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2004 Accomplishments and Results Report

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Joint Themes

Goal	**Themes**
GOAL 1	Agricultural Financial Management
	Agricultural Competitiveness
	Agricultural Productivity
GOAL 2	Food Safety
GOAL 3	Human Health
GOAL 4	Soil Quality
	Agricultural Waste Management
	Pesticide Application
	Water Quality
GOAL 5	Farm Safety

Extension Themes

Goal	**Themes**
Goal 5	4H/Youth Development
	Promoting Business Programs
	Leadership Training and Development
	Family Resource Management

University of Minnesota Extension Service
2003-2004 Federal AREERA Accomplishments and Results Report
Executive Summary

University of Minnesota Enrollment Measures

a. Demand: There was significant demand for Extension resources in 2004. As a result,

- University of MN Extension served 308,023 Minnesotans in educational events.
- There were 9 million visits by 2.4 million people to our Web site (rated by Google as the most for any state extension service.)
- Extension handled 30,000 phone calls via three phone-answering services. (In 2004, there was significant migration from phone to web.)

b. Outreach to Underserved Populations

- In 2004, 19% of program participants were non-white[1].
- Programs in four of five capacity areas targeted immigrant and non-white cultures.

c. Efficiency: In 2004, we cut field administration by 22 FTEs, but experienced a 12% increase in participants per FTE over 2003. Collaboration with program sponsors has brought great efficiency to many programs, providing better access to audiences.

Multi-state Engagement

- Nine programs were widely adopted by other states.[2]
- Extension sold 54 publication titles to more than 10 states.
- We've purchased services from the Iowa State Extension to provide cost-effective phone service to Minnesotans. In year 1, almost 4,800 Minnesotans were served.

Other Performance Measures, including Integrated Service: We made "being the best in the business" our goal in 2003. Integrated efforts are key to accomplishing this goal.

a. Quality and centrality to mission

- All programs are required to demonstrate the research connection for their outreach.
- 140 highly specialized regional educators are at work throughout Minnesota.
- Partnerships with five colleges fund 118 faculty members and forge a strong link between research and outreach.
- Programs are more focused. We consolidated from 208 in 2002 to 56 in 2004.
- All new educators have M.S. or Ph.D. degrees in their area of specialization.
- In 2004–05, 73 percent of programs are developing in-depth evaluations.

b. Development and leveraging of resources

- As a result of county's satisfaction with programming budgets for county positions increased by 7 percent statewide in 2005.
- Grant activity and external revenue generation is up by 7.6 percent.

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[1] . Minnesota's non-white population was 12.5% in 2002

[2] Access eInfo, Business Retention and Expansion, U-Lead, U-Facilitate, Onsite Sewage Treatment, Radon Education, Habitattititude, Agricultural Risk Management, Parents Forever

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2003-2004 Federal (AREERA) Accomplishments and Results Report

I. Programs

GOAL 1. An agricultural system that is highly competitive in the global economy

Overview

The educational objectives of over 20 programs housed within the Agriculture, Food and Environment (AFE) capacity area are aligned with Federal Goal #1. These programs provide education, consultation and distribute research-based information that help the agricultural industry reduce production costs, identify new crops and products, find new uses for agriculture products, manage business more effectively, and prevent or cure harmful conditions that deplete profits.

We have described programs for Goal #1 related to two joint themes and one Extension theme. They describe 2004 efforts in four Extension programs and seven integrated research projects. The University of Minnesota has redoubled its efforts to tie all program activities to a research base. Though not all of this research was funded by Hatch/MRF-funded research, all programs are now working as integrated program teams. Each of the Agriculture, Food and Environment program teams include a Hatch-funded specialist and an Extension educator. Together, these teams are developing program design, content and outreach strategies.

Inputs and Outputs Summary:

Table 1: Inputs and Outputs Summary, Federal Goal #1, University of Minnesota Extension, 2004

	Pgm 1: Farming for Tomorrow	Pgm 2: Bountiful Horticulture: Gardens and Food	Total all Goal 1 Programs
# FTE	33.5	16.5	50
# Program Participants	14,610	48,870	63,480
# of trainers / volunteers trained	210	658	868
Number of meetings, workshops, presentations, seminars, etc.	404	591	995
Number of consultations with individuals, families or business firms	2,539	796	3,335
# of volunteer hours	18,215	13,193	31,408
% of non-white part. served	3%	2%	2.4%
Numbers of materials distributed (newsletters, web pages and publications)	34,319	6,710	41,029

Table 2: Goal 1 Sources of Funding, University of Minnesota Extension

Smith Lever 3B&C	State	County	Grant/Contract	Hatch
$546,460	$1,334,643	$938,726	$1,399,000	$1,246,175

Delivery methods varied, but included significant effort in direct consultation to farmers and the industry using, for instance, tools and software designed to help farmers make business decisions. Extension's web site and media alerts are often focused on Goal 1 issues and are outgrowths of research and programming.. Educators and researchers reported that tens of thousands of newspaper, newsletter, web site articles and

publications were written and distributed around the state. In order to pay attention to the burgeoning existence of for-profit industries that also provide technical assistance related to agriculture competitiveness, the AFE capacity area is seeking to disseminate information through those outlets, working collaboratively with them to assure that the information provides research-based analyses of issues and education within the field.

Outcomes: Participants reported better understanding of various marketing techniques and analysis of business decisions, planning, livestock improvement strategies, commodity crop planting and care, law compliance issues, capital management, product quality, alternative crops, efficiency and disease prevention. Each of the selected educational program goals are linked by research to improvements to the profitability of the agricultural economy.

Key Theme: Agricultural Financial Management (Joint))

(Ref. 2004-2006 Plan of Work) Goal 1, Program 1: Farming for Tomorrow
Program Component: Business Management and Marketing – Winning the Game

Description: The mission of the Center for Farm Financial Management is to improve farm financial management through educational software and training programs. The Center serves farmers and ranchers, university /technical college educators, lenders, veterinarians and other public agencies and businesses who can use information to make the agriculture economy more profitable. This program is built upon research and data base construction that was described in our Report regarding Hatch funds in 2003.

Outcome: The Winning the Game program, delivered in four phases, was evaluated for impact in 2004. Parts 1 and 2 participants demonstrated better understanding of grain price seasonality, how to utilize the price seasonality to price grain and the utilization of revenue based crop insurance to reduce and transfer production and price risk. In the third phase, Winning the Game participants reported a better understanding of post-harvest price trends, costs of storage and selling the carryover in the market. A participant survey of marketing clubs showed significant increases in skill adoption: use of marketing plans (163%), writing a marketing plan (391%), and technical analysis (153%).

a. Impact:
Behavior Change: A study of the Center's Farm Transfer/Estate Planning workshops reported that the strongest impacts were achieved regarding goal-setting for transfers, transfer strategies, financial issues, assets and tax issues. As a result of attending the workshop, 92% of participants stated that they were going to develop a transfer and estate plan or update their current plan. At one multi-state seminar, 56% of attendees indicated that they planned to actively make changes in their business based on information gained. A successful asset transfer for even half of the program's participants would affect $93.3 million of the value of the agricultural economy in Minnesota.

Economic Impact*:* A study of the first two phases of the Wining the Game Program showed that participants increased their net farm income by $5,000 to $11,000 per farm participant. Total financial impact of the program statewide in Minnesota was $5.3 million. A study of Winning the Game Marketing Clubs showed a financial impact per farmer participant of $20,401 in additional net farm income.

Based on the success of this financial analysis, additional impact evaluations will be conducted in 2005 and 2006.

b. Source of funding: Smith-Lever 3b&c, state, county, sponsorship fees from various ag commodity groups, and a Community Assistant Partnership Grant

c. Scope of impact: Multi-state, Integrated Research and Extension (DE, IA, MN, ND, NE, SD, TX, WI)

Key Theme: Agricultural Competitiveness (Joint)

(Ref 2004-06 Plan of Work) Goal 1, Program 1: Farming for Tomorrow
Program Component: Production Systems – Dairy Modernization Program

Description: The Dairy Modernization program works with dairy producers to improve the profitability of dairy businesses. A key goal of the Dairy Modernization program is to maximize profit in light of record low milk prices during the year. Recommendations ranged from improvements in facilities, changes in milking protocol, improvements in herd health, enhancements to record keeping systems, and improvement in the feeding program.

A major program effort is the Minnesota Dairy Initiative Program. Seven regions throughout the state implement this initiative to educate dairy producers and other dairy industry professionals. This program manages farm management teams, field days, educational conferences and other initiatives in order to create a strong impact statewide.

a. *Impact:*

1. Improved profits for dairy farms: Statewide, total improved profits reported from the Minnesota Dairy Initiative were $5,798,184. This was achieved through improved production, decreased costs, improved animal health and reduced culling. Central Minnesota hosts the most prolific dairy processing economy in the state. A study in that region reported the following comparison of profitability from farms not in the program to farms in the program.

Table 3: Financial Impact of Dairy Modernization Initiative, University of Minnesota Extension, 2004

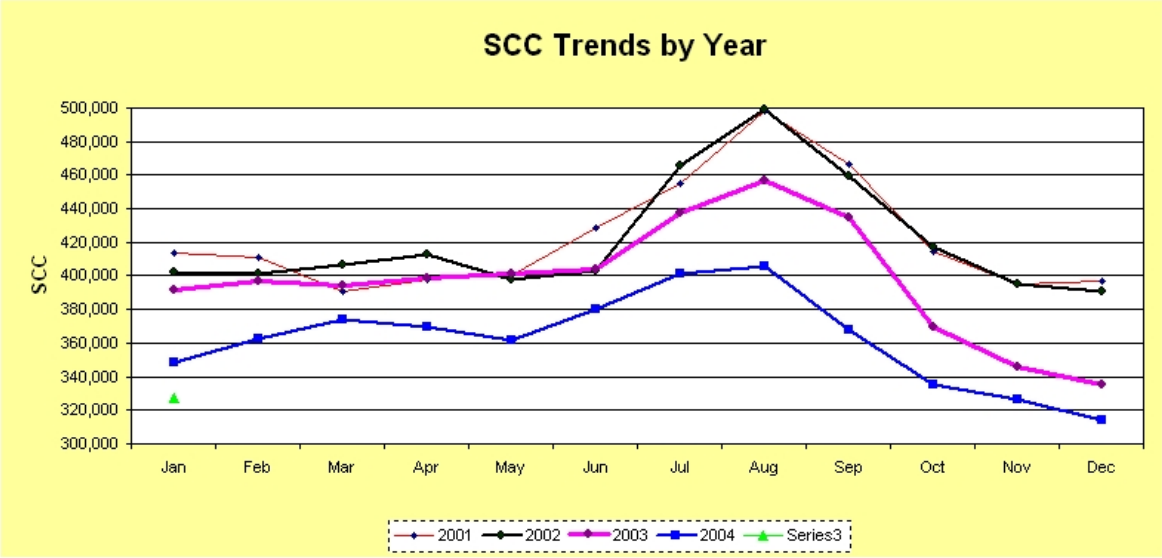
Item	CMDPT[3] Farms	Non-CMDPT Farms	Difference
Gross Return	$2638.66	$2514.84	+$123.82
Return over direct expense	$1057.77	$979.93	+$77.84
Milk produced per cow	20,405 lbs.	18,755 lbs.	+1650 lbs.
Average milk price	$13.07	$12.99	+$0.08

[3] CMDPT: Central Minnesota Dairy Profitability Teams

The total number of cows on farms enrolled in the Central Minnesota Dairy Profit teams is 14,978 and an average return over direct cost advantage of $77.84 per cow in the program, the total dollars of additional profit generated because of this program is $1,165,887.52 (14,978 x $77.84).

2. Improved health for milk-producing herds: The Quality Counts Milk Quality Initiative that started in the summer of 2003 continues to make dramatic improvements in the quality of milk that leaves the farm, as well as the productivity of the dairy industry – including less treatment of infection, fewer gaps in production and a stronger attractiveness of the industry to the quality of the milk. The goal of this program was to reduce Somatic Cell Counts to below 300,000 by June 2005. Credit for impacts should be shared with The Minnesota Department of Agriculture. The Department mandates educational interventions in order to lower the somatic cell counts and, thus, infections. The chart below marks Extension's progress.

Table 4: Somatic Cell Counts Trends, Dairy Modernization Program, University of Minnesota Extension, 2004



b. *Source of funding:* Smith Lever 3b & c, state, county, State of Minnesota MDI program, Minnesota Department of Agriculture, Sponsorships, Dairy Associations

c. *Scope of impact:* Multi-state Integrated Research and Extension (IA, IL, MN, ND, SD, WI)

(Ref 2004-06 Plan of Work) Goal 1, Program 1: Farming for Tomorrow
Program Component: Science and Technology – Alternative Crops and Specialized Management Technologies

Description: A small but growing Extension effort helps the farm economy diversify into organic and improved farming technologies. Between 1997 and 2001, certified organic

acreage in Minnesota grew to about 103,000 acres – the sixth highest of any state.[4] Minnesota is the top U.S. producer of organic corn, soybeans and rye, and second in organic buckwheat. The market for organic products is also growing rapidly and consistently. Recent federal guidelines that standardize organic labeling are expected to fuel even greater consumer interest and confidence in organic foods. These alternative crops require specialized management techniques such as field inspections and contract stipulations.

Extension's response has been to keep Minnesotans informed of organic and specialized production research results. Alternative Crops and Specialized Management Techniques Programs serve producers and marketers of lesser-known crops and certified organic crops, as well as agriculture professionals. The program manages a resource library in hard copy and electronic formats and provides workshops and consultations that deliver unbiased research. Educational offerings keep interested producers in Minnesota informed of the latest organic production options and research findings. Research related to production technologies also continues

a. Impacts:

Behavior Change: Because of multi-site workshops and plot tours, farmers learned to identify crop traits that provide economic returns. Farmers reported that they selected varieties based on that information. For example, participants in one training reported they had not added weed control agents that are marketed but are not effective.

Economic Impact:

- Producers not adding gypsum for weed control saved nearly $15,000 cumulatively.
- Two newly organic certified farmers increased their profits by approximately $15,000 each.
- If 50 farmers with 50 acres each selected the right variety to increase yields by one bushel per acre, the price would be $5 per bushel. Thus the overall impact of this part of the project would be $12,500.
- Selecting the right soybean variety will have an impact. Fifty farmers with 50 acres and one bushel more soybean yield at $12 would create an impact of $30,000.

b. Source of funding: Smith Lever 3b & c, state, county, USDA, Natl. Inst. of Health

c. Scope of impact: Multi-state Integrated Research and Extension (ND)

[4] Atlas of Minnesota: Social and Economic Characteristics of the North Star State. A join project of the Center for Rural Policy and Development, the Blandin Foundation and the University of Minnesota Extension Service. 2003.

(Ref. 2004-06 Plan of Work) Goal 1, Program 2: Bountiful Horticulture: Gardens & Foods
Program Component: Honeybees in Northern Climates

Description: Research conducted and reported to CSREES two years ago developed new ways to reduce the amount of pesticide and antibiotic use in honey bee colonies for control of two harmful destructions: 1) the parasitic mite, Varroa Destructor, and 2) the highly contagious bacterial disease, American foulbrood. In 2004, educational materials guided beekeepers to make sound treatment decisions. The project works with commercial beekeepers to breed for traits that allow the bees to actively resist diseases and mite pests. The resulting breed of honeybees suppresses mite reduction. A web-based course for beekeepers is being developed that emphasizes treating colonies for diseases and mites only as a last resort.

a. Impact:
Behavior Change: In 2004, beekeeping supply businesses and bee breeders report that they are selling tens of thousands of queens from the Minnesota hygienic line all over the United States and Canada.

Economic Impact: Using pesticides increases costs; moreover, labor is required to apply them. Colony losses have more than doubled in many cases even with the use of the pesticides due to re-infestation and increase in the overall stress imposed by the mites. If beekeepers halve the number of treatments they apply by using resistant bee stock, operating costs are halved. Reduction in pesticide use by beekeepers will enhance environmental quality and economic viability of individual beekeeping operations, strengthen an agricultural system based on small and moderate-scale owner operated farms, protect human health and safety by preventing the risk of contaminating honey and hive products and promote the well-being of the world's vital pollinators of crops, gardens and wildflowers.

b. *Source of funding:* Smith Lever 3b & c, state, county, National Institute of Health, North Central Sustainable Agricultural Research Fund, National Science Foundation, National Honey Board and California State Beekeeping Association

c. *Scope of impact:* Multi-state Integrated Research and Extension (WI)

Integrated Research: Economic Assessment of Changes in Trade Arrangements, Bio-terrorism Threats & Renewable Fuel Requirements on the U.S. Grain and Oilseed Sector

Description: Three external forces--trade arrangements, bio-terrorism threats, and renewable fuels requirements--are impacting the U.S. grain and oilseed sectors. Five universities, including the University of Minnesota, are doing research on corn, soybeans, rice, wheat, and biofuels/added value, and are creating models to analyze international trade agreements to determine impacts on grain and oilseed trade flows between the United States and the European Union and among NAFTA partners-U.S., Canada and Mexico--and the expansion of NAFTA to form the Free Trade Area of the Americas (FTAA). Minnesota researchers focused on the renewable fuels requirements. The U.S. Energy Information Agency estimates that U.S. imports of oil will rise from 64% to 77%

of consumption between 2004 and 2025. Research was carried out both for biodiesel and for ethanol. In the biodiesel study, usage patterns of diesel fuel and heating fuel oil were calculated to establish county and monthly use by various classes of machines, vehicles, and boilers. An Excel workbook was developed that allows policymakers and fuel distributors to determine the monthly amounts of 100% biodiesel that will be needed in each county in each month of the year to serve particular classes of vehicles or machines.

a. Impacts:
With data for the usage patterns in this workbook, policymakers can identify situations when using biodiesel blends would be most effective in reducing emissions of particulates and volatile organic compounds (VOCs). This research suggests economical ways to reduce harmful emissions by using blends of biodiesel in both diesel fuel and fuel oil. Minnesota statutes require 2% biodiesel in most diesel sold in the state in 2005.The biodiesel workbook is available for use by policymakers at the following website: http://www.lrrb.org/pdf/MNBiodieselPolTool120904.xls. Using the ethanol cost of production research, risk management strategies can be designed and loan repayment schedules calculated for established ethanol plants and those that might be built soon. In 2004 81 ethanol plants in 20 states produced 3.41 billion gallons, representing a 21% increase in a single year. Currently 16 new plants and 2 major expansions are underway in the U.S. The ethanol workbook is available for managers and investors at the following website:
http://www.agmrc.org/NR/rdonlyres/4C6BD4DE-8DA0-44F6-A9AE-02320DBF99F6/0/ethanolsuccess.xls

b. Source of Funding: Hatch

c. Scope of Impact: Statewide integrated

Integrated Research: Factors Influencing Process Cheese Functional Properties

Description: The dairy industry is a vital part of the rural Minnesota economy. The objective of this basic research program is to help the industry identify formulation and processing parameters that influence the characteristics of natural and process cheese. In 2004, application of this research substantially shortened the time and cost required to develop new dairy products. Researchers developed a new manufacturing process for cottage cheese, which has been commercialized. It allows manufacturers to improve the quality and texture of cottage cheese.

a. Impact:
This process is currently being used by Cabot Creamery in Vermont and is being tested in two additional dairy plants this year. In addition, the research resulted in the ability to produce process cheese with targeted melting and appearance characteristics. This research on process cheese has been used to produce a new process cheese that can be exposed to high temperature sterilization without the development of flavor or appearance defects.

b. Source of Funding: Hatch

c. Scope of Impact: State, Multi-State

Key Theme: Agricultural Profitability (Joint)

Integrated Research: Improving the Capacity for Nitrogen Fixation of Crop, Pasture and Prairie Legumes

Description: Nitrogen shortages can hurt the production of many crops. However, in the case of legumes such as bean and soybean, needed nitrogen can be fixed from the air through a symbiotic relationship with bacteria called rhizobia, thus eliminating the need for nitrogen fertilization. Fixation rates are more sustainable and environmentally friendly than fertilizer N application. Unfortunately, not all soils contain the right rhizobia, so in new areas of crop production it is often necessary to add these organisms to the soil at the time of seeding. This research project is aimed at improving nodulation and nitrogen fixation in several different Minnesota legumes by testing both plants and rhizobia strains for their performance and by ensuring that seeding practices do not inhibit rhizobia added as inoculants. In addition to the more traditional beans and soybeans, researchers are studying prairie legumes, including the purple prairie clover and Illinois bundle flower.

Inoculation of bean and soybeans is of increasing interest to farmers in the Central Lakes region of Minnesota, where yield increases have been obtained in two years of testing with soybeans. A website provides details of recent study results http://www.rhizobium.umn.edu.

a. Impact:

With fertilizer N prices increasing 25% since 2001 and currently close to 30 cents per pound for anhydrous ammonia, inoculation of crop and pasture legumes is increasingly attractive to farmers. The cost of a one-time inoculation with an appropriate rhizobia is about $10 ha-1, and done properly can supply essentially all of the plant's need for nitrogen, replacing N fertilizer needs while reducing the possibility of environmental N pollution.

b. Source of Funding: Hatch

c. Scope of Impact: State, Integrated

Integrated Research: Maintaining Genetic Variation in Corn

Description: In recent years, there has been concern that maize varieties are becoming more elite but less diverse. Theoretical computer models have long indicated that, as inbreeding increases, genetic variance for a quantitative trait such as yield will decrease at a linear rate. In addition to seeking new sources of useful germplasm, researchers are studying the role of different types of gene actions and numbers of parents in determining hybrid performance and maintaining genetic variation in breeding populations of maize.

a. Impact:

A study of corn showed that genetic variance for grain yield did not decrease with each generation of inbreeding. A second study showed greater genetic variance for grain yield when populations were formed from two parents instead of four parents. These two studies suggest that genetic mechanisms that conserve genetic variation may be present. Researchers believe that metabolic control is one possible mechanism. The determination that yield does not always decrease with inbreeding means current breeding methods will not deplete genetic variation for important traits in the near future. However, researchers continue to test new germplasm, such as the Cateto population from South America, in an effort to increase corn diversity and to improve Minnesota corn. The website associated with this project is http://stemmapress.com

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Soybean Breeding and Genetics

Description: Many of the nearly three million hectares (about 7.4 million acres) of soybeans grown annually in Minnesota are cultivars developed by the Minnesota Agricultural Experiment Station to meet various goals, including higher yield, earlier maturity, disease resistance and special purposes such as increased protein and oil content. In 2004, researchers continued working to develop soybeans with resistance to soybean cyst nematode, phytophthora root rot, white mold and brown stem rot resistance. Losses to diseases are very significant and vary from year to year but are more than $100 million almost every year. Cooperative work with other scientists in the United States and internationally continues—as does developing cultivars complementary to those developed by the private sector.

a. Impact:

In 2004, researchers released one new cultivar with soybean cyst nematode resistance, which was selected using molecular markers, a new technique first suggested by University of Minnesota researchers. A second release contains the glyphosate resistance gene. Two others were conventional general purpose varieties. Researchers also released five special purpose varieties, which are more valuable than general purpose varieties. Increased value depends on the intended purpose and whether the varieties are grown with herbicide use or organically. Special purpose soybeans sell for from about 20% more to triple the price of regular general use varieties. The price depends on the availability of the special use varieties. Special purpose varieties are used for things such as tofu, natto, miso, soy sauce, soymilk, high protein flour, and high protein concentrate. They may also be eaten when green (edamame), used in place of dry beans in cooking, for infant formula, and to produce more healthful vegetable oils. Most people believe the use of special purpose varieties will increase in the future. The impact of these University of Minnesota soybean releases is both immediate and long-term. In 2004, yield from recently released Minnesota cultivars brought in $1 million more in profit than yield from older cultivars.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Barley Breeding and Genetics

Description: Barley production has declined in Minnesota in recent years, primarily due to Fusarium Head Blight (FHB) disease, which results in grain contaminated with the mycotoxin deoxynivalenol (DON), making it undesirable to use as malting barley. Most maltsters reject barley if it has DON of more than half a part per million (0.5 ppm). Since malting barley sells at a dollar a bushel more than feed barley, FHB can cause severe economic losses to growers. Although FHB, also known as scab, fluctuates due to different environmental conditions, it can affect up to 80 percent of the barley crop in a bad year. Researchers continue to develop barleys with FHB-, Septoria speckled leaf blotch- and net blotch-resistance and also barleys with improved field performance and malting quality.

a. Impact:

Work on FHB-resistant varieties continued in 2004, with one variety candidate accumulating about half the level of toxin of Robust, the most widely grown malting barley in the Midwest. Researchers say that if this variety candidate passes industry evaluation, it may be released in approximately three years. Its release would help growers ensure that their barley would get the malting barley premium. In other work, one variety candidate (M109)--potentially attractive to growers because it is higher yielding and lower in grain protein than currently grown varieties---is being evaluated for brewing quality by the brewing industry. The most recent University malting barley release, Lacey, yields about 12 percent more than Robust and is increasing its share of the acreage grown—both increase profits for growers. For example, Robust yielding 50 bushels per acre on 100 acres at $2.50 per bushel would bring in an additional $12,500, while 100 acres of Lacey yielding 56 bushels per acre at the same price would bring in an additional $14,000.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Impact of Climate and Soils on Crop Selection and Management

Description: Computer models and databases with information on climate and weather forecasts can help farmers and others associated with agriculture. With shrinking profit margins and the deployment of precision agricultural technologies, crop producers require better guidance on the temporal probabilities for suitable soil and climatic conditions. In conjunction with other states and the Midwest Climate Center, Minnesota Agricultural Experiment Station scientists are developing online databases for evaluating crop and pest models and for examining temporal probability distributions for soils and climate conditions.

a. Impact:

In agriculture, crop and livestock producers are striving to better manage their operations in the context of tighter profit margins and respect for the environment. To do so, they are making better use of reports, databases, climatic probabilities and weather forecasts, many of them provided from University research, to manage their enterprises. Use of researchers' web-based training modules, climatic data and information continues to grow, averaging about 1200 users per day. Soil moisture models and measurements were used in 2004 to predict field working days so that farmers might better plan weekly workload and field operations. One specific aspect of University research is the website training module for assessing the control of blowing snow (http://www.climate.umn.edu/snowfence/Components/Design/introduction .htm) along roads. The website has continued to be heavily used, up to 2000 times in 2004. It served as a basis for negotiations between the Minnesota Department of Transportation and landowners (primarily of agricultural land) regarding the use of unharvested, standing rows of corn stalks as a snow fence to protect roadways. This corn stalk snow fence procedure has met with some success in the agricultural landscape, especially during winters with heavy snow cover. The training module on snow drift control has been valuable for a number of cities that have persistent snow control problems. This research and training module continues to provide a basis to negotiate contracts to set aside land for living snow fences. Farmers usually receive a fair payment, plus they are allowed to harvest the remaining crop. This arrangement also insures safer driving conditions. Assessment of climatic trends and improved deployment of observational networks and measurements enhance the use of precision agricultural techniques, reducing the threat of compaction when fields are too wet, and improving the efficacy of agricultural chemicals that are applied under prescribed environmental conditions that meet label restrictions. Better decision-making and better advice from crop consultants can likely be attributed to these efforts.

b. Source of Funding: Hatch

c. Scope of Impact: State Research and Extension

Goal #2:
A safe and secure food and fiber system.

Overview

Fifty percent of the food dollar is spent on meals prepared by the food service industry. The majority of food-born outbreaks in Minnesota are caused by improper handling in food service situations. In response, Extension offers both on-line and community-based, face-to-face courses about food safety. Online information expands the geographic reach of the program. The ultimate goal of our food safety programs is for producers and consumers to know about food safety issues.

In 2004, we are reporting on five impacts on the theme of food safety. The food safety program team spent a significant portion of this year narrowing its target audience in order to assure the greatest impact and the sustainability of the program in the future. Research has made valuable contributions to food safety through new technologies passed on to food processing industries.

Course content is updated through partnerships with sanitarians from the Minnesota Department of Health, the Minnesota Department of Agriculture and county and city public health departments that advise the program of current issues. They also play a key role in marketing the program.

Table 5: Inputs and Outputs Summary, Federal Goal #2, University of Minnesota Extension, 2004

	Food Safety: Producer to Consumer
# FTE	12
# Program Participants	1,127
Number of meetings, workshops, presentations, seminars, etc.	54
% of non-white part. served	5%
Numbers of materials distributed (newsletters, web pages and publications)	10,831

Table 6: Sources of Funding for Federal Goal #2: University of Minnesota Extension, 2004

Smith Lever 3B&C	State	County	Grant/Contract	Hatch
$225,815	$482,148	$0	$0 (program fees were generated, however.)	$35,774

Outcomes: Food service worker certification makes a significant contribution to the food service industry in Minnesota. In 2004, 91% of food managers completing the course passed with a score of at least 75% and are eligible to become certified with the Minnesota Department of Health. As noted in our 2004-2006 Plan of Work, our goal is to pass 95% of the workers on the first try. In 2004, we learned that participants who fail often do so because English is their second language. Special arrangements have been made to accommodate this audience with review sessions and testing with interpreters.

Key Theme: Food Safety (Joint)

(Ref. 2004-06 Plan of Work) Goal 2, Program 1: Food Safety: Producer to Consumer Program Component: Food Safety for Food Service Workers

Description: The Food Safety for Food Service Workers Program utilizes a web site, courses, certification renewal courses, mini-poster series and other events. Extension's food safety and food service program offers four training courses on food safety for the food industry. (1) ServSafe was developed by experts in the food service industry to meet mandatory Food Manager Certification requirements. (2) Extension cooperates with the National Restaurant Association and University of Nevada Las Vegas on a research project – offering the ServSafe on-line course and serving as test proctors. (3) Serve It Up Safely is a food manager certification renewal workshop course developed by Extension. It includes information on emerging trends, cleaning, sanitizing, food-borne illness and personal hygiene. It was also developed into an on-line course. Certified Food Managers need four clock hours of training every three years to renew their certification with the Minnesota Department of Health. (4) The Food Safety Employee training course is geared toward food service workers and was piloted with three groups of vocational high school students in 2004.

a. Impact:
Behavior change:
94% of participants reported important behavior changes in settings at risk for food borne illnesses. For example:

1. They use gloves more often.
2. They followed food safety regulations.
3. They used better hand-washing procedures.
4. They made proper use of thermometers and monitoring of temperatures of food.
5. They used color-coded cutting boards to separate foods from each other.
6. They used better sanitizing methods for equipment.
7. They implemented a cleaning schedule.
8. They changed how food was stored and rotated.
9. They strictly enforced rules that sick staff do not work with food.
10. They established a Hazard Analysis Critical Control Point (HACCP) plan on file in case a food borne illness outbreak occurred in their facility.

Safer Food Service Establishments: Minnesota Department of Health staff report that there has been an 18-20% decrease in critical violations during health inspections of food service establishments that employ a Certified Food Manager.

b. *Source of funding:* Smith Lever 3b & c, state, county, participant fees

c. *Scope of impact:* State Integrated

Integrated Research: Advanced Technology for Biological, Agricultural, and Food Engineering

Description: Among the aims of this research is the development of novel technologies for non-thermal pasteurization (NTP) and sterilization of foods. Conventional pasteurization, through technologies that employ heat, can have adverse effects on the quality, safety and end characteristics (e.g., taste) of foods. NTP pasteurization and sterilization technologies are particularly suitable for processing of heat-sensitive liquid foods such as fruit juice. NTP-based technologies will also be developed for cost-effective control of odorous and hazardous gases, and solid and liquid wastes. NTP-based technologies will be more efficient and cleaner than conventional ones.

a. Impact:
In 2004 researchers developed new non-thermal plasma (NTP) reactors for pasteurization of dry foods such as almonds. Using this process, researchers achieved a five-log reduction (99.999%) of E. coli and salmonella with little damage to almond quality. Recently, there have been outbreaks of both pathogens in almonds. Salmonella and E. coli can cause illness, and very occasionally death, in humans consuming contaminated food. The young and the old are especially vulnerable. The California Almond Board has expressed interest in the NTP process. California, largest producer of almonds in the U.S., had 550,000 acres of bearing trees in 2004 and the initial forecast for the 2004 California almond production was one million pounds, up 6 % from the 2003 production level.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Enhancing Food Safety through Control of Food-Borne Disease Agents

Description: Food- and water-borne diseases are a major public health concern because more than 70 million people in the U.S. are affected annually and approximately 5,000 individuals die each year. A variety of different food-borne disease agents, including bacteria, viruses, parasites, protozoa and others, are responsible for food-transmitted infections. Food-borne pathogenic bacteria cause more than 4 million infections, costing the American economy $6.9 billion per year. Among these bacteria, Salmonella and E. coli are two of the most important bacterial pathogens. Foods contaminated with Salmonella and E. coli are frequently linked to outbreaks of acute gastroenteritis. These pathogens are easily killed in processed foods, but they can survive in raw, fresh, and minimally processed products. These pathogenic bacteria are normally present in the gastrointestinal tract of livestock and they can easily be transmitted in food products via fecal material and animal manure. Because fresh and minimally processed foods do not have a kill step in their process, it is critical to develop methods of control at the farm level to stop the dissemination of these bacteria from animals. Manure and livestock drinking water have been identified as sources for environmental spread of these

pathogens. Researchers experimented with using different strains of E. coli to decrease the number of another strain (O157:H) a disease-causing bacteria that is shed in the fecal matter of cattle. Subsequently, after treatment with colicinogenic strains of E. coli., the number of O157:H7 present in calves fell to 44% of intestinal tissue samples, compared to 64% of the control samples

a. Impact:
2004 results have shown that feeding colicinogenic E. coli can reduce the fecal shedding of serotype O157:H7. A novel mixture of colicinogenic strains has been developed that can be used to treat cattle to reduce fecal shedding.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Processing and Storage Effects on Stability of Nutraceuticals

Description: Dietary supplements and fortified foods are increasingly used to decrease health care costs. Little is known about the stability of the active agents in these products. According to FDA proposals, processors must guarantee label values for their ingredients, including nutraceuticals, which can be defined as nutrients or non-nutrient compounds that are added to foods to maintain healthy conditions in the body. This research project focuses on the use of an easy-to-swallow, milk-based beverage made stable at room temperature by ultra high thermal processing (UHT).

a. Impact:
Work in 2004 showed that in thermal treatment (pasteurization) and storage, soy isoflavones, creatine and lactoferrin are very stable. Researchers developed a mathematical model to predict the temperature profile under UHT, which permits evaluation of the overall degradation kinetics of these nutraceuticals at each stage of the heating treatment. These studies of UHT, together with work done by collaborators at other universities, can also be used to predict inactivation of bioterror agents such as ricin, anthrax and botulinum toxin. In addition, the University of Minnesota faculty, working with Penn State researchers determined the means to eliminate the non-enzymatic browning off flavors produced under UHT processing conditions. Several food grade antioxidants seem have the ability to block the reaction and are being investigated further.

b. Source of Funding: Hatch

c. Scope of Impact: State

Integrated Research: Elimination of E. Coli and Salmonellae from Ready to Consume Acid Foods

Description: While processing techniques such as acidification/fermentation, cooking and freezing are successful in killing pathogens such as Salmonella sp., Listeria sp. and Escherichia coli 0157:H7, some of them may survive in ready to consume foods and thus pose a health risk. In this project, researchers demonstrated that the use of selected antimicrobial-producing lactococci for cheese making can enhance food safety by accelerating the death of these pathogens in buttermilk and Camembert or Cheddar cheese. Similarly, a combination of natural acids in apple cider and freezing for two weeks can cause severe damage to E. coli 0157:H7.

a. Impact:
The method may be an alternative to pasteurization as stipulated by the U.S. FDA. Researchers also developed a bacteriological medium and test process that would permit recovery of sublethally injured Salmonella sp. and E. coli 0157:H7 that would otherwise not be detected.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Goal #3:
A Healthy and Well-nourished Population

Overview

Sedentary lifestyles and poor dietary habits have contributed to the doubling of overweight frequency among children since 1980. Associated diseases such as diabetes are on the rise, robbing our families of quality of life. Action in communities can make a difference for prevention of disease and promotion of good health. Creating environments that promote healthy eating and physically active lifestyles is a positive approach to the complex issue of childhood overweight.

We are reporting impacts on one theme, describing one Extension program and two integrated research projects.

Table 7: Inputs and Outputs Summary, Federal Goal #7, University of Minnesota Extension, 2004

	Health and Nutrition Education
# FTE	3.2
# Program Participants	2,572
# of trainers / volunteers trained	295
Number of meetings, workshops, presentations, seminars, etc.	90
Number of Consultations with individuals, families or business firms	84
% of non-white served	11%
Number of Educational Materials distributed	4,577

Table 8: Sources of Funding for Federal Goal #3, University of Minnesota Extension, 2004

Smith Lever 3B&C	State	County	Grant/Contract	Hatch
$81,194	$94,076	$0	$0	$99,544

Outcomes: Obesity prevention program efforts are "ramping up" this year. Successful efforts in educational programming, consultation, and materials distribution will change environments in schools and communities. Successful efforts will be replicated in additional areas of the state. Research and program coordination in these efforts are drawn from two other substantial programs in Extension – the Food Stamp Nutrition Education Program and the Family Nutrition Education Program.

Key Theme: Human Health (Joint)

(Ref. 2004-06 Plan of Work) Goal 3, Program 1: Health and Nutrition Education Program Component: Obesity Prevention in Communities

Description: In 2004, activities in this goal focused on the development and delivery of programming. The business and curriculum plan has designed strategies to address the unique needs of different cultures. "Food" and "culture" are intricately tied to each other. Extension has created curricula sensitive to the links between food choices and life in a culture. The mobilization of natural helpers who can work within a culture to change food habits is emphasized. The social function of food is discussed, the health impact of

food, gender roles in food preparation, as well as how religion and spirituality links to food habits. The educational goal is to make people conscious of why they make the choices they make, and to promote understanding of the choices of other cultures.

a. Impact:

Behavior change:

- In just one school setting where the program delivered information, Kindergarteners are choosing and bringing healthy snacks that adhere to new school guidelines. Those kindergarteners (95%) took advantage of opportunities to sample new fruits and vegetables provided by the school food service for snacks. Parents of these kindergarteners reported they were working to model positive eating behaviors when joining their children for lunch.
- 670 participants reported increased skill in reading food labels such as checking for fat content. 453 reported making lower fat selections after reading food labels.

Institutional Change

- In the kindergarten where the intervention was piloted, the cafeteria environment became more conducive to positive eating experience. Tables were separated. Noise absorbers were installed. Guidelines were adopted for healthy snacks.
- Four counties and two Indian reservations are working together on a regional planning effort to prevent obesity. This collaboration was initiated through a joint meeting between Extension and Community Health Services

b. Source of funding: Smith Lever 3b & c, state, county

c. Scope of impact: State Integrated

Integrated Research: Whole Grains Processing and Nutritional Quality

Description: Agricultural economic returns may come at the cost of decreased human nutrition and health. This project examines whole grains and the effect of processing on human diet and health. Specific research assessed their potential uses in helping the immune system fight such problems as cancer and inflammations.

a. Impact:

In 2004, researchers developed a cell culture system to test whether and by how much cereal grain components stimulated the mammalian immune system, thereby helping the body defend itself against bacterial, viral and pathogenic organisms. Researchers found that these grain-derived compounds may also modulate inflammatory responses in the body. The compounds stimulate macrophages that are part of the innate immune system in all mammals. Researchers believe that the grain compounds might support patients during and after surgery and cancer treatments and might improve the immune system of all Americans. Their ability to decrease inflammation may be their most useful contribution, as inflammation is now becoming well known as one of the underlying problems common to chronic diseases, such as hypertension, obesity, heart disease,

diabetes, and cancer. Preliminary studies show that patients on certain anti-inflammatory agents have decreased risks for several degenerative chronic diseases.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Genetic Research for the Functional Food Market

Description: Dairy cultures are essential for producing everyday foods and maintaining a healthy digestive tract. They add an extra health benefit to foods over and above nutrient content. In the food industry, foods in this category are generally referred to as functional foods. The functional, or probiotic, foods market is showing impressive annual worldwide growth. While the probiotic sector is vibrant in Asia, Europe and Australia, it is still quite small in the U.S., where it accounts for more than one-third of the total functional foods market.

This research project uses genomic technologies to answer key questions about Bifido-bacterium longum, an important culture for maintaining health in the human large intestine. B. longum is able to break down many dietary carcinogens, thus potentially protecting against colon cancer. Researchers have isolated a strain of B. longum that was most dominant in a young healthy adult. This strain, DJO10A, was found to inhibit many other bacteria by secreting an effective iron chelator that withheld the iron from its competitors. This iron-binding compound has been purified and its structure is being deciphered. As this strain appeared to have the characteristics necessary to compete and modulate the human large intestine, it was chosen as a model strain to try and understand this process. The complete genome sequence of this strain-- a single chromosome and two plasmids--was deciphered. In addition, a gene transfer system based on electroporation was developed for these bacteria.

These tools will be important for functional analysis of the B. longum genome. Researchers completed a thorough comparative analysis of our B. longum strain with the genome of another published strain. Surprisingly, they found very little colinearity between the strains, even though they showed > 98% sequence identity. This result revealed that the genome of this gastro intestinal tract microbe was quite fluid, subject to both DNA acquisitions and rearrangements. Currently, the genome is being used to reveal important genes for stress protection in this bacterium, as well as genes important for its colonization in the intestine using microarray technology. This information is crucial for the successful application of these probiotic cultures in the functional foods market.

a. Impact

The inclusion of probiotic cultures in dairy products to improve people's health creates a sector of the dairy business with the highest growth potential. To maximize this potential it is imperative that the cultures used have scientifically validated probiotic attributes.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

GOAL #4:
An Agricultural System that Protects Natural Resources and the Environment

Overview

We are reporting on four themes this year, describing five Extension programs and six integrated research projects. Four Extension program clusters address Goal #4:

1. Environmental safety and management programs address drainage issues, manure management, pesticide safety and waste and by-product management. (See impact examples below.)

2. Natural Resource Management and Utilization programs assure that every Minnesotan, now and in future generations, can continue to enjoy and benefit from the wealth of Minnesota's natural resources. Minnesotans were mobilized to make greater use of the land, its timber, and to preserve our land and timber for this generation and the next. A remarkable 7,500 volunteers, citizens, homeowners and professionals were mobilized to improve timber and land stewardship. In 2004, some of our 750 volunteers provided services valued at almost $13,000. They gave workshops to their constituencies, produced newsletters, educated loggers, hosted forestry education events, served on local boards, talked to neighbors about the use of land and timber, and educated city staff and citizens on tree care and management. Tree Inspectors certified by Extension help communities assess tree risk and act accordingly. In an emergency response project in Southwest Minnesota, information was made available to citizens via web and face to face to deal properly with risk to trees after a severe storm.

3. Environmental Science Education Programs are a catalyst for environmental education that happens in school and community settings, with a special emphasis on helping teachers target underrepresented youth with education about the environment. Practitioners received the training and materials they needed to supplement curriculum of youth education, activity programs, and programs of water conservation districts with research-based environmental science education. These practitioners were better able to administer Minnesota Statute 115A.073 which states that pupils and citizens should be able to apply informed decision-making processes to maintain a sustainable lifestyle. Direct activities related to this work include student reports to lakeshore residents about the quality of their water, Environmental restoration projects and quality implementation of environmental field days that reach 10,000 students annually.

4. Water Resource Management and Policy Programs provide key audiences with the tools, skills, education and alternative solutions that make Minnesotans good stewards of Minnesota's waters and shorelands. (See impact example below.)

Table 9: Inputs and Outputs Summary, Federal Goal #4, University of Minnesota Extension, 2004					
	Program 1: Environmental Safety and Management	Program 2: Natural Resource Management and Utilization	Program 3: Environmental Science Education	Program 4: Water Resource Management	Total Goal 4
# FTE	10	10	8	10	38
# Program Participants	4,384	7,347	848	6,387	18,966
# of trainers / volunteers trained	232	157	104	82	575
# of mtgs., workshops, presentations, seminars, etc.	229	102	89	270	690
# of consultations with individuals, families or business firms	1,224	192	641	721	2,778
Number of educational materials distributed	13,177	23,429	555	88,610	125,771
% of non-white	7%	6%	11%	2%	5%

Table 10: Sources of Funding for Federal Goal #4, University of Minnesota Extension, 2004				
Smith Lever 3B&C	State	County	Grant/Contract	Hatch
$535,625	$1,107,332	$228,874	$1,225,050	$265,959

Outcomes: (See above)

Key Theme: Soil Quality (Joint)

(Ref. 2004-2006 Plan of Work) Goal 4, Program 1: Environmental Safety & Health
Program Component: Drainage Education and Water Management

Description: Artificial drainage systems have supported agriculture production in Minnesota for over a hundred years. Surface and subsurface (i.e., tile) drainage systems are an integral part of the landscape in the Minnesota River and Red River Basins and help ensure successful agricultural crop production in these regions. Since the inception of the Clean Water Act (1972) and Swampbuster provisions (1985), societal expectations toward wetlands and the environment have changed.

Artificial drainage on poorly drained agricultural soils can reduce soil erosion and compaction, phosphorous losses and unfavorable field conditions for farm equipment in the spring and fall. Water management on drained lands is vital to sustaining production and profitability of soils.

Basic and applied research is underway to improve our understanding of how artificial drainage impacts the environment and how drainage practices can change to reduce those impacts. Farmers, contractors, consultants, agency staff, local decision-makers and others

understand how they can accomplish the dual objectives of agricultural production and minimize negative environmental effects. This program works to increase awareness of drainage needs, alternatives and impacts within the target audience through applied research, workshops, field days, seminars, conferences, a web site (http://d-outlet.coafes.umn.edu), publications and farm visits.

a. Impact
Funding was acquired in 2003 to conduct an evaluation of the workshop through focus groups and written questionnaires from past program participants. The study is not complete, but early feedback suggests that participants think more analytically and holistically about water management alternatives. Others said that they factor environmental considerations when making water management decisions. Participants also show evidence of understanding the complexity of the soil-plant system they are managing. There is no question that workshop participants are better able to consider thoroughly consider difficult water management decisions that include both production and environment.

The web site received over 10,000 visits since its development in 2001. There is evidence that the site is creating a ripple effect of education. Students and instructors at other institutions have downloaded materials for courses.

b. *Source of Funding:* Smith-Lever 3b&c, State, County, non-agency sponsors

c. *Scope of Impact: Multi-state, integrated (IA, IL, IN, MI, MO, ND, OH, SD, WI)*

Key Theme: Agricultural Waste Management

(Ref. 2004-06 Plan of Work) Goal 4, Program 1: Environmental Safety and Health Program Component: Manure Management and Air Quality Management

Description: Animal agriculture plays an essential role in Minnesota's economy. Unfortunately, manure generated from animals can negatively impact the air and water quality of the state. Federal, state, and local regulations are designed to protect these natural resources; however, meeting these regulations requires innovations in technologies and management practices. Research and education programs come together to develop and disseminate economically feasible and environmentally sound manure handling systems. This program reaches private consultants and engineers who deal with manure and nutrient management, as well as public technical service providers, government regulators, custom manure applicators, livestock and poultry producers and crop farmers through educational materials, workshops and training sessions.

a. *Impact*
This integrated project involves Minnesota organizations working on this important issue, and draws on expertise from a variety of sources; therefore, credit for impacts must be

shared. Extension and its collaborators are changing trends in manure management through extensive research and education.

Behavior Changes:

- In one county alone, 17 producers came into compliance with feedlot laws, and four producers signed the state open lot agreement.
- 22 farmers wrote manure management plans or had them written.
- A post-season survey indicated that 61% of the responding participants had completed their nutrient management plans as the result of the workshops. If changes written into manure management plans are followed, the impacts will be a reduction of 132,000 lbs. of N and 176,000 lbs of P205.

Economic Impact:

- Thirty-four percent of participants in the workshop calculated that they would save at least $20 per acre in fertilizer costs if they utilized manure according to their nutrient management plan. 247 workshop participants were sent a follow up survey. 116 responded that they managed a total of 84,000 acres of cropland in Minnesota. Therefore, quality manure management increased farm profits by approximately $1,680,000 while improving the quality of the environment.
- Non-compliance with feedlot laws could have resulted in fines in excess of $20,000 for the group that came into compliance.

b. *Source of Funding:* Smith Lever 3b & c, state, county, Minnesota Pollution Control Agency, USDA, Environmental Protection Agency 319 and the Minnesota Department of Agriculture

c. *Scope of Impact:* State Integrated

Integrated Research: Aerial Pollutant Emissions from Animal Confinement Buildings

Description: The increasing sizes of poultry, swine and dairy operations in recent years have generated questions about adverse impacts of aerial pollutants from these operations on human and animal health and on the environment. Pollutants include odor, ammonia, hydrogen sulfide, carbon dioxide and particulates produced by the animals, their confinement materials and their manure. In an era of increased regulation, emission standards must be set. These standards will depend on accurate assessment of emissions. Until now, no on-site, long-term emission studies have been done. Minnesota researchers joined scientists from five other states to determine baseline pollutant emission rates for six common types of animal confinement buildings from different sections of the U.S. over a 15-month period (winter 2003 through spring 2004). Researchers evaluated differences in emissions due to season, time of day, building design, growth cycle of the animals, and building management.

a. Impact:
Data gave a good picture of the cyclical nature of emissions. All emission rates fluctuated more in the summer than in the winter, probably due to more ventilation variability. While most daily emissions were well within allowable regulatory limits, spikes in the summer and fall may push the emissions level close to or beyond permissible levels. Research findings suggest the importance of having long-term data from which the Environmental Protection Agency can set allowable standards. The Minnesota study is going to be used as a template as the EPA partners with the livestock feeding industry to continue to collect long-term data.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Key Theme: Pesticide Application (Extension)

(Ref. 2004-06 Plan of Work) Goal 4, Program 1: Environmental Safety and Health Program Component: Pesticide Safety Education

Description: The management of pests is important in many Minnesota industries, such as crop and livestock production, forestry, horticultural plants, fisheries, food processing, waste management, transportation of commodities, and tourism. Pest and pesticide management in sensitive public and urban areas, such as parks, golf courses, schools, etc. are important for both economic and aesthetic reasons, but require expertise and knowledge to protect the public. Pesticide safety and security, of which education and outreach play a central role, have emerged as recognized priorities for national security.

Recertification training also provides skills for employment in the industries where pesticides are used. Evaluation of those certified indicated that 100% found the program effective and 99% will utilize the information. There were measurable improvements in awareness of personal pesticide safety and natural resources stewardship due to the program.

Outcomes: In 2004, 1,749 persons were certified to use pesticides, including farmers, agricultural commodity producers and professional pesticide applicators. Certification provides a quality service to the field, assuring them of an educated workforce; it also provides future economic security for those certified

a. Impacts
Certification: Certification assures knowledge change so that those certified can have the following impacts:

- They insure public health and environmental quality.
- They take measures to assure health and safety for themselves, as well as that of their co-workers and families.

- Producers, industries, government, natural resource managers and the public-at-large act professionally and adopt economically and environmentally sound pest and pesticide management practices.

Environmental Impact: In a longitudinal look at certified persons in one region of the state, there were no major incidents of pesticide poisoning with any of the people that were trained. There were no environmental incidents reported among the producers trained. There were no legal violations reported among farmers trained.

b. *Source of Funding:* Smith Lever 3b & c, state, county, participant fees

c. *Scope of Impact:* State Integrated

Key Theme: Water Quality (Joint)

(Ref. Plan of Work 2004-06) Goal 4, Program 4: Water Resource Management & Policy
Program Component: Small Community Wastewater Education Program

Description: The Small Community Wastewater Education Program supports the thousands of rural "unsewered" communities that need help finding viable solutions to healthy handling of wastewater. The program provides residents and community leaders with the tools they need to make viable solutions based on the solid environmental, financial and social needs of the community.

a. *Impacts:*
Community Processes Working for Health Compliance:
The program is reaching communities of the greatest need in Minnesota. In 2004, the program mobilized community decision-making processes with ten communities, including a lake association, a small town, two townships, and an Indian tribe. Impacts quantified in previous years would indicate that these ten communities will, as a result, find viable solutions that follow federal EPA and state MCPA guidelines. Impacts include cleaner water, longer-lasting septic systems and more informed decision-making about public expenditures of public and private funds.

b. *Source of Funding:* Smith Lever 3b & c, state, county, fees from participants

c. *Scope of Impact:* State Integrated

(Ref. 2004-06 Plan of Work) Goal 4, Program 4: Water Resource Management & Policy
Program Component: Shoreland Education Program

Description: The pressure on our water resources is demonstrated by data collected by the Minnesota Department of Natural Resources. Between 1967 and 1982, the number of homes on lakes outside the metro area grew by 74%. Seasonal homes increased 63%. Permanent homes increased by 99.5%. Many small cabins have been replaced by large

homes and, as available lake and river frontage becomes scarce, more and more marginal lands are being developed.

a. Impacts:

Lake associations are working to improve the water quality of their lakes, and Extension provides them the education and funding connections they need to do the job and do it well. In 2004, four lakeshore projects were connected to funding sources. These communities wrote quality proposals for shoreland restoration with the help of Extension's educational programs and each of the proposals received funding in amounts ranging from $5,000 - $40,000. As a result of those projects, 500 linear feet of shoreland is or will be restored, and 20,000 square feet of shoreline were restored. In addition, these efforts mobilized owners to care for their shoreland property, resulting in future stewardship of the land and water.

b. Source of Funding: Smith-Lever b&c, Minnesota Pollution Control Agency, 319, Minnesota Department of Natural Resources

c. Scope of Impact: Multi-state integrated (ND, WI)

Integrated Research: The Karst Campaign for Clean Water, Productive Soil and Profitable Farms

Description: The overall goal of the Karst Campaign is to promote clean water, productive soil and profitable farms through a comprehensive educational strategy targeted at the karst region of southeastern Minnesota. The karst region is composed of porous limestone, which can allow contaminants to leach into the water supply. To help producers maintain successful farm businesses as well as safeguard their water supply, University of Minnesota researchers and Extension Educators have determined and disseminated the Best Management Practices (BMPs) for the region. In 2004, researchers used the FANMAP (Farm Nutrient Management Assessment Program) to determine to what extent these recommendations had been adopted.

a. Impact:
Results of the analysis of 30,000 acres were mixed, but showed that farmers adopted some of the BMPs. Farmers with a corn/soybean rotation came within 15 pounds of the recommended fertilizer application limit. Encouragingly, only 150 acres were still under moldboard plow, which promotes erosion. No-till practices which result in increased residue cover and thus control erosion and sediment loss were used in 6,000 acres. On the down side, liquid manure—generally hog manure—was over-applied by more than 50 pounds per acre. Results also showed that beef operations were spreading less than 25 percent of manure. Researchers are advising farmers, particularly those with beef operations, to spread more manure to reduce runoff, which releases fecal coliform bacteria into streams and rivers. Farmers who plant corn after alfalfa need to apply less nitrogen. Information conveyed to producers through the Karst campaign may be of potential health benefit to those who live in the area. Bacteria from manure and septic

systems in surface streams and rivers in the area are of special concern, as these bacteria create potential concerns for those using these waters for recreation. The ground water concerns are primarily with Nitrogen levels in aquifers that supply drinking water in private wells.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Watershed Studies for Nutrient Reductions in the Minnesota River Basin

Description: This project is a farmer-led and initiated effort to accelerate the voluntary adoption of Best Management Practices (BMPs) for nutrient management in the Minnesota River Basin. Farmers want to take an active role in identifying practices that improve water quality and agency personnel want to know which practices effectively improve water quality and maintain agricultural productivity. This project uses a coalition of producers, agency personnel, and researchers at the University of Minnesota to evaluate BMPs implemented at the watershed scale in two adjacent agricultural watersheds in Nicollet County, Minnesota. All are in the Minnesota River Basin. Researchers collected water quality samples at the mouth of each watershed for three years. Farmers operating within both the treatment and control watersheds were surveyed to establish farm management practices. After a one-year control monitoring period, farmers in the treatment watershed were visited to discuss the types of changes in management they would be willing to make to improve water quality.

a. Impact:
BMPs were implemented on about 42% and 48% of the treatment watershed for the 2003 and 2004 crop years respectively. Researchers found that farmers are willing to make changes in their management practices to improve water quality. The level of adoption depends on their age, farm size, and production characteristics. Survey findings showed a wide range of management practices in the watersheds, and point out the need for a correspondingly wide range in BMPs. Preliminary results using erosion and phosphorus models indicate that installation of BMPs in the treatment watershed have reduced erosion rates by 20% and phosphorus losses by 15%.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Drainage Design and Management to Meet both Environmental and Agronomic Objectives

Description: Subsurface (tile) drainage systems, while providing a great benefit to agriculture, can also worsen certain environmental impacts, such as nitrate losses to surface waters. In 2004, to determine whether planting winter rye as a cover crop after

corn and before soybeans would reduce the loss of nitrate-nitrogen to surface water, and subsequently to drainage systems, researchers developed a new computer model, called RyeGro, and did long term simulations of using this cover crop.

a. Impact:
RyeGro results, which compare very well to observed data, indicate that using winter rye as a cover crop is most effective when the rye is seeded by mid-September and desiccated in late May. Long-term simulations indicate that nitrate-nitrogen losses may be reduced by up to 45% for a corn-soybean rotation. Reducing nitrogen loads to streams substantially benefit coastal ecosystems. Data and information from this research is allowing producers, contractors and other decision-makers to better incorporate environmental and agronomic objectives into water management planning and management.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Integrated Research: Using Aquatic Insects to Track Water Quality

Description: Since 2001 researchers have been sampling small and large streams in a five-county area around the Twin Cities- including those that feed into the Mississippi and St. Croix rivers--to document the species and numbers of non-biting midges (Chironomidae). The presence or absence of certain species indicates whether and to what degree the water is polluted. This quantitative field data may help authorities correct problems before they become widespread. One of the streams sampled – Minnehaha Creek – is a valued and popular recreational and aesthetic resource as it flows through parks and urban areas from Minnesota's Lake Minnetonka to the Mississippi River. As part of this research project, a study of 168 samples at 14 sites was carried out at the creek from April until November 2003.

a. Impact:
Researchers found that Minnehaha Creek showed unexpectedly high biodiversity for an urban stream, indicating high water quality and very good habitat conditions at several sites. Most sampled sites had at least 60 species, one site alone had more than 90 species, and a total of 124 species were documented. Study results will be given to the Minnehaha Creek Watershed District and researchers will work with the watershed district to ensure that the creek's water quality and in-stream habitat are preserved. In addition, on the basis of findings from all streams, including the St.Croix tributaries, researchers have prepared a guidance document that enables private citizens and working professionals to use aquatic insects to monitor and evaluate water quality. It is available in digital form on-line. Eventually, sampling for certain Chironomidae species may assure the public that the water they use for swimming, fishing and boating is of high quality. In Minnesota and other states where water-based recreational pursuits are an important part of many residents' lives, results of this research may increase the

enjoyment of life. Websites for more information on this project are:
http://www.entomology.umn.edu/midge/minnehaha_creek.htm
http://www.entomology.umn.edu/midge.GuidePage.htm

b. *Source of Funding:* Hatch

c. *Scope of Impact:* State Integrated

Integrated Research: Biogeochemistry and Ecological Risk Management of Trace Chemical Constituents

Description: Mercury and its more toxic form, methyl mercury, are present in most fish caught and/or eaten in Minnesota. Cooking or cleaning methods cannot reduce the mercury levels in fish. Mercury poses a health risk to humans, especially to children, breast-fed babies and developing fetuses, and may cause brain damage and learning disabilities. For three years, researchers have been studying the net methylation of atmospherically derived mercury in pristine upland bogs in northern Minnesota. Application to the bog of sulfates, which combine with Mercury to produce methyl mercury, was part of the procedure. General results of the research suggest that atmospheric deposits of sulfates from power plants and other sources, such as fossil fuels, may cause a net increase in methyl mercury, and hence, in mercury levels in fish. In addition to continuing this project, researchers are beginning a new study investigating the effects of forest fires on net methylation and fish bioaccumulation in paired lake systems in the Boundary Waters Canoe Wilderness Area.

a. Impact:
The study showed that the methyl mercury concentrations present in many surface waters (which appear to be about 10 times pre-industrial levels) may be the result not only of enhanced atmospheric deposition of mercury (currently 2.5 to 3 times pre-industrial levels) but also enhanced atmospheric deposition of sulfate. This coupled biogeochemical cycling of sulfate and mercury/methyl mercury provides an opportunity to reduce the impacts of mercury deposition on aquatic ecosystems both directly (through decreases in mercury deposition) and indirectly (through reduction in sulfate deposition). In light of the current high numbers of lakes and rivers in Minnesota and the world impaired by high concentrations of methyl mercury, this research may have impacts far beyond the region of the study.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Goal 5
Enhanced economic opportunity and quality of life

Overview

Six program clusters address Goal 5.

1) Agricultural Workplace Safety and Health Programs reduce hazards and improve specific safety-related behaviors in the work environment related to the agriculture and food industry.

2) Community Youth Development and 4H Youth Development Programs provide quality learning opportunities during non-school hours, develop Minnesota's future citizens and leaders, and help professionals and community leaders prepare to provide positive out-of-school experiences to youth.

3) Community Economics Programs create a network of informed citizens and leaders who are engaged in thinking strategically about the future of their community's economy.

4) Leadership and Civic Engagement Programs help leaders and citizens act knowledgably together to solve problems and build a future for their community.

5) Family Resource Management programs increase fiscal stability and money management skills of Minnesotans in order to reduce some of the causes of poverty.

6) Parent Education Programs provide exceptional research-based training, education and information to assist families as they make decisions about raising children. These programs are establishing collaborative relationships that serve parents in new ways, developing products that reach new constituencies and create a community environment that encourages systemic change in addressing childrearing when parents divorce.

These programs are carried out by specialists in the youth development, family development and community vitality capacity areas. Demand for Goal 5 activities has grown as communities and Extension align programming to current needs and trends, including:

- Homeland Security: Extension is working more closely with local, health, safety and preparedness initiatives in the state – adding research and education to their efforts.
- Demographic shifts: Programs are being translated into new languages and special efforts are being made to reach out to Minnesota's growing Latino, Somali and Hmong populations.

- As the agricultural economy changes, efforts are being made to help rural communities monitor economic shifts and diversify their economies.
- As local governments face critical questions about future revenues in a time of growing obligations, the support Extension can provide local leaders helps local jurisdictions think innovatively and cope with change.

Table 11: Inputs and Outputs Summary, Federal Goal #5, University of Minnesota Extension, 2004							
	Pgm 1: Ag Workplace Safety & Health	Pgm 2: Youth Develop-ment	Pgm 3: Community Economics	Pgm 4: Leadership & Civic Engagement	Pgm 5: Family Resource Mgmt	Pgm 6: Parent Education	Total all Goal 5 Programs
# FTE	4.82	132	8	12	14	12.5	183.32
# Program Participants	1,474	139,589	8,361	5,237	5,438	15,447	175,546
# of volunteers/ trainers trained	13	6,272	305	111	1,346	291	8,338
# of volunteer hrs. provided	100	1,230,882	3,757	1,613	1,424	21,589	1,259,365
% of non-white part. served	5%	23%	8%	8%	16%	40%	23%
# of mtgs workshops, presentations, seminars, etc.	34	114	404	278	386	388	1,604
# of consul-tations with individuals, families or business firms	5	81	628	117	654	1,440	2,925
# of educational materials distributed	2,592	140,564	13,848	3,988	27,131	31,877	220,000

Table 11: Sources of Funding for Goal #5, University of Minnesota Extension, 2004				
Smith Lever 3B&C	State	County	Grant/Contract	Hatch
$2,267,036	$3,578,402	$3,981,830	$4,914,000	

Outcomes:

Although there is varied thinking on the applicability of outcomes on educational prevention programs in the social sciences, Extension's programs have undertaken effective ways to measure knowledge gains and track longitudinally the effects of programming on the choices that individuals, organizations and communities make. By using post-program evaluations, maintaining contact with program recipients and providing "after care" to program participants, we can tell the stories of positive outcomes and impacts in many cases.

Key Theme: Farm Safety (Joint)

Integrated Research: Safety for Young Hmong Farmers

Description: More than 200 Hmong families living in the Twin Cities area raise vegetables to sell. Children work alongside parents in the fields and at farmers' markets. Almost all labor is done by hand; rototillers are often the only machines used. Though this type of farming differs greatly from more mechanized operations, safety is a concern for both. Since the Hmong have an oral rather than a written culture, merely translating standard written safety information does not effectively convey precautions, and the content is often not relevant to Hmong farming methods. After researchers found that parents relayed instructions to children via stories, they, too, decided to try using the classic Hmong storytelling form to provide specific safety information.

a. Impact:
In 2004, researchers hired a Hmong playwright to tell the story of Tou Joua, an orphan farmer boy. Woven into the saga of the orphan boy are benevolent spirits, wise old ladies, beautiful princesses in disguise, nasty relatives and precise instructions on using rototillers and knives, as well as guidelines for children working in markets. A dramatic reading of the story was piloted tested with a group of Hmong and received favorable response. Additional presentations were scheduled at four different venues in Minnesota early in 2005. A written version, illustrated by a Hmong artist, is being published as a bilingual book. Dramatic presentations were also scheduled for several Hmong communities in Wisconsin. Discussions following the presentations will determine if the safety messages have been received.

b. Source of Funding: Hatch

c. Scope of Impact: State Integrated

Key Theme: Youth Development/4H (Extension)

(Ref. 2004-06 Plan of Work) Goal 5, Program 2: Community Youth Development and 4H Youth Development
Program Component: 4H Youth Development

Description: With nearly two of every ten youth in the sate participating in 4-H and with a volunteer base of over 13,200 adults and youth contributing over a million hours of service, 4-H is one of the largest youth serving organizations in Minnesota. In 2004, 4-H programs were supported by fees ($756,000) and grants and contracts ($3,761,284), as well as federal and state funds. According to longitudinal research about youth programs, the investment in 4-H will pay off in developmental outcomes (learning to be productive, connect and navigate their social world) and also improve their long-term outcomes in adulthood, including economic self-sufficiency, healthy relationships, and

involvement in communities (Gambone, Klem and Connel, 2002). Our own research[5] supports these linkages. Nearly all (86%) Minnesota 4-Hers report active parent involvement. With community service as a key aspect, 80% assert that they are making a difference in their communities through 4-H.

a. Impacts

In studies of Minnesota's 4Hers, 71% say they are learning to take positive risks, 89% say they built new friendships, 90% learned goal-setting and 95% learned teamwork skills. 69% are learning about careers to pursue, 79% are practicing leadership skills and 62% are learning about diversity and new cultures. Nearly 2/3 reported that they think their 4-H experiences help them do better in school. When compared to other youth in Minnesota of similar ages/grades, 4-Hers were more likely to volunteer in their community than their peers (53% vs. 32%). They are also less likely to spend six or more hours a week watching TV (15% vs. 44%). They are less likely to have smoked cigarettes (19% vs. 26%) and less likely to have drank alcohol (23% vs. 37%).

d. *Source of Funding:* Smith Lever 3b & c, state, county, USDA, Center for Public Health Preparedness (CDC), National Institute of Health, U of Minnesota Experiment Station Rapid Response, and multiple other sources

c. *Scope of Impact:* Multi-state Integrated (AZ, CA, CO, DC, FL, IA, IL, IN, KS, KY, MI, MN, MO, NC, ND, NE, NH, NY, OH, OR, PA, SD, TX, WA, WI)

Key Theme: Promoting Business Programs (Extension)

(Ref. 2004-06 Plan of Work) Goal 5, Program 3: Community Economics
Program Component: Business Retention and Expansion

Description: Key to successful economic development are efforts aimed at helping local businesses survive and grow in the community. To make that job easier, the BR&E Strategies Program provides communities with training, research and technical assistance to help them assess business concerns, understand the structure of the local economy, set priorities and implement projects that will help make their economies more vibrant.

a. Impact

Interviews with BR&E program sites that Extension has engaged since 1999 showed that community mobilization for business retention and expansion was sustained through 2004. Communities reported continued work on two or more of the priorities and projects selected in the planning process. This outcome demonstrates success in engaging the community broadly in the economic vitality of the community. Those interviewed described community and business successes such as the following.

[5] Marczak, M. S. (2002) A Comprehensive Approach to 4-H Youth Development Evaluation: Proving the Difference We Make. IRB Study Number: 0109S07221.

1) A three phase housing project was completed in Springfield, Minnesota, and a multi-million dollar grocery store expansion was completed. In addition, a new 30 room highway hotel was completed with an unusual community-based investment of 200 local investors. Both are business investments not typically seen in a community of 2,250 persons.
2) Two communities conducted outreach to "30-something" alumni of local high schools.
3) Regional cooperative tourism efforts were developed in Pipestone County. One of these is the "Pageants on the Prairie" marketing effort, which collaboratively promotes five pageants within the adjacent region of both Minnesota and South Dakota. In addition, cooperative efforts made Highway 75 a state scenic byway.
4) Community beautification efforts continued in two BR&E communities.
5) As a result of business requests described in the BR&E survey, communication was provided to 300 city businesses on topics including transportation updates, new business announcements, etc. Follow up visits were made to manufacturers, revealing that two business expansion projects resulted from the program.

b. *Source of Funds:* Smith-Lever 3b&c, state, contracts with communities

c. *Scope of Impact:* Multi-state and Extension (CT, FL, IA, KS, LA, MI, MN, MO, ND, NY, VA, WI and four Canadian provinces)

Key Theme: Leadership Training and Development (Extension)

(Ref. 2004-06 Plan of Work) Goal 5, Program 4: Leadership and Civic Engagement Program Component: U-Lead

Description: Quality community leadership is critical to helping rural Minnesota with current issues such as increasing mandates, demographic changes, economic shifts and changing relationships from citizens to government. In 2004, Extension's leadership and civic engagement educators conducted leadership education programs for six cohort groups of emerging, elected and acting leaders. In addition, U-Lead workshops were held for 389 organizations involving 2,903 persons. U-Lead programs seek to affect human capital by strengthening leadership, activating group membership and building social capital, thus fostering commitment to a shared vision.

Outcomes: In a study of leadership education cohort group members, 100% of respondents felt the program was worth the significant time and energy they put into the program. This time and effort resulted in a reported increase in skills and behaviors[6]:

- Knowledge of resources – 30% increase
- Public speaking skills – 26% increase
- Understanding public issues – 22% increase
- Articulating a vision – 22% increase
- Change processes – 18% increase

[6] This study utilized the University of Missouri's Community Leadership Survey.

a. Impacts

Return on Investment for Communities: A 1996 study conducted by the University of Guelph showed that each dollar invested in leadership education can bring $11 back to a community in volunteer labor, resource allocation and better thriving economies. In 2004, U-Lead invested $419,000 in six cohort groups of 350 participants. Given these investments, we expect the following economic impacts in various sectors we've reached through these cohort groups:

- rural and agricultural sector - $1.6 million
- natural resources and environment sector – $1.3 million
- three counties - $350 million per county.

Increased Community Leadership:

- Each U-Lead participant provides volunteer leadership to 3.4 organizations, thus impacting an estimated 1,190 organizations. Participants reported a 15% increase in acceptance of leadership positions after participating in the U-Lead programs.
- In 2004, five participants and alumni of our Agricultural Rural Leadership program were elected to public office.
- One cohort group became a finalist in a National Star City project.
- Two counties developed vision statements and framed political platforms that represented multiple cities and governmental jurisdictions.
- One group of countywide entrepreneurs formed a community-wide marketing cooperative for local products.
- After leadership training related to forming public participation processes, Minnesota was 4th in the nation for amount of EQIP funds received. The Executive Director of Minnesota's Soil and Water Conservation Districts credits the U-Lead with this success.

b. Source of Funding: Smith-Lever b & C, state, county, Southern Minnesota Initiative Foundation, Minnesota Soil and Water Conservation Districts, Association of Minnesota Counties and numerous other contracts.

c. Scope of Impact: Multi-state Extension (AK, CA, CO, DE, IA, LA, MI, MN, ND, NJ, OH, SD, VA, WA)

Key Theme: Family Resource Management (Extension)

(Ref. 2004-06 Plan of Work) Goal 5, Program 5: Family Resource Management
Program Component: Family Financial Literacy Programs

Description: Family literacy programs reach out creatively and sensitively to over 5,000 welfare-to-work families, future retirees, low-income families and individuals, persons considering home ownership, Latino families, renters, and the general public. These programs are attentive to new financial management problems such as identity theft and tax changes. Family Resource Management education is conducive to broad distribution of written materials. Financial literacy information is featured regularly on the Extension web site, and educators reported frequent outreach to the media, reaching thousands of

Minnesotans with education about timely topics. Almost 18,000 items of educational materials were distributed to key audiences. Over 1,500 of these materials were in Spanish.

Outcomes: Financial literacy programs helped integrate immigrant, non-English speaking residents into American systems. In a representative sampling of 352 immigrants participating in financial literacy programs, 88% were able to assess how much credit they could afford, 93% reported they knew how to get a credit report and what was in it, 78% knew ways to build a credit history, 97% reported knowing how to open a bank checking or savings account, and 25% of those who didn't have an account got one after the program. Additionally 96% reported understanding less costly ways to transfer money internationally.

a. Impacts

Behavior Change:

- 280 participants developed spending plans to manage ongoing income and expenses.
- A six-month follow up reported the following changes: 62% had reviewed their Social Security statement; 40% had identified later life financial goals; 36% had started or revised savings and investment goals, 34% had estimated later life income needs; 32% had planned for more than one source of income for later life; 30% had discussed these goals with important others; 30% had organized financial records; 30% had started or increased contributions to retirement plans.
- In another post-program evaluation, four behavior changes were reported: 46% had tried something new to save money; 44% had kept track of where money was spent; 34% had written down a spending plan; and 24% had obtained a copy of their credit report.

Improved Financial Status:

- One collaboration with Anoka County tied successful completion of financial literacy classes with eligibility to receive a donated car through a nonprofit organization. In 2004, 94 participants received cars, which made them more self-sufficient and employable.
- Follow up surveys conducted by The Central Minnesota Housing Initiative indicated that 35% of households participating in home purchasing programs in 2004 had purchased a home. Home ownership provides a positive economic impact, including increased equity and stability. Communities benefit through a strengthened local economy and tax base.

b. Source of Funds: Smith-Lever b & c, state, county, participant fees, program sponsors, the National Institute of Health, Department of Employment and Economic Security, AmeriCorps

c. *Scope of Impact:* State Integrated

II. Stakeholder Input Process Update

A. Actions taken to seek stakeholder input that encourages their participation.

In 2004, the stakeholder input process was addressed in the following ways:

- Counties used their budget allocation process to select which areas of expertise they want local staff to work on and which can be staffed appropriately through regional Extension educators. This provided a direct link between county priorities and use of their county's fiscal investment. Of Minnesota's 87 counties last year, 60 chose to staff agricultural areas of expertise, 45 chose youth development, 84 chose nutrition education programs and other family development programs, four chose natural resources and environment and two chose community vitality. Some counties also chose to invest in intensive programming from the regional office.
- Program teams continued to meet in 2004. The emphasis this year was on the completion of business plans and evaluation strategies. Program teams formally convene educators, campus specialists and research staff to review the knowledge model and business model of programs. In the process of developing the program business plan, teams conduct environmental scans, analyze trends, review literature, gather secondary data and talk to target audiences.
- Regional Extension Directors acted as a liaison to stakeholders in the region. Because they are covering multiple counties, educators also reached out to key constituencies. In 2004, a major task of the Regional Extension Directors was to convene stakeholders in each county to identify priority programs of interest. This data is being communicated back to regional Extension Educators in 2005.

B. Brief statement of the process used to identify individuals and groups who are stakeholders and to collect input from them.

The chart below describes our stakeholder input process:

Table 13: Processes for Stakeholder Input Process, University of Minnesota Extension, 2004

Group	**Process for collecting input**	**Who is responsible?**	**Documentation**
County Stakeholders (All 87 county extension committees participated in needs assessment, identifying 1,300 desired program events.)	Needs Assessment meetings that match local needs to Extension programs	Regional Directors	Needs Assessment outcomes to be distributed March 2005.
Statewide Extension Citizen Advisory Committee (A representative group of volunteers from Minnesota's various geographies and diverse interests.)	o Three meetings per year o Conference calls two – three times a year o Regular distribution of memos and reports	Dean and Director	Agenda Minutes Meeting summaries Correspondence

Table 13, cont. **Group**	**Process for collecting input**	**Who is responsible?**	**Documentation**
Local Fiscal Partners; e.g., county commissioners and Extension committees	o Regular review of programs at County Extension meetings. o One-on-one meetings with commissioners. o Attendance of local partners at program showcases, Extension gatherings, etc.	Regional Extension Directors Liaison to the Association of Minnesota Counties	Written MOUs which align local positions to priorities. Written summary of County Extension Committee meetings. Local needs assessments
Current program participants	o Participant satisfaction surveys o Repeat interest in Extension programs	Regional educators and program leaders	Program business plans that include information about past participation and program adjustments
Targeted program audiences and constituents	o Getting acquainted meetings o Surveys and feedback forms at program showcase events	Regional Educators, Campus Specialists and Regional Directors	- Program outreach materials that address key concerns of the target audience. - Program business plans that incorporate feedback into an outreach plan for the audience. -New Programs Needs Assessment
Regional Educators and Campus staff	o Regular program meetings that design research-based programs	Area Program Leaders and Capacity Area Leaders; Associate Dean and Director	Program Business Plans Individual Work Plans
Legislators and Higher Ed Committee	o Personal Meetings and Committee Presentations	Dean and Director; Associate Dean for External Relations	Updates in Extension Weekly

C. Statement of how the collected input was considered.

Input from stakeholders guides program teams and capacity areas as they design program business plans that address stakeholder priorities. Stakeholder input is considered as we answer questions such as:

- Where will staff be placed?
- Which stakeholders should regional educators work with as they conduct programming? Who is interested in their work?
- What fees will be charged, for which services, at what price points?

- How should research-based education be delivered? (Long-term consultation, workshop format, on-line course, assessment, one-on-one consultation, mass media, web site, etc.)
- What other resources do stakeholders turn to? Do these intermediaries need research-based information? Are we duplicating a service? What is our program niche?
- What do stakeholders know about Extension programs? How do they hear about our services?
- Has our past service and research been satisfactory? How might it be changed?
- What new research should shift how we deliver programs?

D. Statement regarding the usefulness of the stakeholder input process in refocusing and reaffirming priorities or in identifying emerging issues.

As Extension has established program specialization, regional centers, and county purchase of service, stakeholder input is more integrated into our organizational design. The extent to which programs continue and how they evolve relies upon the satisfaction, positive feedback and investment from stakeholders.

Each program business plan and capacity area work plan includes input from external scans, stakeholder input and secondary data that feed the strategic planning process. It will directly influence the use of resources and the direction of these programs.

III. Program Review Process Update

A. What is our process?

Since 2002, the University of Minnesota has defined and refined its program review process to support priorities in each of the five capacity areas: (1) Agriculture, Food and Environment; (2) Community Vitality; (3) Family Development; (4) Natural Resources and Environment and (5) 4H and Youth Development. In stage I, program audits created internal guides for program audits (which later became the basis for program business plan processes conducted by program teams). In stage 2, capacity area leaders worked with specialists and educators to determine whether programs met standards of relevance, niche, sustainability and research-based content. Some programs were sunsetted or their content was folded into other programs. As a result of this process, program teams have been identified, and the number of programs was reduced. Also during this time, program support funds were granted by capacity areas to program leaders to apply to program improvements, including new outreach material, new research, market surveys, curriculum development or staff development. In Stage III, formal program teams were established and developed program business plans.

B. Have there been significant changes in it during 2003-2004?

In 2003-2004, 98% of programs submitted program business plans to their capacity area leaders and the associate dean. Upon completion and favorable review, program dollars were released to undertake the next stage in program improvements. Program improvement dollars were allocated to take programs to the "next step" regarding marketing and outreach, evaluation, curriculum development, research, or other matters.

In addition, program dollars were allocated in 2004 to improved evaluation efforts and to program systems that would improve data tracking, on-line registration and program reporting efforts. This *My Programs* on-line system will "go live" in spring of 2005.

Yearly reviews of programs were also conducted at the local level for the first time in 2004, as counties assessed whether their needs are being met well enough through the regional centers, or whether new local, customized positions can be afforded at the local level. These local reviews are conducted by Extension Committees and are facilitated by regional directors and capacity area staffs. In 2004, counties assessed the effectiveness of programs positively and, as a result, increased their allocation to Extension by 7%. It is important to note, however, that counties discontinued programming when expectations were not met or when they could be addressed adequately by regional centers. This local review process has improved accountability and, thus, quality and quantity of service.

IV. Evaluation of the Success of Multi-state and Joint Activities

A. Did the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Stakeholder input processes developed and implemented over the past three years are intended to assure that programs addressed critical issues of strategic importance; that they were not duplicating existing services, and that they were best addressed utilizing research-based information. As noted in the Executive Summary, new resources from the county and from grants and contracts were leveraged in 2004. This indicates that the alignment of programs to strategic issues is creating quality programming of value to local stakeholders. In addition, ongoing demand and increased productivity demonstrates a concrete understanding among Minnesotans of the critical issues Extension addresses, and our competence in delivering outcomes and impacts.

B. Did the planned programs address the needs of underserved and underrepresented populations in Minnesota?

The chart below summarizes the connection between the work of capacity areas and outreach to non-white Minnesotans, as examples of just one under-represented group served by Extension. In 2002, non-white Minnesotans represented 12.5% of the population. In 2004, they represented 19% of those served by Extension.

Table 14: Numbers of non-white Minnesotans served by University of Minnesota Extension, 2004

Extension Serves Minnesotans of Color

Capacity Area	**2004 # served**	**% of Total**
Agriculture, Food and Environment	1,882	2.5%
Natural Resources and Environment	740	5%
Community Vitality	1,315	9%
Family Development	7,392	30%
FSNEP	11,370	32%
FNEP	3,274	47%
Youth Development	31,741	23%
All Capacity Areas	308,023	19%

A number of programs are targeting low-income, non-white, immigrant, elderly and youth. The chart below is a representative sample of programs:

Table 15: Methods for Targeting Underserved Minnesotans, University of Minnesota Extension, 2004

Targeting Underserved Minnesotans

(Note: These programs also serve non-white Minnesotans.)

Program	Population Targets	Program Adaptations Made
4H Clubs and Adventures	Urban, Immigrant, low-income and communities of color	• Varied outreach and agency partnerships • Program adaptations • Recruitment of staff and volunteers from underserved populations
Educational Programming for Youth on the White Earth Reservation	Native American youth	• Program locations • Inclusion of history and cultural expressions of the Native American culture.
Environmental Science Education	Underrepresented youth, including minorities, learning styles, disability	• Curriculum adaptations to train trainers in teaching
Parent Education	Latino and Somali-speaking parents Low-income parents	• Translation of materials • Curriculum Adaptation • Use of staff and volunteers from cultures served. • Outreach and partnerships • Use of mobile services to bring programming to accessible areas
Financial Literacy	Spanish-speaking Immigrants Low-income families	• Translation of materials • Curriculum adaptation • Outreach and organizational partnerships

C. Did the planned programs describe the expected outcomes and impacts?

As noted in the 2002-2003 report, programs must continue to improve their capacity to specify indicators of expected outcomes and impacts at the state level, and collect evaluative data as evidence. In 2004, program dollars were tied to evaluation planning, and Extension-wide tools were made available, including staff development opportunities and an "end of meeting" evaluation report that works to measure knowledge or skill improvement. In 2004, 73 percent of programs reported new phases of evaluation work being implemented.

In addition, the on-line program tracking tool being developed will provide a place for all program teams to report knowledge, skills and attitude changes post-event, as well as impact statements uncovered over time.

D. Was research integrated into the Extension activities?

As noted in the Executive Summary, the integration of research and Extension is a key element to helping the University of Minnesota accomplish its goal to become "the best in the business" related to outreach and Extension programming. Key to strengthening the research base is to improve program focus. From 2002 through the end of 2004, the number of programs offered by Extension decreased from 208 to 56. In 2004, 98% of the University of Minnesota's Extension programs articulated their research base in program business plans submitted to the associate dean. Program dollars for program improvements were contingent upon these submissions. The 140 regional educators working in centers are highly specialized, and are focusing all of their staff development and professional development dollars on improving their connection to new research and quality improvements for their program work. Partnerships with five colleges fund 118 faculty members and forge a strong link between research and outreach.

Recruitment and hiring is also improving the degree of specialization and research connection. All new educators hired in 2004 had Masters' degrees or Ph.D.s in their area of specialization.

V. Multi-state Extension Activities (See Form CSREES-REPT 2/00)

In tracking multi-state activities program by program, it is clear that Extension programs value relationships with other states. Of programs reporting in 2004, 18% identified cooperative relationships with Minnesota's bordering states of Iowa, Wisconsin, North Dakota and South Dakota, serving each others' residents and distributing educational materials, and 42% of programs reported multi-state activities of any kind, including program cooperation described above, as well as shared curriculum and training opportunities, joint conferences and joint research. These efforts are both documented and non-documented.

At the agency level, Extension utilizes multi-state relationships through participation in the Northeast Leadership Development Program, NASULG activities and purchase of phone answering services from the University of Iowa Extension Service. These relationships are all documented and auditable and, thus, are represented in our multi-state budget description.

VI. Integrated Research and Extension Activities (See Form CSREES REPT 2/00)

As of 2004, all research and Extension activities are articulated and documented for 97% of our programs due to the development of program business plans. Other examples of progress in integrating research and Extension activities are described in the Executive Summary and in the Program Review Process section of this report. Our integrated budget outlines expenditures for programs that are integrated through Hatch funded research projects. All other programs use other funding and collaborations to integrate research into programming.

University of Minnesota Extension Service
2003-2004 Federal Accomplishments and Results Report Financial Data
Sources of Funding and Staff Time Used

GOALS AND PROGRAMS	Reported Themes	Smith Lever	State	County	Grant/ Contract	Hatch/ MRF	Total	Staff FTE
GOAL 1 Program 1 Farming for Tomorrow	*1 Ag Fin. Mgmt 2. Ag Competitiveness 3. Ag. Productity*	$353,923	$931,947	$469,363*	$809,000			33.54
Program 2 Bountiful Horticulture	*1 Ag Com'veness 2. Agricultural Productivity*	$192,537	$402,696	$469,363*	$590,000			16.5
Total		**$546,460**	**$1,334,643**	**$938,726**	**$1,399,000**	**$1,246,175**	**$5,465,004**	**50**
GOAL 2	*Food Safety*	**$225,815**	**$482,148**	---	---	**$35,774**	**$743,737**	**12**
GOAL 3 Total	*Human Health*	**$81,194**	**$94,076**	---	---	**$99,544**	**$274,814**	**3.2**
GOAL 4 Program 1 Env. Safety & Mgmt	*1. Ag Waste Mgmt 2. Pesticide Application*	108,414	212,693	228,874*	699,500			10.09
Program 2 Natural Res. Mgmt & Util	*Soil Quality*	158,306	328,459	230,275 (pgms2-4)	135,150			11.09
Program 3 Environmental Science Ed		129,935	259,112		27,400			9.09
Program 4 Water Res. Mgmt & Policy	*Water Quality*	138,970	307,068		363,000			11.34
Total		**$535,625**	**$1,107,332**	**$459,149**	**$1,225,050**	**$99,544**	**$3,426,700**	**41.6**
GOAL 5 Program 1 Ag Workplace Safety/Health	*Farm Safety*	68,750	39,913		293,500			4.82
Program 2 Youth Dev/4H	*4H / Youth Development*	972,410	2,234,477	3,775,111	4,370,000			132.08
Program 3 Community Economics	*Promoting Business Development*	138,970	253,200	---	48,500			8.09
Program 4 Leadership & Civic Engagement	*Leadership Training and Development*	226,656	416,572	52,992	167,000			14.09
Program 5 Family Resce Mgmt	*Family Resource Management*	247,655	534,240	61,490	35,000			14.09
Program 6 Parent Ed		612,595		92,237	---			12.59
Total		**$2,267,036**	**$3,578,402**	**$3,981,830**	**$4,914,000**	**$116,874**	**14,858,142**	**185.76**
Grand Total		**$3,656,130**	**$6,596,601**	**$5,379,705**	**$7,538,050**	**$1,764,326**	**$1,764,326**	**292.56**

JOINT APPOINTMENTS, 2004

COLLEGE/DEPARTMENT	Research	Extension	Teaching	Total
COAFES				
NWROC - CROOKSTON				
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				
Baidoo,Samuel Kofi	80%	20%	0%	100%
Fritz,Vincent A	70%	30%	0%	100%
Zhu,Jun	80%	20%	0%	100%
BIOSYSTEMS AND AGRICULTURAL ENGINEERING				
Jacobson,Larry Dean	25%	75%	0%	100%
Sands,Gary Robert	35%	65%	0%	100%
Shutske,John M	25%	75%	0%	100%
Wilcke,William F	50%	50%	0%	100%
AGRONOMY AND PLANT GENETICS				
Becker,Roger Lee	25%	75%	0%	100%
Gunsolus,Jeffrey L	30%	70%	0%	100%
Hicks,Dale Ray	8%	92%	0%	100%
Naeve,Seth L	25%	75%	0%	100%
Peterson,Paul Richard	25%	75%	0%	100%
APPLIED ECONOMICS				
Buhr,Brian L	50%	29%	21%	100%
Fruin,Jeremiah E	50%	50%	0%	100%
Hurley,Terrance Michae	40%	50%	10%	100%
Kalambokidis,Laura TJachim	32%	58%	10%	100%
Lazarus,William Frankl	35%	65%	0%	100%
Olson,Kent D	33%	25%	42%	100%
Parliament,Claudia	13%	50%	37%	100%
Stinson,Thomas F	46%	44%	10%	100%
Taff,Steven James	50%	50%	0%	100%
ANIMAL SCIENCE				
DiCostanzo,Alfredo	19%	71%	10%	100%
Endres,Marcia Ines	25%	75%	0%	100%
Linn,James Gary	15%	75%	10%	100%
Noll,Sally	15%	75%	10%	100%

Roeber,Deborah L.	50%	50%	0%	100%
Shurson,Gerald C	5%	30%	65%	100%
ENTOMOLOGY				
Cannon,Colleen Ann	40%	60%	0%	100%
Hutchison,William Dale	66%	34%	0%	100%
Krischik,Vera	35%	65%	0%	100%
Ostlie,Kenneth R	40%	60%	0%	100%
Ragsdale,David Willard	64%	10%	26%	100%
Spivak,Marla S	59%	13%	28%	100%
COAFES - FOOD SCIENCE AND NUTRITION				
Addis,Paul B	40%	15%	45%	100%
Feirtag,Joellen	3%	94%	3%	100%
Schafer III,Henry W	2%	95%	3%	100%
HORTICULTURAL SCIENCE				
Erwin,John E	70%	30%	0%	100%
Hoover,Emily Esther	17%	24%	59%	100%
Horgan,Brian P	40%	60%	0%	100%
Meyer,Mary H	15%	85%	0%	100%
Tong,Cindy Bow San	50%	50%	0%	100%
PLANT PATHOLOGY				
Jones,Roger Kent	20%	80%	0%	100%
SOIL, WATER, & CLIMATE				
Anderson,James L	1%	88%	11%	100%
Lamb,John Alexander	55%	20%	25%	100%
Moncrief,John F	40%	60%	0%	100%
Rehm,George W	18%	79%	3%	100%
Rosen,Carl Jay	30%	70%	0%	100%
Seeley,Mark W	21%	79%	0%	100%
CNR				
FISHERIES AND WILDLIFE				
Blair,Robert B.	20%	65%	15%	100%
Oberhauser,Karen S	35%	35%	30%	100%
FOREST RESOURCES				
Blinn,Charles Robert	25%	70%	5%	100%
CHE				
FAMILY SOCIAL SCIENCE				
Bauer,Jean W	35%	65%	0%	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%
Johnson, Kim Kp	30%	7%	63%	100%
CHE - FOOD SCIENCE AND NUTRITION				
Hassel,Craig Alan	26%	64%	10%	100%
Reicks,Marla M	23%	69%	8%	100%
SOCIAL WORK				
Quam,Jean Kathleen	10%	7%	83%	100%
CVM				
CLINICAL AND POPULATION SCIENCES				
Ames,Trevor R	27%	9%	64%	100%
Dee,Scott Allen	64%	27%	9%	100%
Fetrow,John P	32%	51%	17%	100%
Morrison, Robert B	4%	31%	65%	100%