,236	85,236
42-046 BENEFITS-BASED MANAGEMENT: ASSESSING AND MANAGING FOR PUBLIC, PRIVATE, AND COMMUNITY BENEFITS	12,520	0	0	0	40,450	198,931	20,430	272,331
52-035 FAMILY BUSINESS VIABILITY IN ECONOMICALLY VULNERABLE COMMUNITIES	0	435	0	0	0	0	0	435
52-040 FAMILY SYSTEMS AND FAMILY REALITIES	1,995	0	0	0	22,011	0	0	24,006
52-049 FAMILY BOUNDARY AMBIGUITY IN ALZHEIMER'S DISEASE AND OTHER SITUATIONS OF UNCLEAR LOSS AND CHANGE	1,284	0	0	0	14,726	0	428	16,438
52-054 DECISION-MAKING INTEGRAL TO RELATIONSHIP TRANSITIONS IN FAMILIES	5,359	0	0	0	23,182	0	1,831	30,372
52-055 FAMILY ECONOMIC WELL-BEING: TRANSITIONS FOR FAMILIES	7,125	0	0	0	25,420	0	0	32,545
52-066 INTERGENERATIONAL RELATIONSHIPS IN SOUTHEAST ASIAN REFUGEE FAMILIES	4,121	0	0	0	26,688	0	0	30,809
52-073 FAMILY BUSINESS: WORK AND FAMILY INTEGRATION	5,019	0	0	0	21,893	0	0	26,912
52-077 SELF EMPLOYMENT AMONG THE UNITED STATES HISPANIC HOUSEHOLDERS POPULATION	3,485	0	0	0	20,214	0	0	23,699
52-078 RURAL LOW-INCOME FAMILIES: TRACKING WELL-BEING AND FUNCTIONING IN THE CONTEXT OF WELFARE REFORM	0	1,168	0	0	0	0	0	1,168
52-079 FAMILY PROCESSES INFLUENCING THE DEVELOPMENT OF PSYCHOPATHOLOGY AMONG RURAL ADOLESCENTS	6,897	0	0	0	2,586	0	0	9,483
52-080 ASSET ACCUMULATION FOR LOW-INCOME WORKING FAMILIES	3,300	0	0	0	1,172	0	0	4,472

AREERA
Fiscal Year 2002/2003 ESTIMATED ALLOTMENTS

Goal / Research Project	Hatch	MRF	McIntire Stennis	Animal Health	State Funds	Other Federal	Other NonFederal	Total Funds
52-084 DEVELOPING CULTURALLY APPROPRIATE MENTAL HEALTH PROGRAMS FOR LATINO/A FAMILIES	1,663	0	0	0	13,646	0	0	15,309
53-070 IMPACT OF TECHNOLOGY ON RURAL CONSUMER ACCESS TO FOOD AND FIBER PRODUCTS	638	51	0	0	25,796	0	0	26,485
53-073 HOUSING, NEIGHBORHOOD, AND COMMUNITY ENVIRONMENTS OF LOW-RESOURCE FAMILIES WITH YOUNG CHILDREN	540	0	0	0	31,701	0	533	32,774
54-070 COMMUNITY HEALTH PRACTICES	14,247	0	0	0	38,675	0	33,344	86,266
55-035 VITAL INVOLVEMENT PRACTICE: PROMOTING LIFE STRENGTHS AMONG DIVERSE ELDERLY	8,048	0	0	0	15,180	0	0	23,228
55-036 SOCIAL SUPPORT, SOCIAL NETWORKS, AND FAMILY VIOLENCE	6,228	0	0	0	15,762	0	0	21,990
55-047 PROFESSIONALISM AMONG SOCIAL WORKERS: COMMUNITY STRUCTURE AND DELIVERY OF HUMAN SERVICES	7,511	0	0	0	51,700	0	325	59,536
55-048 PATTERNS OF ADAPTATION AND ACCEPTANCE OF HISPANICS IN AMERICAN COMMUNITIES	9,299	0	0	0	6,360	0	114	15,773
Total Goal 5	117,010	8,593	0	0	418,423	471,926	108,241	1,124,193
Grand Total	2,037,908	797,631	0	0	4,436,655	5,550,45	4,427,584	17,250,233