2010 University of Minnesota Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

This report highlights accomplishments of the University of Minnesota's Agricultural Experiment Station (MAES) and Extension for 2010. The report is organized under 18 programs areas. Five of the programs address NIFA priorities. In Extension, two of these five - sustainable energy and climate change-- are not managed as other program areas but rather as interdisciplinary issue teams. In MAES the research reported under all of the programs, including the NIFA priorities, describe research conducted within the five colleges that receive MAES funding. In many cases the research is interdisciplinary and integrated with Extension outreach efforts.

Though this is a joint program report of Extension and the Experiment Station, several programs do not have designated joint appointments between the two entities. In this circumstance, the research base of program content is driven by sources funded with other federal, state or private funding.

MAES Summary of Activities:

Due to continued economic stress, tumultuous weather events, and increasing need to make do with less, it was a challenging year for MAES research, as it was for Minnesota agricultural producers, natural resource managers, and all Minnesotans. The Minnesota Legislature cut funding to the University's Agriculture State Special 12.7 percent in 2010, which also resulted in an equal cut in funding for the Rapid Agricultural Response Fund and the Small Grains Initiative, two state research funds that MAES manages.

MAES responded to these challenges by working with stakeholders to communicate the benefits and impacts of its research, and by working on strategies to maximize efficiencies and encourage inter-disciplinary high quality research.

UMN Extension: Summary of 2010 Activities

Service Levels. Extension's network of educators and researchers address the most pressing issues facing Minnesota in environment, food and agriculture, communities, families and youth. In 2010, U of M Extension program teams report education provided to over 700,000 Minnesotans. This includes federal and state funded programs, nutrition education (EFNP and FSNP) programs and Farmer Lender Mediation. The dean of Extension has identified a priority to use technology to expand Extension's reach for several years, and so each program team at Extension is utilizing the Internet as a means of public education through new sites, social media or on-line education. The University of Minnesota Extension Web Site received more than thirteen million visits in 2010. Google's criterion places UMN Extension's web site just under NIFA sites with a search for "Extension Service".

Outreach to Underserved Populations: The Minnesota State Demographer's Office estimates Minnesota's non-white population to be 11.4 percent (2009, U.S. Census Bureau). However, minorities were at or greater than 11 percent of program participants for five of our planned programs.

1. Childhood Obesity (32%)
2. Family Resource Management (29%)

3. Family Relations (28.5%)
4. Youth Work Institute (16%)
5. 4-H: Eleven (11) percent of youth reported non-caucasion and non-Hispanic or Latino races; and 8% reported as Hispanic or Latino. There are duplications in this count. Promise Fellow and Urban 4-H programs, which target underserved populations, report 44% and 54% minority participation, respectively.
6. Other programs targeting underserved audiences successfully include Environmental Science Education (10%), Leadership and Civic Engagement (9%).

Multi-State Engagement. All of U of M Extension's planned programs are engaged in formal or informal involvement with other states. Among our standout efforts are the following: The Youth Work Institute provides on-line training that is instilling research-based quality practices into youth programs across the multi-state region. Crops and livestock programs are collaborating with regional and national teams. Joint staff positions with North Dakota and Wisconsin provide seamless support on issues of agriculture and the environment. The Leadership and Civic Engagement team is now the designer and host of the North Central Extension Leadership Development program. The U of M Extension's Distribution Center delivered 108,500 educational materials to all 50 states, four territories and 16 foreign countries. To create regional efficiencies, a contract with Iowa State Extension provides cost-effective phone service that provided to consultation to 5,825 Minnesotans in 2010.

Other performance measures, including integrated service: U of M Extension programs provide integration and performance measures in a number of ways:

- All demonstrate a research connection in teams and through program business plans.
- Regional offices offer 135 highly specialized Extension educators who deliver the programs described in this report. In county offices, 36 educators work with 235 program coordinators to deliver these programs.
- Since 2008, an academic promotion process has been in place to monitor and reward regional educator performance. In 2010, eight educators were promoted after rigorous peer review of their scholarship, teaching and program leadership. Eleven educators started the process for 2011 promotion. As described in "Merit Review Processes", a new promotion policy was put in place in 2010 for county educators.
- Partnerships with five colleges fund 87 faculty members (51.4 FTE) in academic departments.
- Of the 2010 new hires for Extension educator positions, 67percent had Masters or Ph.D.s.
- Despite significant decreases to local aid by the State of Minnesota, there was still good news about county investment in Extension programs in 2010. County investment was reduced by only 2.07 percent in 2010, (The 2009 decrease was 4.98 percent.) and 47 percent of counties actually increased their investment. Forty percent decreased and 13 percent kept their investment the same. The average decrease in investment was 5.7 percent, while the average increase was 10.2 percent. Extension and local government will continue to collaborate to target service delivery for optimum benefit in 2011, but we believe 2010 investments were an endorsement for the public value of Extension.
- Program fees, grants and gifts accounted for 23 percent of Extension's annual budget in 2010. Earned income to Extension rose by 34 percent. Grants revenue increased 18 percent. Gifts to Extension rose by 281 percent, owing to a generous endowment gift to 4-H programs. These increases are the result of the U of M Extension's extensive efforts to diversify revenue resources, though Smith-Lever funds are still essential to our ability to accomplish our mission.
- Extension programs mobilized over 16,268 volunteers to leverage 1,201,061 hours of service in 2010. The total value of this service, including 4-H contributions of personal travel and per diem, is $23,250,757.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	326.2	0.0	462.0	0.0
Actual	317.2	0.0	486.4	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

For MAES, the merit review process for researchers is managed through the five collegiate partners that receive MAES funding. These are the Colleges of Food, Agricultural and Natural Resource Sciences, Veterinary Medicine, Biological Sciences, Education and Human Development, and Design. The deans and associate deans for research of these colleges are members of the MAES Executive Council. The merit review process is governed by University of Minnestoa standards for all faculty. Within those standards, MAES partner colleges establish their own research peer review process managed by department heads and reviewed for applroval by the associated deans for research of each of the colleges.

In 2010, U of M Extension continued to engage its academic promotion process for educators with academic rank. These educators work in regional offices. Eight faculty members advanced in rank after a rigorous peer review process. After examining applicability of academic promotion for local educators, Extension implemented a new system for educators who do not hold academic rank. (These are typically county educators.) Salary reviews and raises are contingent on promotion for those without academic rank. However, unlike those with academic rank, local educators who do not achieve promotion are not terminated when promotion is not achieved. To facilitate a successful merit review process, program leaders continue tto provide training and support to educators as they begin the promotion process.

Promotion of U of M Extension faculty is neither automatic nor routine, and the decision is made without regard to race, color, creed, national origin, sex, age, marital status, disability, public assistance status, veteran status or sexual orientation. The process does not result in tenure. Every Extension Assistant Professor with academic rank is expected to apply for and receive promotion to the rank of Associate Extension Professor within six years of employment. Promotion for both regional and local educators is based on six criteria, consistent with the following organizational values.

1. Program Leadership: Extension educators will help to envision, organize and lead educational programs that address priority interests of citizens.
2. Extension Teaching: Extension teaching will bring relevant content to a current issue.
3. Scholarship: Creative intellectual work will contribute to knowledge in the discipline, have impact, be communicated and valued, and is reviewed by peers.
4. Engagement: Extension staff will connect with communities and stakeholders to better understand their needs, use their resources and build their capacity.
5. Program Management: Extension programs will be "done right" through planning, organization, staffing, implementation and evaluation.
6. Service: The University and the profession will benefit from staff contributions.

External and internal input during this process is provided by:

1. Internal peers or near peers in UMN Extension who comment upon the candidate's performance;
2. External peers or near peers within Extension or the educator's field of interest who comment upon the candidate's promotion portfolio in writing;
3. Promotion Committee members from within the organization who are recommended by the candidate and are ultimately chosen by the associate dean. The Promotion Committee makes a recommendation to an Associate Dean, who makes a recommendation to the Dean. The Dean ultimately decides upon the candidate's promotion.

III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals

Brief explanation.

In MAES

The research that MAES supports is defined by the five colleges that receive MAES funding. Those decisions are guided by stakeholders' input gathered through each college's research advisory committees. Feedback is also gathered from stakeholder groups on specific research areas. For example, in 2010, under the organization ofthe Collge of Food, Agricultural and Natural Resource Sciences, more than 70 individuals and groups participated in round table discussions concerning the direction of undergraduate education and research.

Besides the formal processes in place to identify stakeholders and gather input, there are other strategies in place to elicit input for research decisions, including the requirements for stakeholder input into each proposal for Rapid Agricultural Reponse research project funding, and Small Grains Initiative research project funds. Both those funds are managed by MAES. Other research-related committees bring stakeholders to the table for input and decision-making, such as the Agronomic and Horticultural Variety Review Committee and the Plant Licensing Task Force, which, under the leadership of the MAES director, serve the colleges on intellectual property issues.

In Extension:

1. Local advisory committees are convened, as mandated by state statute, in each county. A statewide advisory committee is convened to scan statewide and multi-disciplinary interests. A dean's designee serves on the University of Minnesota's Public Engagement initiative in order to better engage Extension as a vehicle for University outreach to communities. (www.extension.umn.edu/About/citizens.html)
2. Program business plans include outreach strategies to key audiences. Often, organizations are invited to partner with Extension to sponsor program events. Programs often convene advisery councils.
3. Extension educators involved in the American Indian task force engaged with tribal leaders and targeted audiences within Minnesota's American Indian tribes to cope with specific problems and opportunities of relevance.
4. Five groups were selected to participate in the Blue Ribbon Listening Sessions:

- The Citizen's Advisory Committee
- The Association of Minnesota Counties' Extension Committee
- Extension's Faculty Consultative Committee
- Extension's Civil Service Consultative Committee
- The Minnesota Association of Extension Educators

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Needs Assessments
- Use Surveys

Brief explanation.

In MAES

Developing strong and supportive relationships with agricultural stakeholders is an important priority and the focusin of ongoing work for MAES. The critical nature of this effort was especially clear in 2010 with continuing economic pressures on the University budget. MAES maintains good relationships with agricultural groups such as the Minnesota Corn Growers and Minnesota Soybean Producers, the Minnesota Pork Producers and the Minnesota Dairy Association, as well as other agricultural organizations such as the Minnesota Organic Farmers Association. Specific stakeholder groups were identified to help define the needs of Minnesota's biofuels and renewable energy industry, for example. Other research priorities, including best management of the physical resources of the Research and Outreach Centers, required identification of local and regional stakeholders.

In Extension:

1. Regional directors identify committee members through their relationships with county Extension committees as well as locally elected County Commissioners, and through recommendations from regional and local educators. The dean, associate deans and government relations staff scan statewide stakeholders to consider representation of key liaisons on statewide

advisory committees.

2. Program leaders identify stakeholders by being involved with local, state and national initiatives and through outreach to target audiences. Organizations and individuals identified by programs to sponsor or partner programs are those who benefit when Extension is successful in achieving its goals.

3. Tribal groups were selected because of their interest in in environmental concerns, as well as local foods, nutritional problems due to isolation from fresh fruits and vegetables, economic development concerns, and poor testing in the arenas of science and math.

4. Five groups were selected to participate in the Blue Ribbon Listening Sessions:

- The Citizen's Advisory Committee
- The Association of Minnesota Counties' Extension Committee
- Extension's Faculty Consultative Committee
- Extension's Civil Service Consultative Committee
- The Minnesota Association of Extension Educators

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

1. Local Extension advisory committees are engaged in regular meetings and one-on-one contact to collect input.

2. Program teams collect input as they observe audience demand for service, engage in collaborative relationships to develop program delivery, and systematically utilize evaluation methods to solicit input on issues of importance to program design and delivery.

3. The American Indian Task Force engages tribal groups of interest and leaders in grants development, project development and listening sessions to discern how cultural differences and capacity issues should change Extension's approach to staffing, program design and delivery.

4. The Blue Ribbon Committee designed facilitated group meeting sessions as well as surveys to collect input.

3. A statement of how the input will be considered

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

- In the Action Plans
- To Set Priorities

Brief explanation.

For Extension:

1. Input from local and state advisory committees are used to guide Extension's budget decisions, and to shape messages for policy makers and the general public.
2. Input from program sponsors, advisers and audiences is used to update curriculum content, customize programming, and refresh programs with new research about current issues.
3. Input from Native American tribes is used to change programming for culture relevance, introduce helpful programming to tribal audiences, and start multi-disciplinary initiatives that address current concerns.
4. Input from the Blue Ribbon Advisory forums will be used for strategic planning.

For MAES:

Stakeholders are concerned about declining dollars for research and education, particularly around disease prevention and food safety. Business leaders are counting on the University to prepare the future workforce. This is a recurring theme among stakeholders. Stakeholders in agriculture are concerned about continuing funding for valued MAES research programs. They expressed their concerns to State Legislators, however, due to pressure on state finances, the University budget was cut and MAES research took it's share of that cut.

Brief Explanation of what you learned from your Stakeholders

1. From local and state advisory committees, we learned about programming that is perceived to have great public value. Input from these committees was used in the decision to keep program fees flat for counties in the coming fiscal year.
2. Program sponsors provide valuable information to programs regarding sponsorship price points. They also alert programs when competing resources are providing educational programming. They provide positive and negative feedback about perceptions of a program's public value. They describe user experiences with programs that are not addressing relevance or usability.
3. Native American tribes are informing Extension about needed cultural adaptations for Extension programming. They bring to light when Extension is communicating with euro-centric values. They describe which issues are most important to their communities.
4. The Bue Ribbon Committee forums were completed in 2011. Information about feedback will be reported next year.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
8747881	0	5670246	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	8318447	0	4712714	0
Actual Matching	26112546	0	38075819	0
Actual All Other	27394743	0	42556201	0
Total Actual Expended	61825736	0	85344734	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger - Livestock

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	5%		10%	
304	Animal Genome	0%		5%	
305	Animal Physiological Processes	5%		10%	
306	Environmental Stress in Animals	20%		5%	
307	Animal Management Systems	30%		30%	
311	Animal Diseases	20%		25%	
315	Animal Welfare/Well-Being and Protection	10%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	16.3	0.0	49.8	0.0
Actual	10.2	0.0	58.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
561950	0	1148154	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1751698	0	8163836	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
493207	0	4712203	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES research continued to support Minnesota's livestock producers with research on animal genomics, animal health and disease prevention, improved feed and nutrition, animal welfare and environmental issues related to animal production systems. MAES livestock research is conducted with strong regional collaboration, and local partnerships between the U of M and animal producers and agricultural industry. Some examples of 2010 progress in research include:

- Research showed that using a new management system called Statistical Process Control for early detection of mastitis in dairy cows proved to be more sensitive and give fewer false-positive alerts than the disease detection system currently used on the farm.
- In 2010, 950 2-to-4 day-old heifer calves from 3 commercial dairy farms were custom raised at the U of M Southern Research and Outreach Center. Information about their growth and health was added to a data base of over 5,000 calves, which was developed over the past five and a half years to provide farmers with information about the relationships between lactation performance, nutrition management, growth and health from birth to six months.
- A collaborative project to sequence the turkey genome, which originally involved U of M, Virginia Tech and Michigan State University animal geneticists, was expanded by joining forces with researchers at the USDA's ARS and the University of Maryland. As a result the genome is now 90% sequenced at several-fold higher coverage than anticipated.
- Research on forages for livestock use has shown that alfalfa/orchardgrass produced the most milk per acre in one study area, while alfalfa/meadow fescue produced the most milk per acre in another. Project results have created greater awareness of the forage potential, value and differences among perennial cool-season grasses in Minnesota and the North Central region. Dairy producers appear to be using more grasses as a result.
- Ongoing research on PRRS virus in swine has increased the scientific knowledge of PRRS and methods to control and eliminate it. Because of this knowledge veterinarians and producers have changed behaviors and actions to implement new measures of biosecurity that include air filtration.
- In other swine disease research, this year researchers developed a new method for Brachyspira species identification.
- Final reports were completed on long-term research on systems for controlling air pollutant emissions and indoor environments of poultry, swine and dairy facilities. Results were forwarded to the EPA to inform regulatory guidelines for the animal production industry.

The Extension Livestock team is working through research, education and collaboration to sustain and improve the quality of dairy and other livestock economies. Two efforts distinguish the team's work this year. 1) The Quality Count$ initiative continues to successfully lower somatic cell counts across Minnesota. In 2010, an even greater premium was placed on this effort when the European Union proposed a mandate that each dairy farm maintain cell counts under 400,000. Though this change is still being negotiated with the USDA, Minnesota's farmers are assertively seeking ways to bring their farms in line with the mandate, assuming future enforcement and even similar mandates in American markets. 2) The FARM and Pork Quality Assurance projects are working to proactively assure customers of major retail stores that meat coming from Minnesota's farms treat livestock well. This is a national initiative, but as the third largest livestock producer in the United States, Minnesota has been very involved in these projects, which use scientific indices and education to develop and monitor quality standards for animal care.

Reviewers may note that the difference between projected FTEs and actual FTEs are significant related to this planned program. However, the 2010 actual FTEs are consistent with 2009 actuals. Projections were based on assumptions that have changed.

2. Brief description of the target audience

The Livestock team at the University of Minnesota Extension serves Minnesota's producers of dairy, pork, and beef, as well as veterinarians, consumers and the Minnesota feed industry. MAES research is used by the same audiences. MAES target audiences also include other animal research scientists, other scientists in genetics, public health, medicine and agriculture in Minnesota, the U.S. and internationally, public policy makers at the state and local levels, Extension educators and industry professionals including private consultants.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	36543	64000	1514	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	34	77	111

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Through demonstration projects, provide ideas and solutions to producers on such topics as milk house waste, manure rate application on fields, and on-farm demonstrations of forage topics such as alfalfa brown root rot variety screening, and alfalfa fall cutting. (Target expressed as number of demonstration projects.)
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Provide workshops, training sessions, schools, and other processor specific events. (Target expressed as number of events.)

Year	Actual
2010	276

Output #3

Output Measure

- The Quality Count$ initiative will sustain its cooperative partnerships with regulatory, association and production groups that assist in addressing the issue of somatic cell count. (Target expressed as the minimum number of groups involved.)

Year	Actual
2010	28

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Through the Quality Count$ program, the average bulk tank somatic cell count in Minnesota dairy operations will be maintained at a low level, and move downward over time through changed attitudes and improved consistency of dairy producers. (Target expressed as the somatic cell count under which Minnesota's dairy industry will stay.)
2	Participants of the Livestock program workshops/classes and conferences will achieve significant learning gains regarding research-based livestock knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Livestock program workshops/classes and conferences.)
3	Participants of the Livestock program workshops/classes and conference sessions intended to improve participant livestock practices will significantly improve their livestock practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their livestock practices as a result of attending workshops/classes and conference sessions intended to improve participant livestock practices.)
4	Research will provide animal producers with information to manage the health and diet of their animals.
5	Research on animal breeding will provide animal producers information to manage their herds for health and productivity.
6	Research will provide information to animal producers on animal health, comfort and welfare.
7	Laboratory research will provide necessary information to understand muscle growth in meat animals.

Outcome #1

1. Outcome Measures

Through the Quality Count$ program, the average bulk tank somatic cell count in Minnesota dairy operations will be maintained at a low level, and move downward over time through changed attitudes and improved consistency of dairy producers. (Target expressed as the somatic cell count under which Minnesota's dairy industry will stay.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	250000	290000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In January of 2010, the European Union imposed new quality milk standards, shifting the requirements for low somatic cell counts to individual farms. Previously, entire stores of milk needed to be lower than 400,000, though individual farm supplies could be higher than that. The new standards would require each dairy producer to prove somatic cell counts lower than 400,000.

What has been done
The Livestock team delivered private consultation to farms to change methods of production and livestock care that are known to lower somatic cell counts. Research continues to delineate best practices that improve milk quality. There is a windfall of demand for programs and consultation among farmers who want to proactively maintain their markets in the EU and the U.S.

Results
In 2005, average somatic cell counts were well over 400,000. In 2009, collaborative efforts to lower cell counts had reduced the average to 297,188. In 2010, the count lowered again to 290,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
306	Environmental Stress in Animals

307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #2

1. Outcome Measures

Participants of the Livestock program workshops/classes and conferences will achieve significant learning gains regarding research-based livestock knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Livestock program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As the third largest livestock producer in the United States, Minnesota is highly invested in maintaining and strengthening supply and demand for beef and dairy products.

What has been done
Educational offerings cover timely topics in the industry, and address current trends and problems.

Results
Those who used pre-post retrospective workshop evaluations reported that 91 percent achieved significant learning gains in livestock workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems

311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Participants of the Livestock program workshops/classes and conference sessions intended to improve participant livestock practices will significantly improve their livestock practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their livestock practices as a result of attending workshops/classes and conference sessions intended to improve participant livestock practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	66	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Pork Quality Assurance Plus program (PQA+) developed by the National Pork Board is designed to improve the quality of pork and the viability of markets that are sensitive to animal well-being. Certification assures consumers that meat was produced on farms where animals are humanely treated. U of M Extension educator was certified to be one of 60 trainers nationwide that could train other industry professionals to be PQA+ Advisers. After three years, advisers must compete a re-certification course.

What has been done
To satisfy re-certification training needs, University of Minnesota Extension faculty developed an on-line training module for existing PQA+ Advisers. It provided a convenient format that advisers could use to be certified on their own schedule and without distance travel.

Results
In 2010, U of M Extension faculty re-certified fifty advisers from eight states in five different on-line offerings. As a result of this effort, pork producers in the upper Midwest region can maintain PQA+ certification and help to maintain market access for the pigs they produce while improving the welfare of pigs and enhancing the quality of pork.

4. Associated Knowledge Areas

KA Code	Knowledge Area

302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

Research will provide animal producers with information to manage the health and diet of their animals.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Errors in prepartum and postpartum feeding can predispose cows to metabolic disorders resulting in economically significant reductions in cow performance that can reduce the profitability and sustainability of dairy farms.

What has been done
Researchers studied pariparturient dairy cows to determine the best diet

Results
The research revealed that 1) Diets containing 30 percent chopped wheat straw or 30 percent chopped orchard grass hay fed during the periparturient period resulted in similar minimal incidences of metabolic diseases and milk production. 2) Grass hay diets were the more economical at 40 cents less per cow per day than straw containing diets. The results were delivered to dairy producers at seminars and meetings in Minnesota and the Upper Midwest.

4. Associated Knowledge Areas

KA Code	Knowledge Area

302	Nutrient Utilization in Animals
311	Animal Diseases

Outcome #5

1. Outcome Measures

Research on animal breeding will provide animal producers information to manage their herds for health and productivity.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Losses from poor fertility, health disorders and short herd life of dairy cows are the most-mentioned disappointments of dairy producers around the world at this time. In recent history, the vast majority of dairy cattle are from only the Holstein breed.

What has been done
Hybrid vigor has been used successfully by all other livestock species to improve reproductive capability, health and survival for commercial production. Previous MAES research on this topic has shown the advantage of crossbreeding for dairy cows. In 2010 part of this research included a field study with seven cooperating dairies in California.

Results
The research showed that Scandinavian Red x Holstein crossbreds and Montbeliarde x Hostien crossbreds had large advantages for all traits related to functionality, including fertility and survival. Lifetime profit was 45 percent higher for Scnadinavian Red x Holstein crossbreds compared to pure Holsteins and was 50 percent higher for Montbeliarde x Holstein crossbreds compared to pure Holsteins. Many dairy producers domestically and internationally have initiated crossbreeding programs in their dairy herds based on the scientific recommendations from results of this research project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

302 Nutrient Utilization in Animals
307 Animal Management Systems

Outcome #6

1. Outcome Measures

Research will provide information to animal producers on animal health, comfort and welfare.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Improvement of dairy cow well-being is important from an economic and public perception perspective. Public perception of the animal welfare related to swine housing has led to some confinement housing systems being banned in several states.

What has been done
Research on alternative bedding materials for compost bedded pack barns completed in 2010 was the first conducted in the upper Midwest on the best practices for handling recycled manure solids as bedding. Research on management strategies to improve performance and welfare of swine in loose housing systems also provided useful information to producers.

Results
Using a compost barn system, many dairy producers saw a substantial improvement in feet and leg health and longevity of their cattle. Research revealed that piglet mortality in loose farrowing systems can be reduced by increasing the proportion of young sows in the herd, and selecting sows against minimal birth weight in the loose farrowing system. Related research showed that pigs originating from group farrowing systems were more tolerant of unfamiliar pigs at mixing, compared to pigs from conventional farrowing systems. The tolerance in these pigs can alleviate mixing-induced stress, and consequently, improve well-being and performance during the growing and finishing period.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
306	Environmental Stress in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #7

1. Outcome Measures

Laboratory research will provide necessary information to understand muscle growth in meat animals.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The retail value of the U.S. beef industry is estimated to be well over $75 billion, and the economic impact of anabolic agents in the industry is in the billions of dollars. Until now, the research community has been unable to consistently demonstrate a stimulatory effect of anabolic steroids on proliferation of myogenic cells or on myotube protein synthesis and degradation.

What has been done
MAES researchers have developed primary bovine and porcine culture conditions that enable them to measure these effects--the first time this has been accomplished.

Results
The findings further the understanding of the molecular and cellular mechanisms of steroid-enhanced muscle growth. Because the impact of anabolic steroid usage in the beef industry is so significant, understanding the biological mechanisms underlying muscle growth provide the foundation for the development of alternatives to steroid use and future tools to enhance muscle growth in meat animals.

4. Associated Knowledge Areas

KA Code	Knowledge Area

305 Animal Physiological Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger - Crops

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		20%	
204	Plant Product Quality and Utility (Preharvest)	20%		20%	
205	Plant Management Systems	30%		20%	
206	Basic Plant Biology	10%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Pathogens and Nematodes Affecting Plants	10%		10%	
213	Weeds Affecting Plants	10%		5%	
216	Integrated Pest Management Systems	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	21.5	0.0	140.7	0.0
Actual	9.8	0.0	107.7	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
547988	0	874843	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1669298	0	8788491	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
565992	0	9682775	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES:

In 2010 MAES invested in research to: develop disease resistance in crops and improve the nutrient quality of food; and develop information so that crop producers could manage crop disease and invasive insects. Many promising research avenues received continued emphasis such as precision agriculture. Both research and outreach has supported new agricultural niche markets, responses to new consumer preferences and created opportunities for local and organic foods. Here are some examples of MAES crop research results in 2010:

Integrated pest management research and Extension education have resulted in new recommendations for methods to manage soybean aphid infestations. The pest control tactics could save U.S. soybean growers $1.3 billion over the next 15 years.

The U of M is the only land-grant university with an insect quarantine facility and a plant pathogen quarantine facility. With these tools, researchers are finding beneficial insects to control soybean aphids, buckthorn, and garlic mustard, and monitoring threats such as Ug99 wheat stem rust, Asian soybean rust and sudden oak death.

MAES funded the development of many crop varieties over the years. In 2010, nine new soybean varieties developing with the support of MAES were released. Minnesota now has produced speciality soybean varieties of importance to Asian markets, and Minnesota is nownumber one in organic soybean production, with 20 percent of the market.

Extension:

Farmers have little or no control over two big factors that determine their profitability--weather and market prices. In 2010, early spring frost and September floods in southern Minnesota were followed by ideal harvest weather in October. Grain markets were erratic with global crop conditions driving markets and increasing the importance of every bushel harvested.

These rapid changes prompted the EFANS Crop Team to be proactive in reminding famers of the importance of taking control of farm business decisions that they can influence - input costs, outcomes from inputs and research-based management decisions about inputs. To respond, the team began development of a communications strategy using the message "Take Control" to position research-based information that can help growers with input decisions. One outreach vehicle for the "Take Control" campaign is a Crop News Blog (http://blog.lib.umn.edu/efans/cropnews/) that provides posts on timely information for subscribers. In 2010, 68 blog posts covered inputs topics such as:

• Picking the right combination of herbicides that can have an impact on yield and the emergence of resistant weeds
• Choosing the right strategy to manage diseases and pests;
• Assessing crop rotations and soil sampling to make fertilizer purchase decisions that influence yield, profits and environmental impact.

The Crop News Blog also alerts subscribers to crop-related educational programs targeted to farmers and Ag Professionals that advise them. Educational programming on best management practices in crop production and pest management are conducted annually in winter months at the State, Regional and Local levels. Programming at the State level this year included the Crop Pest Management Short Course held in Minneapolis, hosting 1100 agricultural professionals for a 3-day event. The Conservation Tillage Conference hosted 120 farmers and crop advisors and focused solely on reduced tillage and the ensuing savings of soil, fuel, time and money. At the regional level there were Forage Days and Ag Professional Update workshops. The Ag Professional Update series was held in six locations across Minnesota in 2010. There were 476 attendees who influence crop input decisions on approximately one-third of Minnesota's 15 million acres of corn, soybean and wheat. In the summer in-field, hands-on, clinics were held to address new diseases such as tan spot in wheat, sudden death syndrome in soybean and in-field diagnostic skills.

Reviewers may note that the difference between projected FTEs and actual FTEs are significant related to this planned program. However, the 2010 actual FTEs are consistent with 2009 actuals. Projections were based on assumptions that have changed.

2. Brief description of the target audience

A wide variety of audiences use the results of Extension and MAES research including local, regional, national and international agricultural producers, industry, governments and policy makers. Another major sector of the target audience for MAES research includes other researchers, including crop breeders, plant geneticists, entomologists, ecologists, economists, plant pathologists, soil specialists and others. Another important target audience includes agricultural professionals, Extension educators and consumers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12652	51000	1477	0

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

Year: 2010
Actual: 9

Patents listed
20100227 Soybean Line MN0210SP (M02-349053)
20100228 Soybean Line MN1413CN (M02-385041)
20100229 Soybean Line MN0907 (M01-278013)
20100230 Soybean Line MN0209SP (MN02-349008)
20100231 Soybean Line MN1013 (MN01-242025)
20100232 Soybean Line MN0309RR (M01-321123)
20100233 Soybean Line MN0605SP (M00-440060)
2010-234 Soybean Line MN09808CN (M01-314012)
20100236 Soybean Line MN0506RRCN(M01-320141)

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	99	99

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conduct regional and local events to provide producers with latest applied research for improved crop management. (Target expressed as number of events)

Year	Actual
2010	518

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Crops program workshops/classes and conferences will achieve significant learning gains regarding research-based crops knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Crops program workshops/classes and conferences.)
2	Participants of Crops workshops/classes and conference sessions intended to improve participant crops practices will significantly improve their crops practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their crops practices as a result of attending workshops/classes and conference sessions intended to improve participant crop practices.)
3	New crop varieties will expand Minnesota's agricultural markets and support global food security.
4	Research will provide new information and develop strategies to support crop health.

Outcome #1

1. Outcome Measures

Participants of the Crops program workshops/classes and conferences will achieve significant learning gains regarding research-based crops knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Crops program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	82	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Crop producers rely on ag professionals to help them manage crops efficiently, with an increasing focus on environmental stewardship. Because of the increased emphasis that the agri-chemical and seed technology industries place on education of personnel, Extension designs and delivers intensive educational offerings to agricultural professionals to inform them of current research on production techniques. This ensures that more responsible and successful cropping decisions are made throughout the state.

What has been done
Six programs for Agricultural Professionals were conducted in Minnesota in 2010, serving almost 500 ag professionals. The Institute offers the Crop Pest Management Short Course (2 days of seminar-based programs held in November), the Ag Professional Research Update (several half day sessions in January in different regions of the state), and the Field School for Ag Professionals (2 day hands-on learning school in July).

Results
When agricultural professionals were asked about the number of clients and acres they had contact with, they indicated that they had an average 57 clients with a total of 47,626 acres. Thus, the 2010 Research Update for Ag Professionals had an impact on 5.45 million acres across the state and surrounding regions. This educational programming impacts more than three times the number of acres impacted by the 2008 course.

4. Associated Knowledge Areas

KA Code	Knowledge Area

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

Participants of Crops workshops/classes and conference sessions intended to improve participant crops practices will significantly improve their crops practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their crops practices as a result of attending workshops/classes and conference sessions intended to improve participant crop practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	52	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Crop producers rely on agricultural professionals to help them manage crops efficiently, with an increasing focus on environmental stewardship. Because of the increased emphasis that the agri-chemical and seed technology industries place on education of personnel, Extension designs and delivers intensive educational offerings to agricultural professionals to inform them of current research on production techniques. This ensures more responsible and successful cropping decisions are made throughout the state.

What has been done
Six programs for Agricultural Professionals were conducted in Minnesota in 2010, serving almost 500 ag professionals. The Institute offers the Crop Pest Management Short Course (2 days of seminar-based programs held in November), the Ag Professional Research Update (several half day sessions in January in different regions of the state), and the Field School for Ag Professionals (2 day hands-on learning school in July).

Results
In post-session evaluations, participants were asked to rate their knowledge before the session and how much they know after. While learning gains were positive for all offerings, most significant learning gains were gained regarding: 1) charcoal rot of soybeans; 2) Goss's leaf blight and wilt of corn, and 3) new nitrogen guidelines for spring wheat. The strongest intentions to change behaviors were related to adopting new nitrogen recommendations for hard red spring wheat.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

New crop varieties will expand Minnesota's agricultural markets and support global food security.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Asian countries, including China, are potentially a large growing consumer base for U.S. agricultural commodities, if crop varieties produce a product that meets their needs.

What has been done
MAES-supported research in soybean variety development has resulted in several new specialty

soybean varieties that are used for soymilk, tofu, miso, and other soybean food products.

Results
One result was a U.S. visit of a delegation consisting of representatives from China's 10 largest soybean crushers, who signed 10 contracts to purchase soybeans. The agreements included purchases of 110 million bushels of soybeans, roughly seven times the average U.S. weekly soybean export sales number. The soybean contracts were worth $1.8 billion, or about $16 per bushel. U of M agronomists also survey the quality of the U.S. soybean crop each year and summarize their results in a report entiteld "Quality of the U.S. Soybean Crop." U of M soybean breeders traveled to China, Japan, Korea and Taiwan in 2010 to present the data to soybean buyers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)

Outcome #4

1. Outcome Measures

Research will provide new information and develop strategies to support crop health.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Early and efficient identification of crop disease during the growing season is critical both to support the crop and for optimum and economical timing of insecticide application.

What has been done
Research projects investigated the use of remotely sensed imagery to assess soybean aphid population densities in soybean fields, and to discover if use of the same technology could be useful in identifying sugarbeet plants infected with Rhizoctonia. The soil borne fungus that

causes Rhizoctonia crown root rot may make sugarbeet more susceptible to soil insects.

Results
Research results indicated the technology can be used effectively, and is expected to reduce the overall insecticide applied to control sugarbeet insects, improve the scouting efficiency, economics and adoption of scouting for soybean aphids, decrease environmental impacts of insecticide application, and improve insect control. The results were demonstrated to sugarbeet prducers and soyben producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%		20%	
701	Nutrient Composition of Food	0%		50%	
703	Nutrition Education and Behavior	90%		20%	
704	Nutrition and Hunger in the Population	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	11.7	0.0	19.2	0.0
Actual	8.0	0.0	31.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
231633	0	317594	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1169015	0	1780442	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3587369	0	2341692	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

As children's health is supported within the context of a healthy family, MAES continued to support research into the nutritional benefits of foods on human health. Examples of research results in 2010:

• Research determined the best combination of pre-treating wheat bran to increase its soluble fiber while preserving the maximum total dietary fiber content in the bran. Laboratory research results have shown the potential of processed wheat bran to reduce cholesterol by preventing re-absorption of bile acids during digestion.
• Continuing research on nutritional needs of patients who have undergone gastric bypass surgery focused this year on Vitamin D status changes after surgery. The findings have implications for the long-term health of individuals undergoing the surgery, as quality of life is significantly impacted by bone disease caused by vitamin D deficiency. The research findings were disseminated to national audiences of health care practitioners.
• Studies on the health benefits of soy protein identified the protein with pronounced bioactivity. Researchers succeeded in modifying the protein to enhance its potential wider use such as in beverages.
• Results of dietary fiber studies produced the recommendation to consume a wide range of mixed fibers to get maximum benefit, as research has shown that all fibers are different.

2. Brief description of the target audience

Extension nutrition education programs reach families and individuals who qualify to participate under federal eligibility standards. In addition, Childhood Obesity programs are reaching into communities and schools to encourage, support and inform community approaches to healthful eating.

MAES research in childhood obesity and human health is addressed to human health and nutrition professionals, the food industry, students and faculty in health and nutrition, applied economics, and family development, state and local policy makers and governments, directors of school lunch programs, the food and food service industries, and consumers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	26001	310507	50148	93152

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

Year: 2010
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	5	34	39

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes will be provided in individual and group settings that teach about diet quality, food safety, food resource management and food security. (Target expressed as number of workshops/classes taught.)

Year	Actual
2010	4306

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	An increased number of individuals will use research-based information from Extension to improve their intake of healthful foods. (Target expressed as percentage of participants who self-report change.)
2	Program participants will increase human nutrition knowledge. (Target expressed as percentage of participants who report knowledge change.)
3	Program participants will increase their skills in selecting and buying food that satisfies nutritional needs, managing food budgets and preparing affordable foods within the food groups. (Target expressed as percentage of participants who reported learning these skills.)
4	Research will provide information to support childrens' increased intake of healthy foods.
5	Research will produce information to support childrens' consumption of calcium rich foods.
6	Research will provide information on cross-cultural engagement for healthy food choices.

Outcome #1

1. Outcome Measures

An increased number of individuals will use research-based information from Extension to improve their intake of healthful foods. (Target expressed as percentage of participants who self-report change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	69

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Childhood obesity and its negative effects threaten low-income families disproportionately because of the cost structures of food, the availability of healthy foods and poor choices that result from lack of information.

What has been done
Classes, workshops and hands-on demonstrations are offered to people on limited incomes with nutrition and food budgeting challenges.

Results
Retrospective pre-post end-of session evaluations demonstrated that 69 percent of individuals had reported change in their intake behaviors after program delivery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Program participants will increase human nutrition knowledge. (Target expressed as percentage of participants who report knowledge change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Childhood obesity and its negative effects threaten low-income families disproportionately because of the cost structures of food, the availability of healthy foods and poor choices that result from lack of information.

What has been done
Classes, workshops and hands-on demonstrations are offered to people on limited incomes with nutrition and food budgeting challenges.

Results
Retrospective pre-then post evaluations demonstrated that 94 percent of adults and 58 percent of youth had increased their knowledge of human nutrition, and so the knowledge gain average was 76 percent of participants.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #3

1. Outcome Measures

Program participants will increase their skills in selecting and buying food that satisfies nutritional needs, managing food budgets and preparing affordable foods within the food groups. (Target expressed as percentage of participants who reported learning these skills.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	65	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Household budget managers can make a significant difference in their household's diet by selecting and buying food that satisfies nutritional needs. This is difficult when budgets are tight, limited food is available, and there is a familial history of poor diet choices.

What has been done
Nutrition education programs blend nutrition education and family resource management education to help household food buyers manage their food-buying budgets.

Results
Among participants who attended nutrition education sessions, 66 percent of adults said they had learned skills in food budget management in a post-series evaluation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #4

1. Outcome Measures

Research will provide information to support childrens' increased intake of healthy foods.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Whole grain intake has been associated with improved chronic disease risk factors and weight status in adults, but similar studies are limited among adolescents. Information is needed to inform dietary recommendations for them.

What has been done
Researchers examined data from about 5,000 U.S. adolescents collected in-person at home and a mobile examination center. The main outcome measures were adjusted fo dietary intake and chronic disease risk factors.

Results
The study showed that less than one-third of the adolescents consumed a single serving of whole grains a day. It also showed that higher whole grain intake was associated with lower body mass index for boys. For boys and girls with higher whole grain intake, fasting insulin levels were lower. The research also found positive associations among whole grain intake, nutrient intake and some chronic disease risk factors warranting efforts to promote increased intake among adolescents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
703	Nutrition Education and Behavior

Outcome #5

1. Outcome Measures

Research will produce information to support childrens' consumption of calcium rich foods.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Early adolescence is a period of peak bone acquisition for which calcium is a critical nutrient. Previous MAES research has shown the importance of parents food decisions in supporting adequate intake by early adolescent children.

What has been done
Based on data collected regarding parental practices that impact calcium intake, a regional research project was designed and a nominal group technique tested.

Results
Pilot interview sessions results were shared with the regional project members and it will be used to determine the most important motivators and barriers of Hispanic, non-Hispanic White, non-Hispanic Black, and Asian parents for role modeling and making calcium rich foods available to their early adolescent children.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #6

1. Outcome Measures

Research will provide information on cross-cultural engagement for healthy food choices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food choices are often emotional choices, based on cultural attitudes toward food. Work in cross-cultural engagement is useful with communities holding knowledge of food and health that are different from Euro-American understanding and expectations of food.

What has been done
Working with an urban American Indian project that is focused on protecting native heirloom seeds, and on cultural life and health practices, researchers developed a food experience questionaire and tested it with urban American Indian youth and adults.

Results
The research data has led to the development of a new nutrition education model for indigenous communities that includes mental, emotional and spiritual relationships to food.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Data collection changes)

Brief Explanation

Targets in direct contact for adults were not met because of a shift in how participants were counted. Brief educational opportunities (5-15 minutes in length) are now counted as indirect education. In FY2011, we plan to modify our delineation between direct and indirect education. The team will count brief educational sessions during which intentional lesons plans are being delivered.

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
131	Alternative Uses of Land	30%		30%	
601	Economics of Agricultural Production and Farm Management	30%		30%	
605	Natural Resource and Environmental Economics	30%		30%	
610	Domestic Policy Analysis	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	22.0	0.0
Actual	0.0	0.0	46.2	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	188446	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	2429503	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3506593	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES research on sustainable energy issues is providing a foundation for agricultural and natural resource stakeholders and policy makers to support sustainable energy development on a variety of fronts. In 2010:

- In the first study of its kind, researchers compared water use in corn-ethanol production on a state-by-state basis. They found that ethanol production in Minnesota and Iowa uses far less water overall than similar processes in states where water is less plentiful Water usage could be an important factor in policy decisions about where ethanol plants are built. The study concluded that both energy security and water security are important, and that improvement in one area should not be made at the expense of the other.
- A plan to create the world's only wind-to-hydrogen-to-ammonia system has made progress at the West Central Research and Outreach Center in Morris, Minnesota. A companion facility to a wind turbine already in place has been designed. It will convert wind into hydrogen that can be used to create storable electricity. The hydrogen also will be combined with nitrogen separated from air to produce nitrogen fertilizer.
- Modification of wood pulp mills into integrated forest biorefineries presents an good opprotunity to produce, in addtion to cellulose fiber, co-products including fuel grade ethanol and additional energy. To gauge that potential, a process model has been developed. It was used to compare three integrated biorefinery scenarios. Results showed the economic feasibility of integrated forest biorefineries.
- Researchers have developed a consortium of about 70 scientists and 50 collaborating organizations and firms to develop regional bioenergy systems for production of advanced liquid biofuels, based on a network of four "landlabs" to be established across the upper Midwest.
- Researchers have devised a way to incorporate high amounts of biomass in acrylic pressure-sensitive adhesive, reducing the amount of plastic.
- Researchers have developed the technology for mass cultivation of microalgae on wastewater for biofuel production.
- An analysis of the logistics system requirements for the widespread collection of different types of cellulosic biomass has changed the focus on the need to find local or nearby uses of biomass crops.
- Projected enterprise budgets for energy crops including switchgrass and corn stover, were published.
- An analysis of "green" swine barn technologies showed that some combinations may be profitable such as under-slat manure scrapers and geothermal air cooling.

Alternative and sustainable energy sources are critically needed for the United States. In Minnesota, the boon and bust of the corn-based ethanol industry has affected rural economies as, unfortunately, the extensive use of corn as a feedstock creates a myriad of economic, social and environmental issues that challenge sustainability.

Alternative sources of feedstock for energy production, such as cellulosic biomass, are being proposed to meet demands while addressing environmental and social issues. Success will depend on the development of efficient conversion technologies, a robust supply of feedstock in known quantity and quality and equitable financial incentives for farmers.

The overall goals at the University of Minnesota are to: 1) conduct fundamental research on plants and microbes to develop genomics-based solutions for renewable energy sources and 2) develop economically feasible and ecologically sustainable solutions for producing biofuels from cellulosic biomass and other sources, especially as it pertains to developing new feedstock genotypes.

. Extension's interdisciplinary team is serving on state, regional and local committees and forums with public and private entities that are developing effective markets and technologies. In 2010, Extension developed grant proposals in partnership with contiguous states to better develop regional initiatives related to sustainable energy.

2. Brief description of the target audience

Primary audiences for outreach and education are producers of biomass feed stocks, as well as processors of biomass fuels and bio-products. Secondary audiences are policy makers at the local and state level, as well as users who influence public policy and demand for bio-fuel products.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1100	7000	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 4

Patents listed

20100028 Hydrothermal Carbonizaion of Distiller's Dry Grain

20100040 Transforming Corn from a Commodity Crop to a Higher-energy, Multipurpose biofuel Crop

20100056 Algae Oil Extraction Process

20100213 Bio-renewable Plasticizers for PVC and Other Plastic Materials

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	2	36	38

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Graduate student research assistants

Year	Actual
2010	14

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Research will provide information on new uses for ethanol byproducts.
2	Research will provide information on technologies for use of on-farm energy sources.
3	Research will provide better understanding of the economic impact and environmental trade-offs of renewable energy sources.
4	Plant genetic research will provide information to create new alternative fuels

Outcome #1

1. Outcome Measures

Research will provide information on new uses for ethanol byproducts.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As the price of corn continues to remain volatile at best, livestock producers are continually looking for more cost effective animal feeding strategies. Dried distiller's grains with soluble (DDGS) are a common byproduct of ethanol production from corn, and have been used in the formulation of cattle and swine diets.

What has been done
Before this research, producers did not know the affects of the use of DDGS on animal growth and health. Studies incorporating DDGS in cattle and swine diets have been conducted to. Based on those results, studies of the use of DDGS in poultry diets have begun.

Results
Research has determined that additions of commercial additives to corn-soybean meal-30 percent DDGS diets have minimal effects on nutrient digestibility in nursery and finishing pigs, and do not improve growth performance. Also periodical inclusion and removal of 40 percent DDGS from diets did not adversely affect growth or carcass traits. A feeding trial of commercial toms fed diets with DDGS of varying fat and oil content showed that descreasing the fat content of the distiller's grains tended to decrease the metabolizable energy content. All these studies are providing animal producers with needed information to determine their animal feeding strategies, and providing a use for an ethanol by-product.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Research will provide information on technologies for use of on-farm energy sources.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Strategies for development of small scale on-farm energy sources are appealing because they would increase the economic stability of the farm, and increase local energy options.

What has been done
Research is being conducted in several areas. One study assessed the cost competitiveness of small-scale, on-farm production of canola and soybean based biodiesel and straight vegetable oil biofuels. Another research project is evaluating anaerobic digestors on dairy farms to determine their performance at different milk levels.

Results
Valuing feedstock at market price, canola biofuels were more cost competitive than soybean-based biofuels. Straight vegetable oil biofuels were less costly than biodiesel due to reduced input costs. However, unless the proice of petroleum diesel increases substantially, the economics of small-scale on-farm canola and soybean biofuels production is not cost competitive. The dairy farm digestor study is providing practical information to help clear the way for wide adoption of anaerobic digesters on dairy farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Research will provide better understanding of the economic impact and environmental trade-offs of renewable energy sources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Much needs to be understood about how public policy can realize the potential of producing energy from forest biomass.

What has been done
Following a nationwide analysis of state policies aimed at increasing energy production from forest biomass, a study on the physical, economic and social availability of woody biomass in Minnesota was completed. Focus groups and surveys were adminstered to private landowners to assess their willingness to participate in a bioeconomy.

Results
State biomass policies are increasingly seen as key to advancing renewable energy goals. The contribution of private forestlands to biomass supply was previously unknown in the region and this research showed economic potential in various contexts. As a result of this research, states are beginning to model their biomass policies along the production supply chain to identify policy gaps for biomass use. Local communities and municipalities are now more confident in their assessment and adoption of biomass conversion.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #4

1. Outcome Measures

Plant genetic research will provide information to create new alternative fuels

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alternative fuels from corn aren't new, but what if one kernel of corn could be used to create both ethanol and biodiesel?

What has been done
Plant genetic researchers received a sample of corn from breeders in North Korea that had much higher oil content than U.S. varieties. But because North Korea is a closed state it was impossible for the researchers to get enough of the corn to study. So they used genetic mapping to create hybrids for further study.

Results
The high oil corn lives up to its name. Tests have shown its oil content at 20 percent. The typical U.S. crop has about 3.5 percent oil, and current high-oil hybrids are only around 7 percent.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

The importance of developing sustainable energy options became increasingly critical as Minnesota faced natural disasters such as flooding which threatened agricultural producers and communities, and as the costs of traditional energy sources increased. At the same time there was increasing interest in options in biofuels besides corn ethanol, due to international food security and hunger concerns. All of this created an impetus for research on alternative energy sources, conservation, and public policy issues related to sustainable energy.

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		20%	
104	Protect Soil from Harmful Effects of Natural Elements	50%		20%	
123	Management and Sustainability of Forest Resources	0%		20%	
132	Weather and Climate	25%		20%	
605	Natural Resource and Environmental Economics	25%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	36.1	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	159394	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1603132	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3153198	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

While dramatic weather events in 2010 heightened interest in climate change, those same weather events were interpreted by some to discount the reality of climate change. Meanwhile, the stresses created by tumultuous weather patterns also distracted focus on the policy decisions needed to address this issue. MAES research and Extension outreach explained to agricultural audiences that local rapid swings of weather events are a mark of climate change. There is a lot that is not known about what are potential strategies to address the effects of climate change. Results of research is suggesting what might work, and, equally important, what doesn't work.

A sampling of MAES research progress on this issue In 2010:

- A study of the effects of climate warming on Minnesota trees showed that some boreal species are more sensitive to climate change.
- A conceptual framework was developed that shows how multiple environmental change drivers will interact with climate to influence Midwestern forests.
- An analysis of the limits to carbon sequestration potential alerted government agencies to the danger of attempting to build state greenhouse emissions reduction strategies on the back of forest sequestration.

2010, the Extension interdisciplinary climate change team engaged in two primary activities, both meant as a precursor to the eventual development of a logic model for Extension programming around climate change.

The team surveyed Extension staff across the organization, and especially within the Extension Food, Agriculture and Natural Resource Sciences program area, to learn about Extension staff's beliefs and knowledge regarding climate change. The survey is informing the team's understanding and decisions about: 1) who within Extension is able and willing to deliver education related to climate change; 2) which resources Extension staff trusts most when it comes to information about climate change; 3) how staff belief climate change is affecting and will affect Minnesota; and, 4) what internal staff education may be needed or desired and how to deliver it. The team is currently reviewing results of the survey, which is described in the "Evaluation Studies" section of this report. Results will be used in the development of future program and grant proposals.

The team delivered presentations at selected conferences to deliver some educational content and garner more partnerships for the work of climate change program development.

In 2010, the interdisciplinary climate change team engaged in two primary activities, both meant as a precursor to the eventual development of a logic model for Extension programming around climate change.

The team surveyed Extension staff across the organization, and especially within the Extension Food, Agriculture and Natural Resource Sciences program area, to learn about Extension staff's beliefs and knowledge regarding climate change. The survey is informing the team's understanding and decisions about: 1) who within Extension is able and willing to deliver education related to climate change; 2) which resources Extension staff trusts most when it comes to information about climate change; 3) how staff belief climate change is affecting and will affect Minnesota; and, 4) what internal staff education may be needed or desired and how to deliver it. The team is currently reviewing results of the survey, which is described in the "Evaluation Studies" section of this report. Results will be used in the development of future program and grant proposals.

The team delivered presentations at selected conferences to deliver some educational content and

garner more partnerships for the work of climate change program development.

2. Brief description of the target audience

Currently, the target audience for this program development stage is: 1) internal Extension program teams who may be able to integrate climate change education into workshops, consultation and materials development; and 2) potential partners in the state of Minnesota who can help Extension create a cohesive statewide effort..

Target audiences for MAES research also includes researchers in the fields of forest ecology, tree physiology and forestry professionals in industry; state and county agencies, climate, carbon, and water cycle scientists, farmers, landowners and citizens.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	420	300	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	24	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research will give undergraduates and graduate students the opportunity to develop knowledge and experience in this issue.

Year	Actual
2010	7

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Weather monitoring will provide researchers, agricultural producers and policy makers with necessary information about climate change.
2	Research on carbon sequestration will provide policy makers with needed information for decision-making

Outcome #1

1. Outcome Measures

Weather monitoring will provide researchers, agricultural producers and policy makers with necessary information about climate change.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The past four years of heavy rains and flash flooding have been difficult for Minnesota agriculture. To better respond to abrupt and dramatic weather events, and understand weather trends, careful and scientific climate monitoring is critical.

What has been done
Monitoring networks using new measurement technologies that precisely characterize the spacial and temporal variability in climate, carbon, nitrogen, and water cycling processes have been established in the Minnesotal Agricultural Experiment Station Research and Outreach Center system. Also during 2010, researchers established carbon isotope measurements at a Minnsota peatland site in collaboration with the U.S. Forest Service.

Results
Over the past year the research has made significant contributions to understanding the greenhouse gas budget of agricultural ecosystems typical of the Upper Midwest. Weather monitoring data, which has provided farmers useful information over the years on early planting dates and other decisions, is now providing equally important information on climate change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

Outcome #2

1. Outcome Measures

Research on carbon sequestration will provide policy makers with needed information for decision-making

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Plants take up carbon dioxide from the atmosphere to build leaf, stem, and root biomass, some of which is then transferred to soil, where it can reside for decades before eventually being broken down by soil organisms and returned to the atmophere. Some policymakers and scientists view this process, known as carbon sequestration, as a possible way to combat global warming.

What has been done
Researchers found, however, that the potential to offset substantial emissions is constrained by a lack of land. For example, if 10 percent of current cropland in the Upper Midwest were converted into a combination of new forests and grasslands, less than 5 percent of total carbon dioxide emissions for the region would be offset.

Results
Rather than convert land, researchers concluded implementing land use policies that would protect current carbon stores, such as peatlands and wetlands, would be more beneficial. The information was provided to policy makers. Minnesota has taken substantial steps to preserve existing forest, with eventually half a million forested acres under protection.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

While dramatic weather events in 2010 heightened interest in climate change, those same weather events were interpreted by some to discount the reality of climate change. Meanwhile, the stresses created by tumultuous weather patterns also distracted focus on the policy decisions needed to address this issue. Minnesota legislators have set a goal of a 15 percent decline in CO2 emissions; however, the annual greenhouse gas update showed that between 2005 and 2008 CO2 emissions only declined by 1.2 percent.

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

Evaluation Results

Over 200 Extension staff were surveyed in 2010 to assess knowledge and beliefs about climate change. Most staff surveyed were from the Extension Center for Food, Agricultural and Natural Resource Sciences. Others represented administrative units, the Center for Youth Development, the Center for Family Development and the Center for Community Vitality. The purpose of the survey was to identify opportunities and barriers in developing interdisciplinary approaches to climate change programming. The survey examined: 1) beliefs about climate change in Minnesota, 2) preferred information sources and needs related to climate change, 3) current personal confidence related to knowledge about climate change; 4) concerns of staff related to the impact of climate change on Minnesota, 4) the degree to which climate change is an issue of concern -- for staff and their audiences; and 5) disciplines and people within Extension most likely to help with climate change in Extension who are in the coming years.

The survey revealed that:

1. Staff of Extension hold diverse views regarding whether climate change is happening, and people tend to be very sure of their current beliefs.
2. There is a need for reliable information that is trusted, because people view much of the information available in the public to be skewed by opinion.
3. Views of whether change is happening should be treated separate from perceptions of human causation because there are commonly held concerns about changes that will occur due to climate change in coming years. These effects of climate change in communities and for individuals can be addressed in Extension regardless of beliefs about causation.
4. There are opportunities to focus education on fundamental concepts of climate change within Extension first, because staff feel a need for better information.
5. Several most trusted resources of information were identified, which can guide Extension in identifying partners and seeking development of collaborative programs and initiatives.
6. Finally, most Extension staff do not currently feel comfortable delivering educational

presentation about climate change. There is a need for materials that support staff in integrating climate change into presentations.

Key Items of Evaluation

An internal assessment of Extension staff's attitudes, belief and comfort level regarding climate change was considered to be a prerequisite to program development. A survey of Extension staff identified factors that need to be addressed in order to integrate climate change into Extension education, and revealed that internal education should be a first course of action.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	10%		60%	
503	Quality Maintenance in Storing and Marketing Food Products	45%		40%	
504	Home and Commercial Food Service	45%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	8.6	0.0	12.8	0.0
Actual	8.6	0.0	23.1	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
475195	0	2374	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1528911	0	1159709	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
612702	0	1640863	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Two efforts distinguish 2010 efforts by the U of M Extension Food Safety team. The first is a

continued and revitalized effort to validate that investments in food safety training methods result in changed behavior and safer retail food environments. A grant obtained in 2010 will allow for a future report to NIFA that describes whether modified training components are effective for Minnesota's growing Latino food service worker population, as well as how various demographics fare differently in effective change after food safety training. Secondly, the team has provided 67 consultations on site safety questions to retail food settings. Notably, this effort provided a new validated approach to food safety for a major retailer in 2010. (See outcomes.)

MAES food safety research in 2010 focused on designing new techniques for detecting contaminants and pathogens in foods during production, processing and storage, and evaluating the farm to table movement of food to determine where contamination could occur.

Here are highlingts of research results 2010:

- Research on non-thermal pasteurization of liquid foods using concentrated high intensity electric field process showed that the process was very effective in reducing bacteria in liquid foods such as juice and milk. It is also low cost and energy efficient. The researchers developed a small continuous prototype that can be used for tests and demonstration. Several major food companies are very interested in the invention.
- Research on Salmonella in dry cereals showed that the pathogen becomes more resistant to heat in drier foods, Also studies of the growth of pathogenic bacteria in queso fresco, a popular type of Mexican cheese, identified antimicrobial ingredients that can inhibit their growth.
- Researchers have determined the mechanisms by which E Coli survives desiccation conditions. Understanding the mechanisms of desiccation tolerance can be applied to safe food packaging.
- A method for non-thermal pastuerization of liqud foods using a concentrated high intensity electric field process has been developed and tested and a patent applied for.
- Previous year's reports have discussed the development of sanitizers that can be used in the organic food industry. Researchers continue to develop this technology and have screened and selected bacteriophages against specific strains of the same pathogen. They found that they can kill bacteria on solid surfaces typical of food processing equipment, and also on lettuce and spinach leaves.

2. Brief description of the target audience

Food Safety training reaches points of entry in food service work that make a difference. This means reaching front line workers in retail food environments, as well as burgeoning local foods markets, community events, and industry management teams that establish systems for food safety success. The team continues to modify its program delivery mechanisms to reach new Minnesota demographics, with notable success in reaching Spanish-speaking food service workers.

Research in food safety is important to the food safety industry, clinical laboratories, microbial engineers, organic farm producers and other agricultural producers, food processors including the dairy and meat industries, companies engaged in the storage, transportation, selling and serving of foods, and consumers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3300	92000	225	0

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

Patent Applications Submitted

Year: 2010

Actual: 1

Patents listed

20100039 A New, Faster Melamine Deaminase for Use in a Test Kit for Detecting Melamine in Foods

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	25	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- On-line and face-to-face classes will be delivered for food service workers in English. (Target expressed as number of courses offered.)

Year	Actual
2010	121

Output #2

Output Measure

- Content for food service professionals will be translated into Spanish and other languages and adapted for the cultural orientations for related participants. (Target indicates number of courses available in languages other than English.)

Year	Actual
2010	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of the Food Safety program classes will achieve significant learning gains regarding research-based food safety knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Food Safety classes.)
2	Participants of the Food Safety program classes will significantly improve their food safety practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their food safety practices as a result of attending classes intended to improve food safety practices.)
3	The MN Dept. of Health reports an 18-20% decrease in inspection critical violations in establishments that employ a Certified Food Manager. Food Safety Education programs will certify food managers. (Target expressed as % of pass rates.)
4	A major corporation will adopt training and practice procedures that prevent foodborne outbreaks after identifying risk. (Target expresses number of major retailers affected in 2010.)
5	Research will provide techniques to identify dangerous chemicals in foods and liquids.

Outcome #1

1. Outcome Measures

Participants of the Food Safety program classes will achieve significant learning gains regarding research-based food safety knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending Food Safety classes.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	72	85

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is the responsibility of the Certified Food Manager (CFM) to assure that employees have food safety education. While the Minnesota Food Code requires that at least one employee from each food service establishment be a CFM, the majority of food service workers have not taken a food safety certification course. Many CFMs do not have the time or teaching skills to teach their employees, or they feel employees will be more receptive if information comes from "an expert".

What has been done
Food Safety Employee Training is offered to persons currently working in or interested in working in the food service industry, providing "need-to-know" food safety information. Two hour face-to-face workshops are available for individual registration, or are provided to sponsors from a specific establishment. The FSET was presented 13 times in 2010, and was delivered to three school districts.

Results
Life Skills Evaluations were used to assess life skills learned. This instrument has been tested and is valid and reliable for adult programming. Responses from 247 (88 percent) of participants that turned in the evaluation assessed what was learned. As measured by this instrument, 85.42 percent of participants who responded made positive gains from pre-program to post-program. The school district trainings alone have the potential to make food safer for 1.2 million student meals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products

504 Home and Commercial Food Service

Outcome #2

1. Outcome Measures

Participants of the Food Safety program classes will significantly improve their food safety practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their food safety practices as a result of attending classes intended to improve food safety practices.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	67	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Minnesota Department of Health requires Certified Food Managers to renew their certification every three years and requires four clock hours of continuing education. With their knowledge, Certified Food Managers oversee quality food safety practices. The Minnesota Department of Health reports an 18-20 percent decrease in inspection violations in establishments that employ a Certified Food Manager.

What has been done
Each year, Food Safety educators certify and re-certify Food Managers. In 2010, 274 food managers were re-certified. Because these managers had previously attended initial certification classes, two questions were asked to determine behavior changes due to the initial training. Participants were asked, "What changes have you made in food handling practices since attending initial certification?" and "What changes have you made in your food service establishment?"

Results
Participants listed many changes in behavior in 1) personal hygiene, 2) food handling, 3) cleaning and sanitizing, 4) food storage, 5) temperature management, 6) employee training, 7) sick employee management, and 8) adding official food safety checklists for daily use. When asked what changes they had made in their food service establishments, participants listed a wide range of new and upgraded equipment that support food safety.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

Outcome #3

1. Outcome Measures

The MN Dept. of Health reports an 18-20% decrease in inspection critical violations in establishments that employ a Certified Food Manager. Food Safety Education programs will certify food managers. (Target expressed as % of pass rates.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	90	86

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Education, testing and certification of food service managers is known to reduce critical violations.

What has been done
Extension trains and certifies food service managers, with a special emphasis on serving non-metro areas.

Results
Eighty-six (86) percent of those tested for certification passed the test in 2010. In 2011, program leaders will investigate how pass rates and scores co-relate to demographics. As a result, changes in course delivery can be made to improve outcomes for specific demographics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

Outcome #4

1. Outcome Measures

A major corporation will adopt training and practice procedures that prevent foodborne outbreaks after identifying risk. (Target expresses number of major retailers affected in 2010.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the summer of 2010, a large food retail company was found to have Listeria contamination in its deli area. The Department of Agriculture found the source of the foodborne pathogens in a distribution center from which food was sent to grocery stores nationwide. Contamination and foodborne outbreaks coming from this facility could have affected customers in over 700 stores.

What has been done
The Food Safety Team investigated the outbreak and discovered two separate causes. 1) Cleaning procedures at the retail stores did not effectively killed the contaminant. 2) The warehouse distribution center from which the food had come was delivering new produce nightly, recontaminating the stores. To correct the problem, the team established nightly preventative procedures and developed models for communication and training between employees in the distribution center, warehouse and retail stores to prevent future problems.

Results
The major retailer has adopted the cleaning procedures, training and safety models developed for and with them by the Food Safety team. Problems have been solved, and no further problems have been reported to date. As a result of this work, the Food Safety team developed models that can be adopted by other major retailers, especially utilizing validated food safety training programs that are known to work. These models are already being integrated into systems for a second major retailer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #5

1. Outcome Measures

Research will provide techniques to identify dangerous chemicals in foods and liquids.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
"Melamine" quickly entered the popular vocabulary late in 2008 after a tragedy in China where 6 children died and 150,000 were hospitalized after drinking infant formula tainted with melamine. In response, the World Health Organization sought a simple, inexpensive means of detecting melamine in foods, formula, and other liquids.

What has been done
Researchers who had been studying the biodegradation of herbicides discovered an enzyme in a soil bacterium that bore a chemical resemblance to melamine. They realized the obscure enzyme could be used to detect the presence of the toxic compound.

Results
They developed a test kit for the chemical that now helps protect human health. The kit uses an enzyme that quickly produces a color change when melamine is detected in samples of various food products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

4-H Programs in Minnesota

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
805	Community Institutions, Health, and Social Services	20%		0%	
806	Youth Development	80%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	45.9	0.0	0.0	0.0
Actual	52.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1280502	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3086349	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
8747025	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2010, major activities within 4-H programs addressed three goals:

• **To bring research-driven youth development strategies to 4-H programs**, staff collaborated with the Youth Work Institute to integrate quality assessment into 4-H programming. New structures, training, volunteer recruitment and monitoring practices are aligning to assure that 4-H develops eight elements of positive youth behaviors and five basic competency areas youth need as they grow to adulthood. Regional leaders were trained about Quality Matters research so that they could implement new strategies in their service area. The Volunteer Strategic Investment Team is finding ways for volunteers to become as enthusiastic about quality youth development program management as they are about the activities they lead. Program evaluation strategies have embraced the Youth Program Quality Assessment tool, and have tested ways to engage youth in evaluating their 4-H programs. Forty 4-H clubs have been trained to manage YPQA evaluation. The adoption of YPQA as the Minnesota 4-H assessment tool occurred so quickly that staff created "Quality on a Stick" for the 2010 Minnesota State Fair. This outreach effort introduced 12,000 youth to program quality ingredients, and encouraged them to watch for quality in their state fair experience**.**

• **To respond to 2009 retention study findings,** 4-H staff have taken steps to assure that 4-H better welcomes new members and manages 4-H paperwork and communication efficiently and effectively. The 2009 study revealed that difficulty in adopting procedures and not feeling welcome were primary reasons that members left 4-H clubs.

• **To grow and diversify club membership,** 4-H is developing models that meet the needs of youth of color. A grant from New York Life has led to the creation of 27 new 4-H clubs in the metro area. A partnership with Promise Fellows/Minnesota Alliance with Youth has placed seven Promise Fellows across the state to increase the number of youth of color. Finally, in December of 2010, key Extension youth development staff met with Tribal College staff and administrators, program staff, volunteers and youth to nurture partnerships, identify current needs and assets and determine a program plan based on the priorities of Native American communities.

Program research for 4-H programs is derived from the Youth Work Institute and other resources in the field of youth development. No MAES dollars are expended in research tracked to this program.

2. Brief description of the target audience

The target market for 4-H clubs is youth. Through training and resources to support staff and volunteers to create quality learning environments in clubs that are inviting, accessible and welcoming to a broader range of Minnesota youth. The Urban Youth Learn audience includes adults working with schools, agencies and organizations and volunteers interested in building sustainable youth programs. Youth leadership programs target young learners who are working in the context of their neighborhood or community to make a difference.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10863	110000	131045	0

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

Patent Applications Submitted

Year: 2010
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	2	0	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Well-trained adult volunteers will work with Minnesota's young people. (Target expressed as percentage of volunteers trained in effective practices for working with 4-H youth.)

Year	Actual
2010	89

Output #2

Output Measure

- 4-H Club membership, which is known to improve youth development outcomes, will increase. (Target expressed as the number of 4-H club members in Minnesota.)

Year	Actual
2010	35808

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth involved in 4-H programs will demonstrate skills and knowledge on target with their youth development. (Target expressed as a percentage of 4-H youth showing appropriate skills.)
2	Youth participating in 4-H programs will demonstrate more civic leadership and/or volunteerism in their communities than a statewide comparison group. (Target expressed as a percentage of difference between the two groups.)
3	Membership in 4-H will result in a choice to pursue positive life choices. (Target expressed as a percentage of difference in one positive behavior choice between 4-H members and a comparison group.)
4	Youth involved in the Power of Wind program will report that being involved in the project increased their confidence in asking science-related questions and carrying out scientific investigations. (Target expressed as percentage of those surveyed reporting confidence.)

Outcome #1

1. Outcome Measures

Youth involved in 4-H programs will demonstrate skills and knowledge on target with their youth development. (Target expressed as a percentage of 4-H youth showing appropriate skills.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	81

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth who gain skills in lifelong learning through youth programming can develop more fully as contributing, engaged citizens. Communities, families, parents and society benefit when children benefit from youth programming. One county commissioner summed up the reason for his commitment to his county's 4-H budget in this way: "Just three juvenile delinquents in our county cost more than our entire 4-H budget."

What has been done
Three communities participated in a Children, Youth and Families At Risk (CYFAR) programming, engaging youth and parents in non-formal programs that develop supported learning plans for youth.

Results
Youth indicate that they see participation in this program as a learning opportunity. Eighty-one (81) percent believe the skills and knowledge they learn help them improve their grades, set educational goals and will serve them later in life. A sixth grade female described her learning experience: "You can try new things and make mistakes and just try again... You can express yourself in projects. Teachers (program staff) don't tell you exactly what to do."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Youth participating in 4-H programs will demonstrate more civic leadership and/or volunteerism in their communities than a statewide comparison group. (Target expressed as a percentage of difference between the two groups.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	20	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth who contribute as volunteers are a valuable resource to their communities and the state while they establish skills and patterns for a lifetime of community involvement. Communities who need civic involvement benefit from opportunities for youth to volunteer.

What has been done
Youth ambassadors and youth leaders are involved in leadership training and networking at regional and statewide conferences through Minnesota 4-H.

Results
Eighty-five (85) percent of young people in Minnesota's urban 4-H programs reported new community involvement to a great extent or quite a bit. According to a survey of Minnesota youth conducted by the Wilder Foundation's Minnesota Compass, 38 percent of Minnesota youth aged 16 - 19 volunteered in 2010. The 4-H sample shows a 47 percent difference than the general population survey.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #3

1. Outcome Measures

Membership in 4-H will result in a choice to pursue positive life choices. (Target expressed as a percentage of difference in one positive behavior choice between 4-H members and a comparison group.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	10	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth who have opportunities to make positive life choices through non-formal learning programs are significantly more likely to have positive academic and social outcomes in programs and in other areas of their lives. Non-formal learning program investments leverage outcomes in other areas of youth well-being in addition to the programmatic experiences.

What has been done
35,808 youth were involved in 4-H clubs in 2010 and 5,403 youth were involved in 4-H camping programs.

Results
200 youth were surveyed in the Retention Study and asked why they continued in 4-H. Seventy-two (72) percent reported that they stayed in 4-H because they "learned new things."

We do not have a comparison figure for 2010, but will incorporate a caring adult measure into future methods within the initiative evaluations, and compare it to data reported in the Minnesota Compass study available yearly from the Wilder Foundation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Youth involved in the Power of Wind program will report that being involved in the project increased their confidence in asking science-related questions and carrying out scientific investigations. (Target expressed as percentage of those surveyed reporting confidence.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Multi-state partners concerned with science-related youth development received funding from the 3M Foundation to pilot the Power of the Wind program. The project sought to develop and test models to train adults to work with youth through inquiry approaches and with hands-on wind kits that demonstrate the engineering behind capturing wind as energy. This program responds to a societal need to prepare our youth for science careers in later life. Primary project goals were to test written curriculum and adult facilitation skills.

What has been done
The program was piloted across six states within Extension youth development organizations. Fifteen "Master Explorers" were trained; 137 adults, and 3,353 youth of all grade levels were reached and 356 youth participated in Power of Wind programming. The project was completed in June, 2010.

Results
In a survey of 28 youth participants, three-quarters (75 percent) reported that being involved in the project increased their confidence in asking science-related questions and carrying out an investigation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

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

Evaluation Results

2009 Retention Study, and 2010 Implications

On February 1, 2009, approximately 3,000 Minnesota were invited to participate in a survey to better understand why young people both remain in and leave the 4-H program in Minnesota. Young people who were members in 2007-2008, but did not re-enroll in 2008 and had supplied an email address were asked to complete the survey. This report summarizes the responses provided by 220 youth.

Based on 4-H enrollment data, the average length of 4-H membership for the responders was 3.3 years. When asked to select all reasons they stayed in 4-H, the following were primary reasons youth stayed as long as they did:

Reason
%
Why Youth Stayed in 4-H
I liked being with other kids
79%
I had fun
76%
I learned new things
72%
My parent(s)/guardian(s) wanted me to stay
67%
I liked the 4-H club leaders
63%
I enjoyed projects, fairs and events
61%
I liked doing community service

56%
I liked the awards and recognition
55%
I liked teaching others things I know how to do
40%
Other (most common were activities, meeting others & the fair)
5%

Typical reasons for leaving the program included: 1) difficulty managing paperwork required for the program, 2) difficulty in giving and receiving communication and information from program leaders and managers. Another reason was that the program did not feel welcoming or accessible to new members or their parents.

In 2010, 4-H in Minnesota took actions to address these barriers. Through paperwork reduction, implementation of quality assessment and coaching, and a dramatically changed web site for the program, the program is seeking to make 4-H a more efficient, accessible and welcoming program for youth.

Key Items of Evaluation

Using an evaluation of youth who were once members of 4-H, the program learned what youth and parents both liked and disliked about the program. In response, structural changes have been made in the program to make it more accessible and welcoming to new families through paperwork reduction, quality assessment and coaching, and an improved website. The program will continue to monitor these changes in order to improve retention.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Youth Work Institute

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
805	Community Institutions, Health, and Social Services	50%		80%	
806	Youth Development	50%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.3	0.0	0.0	0.0
Actual	12.7	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
492266	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1859597	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1275775	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Youth Work Institute has become a state and national leader that brings research on quality youth development to practice. The Institute now has eight signature educational courses that offer foundational knowledge and practical application in youth work practice. These courses were delivered statewide in 2010, and were offered nationally and internationally online.

Quality Matters, and the Youth Program Quality Assessment (YPQA), incorporate research that has identified eight critical factors of positive youth experience, as well as five basic competencies that are essential to youth as they grow to adulthood. (www.extension.umn.edu/distribution/youthdevelopment/DA6699.html) Among YWI's primary successes is that Quality Matters assessments and trainings are now "hard wired" into five of Minnesota's leading organizations that fund youth development work. In 2010, the Sheltering Arms Foundation joined 4-H, the McKnight Foundation, the State Department of Education, and the United Way of the Greater Twin Cities area in weaving Quality Matters benchmarks into funding requirements and training resources. In 2010, the United Way designated significant resources to support quality improvement among its grantees. These Minnesota Institutions invest millions of dollars in youth development, and the work of YWI is improving outcomes from these investment.

Finally, as described in our 4-H program report, the YWI has integrated knowledge of good practice into 4-H program structures and training. This brings a strong research base to Extension youth development programming.

2. Brief description of the target audience

In 2010, the Youth Work Institute successfully reached its target audience of youth workers who are involved in out-of-school activities for Minnesota's youth. In the fall, the Institute distributed 7,000 catalogs offering eight courses that teach research-based programs enhance youth program quality. Moreover, the new client-driven website - developed with extensive audience profiling and user-testing in 2009 - became operational in January 2010.

The Institute constantly seeks new audiences for its research-based content and tailors programming to meet audience needs. In 2010, the Institute increased the number of contacts in its data base to 9,257, and began using social media tools to reach its audiences more effectively. Several new social media tools will be launched in 2011. In addition, YWI conducted a needs assessment to determine desire for online learning. As a result, 241 responses about technology access, comfort and preferences will inform future programming and address barriers between audiences and resources.

By influencing and improving funding guidelines and training objectives among major Minnesota funders of youth programs, the program has also helped change the culture of youth-serving organizations in Minnesota, directing attention to benchmarks of quality programming where youth learn and grow and youth workers create activities.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3909	9257	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	4	0	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational events will be delivered through public offerings and contracts with youth-serving organizations. (Target expressed as the number of events, classes, workshops, etc. offered.)

Year	Actual
2010	97

Output #2

Output Measure

- The number of organizations participating in capacity building consultation and technical assistance will increase. (Target expressed as number of participating organizations.)

Year	Actual
2010	40

Output #3

Output Measure

- Individuals representing diverse organizations will participate in networks and collaboratives supported by Youth Work Institute Staff. (Target expressed as number of organizations involved.)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Educational offerings will be delivered through distance education methods. (Target expressed as the number of online offerings delivered.)

Year	Actual
2010	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

Participants at public educational offerings will report that they increased their knowledge of current research and effective program practices. (Target expressed as a percentage of participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	85	93

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research is the backbone of effective youth development programs. It is critical that practitioners understand the latest youth development research and related best practices.

What has been done
The Youth Work Institute's offerings are grounded in latest research, and bridge that research with practical ways to apply it to daily practice.

Results
Evaluation summaries for all Youth Work Institute classes in 2010 demonstrated that 93 percent of respondents (N=740) agreed that their understanding of research related to the session topic was enhanced.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #2

1. Outcome Measures

Youth Development organizations participating in consultation and technical assistance will report that their participation increased their ability to effectively serve youth. (Target expressed as percentage of those in agreement.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	98

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Professional development opportunities need to go beyond increasing knowledge and building skills. Participants need to transfer and apply new knowledge and skills into practice. This requires sufficient time, support and resources to master and integrate new content and skills.

What has been done
The Youth Work Institute provides professional opportunities that describe research and provide practical ways to apply it to daily practice. From tool kits to learning circles; from workshops to dialogues, the Youth Work Institute provides useful information and resources for those who work with and on behalf of young people.

Results
Evaluation summaries for all Youth Work Institute classes in 2010 showed that 98% of respondents (N=703) agreed that they will be able to apply what they learned to their work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #3

1. **Outcome Measures**

Youth development professionals will report that they used Youth Work Institute products and publications to strengthen their youth programs. (Targets expressed as percentage of practitioners utilizing them.)

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Evaluation-driven programmatic changes)

Brief Explanation

Shifts were made in program delivery plans in 2009 and 2010 in response to vigorous stakeholder needs assessment, as well as modernization of program delivery tools. As a result, some output and outcome measures were changed to correspond to actual program delivery methods. Outputs and outcomes will be changed in future plans of work. This year, it resulted in lower outputs because of a change in what was being counted.

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

Evaluation Results

Using the core Quality Matters design, YWI is taking national leadership to improve the quality of work with the U.S. Department of Agriculture and the University of Arizona. This work includes: 1) a research study on how youth and adult volunteers assess and drive quality improvement in 4-H clubs; 2) issue briefs on research findings and articles on current status of program quality assessment tools across three sectors (early childhood, out-of-school time and family involvement); 3) source material for a national database on evaluation tools and resources for practitioners; and, 4) hosting a national conversation focused on evaluation in youth program for national thought leaders on December 2-3.

As a result of the research study, 40 youth and adult volunteers are now trained to assess quality using the Youth Program Quality Assessment (YPQA) tool in 4-H clubs in Minnesota. Forty 4-H clubs have also been observed and are completing action plans for improvement with the YPQA data. The adoption of the YPQA as the Minnesota 4-H assessment tool occurred so quickly that staff created *Quality on a Stick* to create awareness at the Minnesota State Fair. In this effort, a modified version of YPQA allowed youth to observe judges at the Minnesota State Fair competitive events in 2010, considering whether judges were helping to create a positive youth development experience at the fair. Knowing that 12,000 youth are involved in fair competitions each year, the potential to improve programming experiences is high.

Key Items of Evaluation

In Minnesota, the Youth Work Institute is influencing the entire field of youth development by integrating Youth Program Quality Assessment into programs. This

assessment helps programs measure whether they exhibit the characteristics that are known to make a difference in youth outcomes. This assessment tool is influencing millions of dollars of investment in youth programming in Minnesota, including the investment of NIFA in 4-H programming.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Family Relations

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
802	Human Development and Family Well-Being	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.7	0.0	8.0	0.0
Actual	7.8	0.0	8.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
695988	0	149495	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
910398	0	676607	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3267096	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Extension Family Development team designs, delivers and rigorously evaluates parent education for targeted groups in Minnesota while serving the field of parent education. In 2010, programs for Latino immigrant parents and divorcing parents proved their effectiveness in helping parents create stronger home environments. The team is evaluating the effectiveness of programs for parents and children, as well as their costs and benefits, as described in this report.

As it delivered and evaluated family development programs, the team also responded to current issues concerning families in 2010. Several national high-profile cases of teen suicides after being bullied brought to light a need for education for youth and adults on relational aggression, school bullying and cyberbullying. In response, a team of parent and youth educators in Extension developed a "Teen Talk" series about the issue, and designed research updates for professionals.

In 2010, MAES family development research investigated positive family development and effective services that support families. Some specific research results this year:

- Researchers studied preventive intervention strategies aimed at improving parenting and child adjustment among formerly homeless families living in supportive housing communities. Findings showed the intervention was helpful. As a result housing agencies have requested them.
- A study on children with disabilities in the child welfare system has analyzed state data and established the prevalence of children with disabilities in the child welfare system. This information has been provided to policy makers.
- Researchers have developed Vital Involvement Practice as a method for promoting vitality in frail elders. They are collaborating with social service agencies to use their Vitality Involvement rating scale to support purposeful living among frail elders living in nursing facilities and independent housing.

2. Brief description of the target audience

The program serves professionals in collaborating agencies such as mental health professionals, parent educators, schools, courts, family service agencies, health care settings and others. The program also conducts programming directly for parents who are divorcing, parents of adolescents and parents of pre-school and school-aged children.

Other target audiences of MAES research include nursing home staff, professionals in the field of aging, social work professionals and researchers, parents with disabilities, families who were formally homeless.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4818	102000	107	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	10	11	21

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Publications will be distributed.

Year	Actual
2010	14247

Output #2

Output Measure

- Professionals will be trained.

Year	Actual
2010	1143

Output #3

Output Measure

- Parents will participate in Extension trainings.

Year	Actual
2010	3675

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Professionals who work with parents and families will improve their skills in working with parents and families (e.g., utilizing best practices for improving parenting skills). (Target expressed as a percentage of participants who report improving skills.)
2	Parents will improve their parenting practices. (Target expressed as percentage reporting improvement.)
3	Parents who are mandated to participate in Parents Forever because of contentious divorce situations will reduce conflict in front of their children following divorce. (Target expressed as percentage of parents who report reducing conflict.)
4	Parents mandated to participate in Parents Forever because of contentious divorce situations will increase the access of children to both parents following divorce. (The lower percentage reflects that these cases often occur where having access to both parents is not in the best interest of the children.)
5	Research will provide information to support parents with disabilities.

Outcome #1

1. Outcome Measures

Professionals who work with parents and families will improve their skills in working with parents and families (e.g., utilizing best practices for improving parenting skills). (Target expressed as a percentage of participants who report improving skills.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The quality of family resource staff in nonprofit organizations, school settings and other community-based settings makes a difference in how welcome parents feel when they seek information and support, and how well that information and supports makes a difference.

What has been done
Family Resource educators are the backbone of the Minnesota Family Education Network (MFEN). MFEN serves 1,757 family professionals across the state, providing them with field updates, information on class offerings and valuable research-based information from Extension and the University of Minnesota. Family Resource educators led the Minnesota Council of Family Relations' workshop series titled "Ethical thinking and practice for parent and family life educators." Five workshops were held and 150 professionals attended.

Results
In post-workshop evaluations, 79 percent reported improving their skills as a result of education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #2

1. Outcome Measures

Parents will improve their parenting practices. (Target expressed as percentage reporting improvement.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Twenty-three percent of children in this country (16.5 million) have immigrant parents. Over 9 million children of immigrants are Hispanic, and 6.9 million children have Mexican parents (Census Bureau). The average Hispanic child grows up in a neighborhood where nearly 20 percent of neighbors are poor and nearly half are in extreme poverty, with incomes below half the poverty level. More than 40 percent do not speak English fluently, and 9 percent of older teens are jobless high-school dropouts. As immigrant parents navigate difficult lives, parenting their teen well is critical to preventing multiple generations of poverty.

What has been done
Immigrant Latino parents trying to parent teens in the U.S. (n = 132) participated in Extension's eight-session (16 hour) parent education program. Parents learned strategies in listening to children, deciding on negotiable and non-negotiable rules and more. Eighty-three parents participated in eight classes at four collaborating community sites.

Results
Overall, 70 percent of Latino program participants reported they were utilizing practices at home. Another study more thoroughly investigated outcomes. Results of paired t-tests analysis indicate statistical significant changes for the following: Parenting self-efficacy ($p<.001$), consistent discipline ($p<.001$), harsh parenting ($p<.001$), parent youth attachment ($p<.001$), parental acceptance ($p<.001$), parental involvement ($p<.001$), and conflict ($p=.01$) In addition, parent perception of adolescent behaviors indicate statistically significant improvements in youth internalizing behaviors ($p<.001$).

4. Associated Knowledge Areas

KA Code	Knowledge Area

802 Human Development and Family Well-Being

Outcome #3

1. Outcome Measures

Parents who are mandated to participate in Parents Forever because of contentious divorce situations will reduce conflict in front of their children following divorce. (Target expressed as percentage of parents who report reducing conflict.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	86

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research on children of divorced households has determined that sustained conflict following divorce can produce negative eventual outcomes for children.

What has been done
Parents are court-mandated to attend Parents Forever classes when the court is concerned about the contentious nature of a divorce. Parents are educated about the negative effects of conflict and are guided through a plan for co-parenting.

Results
Parents Forever participants were interviewed as part of a larger cost benefit study. Parents, even those who were upset that they had to attend classes, reported learning to get along better with their children and the other parent. Parents also reported that they noticed their children are happier as a result of the strategies they are employing after the program. A mother remarked, "I get along with kids better...No matter what happens, he's going to be their dad." A male participant who had not wanted to attend said, "Parents Forever eased our transition. I learned how to make kids comfortable...I do not scold her (his ex) in front of the kids anymore."

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Parents mandated to participate in Parents Forever because of contentious divorce situations will increase the access of children to both parents following divorce. (The lower percentage reflects that these cases often occur where having access to both parents is not in the best interest of the children.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	35	58

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Following divorce, access to both parents is attributed to positive results for children, except in cases where access is not in the best interest of the child. Negotiated access, along with positive ways of communicating and solving problems, reduces the amount of conflict.

What has been done
Parents Forever helps parents develop a co-parenting plan that can be followed to allow for access.

Results
After the program, 58.4 percent of participants reported a plan to provide access to both parents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #5

1. Outcome Measures

Research will provide information to support parents with disabilities.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Parenting is never easy. For parents with disabilities it is even more stressful. Yet the common model for parenting in America is to support the independence of parents.

What has been done
Researchers interviewed parents with disabilities to determine their needs.

Results
Based on the findings from those interviews, the researchers have proposed that parents with disabilities be viewed as needing "parental supports" for supporting family functioning. Some states are changing their state laws based on the researchers' development of model language, and a curriculum module was developed and made available to the general public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Population shifts in Minnesota is increasing demand for parent education programs for diverse groups, especially new immigrant groups.

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

Evaluation Results

A cost benefit analysis study of the Parents Forever program completed in 2009 was re-examined. Final results are described below.

Program Benefits: Benefits include those we accrue as a society, as well as those derived by program participants. Benefits are defined as all positive outcomes or consequences resulting from actions of the program. Direct benefits are accurued to courts involved in the program, for instance. Determination of benefits is derived from objectives and impacts. For this study we used a combination of program survey results and existing literature and data to capture a full picture of the benefits of Parents Forever. A thorough investigation of the economic effects of parent education programs by Karoly (A Rand Senior Economist) and her colleagues in 2005 guided benefits analysis. To estimate net effect in dollar value of the increase in positive parenting, we took average net savings estimated through the Rand Study and then multipled that number by the average number of children of divorcing parents in the evaluation. Then we discounted the benefit over 12 years to calculate net present value, because the average age of children of divorcing parents in the study is six years. A sensitivity analysis was conducted to account for potential loss of Parents Forever outcome over time.

Program costs: The following costs were estimated and summed for the analysis: 1) all personnel involved in implementing Parents Forever (.g., court staff and program staff); 2) cost of facilities; 3) cost of program materials, equipment and supplis; 4) any direct cost to parents, as well as individual opportunity cost to parents (forgone earnings/fringe benefits for the twelve hours that they were in the program.)

In addition to typical cost estimates, the more subtle cost is estimated, considering the time, money and other resources required to carry out positive parenting practices. This cost per effect was determined. This was limited to the ages of 6 to 18 for a total of twelve years.

The determination: The cost-benefit analysis of Parents Forever indicated that for every dollar spent on the program, society gains approximately $10.08 of benefits. This aligns with figures estimated by the Randy study which determined net benefits are between $1.80 and $17.07 per dollar invested. The caveat to this assertion is that computation of future benefits are based on estimates adapted from the literature.

Key Items of Evaluation

A cost benefit analysis identified the financial benefit of the Parents Forever program. Parents Forever helps divorcing parents negotiate positive co-parenting relationships and nurturing activities. The study revealed that for every dollar spent on the program, society gains approximately $10.08 of benefits. This is aligned with fitures estimated by a Rand study, where such programs typically result in benefits between $1.80 to $17.07 for every dollar invested.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Family Resource Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	90%		90%	
806	Youth Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	9.6	0.0	7.0	0.0
Actual	13.9	0.0	7.9	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
513220	0	88190	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1492775	0	538637	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3453731	0	255841	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The ongoing recession continues to place Minnesota's families in difficulty through prolonged unemployment, underemployment, reduction in wages, and lack of resources to meet basic needs. An environmental scan was conducted by educators across Minnesota in 2010. It showed that economic worries are one of the greatest concerns for families today and in the future. RentWise, a program to

support renters with information about renting rights and responsibilities, is experiencing increased demand due to foreclosures and an inability to purchase homes. Education around paying for college is also of interest.

Family Resource Management programs in 2010 provided educational workshops, on-line resources, publication sales and work with professionals who have the opportunity to deliver financial literacy programs in community settings. While the team is responding to increased need, it is also conscienciously evaluating programs' effectiveness in changing knowledge, attitudes and behaviors.

MAES family resource management research has informed social science professionals, education and policy makers about constraints and challenges to family financial management in these times of economic difficulty. This has included studies on financial strategies for later life, the economic well being of families in transition, and understanding family resource decisions through multi-cultural lenses. Some specific examples of results from 2010 research:

- Over 28 Minnesota community action and other non-profit agencies serving low-income families are using data collection instruments developed by MAES-supported amily resource management research.
- Studies on the impact of spousal inclusion on family business start-ups showed that female entrepreneurs have less involved spouses during firm creation, and fewer spousal resources for female entrepreneurs have a negative impact on firm sustainability.'
- A continuing study of the financing of long term care and later life financial security examined the perceptions and financial literacy of individuals on this topic. The findings offer practical insight for policymakers and practitioners interested in motivating people to address the financial risk of long term care.

2. Brief description of the target audience

Audiences for Family Resource Management programs include youth and teachers of youth, community non-profit groups and individuals, the general public, individuals and families who seek knowledge and skills by choice or mandate, professionals seeking to enhance knowledge, public and private agencies, organizations and businesses seeking training to enhance their delivery of resource management programs. Special program design is reaching Latino immigrant families in Minnesota. Evaluations of programs for Latino immigrants are described in this report.

The target audeinces of family resource research includes family professionals, policy makers and educators, and the legislative and judicial branches of state and federal governments

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12232	67000	7111	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	8	21	29

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Community-based workshops will be held for individuals and families. (Target expressed as the number of events delivered.)

Year	Actual
2010	305

Output #2

Output Measure

- Curricula and guides will be distributed.

Year	Actual
2010	6481

Output #3

Output Measure

- Training will be held for trainers in other organizations so that they can deliver education to their constituents. (Expressed as number of events.)

Year	Actual
2010	47

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Individuals, families and employees who participate in Resource Management programming will report they have increased knowledge related to the targeted financial management goals. (Target expressed as a percentage of participants who report increasing knowledge.)
2	Individuals, families and employees who participate in Resource Management programming will report they have increased confidence (increased efficacy) in financial management, decision-making and planning for later life. (Target expressed as a percentage of participants who report increasing efficacy.)
3	Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge/materials gained from the program to change behaviors related to targeted financial management goals. (Target expressed as a percentage of participants who reported making behavior change.)
4	Research will develop information to support the physical and mental health for rural low-income families.

Outcome #1

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have increased knowledge related to the targeted financial management goals. (Target expressed as a percentage of participants who report increasing knowledge.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Management of resources helps families prevent financial crisis and reduce the effects of financial instability.

What has been done
Latino family members were provided Family Resource Management Programs in their communities. In 2010, 33 Latino participants were interviewed six months following their participation.

Results
Participants not only recalled key learning, but told numerous stories about real changes they were able to make due to the program. One head-of-household noted, "...I know how to go to a bank and open a savings account; what kinds of insurance there are and what they are for." Another said, "I have saved all my change to start, and deposit a little each time they pay to my spouse from each check and see if they see the difference."

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have increased confidence (increased efficacy) in financial management, decision-making and planning for later life. (Target expressed as a percentage of participants who report increasing efficacy.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Because attitudes about money are embedded in culture and life experience, many families in poverty feel hopeless about financial management. Management of resources can lead families to spend and save effectively.

What has been done
Latino household leaders participated in Family Resource Management education programs. In 2010, 33 were interviewed six months following their participation.

Results
Participants had much to say about the positive effect the program had on morale. One participant said that she'd always had a dream to have a dressmaking business but always put it on hold. After the classes, she no longer thinks it's impossible. Others said they shared information with others to produce "a better quality of life and teaching others how to do it; how they can see their achievements." One father talked about not only feeling he can do it but teaching his son. "I am teaching my son how to save for the future. He has his own savings account now."

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Individuals, families and employees who participate in Resource Management programming will report they have used the knowledge/materials gained from the program to change behaviors related to targeted financial management goals. (Target expressed as a percentage of participants who reported making behavior change.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota has one of the highest influx of Latinos (141.7 percent) in the country. Rapid growth of this immigrant population in rural towns is creating new challenges and pressures for service providers (Blewitt, et al., 2008). Rural immigrant families are "at risk of living in economic crisis, or critical hardship, with inadequate earned and unearned income to meet basic needs."

What has been done
In 2010, 33 Latino participants of Family Resource Management programs were interviewed six months following participation.

Results
Participants discussed behaviors they are engaged in now that help them achieve greater financial stability. These include such important changes as looking at information to make sure they understand their rights, renegotiating with creditors, opening savings accounts, finding higher wage jobs., etc. One participant noted: "The situation with my renter is more accessible. I'm looking for what my rights are and the law applies in the contract."

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #4

1. Outcome Measures

Research will develop information to support the physical and mental health for rural low-income families.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Low-income families experience difficulties in finding needed resources, and rural low-income families have even more difficulty finding those resources.

What has been done
A long-term multi-state project has looked at several issues related to this problem and recent research has focused on mothers' struggle to find and keep employment. The research found that child care was the largest barrier for these mothers, especially mothers who were raising a child with a disability.

Results
The research has guided recommended policy changes and ways to increase education with policy makers and professionals working with families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

Economic recession is creating greater demand for family financial literacy education programs, as indicated by increased numbers. A change in program plans has shifted some attention from train-the-trainer models to direct service, thus lowering the number of trainers trained.

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Leadership and Civic Engagement

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	60%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	40%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	0.0	0.0
Actual	11.6	0.0	1.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
527002	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1617545	0	126383	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
635527	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Despite the continuing economic downturn, the amount of sponsorship for Extension Community Vitality programs grew by 34 percent in 2010. This indicates that communities know they are facing

change, and are investing in the human and social capital that can make their communities create the future.

Fifteen community cohorts were convened in 2010 by Extension LCE educators, with the collaboration of local sponsors. These cohorts, which are known to produce impacts in communities, reached four counties, four cities that are regional centers, two groups of low-income emerging leaders in regions, two agriculture and rural leaders groups, county government leaders from across the state, and one law enforcement group. Several county-based programs co-designed their leadership initiative to strengthen bonds among cities in their county, foster collaboration, and help their area act as a regional economy.

Also in 2010, the University of Minnesota was named the host and program lead for the North Central Extension Leadership Development program. The first NELD cohort delivered by Minnesota was convened in the first quarter of 2011.

The LCE team worked with the rest of Community Vitality to develop a theory of change to guide program decisions and indicators of success. The newly adopted theory of change promises Community Vitality's targeted participants and stakeholders that programs will: 1) assess context within community work; 2) build relationships that foster trust with and throughout communities; 3) facilitate learning; and 4) design and deliver programs that are relevant to community concerns. The theory of change also underlies future evaluation efforts with a statement of when we know we are successful.

We are successful when a community . . .

1. recognizes and understands its current situation;
2. has greater confidence that it can manage change;
3. acts to move toward a desired vision;
4. is better able to respond to social, civic, environmental, cultural and economic opportunities and challenges;
5. works through limitations, differences, interests and other barriers to resolve problems;
6. considers the impact of its actions on the greater community.

2. Brief description of the target audience

Leadership and Civic Engagement programs reach out to five primary audiences:

- local government agencies, employees and leaders
- nonprofit organizations that are working collaboratively on an issue
- foundations and their grantees
- the natural resources sector
- agriculture and rural interests

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3793	17000	58	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	3	0	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Community cohort groups will meet to develop leadership skills and create civic connections. (Target expressed as number of cohort groups convened.)

Year	Actual
2010	15

Output #2

Output Measure

- Community assessments and research projects will help communities understand their strengths related to civic leadership and social capital. (Target expressed as number of local assessments conducted.)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Workshops and other structured gatherings will provide communities with increased skills, knowledge and behaviors related to leadership and civic engagement. (Target expressed as number of events.)

Year	Actual
2010	142

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Community leadership cohort members will increase the intensity of their leadership. (Target expressed as the percentage increase in the number of leadership roles held by members of U-Lead cohort groups.)
2	Participants in Leadership and Civic Engagement programs will increase their knowledge of relevant leadership and civic engagement topics. (Target expressed as the percentage of participants reporting increased knowledge.)
3	Structured community gatherings are more productive. (Target expressed as percentage of participants who report in follow-up surveys that participation in LCE programming led to improvements in the process and product of structured community gatherings.)
4	Findings generated from community-based social capital assessments guide communities to informed action. (Target expressed as percentage of community task force members who report in follow-up surveys that the social capital assessment led to actions designed to strengthen trust, networks or civic engagement.)
5	Community decision-makers improve the quality and quantity of engagement with those who have a stake in public decisions. (Target expressed as percentage of participants who report in follow-up surveys that collective decision-making has effectively engaged relevant stakeholders.)
6	The Horizons program, which uses leadership education and community involvement to reduce the effects of poverty, will result in community action that brings financial resources to communities. (Target expressed as dollars known to be brought to rural communities.)

Outcome #1

1. Outcome Measures

Community leadership cohort members will increase the intensity of their leadership. (Target expressed as the percentage increase in the number of leadership roles held by members of U-Lead cohort groups.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	42	73

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is an expectation that non-profits, government and community organizations will be able to find enough qualified and willing people to serve the many organizations and public offices that need leadership year after year, but often, leadership positions are difficult to fill. Leaders are an important part of the social organizational infrastructure and must be found, coached and supported.

What has been done
Fifteen leadership education cohorts were convened in 2010 with support from local sponsors, challenging potential, emerging and existing leaders to understand the future direction of their leadership and to step up for communities. During 2010, leadership role change data were collected with 118 participants in six community leadership cohort groups.

Results
Of those studied, 73 percent increased their level of involvement in at least one of their organizational roles -- either a new role, an increase from "inactive" to "active" or "leader" roles, or an increase from "active" to "leader" roles.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

Participants in Leadership and Civic Engagement programs will increase their knowledge of relevant leadership and civic engagement topics. (Target expressed as the percentage of participants reporting increased knowledge.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	90	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Leaders are an important part of communities' social organizational infrastructure. Organizations depend upon the finite talent, time, volunteerism and financial resources of residents.

What has been done
Five community leadership education cohorts completed their programs during 2010, reaching emerging, existing and elected leaders. Program participants engaged in self-assessment, community forums and leadership education curricula to increase their capacity to lead. The program measured its effectiveness through the use of the Community Leadership Survey developed at the University of Missouri for community leadership programs.

Results
The majority (91.2 percent average) of participants reported improvement in all five domains of community leadership. The largest gain was in personal growth and self-efficacy (94.5 percent), followed by knowledge of community (92.3 percent), civic engagement (91.2 percent, shared future and purpose (90.1 percent) and commitment to community (87.9 percent).

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #3

1. Outcome Measures

Structured community gatherings are more productive. (Target expressed as percentage of participants who report in follow-up surveys that participation in LCE programming led to improvements in the process and product of structured community gatherings.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	85	86

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The quality of local forums and decision-making prcesses predicts the degree to which citizens will continue to be engaged in their democracy. Developing quality public participation strategies is a critical leadership skill, because meetings are where democracy happens, and where citizens build trust with their local government and institutions.

What has been done
Leadership education programming incorporates skill-building in managing local meetings, as well as modeling of group leadership processes that leaders can use to lead future community meetings. "Committees that Work", a product developed by Extension for use in program settings, is one example of a practical workshop and guide that helps leaders conduct meetings and lead decision-making groups effectively.

Results
The Leadership and Civic Engagement team conducted an electronic survey with alumni of community leadership programs that ended in 2009 or 2010. When asked to what extent the Extension program had helped their community make structured gatherings more productive (using a scale of 1 = not at all to 6 = to a great extent). Eighty-six (86) percent (26 of 30) selected a response of 4 or higher on the scale. The average response based on this six point scale was 4.4.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Findings generated from community-based social capital assessments guide communities to informed action. (Target expressed as percentage of community task force members who report in follow-up surveys that the social capital assessment led to actions designed to strengthen trust, networks or civic engagement.)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Community decision-makers improve the quality and quantity of engagement with those who have a stake in public decisions. (Target expressed as percentage of participants who report in follow-up surveys that collective decision-making has effectively engaged relevant stakeholders.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Complex modern problems cannot be solved by any one institution -- not any one government, one corporation, one nonprofit. A new kind of leadership, a more collaborative model, is needed. More than ever, leaders must integrate knowledge and talent from individuals, units, and organizations in the business, nonprofit, and government sectors to advance the common good. (U of M Humphrey Institute of Public Affairs)

What has been done
Leadership and Civic Engagement programs work strategically in communities and with community leaders, helping them to bring a variety of sectors, individuals and institutions to the processes where problems are solved. LCE conducted an electronic survey with alumni of leadership programs that ended in 2009 or 2010, and asked whether programs were effectively helping decision-makers work across sectors.

Results

When asked to what extent Extension had helped their community work across sectors or interests to address problems, 79 percent (22 of 28) indicated a substantial impact (as measured by a response 4, 5 or 6 on the scale). The average response was 4.4. Another question asked to what extent civic life of the community had been affected. On this question, 85 percent indicated a substantial impact. The average response was 4.7. Civic life in this context refers to growing new local leadership, making existing leaders more effective and engaging low-income residents or newcomers in community life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #6

1. Outcome Measures

The Horizons program, which uses leadership education and community involvement to reduce the effects of poverty, will result in community action that brings financial resources to communities. (Target expressed as dollars known to be brought to rural communities.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	10500000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rural communities often lack the infrastructure and civic morale necessary to chart their own course. Many Minnesota communities under 5,000 in population have poverty rates at ten percent or higher. These communities can succeed when social and human capital are leveraged, and residents act on a new vision for the future.

What has been done
The Horizons program brought leadership education, study circles on poverty and community visioning processes to thirty rural communities with fewer than 5,000 residents and poverty rates higher than ten percent. Among many outcomes that came from that programming, communities garnered new grants and gifts to fund community projects.

Results

As of April, 2010, communities reported that grants, gifts and sources leveraged for communities totaled more than $10.5 million in new resources. This amount is over three times the $3,000,000 investment that the Northwest Area Foundation made in the Horizons program in Minnesota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- Other (Grant period ending)

Brief Explanation

Grant activities for the Horizons program, a community initiative to reduce poverty sponsored by the Northwest Area Foundation, wound down in 2010, decreasing outputs of the team. Remaining leadership and civic engagement programs invested more time in fewer adult participant "outputs" through one-time workshops because their focus was on the development and management of leadership cohorts, which require time but produce measurable outcomes.

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

Evaluation Results

Leadership and Civic Engagement educators have conducted social capital assessments using a new tool, Our Community: Assessing Social Capital, in nine Minnesota communities. The tool is also being used in two other states. But can the tool -- which measures the degree to which communities have strong bonds, bridges and linkages -- soundly predict success in how communities can accomplish these goals? A team led by Ryan Allen, Extension specialist and social capital expert at the Humphrey Institute of Public Affairs, examined four communities where studies were done to consider this question. The resulting study extends a typology developed by Flora et al. that predicts the nature of collective action in communities based on the relative mixture of bonding and bridging social capital and adds the component of linking social capital.

A conceptual rationale was used to explain why communities rich in linking social capital are more adept at leveraging economic and political resources to help them achieve collective goals than communities poor in linking social capital.

Researchers measured social capital in four Minnesota communities, predicted each community's likely success with community development initiatives based on scores, and then assessed community development successes in the communities through key informant interviews. The study presents tentative support for the predictive power of this typology. The findings should be viewed with a fair amount of caution since they are based on only four communities, and more exhaustive attempts to evaluate each community's

success with community development initiatives did not occur. Nor did the research account for additional factors that previous research indicates are important for success in community development efforts, such as the presence of well-balanced coordinating teams, the development of solid and meaningful action plans, and regular follow-up by well-qualified facilitators and charismatic local leadership.

However, the research contributed two additional factors that help to explain relative degrees of progress in community development initiatives. First, the experiences of two communities studied indicate that a wider focus on community development, as well as an attempt to broaden participation, resulted in more resilient leadership and a diverse pool of participants for community development success. Second, even small successes help community development initiatives maintain momentum and pave the way for larger successes. More specifically, communities with residents that have substantial stocks of bonding and bridging social capital may find it easier to obtain broad and diverse participation in community development initiatives. Communities with more linking social capital (i.e., access to resources outside the community) may also be better able to tap into talented individuals who can put together winning proposals or access other social or political resources that make success more likely.

Key Items of Evaluation

The Extension Center for Community Vitality in Minnesota is deeply engaged in understanding how social capital works to make more successful in garnering resources and carrying out community initiatives. As part of that work they have learned ways to measure social capital, and have examined the degree to which measuring social capital can predict success. A 2010 study provided cautious support for social capital assessment as a predictive tool, but also came to understand other ingredients important to community success. These studies can be used to inform program logic models developed by the field of community development, and adjust them for greater success.

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Community Economics

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation	90%		90%	
608	Community Resource Planning and Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	13.3	0.0	5.9	0.0
Actual	14.6	0.0	6.8	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
403437	0	784074	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1962418	0	888397	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1004967	0	378475	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Despite, or perhaps because of, the continued downturn in the economy, there is a high demand for Extension community economics programming, especially applied research to help communities: 1) understand their current economic strengths and weaknesses, 2) articulate the economic value of certain

local industries and initiatives, and 3) understand current market audiences and how they can best be reached. In fact, the number of applied research reports that the Community Economics staff worked on increased from 32 in 2009 to 67 in 2010.

The CE team worked with the rest of Community Vitality to develop a theory of change to guide program decisions and indicators of success. The newly adopted theory of change, described fully in the Leadership and Civic Engagement program activities section of this report, will guide the Community Economics team to increase their engagement with communities as they conduct applied research and deliver workshops.

Research assessed the impact of public policies, the impact of change on rural, suburban and urban communities and businesses, as well as community and business challenges and opportunities related to demographic changes, housing, and tourism. Some highlights of MAES funded community economics research in 2010 included:

- Research on a ten year forecast of income tax receipts incorporated aging of the tax payer population as well as differential growth rates for different types of income. Results have been incorporated into a report to the Minnesota Legislature to provide information during budget deliberations.

- An analyzing change in rural labor markets showed that short-run changes in employment in a county are associated mainly with changes in commuting flows. The results emphasize the importance of accounting for economic ties between counties when formulating economic development policy.
- Results from research on foreclosure and housing policy in Minnesota are resulting in the development of a statewide system of electronic foreclosure data. Findings have also been used to develop federal policies.
- Tourism research investigated the Minnesota Zoological Gardens' economic impacts to the seven-country Metro Area and the information was provided to Minnesota Legislators as they assess and set priorities for public investments at the state level during critical shortages in funding public projects.

2. Brief description of the target audience

Primary audiences for community economics programs include chambers of commerce, the tourism industry, economic development officers, local governments, and nonprofits that can, in turn, support local economic development efforts.

Additional audiences for research knowledge and results are rural social scientists and economists, Extension educators, and state and federal as well as local policy makers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	9513	40700	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	10	5	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational workshops will be provided (face-to-face and on-line). (Target expressed as numbers of workshops.)

Year	Actual
2010	115

Output #2

Output Measure

- Community-based applied research will be conducted regarding retail trade, business retention and expansion and tourism development. (Target expressed as numbers of communities engaged.)

Year	Actual
2010	67

Output #3

Output Measure

- Community-based trainers will be trained to continue providing education in communities through business retention and expansion programming, customer service training and internet literacy programs. (Target expressed as the numbers of trainers trained.)

Year	Actual
2010	32

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants in Community Economics programs will increase their knowledge of relevant community economic development topics. (Target expressed as the percentage of participants reporting increased knowledge.)
2	Participants in applied research (e.g., Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will apply the new research-based knowledge to plans for local economic development. (Target expressed as a percentage of participants in applied research programs initiated in prior three years who report that participation in Community Economics programming led to improved plans.)
3	Communities engaged in applied research programs (e.g., Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will implement plans that result in the improvement of local economies. (Target expressed as a percentage of community task force members from programs initiative in the past three years that report programming led to a betterment of the their local economy.) Note: Communities could be those of place (geographic) or those of interest (industry or sector-based.)

Outcome #1

1. Outcome Measures

Participants in Community Economics programs will increase their knowledge of relevant community economic development topics. (Target expressed as the percentage of participants reporting increased knowledge.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information and knowledge about market analysis and business development groups can help local businesses act together to maintain competitiveness. While major corporations typically have resources to tap these, small community-based businesses typically do not. Community Economics programs develop more competitive local economies, by bringing fair access to information about technology and market research to local businesses.

What has been done
Community economics educators at the University of Minnesota provide local discussions and workshops about 1) economic impact analysis of local industries, 2) public value, 3) market area profiles, 4) retail analysis, 5) use of social media and web sites in sales and customer service, 6) Geographic Positioning System (GPS) mapping as a marketing tool, and 7) business retention and expansion.

Results
Knowledge outcome data were collected from 51 Community Economics workshops during the 2010 calendar year. A total of 695 participants completed evaluations of these workshops. Ninety-six (96) percent of these reported learning gains, as measured by comparison of average retrospective pre-test scores to their average post-test scores across all session learning objectives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

608 Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Participants in applied research (e.g., Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will apply the new research-based knowledge to plans for local economic development. (Target expressed as a percentage of participants in applied research programs initiated in prior three years who report that participation in Community Economics programming led to improved plans.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Communities engaged in applied research programs (e.g., Business Retention and Expansion, Tourism Development, Connecting Rural Communities) will implement plans that result in the improvement of local economies. (Target expressed as a percentage of community task force members from programs initiative in the past three years that report programming led to a betterment of the their local economy.) Note: Communities could be those of place (geographic) or those of interest (industry or sector-based.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	40	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Most new jobs in a community come from existing businesses rather than the attraction of new ones. Often, community economic development leaders face barriers to success because businesses face barriers that communities could address. The climate of community support for a business relies on open communication and trust between businesses and economic development planning decision-makers.

What has been done
Business Retention and Expansion Strategies programs provide community volunteers and economic development professionals with guidance in survey development, business recruitment

and interviewing skills. An electronic survey examined program success with alumni of business retention programs and economic development leadership programs ended in 2009 or 2010.

Results
When asked to what extent the Extension program helped their community implement economic development activities, 47 percent indicated a substantial impact.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Public priorities

Brief Explanation

Demand for applied research studies supplanted demand for educational programming in 2010, which reduced the number of workshops and trainers trained, but dramatically increased the number of research reports produced.

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Agricultural Business Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	10%		20%	
602	Business Management, Finance, and Taxation	40%		20%	
603	Market Economics	10%		30%	
604	Marketing and Distribution Practices	40%		20%	
610	Domestic Policy Analysis	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	8.7	0.0	22.9	0.0
Actual	8.7	0.0	11.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
513845	0	922	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1571258	0	149878	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
589500	0	2131117	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Analysis of the financial health of Minnesota farms showed that average earnings decreased by over 60 percent in 2010, continuing a downward trend that began in 2008. Low incomes for virtually all types of livestock operations pulled the average down, and some livestock farms sustained large losses. Crop farms, on average, were profitable but also earned much lower incomes compared to recent years. For pork producers, the crisis was the toughest and deepest in 20 years, according to MAES applied economists studying the industry. Minnesota farmers must now deal with a complicated risk management situation, and MAES research to support agricultural business decision making and Extension outreach efforts are increasingly important. Highlights of MAES research to support agricultural business management in 2010 included:

- A study that investigated welfare consequences to U.S. agriculture of eliminating volatility was concluded. The results are being used by the USDA Economic Research Service to evaluate alternative farm policies that might be included in the next farm bill, such as crop insurance and farm income insurance.
- A study addressing the issues of competition in the livestock and meat sectors will directly impact national level conversations on policy making on competition issues in animal agriculture. The researcher provided public testimony at USDA and Department of Justice joint hearings on competition.
- Research on the cost benefits of soybean rust monitoring networks has found that under the right circumstances pest monitoring and communication networks can reduce the cost of claims paid to producers by crop insurance providers. Those networks also reduce risk associated with potential pest infestations.
- A new national Trade Adjustment Assistance for Farmers Program (TAAF) was established by the University's Center for Farm Financial Management which will design training programs to help producers make the transition to alternative crops or products.

As the population ages and markets grow more complex, Extension Agricultural Business Management programs are a constant resource to the farming industry. In 2010, most efforts turned to the work of Farm Transfer. As the population of farmers ages, and as the business of farming becomes more complex, the intentional transition of farms prevents the risk of losing local businesses in rural areas. Demand for this programming was strong in 2010; however, demand for programming about marketing of products was low as commodity prices continued to yield good profits for most crops producers.

Through educational events, consultations and media resources, Agricultural Business Management programs provides education about tax issues, land rent data, machinery management, strategic business planning, earning a living on a modern farm, making sense of current events, special purpose technology lending, and farm business transfer and estate planning.

2. Brief description of the target audience

Our survey and anecdotal data has shown that Extension and Experiment Station research have a greater impact on agriculture when they reach those who disseminate key information. Therefore, our target audiences for Ag Business Management programs include farmers, farm business management associations, bankers and lenders, agricultural leaders, agricultural professionals, farm business management educators and state and federal policy makers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8500	42000	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 1

Patents listed

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3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	1	10	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational events will deliver agricultural business management content. (Target expressed as the number of events.)

Year	Actual
2010	140

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	In post-program surveys, farm owners will report increased net in farm income as a result of actions taken. (Target expressed as an average net income increase for outcomes of any program intervention.)
2	Participants of the Agriculture Business Management (ABM) program workshops/classes and conferences will achieve significant learning gains regarding research-based agriculture business management knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending ABM program workshops/classes and conferences.)
3	Participants of Agriculture Business Management (ABM) workshops/classes and conference sessions intended to improve participant agriculture business management practices will significantly improve their management practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their agriculture business management practices as a result of attending workshops/classes and conference sessions intended to improve participant management practices.)
4	Farm transfer plans will assure the financial security of local farms, with a financial impact for the rural midwest. (Target expressed as financial impact in dollars.)

Outcome #1

1. Outcome Measures

In post-program surveys, farm owners will report increased net in farm income as a result of actions taken. (Target expressed as an average net income increase for outcomes of any program intervention.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Participants of the Agriculture Business Management (ABM) program workshops/classes and conferences will achieve significant learning gains regarding research-based agriculture business management knowledge and skills. (Target expressed as the percentage of participants who achieved significant learning gains as a result of attending ABM program workshops/classes and conferences.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	82	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farm Transition and Estate Planning: Build Your Exit Strategy is a U of M Extension program to assist farm and ranch families with business succession and personal estate planning. As the population ages, transfer of farms and estates is essential to maintaining business strength in rural America, creating strong demand for this program from farm and ranch families as well as professionals who work with them.

What has been done
A total of 402 Minnesota, North Dakota and Iowa farm and ranch family members from 130 communities, representing 215 farm business units, attended one of 14 workshops. There were 34 local business sponsors involved in the program effort. Participants aged from 22 to 89 years. Evaluations followed each workshop.

Results

Participants were asked to indicate their change or increase in knowledge on a five-point Likert scale. Respondents felt strongest about their understanding of "the need for clear goals and communication as part of the transfer process." (4.56) This was followed by the understanding of "the importance of assessing the financial strength of the farm business." (4.35) and understanding of "various estate planning laws and strategies." (4.30) Participants also indicated understanding of "transfer strategies available for use in a transfer plan." (4.18) Finally, there was increased knowledge of "tax issues and strategies related to farm transfer" and "knowing how to write a transfer plan outline." (4.14 each)

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices

Outcome #3

1. Outcome Measures

Participants of Agriculture Business Management (ABM) workshops/classes and conference sessions intended to improve participant agriculture business management practices will significantly improve their management practices as a result of attending the program. (Target expressed as a percentage of participants that significantly changed one or more of their agriculture business management practices as a result of attending workshops/classes and conference sessions intended to improve participant management practices.)

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Farm transfer plans will assure the financial security of local farms, with a financial impact for the rural midwest. (Target expressed as financial impact in dollars.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	384300000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The average balance sheet for a Minnesota and North Dakota farm/ranch family lists total farm/ranch business assets of $1,776,955 and $1,525,834 respectively. More than 86% of participants of farm transfer Extension programs did not have an up-to-date farm business transfer plan to manage these considerable assets.

What has been done
Workshops delivered to farmers in the region illustrated the importance of planning, and provided concrete strategies for creating a transfer plan.

Results
A total of 95.4 percent of participants stated that as a result of attending one of the workshops, they were going to begin the process of developing and implementing a transfer and estate plan. A post-meeting follow up evaluation showed that 68.5 percent had started their transition plan and 27 percent had completed and implemented that plan. Therefore, the value of assets protected after receiving education from Extension was $1,689,609 including owned land, livestock equipment and machinery. Weighted average total for non-farm/ranch assets for participant families was $187,714 (FINBIN, 2009) Total financial impact of protected rural poverty can be assessed at $384,300,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Programmatic Challenges

Brief Explanation

As the volatility of commodity crop prices stabilized, and prices remained high, the demand for farm management and marketing classes was greatly reduced. Staff turned its efforts to the increased demand for farm transfer education, as farmers and ranchers became most concerned about protecting their business assets.

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Environmental Science Education

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	20%		0%	
136	Conservation of Biological Diversity	20%		0%	
903	Communication, Education, and Information Delivery	60%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	3.5	0.0	0.0	0.0
Actual	4.7	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
365339	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1501680	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
565397	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension's Environmental Sciences staff worked in 2010 to create effective and prolific opportunities for the environmental science education in schools, in youth development programs, on the White Earth

reservation and in community spaces where volunteers can make a difference.

Of note in 2010 was that the Best Practices for Field Days program completed its study of the most effective means to teach science and then, having disseminated its curriculum to most Minnesota venues and published its results, determined that most of its aims had been addressed. While the work team will continue to refine resources and disseminate them through continuous outreach efforts, it will sunset the program in 2011.

The White Earth program continued its efforts to bring environmental science and math programs to youth through a summer program. This year, the team evaluated its effort to help students be more interested in careers in math and science, and more confident in their abiility to learn math and science.

Finally, Master Naturalists across Minnesota are fulfilling their pledge to bring environmental education to community settings. They are providing valuable leadership to the program in determining how to structure ongoing training and support to Master Naturalists in order to improve the impacts of the program.

Note that some research for this programming is gathered from non-MAES sources, especially Environmental Science studies at the U of Minnesota-Duluth, the Biology, Fishery, Wildlife and Conservation lab at the University of Minnesota's Twin Cities campus, and Extension-funded specialists.

2. Brief description of the target audience

Environmental Science Education programs reach: 1) Concerned citizens and volunteers who are willing to be trained and serve in a variety of roles as citizen teachers and scientists. 2) Minnesota professionals from within Extension, the Minnesota Department of Natural Resources, Soil and Water Conservation Districts, US Fish and Wildlife Services, Health and Human Services Departments, Environmental Sciences, the public schools and others involved in environmental science education programs. 3) Youth on the White Earth Reservation in Northwest Minnesota, when funding allows.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3685	17700	645	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	3	0	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Through training and other communications, volunteers, educators and natural resource professionals will be prepared to deliver research-based environmental science education programs. (Measure expressed as number of Minnesota Master Naturalist volunteers trained and supported.)

Year	Actual
2010	874

Output #2

Output Measure

- White Earth Reservation youth will graduate from a four week summer program that includes environmental science education. (Target expressed as a percentage of students graduating.) Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Recruitment strategies for Environmental Science Education programs for adults will reach under-represented audiences. (Target expressed as a percentage of total audiences served.)

Year	Actual
2010	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Within a year of environmental science education instructor training (i.e., Master Naturalist and Best Practices for Field Day Trainings), educators and community-based instructors will use the research-based educational methods in environmental science education delivery. (Target expressed as a percentage of participants.)
2	Minnesotans will have increased opportunities to participate in natural history learning activities. (Target measure reflects increases in number of events available.)
3	Master Naturalists will become more knowledgeable about natural history. (Measure expressed as a percentage of knowledge gain.)
4	Native American youth will increase their academic performance on standardized achievement tests following the four week ESE program. (Target expressed as a percentage of increase.)

Outcome #1

1. Outcome Measures

Within a year of environmental science education instructor training (i.e., Master Naturalist and Best Practices for Field Day Trainings), educators and community-based instructors will use the research-based educational methods in environmental science education delivery. (Target expressed as a percentage of participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	90	44

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesotans who seek ways to explore and understand nature help conserve the environment. The availability of quality environmental service and teaching opportunities across Minnesota mobilize human capital on behalf of the environment.

What has been done
Through our research-based programs and products, we work with educators and volunteers to support quality environmental service and teaching about nature and the sciences.

Results
In follow up surveys with a sample of 16 percent of participants engaged in Master Naturalist and Best Practices training, 50 percent responded, and 44 percent reported that they had used the taught methods in places where environmental science education was delivered.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
903	Communication, Education, and Information Delivery

Outcome #2

1. **Outcome Measures**

Minnesotans will have increased opportunities to participate in natural history learning activities. (Target measure reflects increases in number of events available.)

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Master Naturalists will become more knowledgeable about natural history. (Measure expressed as a percentage of knowledge gain.)

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Native American youth will increase their academic performance on standardized achievement tests following the four week ESE program. (Target expressed as a percentage of increase.)

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The White earth Reservation recognized in the 1990's that students were not going on to higher education because they lack skills and knowledge in science and math. High poverty in the community means that all programming must be externally funded and transportation costs are extremely prohibitive because of the large geographic area around the White Earth Reservation.

What has been done
The White Earth Summer Academy has reached White Earth youth since 1998. The overall goal is to engage students in hands-on science and math activities and motivate students for

advanced education. In 2010, the program's hands-on events included launching helium-filled balloons and collecting data, exploring wildlife and environmental science, exploring careers in environmental management and touring a campus where environmental science majors are taught.

Results

Post-program evaluations showed a number of outcomes related to learning, attitudes change and behaviors. These are among the most significant findings:
* 85 percent of students reported they pay more attention to their work when they use a computer. 61 percent strongly agree that using a computer does not scare them.
* There was a 572 percent increase in using and teaching presentation software skills. There was a 102 percent increase in using and teaching how to enter numbers and perform calculations in spreadsheet programs.
* Students showed a 103 percent increase in believing they would like a job that involves science, math or engineering. There was a 65.9 percent increase in belief that they are good at science.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges

Brief Explanation

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Water Resource Management and Policy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	35%		20%	
133	Pollution Prevention and Mitigation	45%		50%	
403	Waste Disposal, Recycling, and Reuse	10%		10%	
605	Natural Resource and Environmental Economics	10%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	20.7	0.0
Actual	8.0	0.0	42.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
460608	0	172996	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1589201	0	3009809	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
591859	0	3536940	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES research reported this year has informed water resource management and policy makers on ways to improve the quality of Minnesota's lakes, rivers and streams. This research includes work on agricultural impacts on water quality, as well as the problems of invasive fish and aquatic plant species on water quality. Some specific examples of research results in 2010:

- Watershed and channel improvements to improve water quality have been undertaken in portions of a tributary of the Minnesota River Basin, based on evaluation and modeling research.
- The use of distillers dried grains with soluble (DDGS) in animal feeds has water quality implications as well as sustainable energy impacts. This is because some formulations produce manure with higher nitrogen content, which then creates a potential hazard to surface waters. Researchers studied nitrogen retention of three different distillers grains products and found that a higher protein product had lowered nitrogen retention. This indicated that a more precise nutritional formulation is needed to minimize the impact of excess dietary nitrogen and its potential effect on water quality.
- Research on arsenic contamination of small community water systems showed how the 2006 arsenic standard puts some small communities at a financial disadvantage. A less costly alternative for some would be to have arsenic filters installed in each household.
- Tools were developed to be used in TMDL assessment, including revisions to the MinnFARM model for computing the average annual loading from agricultural feedlots, and changes in the WINDS model to account for a changing climate. Field work was also conducted on alternative drainage ditch designs, and presented to agricultural producers, who have been resistant to changes in their current drainage ditch design.

Extension Water Resource Management programs at the University of Minnesota manage educational programs and publish informational resources about shoreland management, stormwater runoff and septic system management. Each of these issues requires an educational response because Minnesotans want to protect water quality, but may lack the knowledge or inspiration to act.

In 2010, special initiatives were conducted in Hubbard, Cass and Wadena County, and the Stop Aquatic Hitchhikers! campaign reached 13,418 Minnesotans through special events, and a mass media effort that generated 19 story placements with a potential audience of 2.2 million. Also, new grants are focusing team efforts and collaborations on specific issues such as climate change and assessment standards.

2. Brief description of the target audience

Target audiences for the results of MAES research include the aquatic ecology scientific community, state and local natural resource managers, state conservation district managers, scientists, decision makers and policy makers dealing with water quality, wildlife and water management, conservation groups, Minnesotans who care about the state's water resources, individuals and groups across the nation and across the world who are invested in creating sustainable water management systems and policies.

Communities likely to use the storm water education program are those within the Twin Cities' third tier of urban development, communities in Minnesota's lake districts and the western Lake Superior Basin. Local government engineers and planners, consulting engineers, planners and architects are also targeted as they help communities make decisions that impact Minnesota's waters. Homeowners are a key audience -- whether they be shoreland property owners, lake association members, the horticulture industry, volunteer groups, or owners of on-site septic systems. Professionals are also a key audience as their professions interface with the water resources. These include natural resource professionals, real estate

professionals, the hospitality industry or professionals who have access to homes and communities with on-site sewage treatment programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11639	27000	2945	0

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

Patent Applications Submitted

Year: 2010
Actual: 1

Patents listed
20100248 Anti Oil Fouling Super-Water-Repellent Surfaces

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	42	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Provide useful information about shoreland, storm water and septic system management into web links, printed products and media. (Target expressed as numbers of products created per year.)
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Workshops, seminars, and presentations will educate community members and professionals about strategies that provide wastewater treatment for their community at a reasonable cost in a way that is consistent with community values. (Target expressed as number of events.)

Year	Actual
2010	63

Output #3

Output Measure

- Provide workshops on water quality, stormwater issues and shoreland management, revegetation and use of plants to maintain shoreland structures. (Target expressed as number of events.)

Year	Actual
2010	57

Output #4

Output Measure

- Coordinate shoreline demonstration projects that provide hands-on learning opportunities and add to educational goals.

Year	Actual
2010	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Three things they can personally do to prevent pollution. (Measure expressed as percentage of residents in targeted communities.)
2	Workshop participants will use information from shoreland education programming to provide education to 25 additional people, creating a multiplier effect. (Target expressed as a percentage of workshop participants.)
3	Shoreland education workshop participants will practice one or more of five lake/river friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)
4	Homeowners will modify or change their habits regarding home water and product use to better protect their on-site septic systems. (Measure expressed as a percentage of those evaluated.)
5	Small communities will develop a viable plan for onsite sewage treatment--plans that are affordable and address onsite sewage treatment. (Target expressed as number of communities per year.)
6	Research will develop information to help reduce erosion impairing surface waters.
7	Research will develop methods to mitigate the effects of agricultural chemicals on water quality.
8	Research on pheromones in fish will provide information to help deal with invasive species.
9	Research will develop new strategies for agricultural drainage.

Outcome #1

1. Outcome Measures

Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Three things they can personally do to prevent pollution. (Measure expressed as percentage of residents in targeted communities.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Changes in land use and management are leading to deterioration of the water quality, aesthetic beauty, recreational use and ecological value of the St. Croix River -- a National Scenic Riverway. The River Basin is facing a 20 percent target reduction in phosphorous. Local communities along the St. Croix and the watershed basin have the greatest opportunity for preventing further degradation. Local policies, planning and practices have the greatest potential for adverse impacts due to land use and management.

What has been done
In 2010, Extension led a partnership with three local environmental agencies to provide several specific education programs to increase knowledge and awareness of concerns and solutions for elected and appointed officials. A total of 133 local leaders participated. Also, an on-the-ground workshop provided an opportunity for local leaders to see problems with water quality in their community and visit best management practices.

Results
Evaluations of the initiative showed that over 60 percent of participants strongly agreed that they left with a better understanding of the water quality and challenges facing lakes in the district. Most responded that they would use the information to talk to boards and private individuals about the present conditions related to lake health, and would seek to improve lake quality. (The quantitative actual number above reflects knowledge grant across the larger program area.)

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Workshop participants will use information from shoreland education programming to provide education to 25 additional people, creating a multiplier effect. (Target expressed as a percentage of workshop participants.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Shoreland education workshop participants will practice one or more of five lake/river friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With thousands of access points and millions of hours of use each year, Minnesota's water resources face increasing pressure to serve multiple purposes. Expanding residential development, increasing recreational use, loss of habitat, introduction of harmful invasive species and changing climate patterns are degrading lakes and streams. Educational responses inform Minnesotans because they do care about water quality, but may not have the information or inspiration they need to act.

What has been done
Workshops and community consultations are helping volunteers and citizen groups act to preserve shorelines. While quantitative measures are not available for the whole statewide efforts, at least four initiatives resulted in concrete citizen action to protect shorelines. Community consultations typically examined causes of concern and then convened community groups that had the opportunity to make a difference, and who may have used erroneous information to guide actions in the past.

Results

1) Volunteers who attended Aquatic Plant identification workshops quit harvesting aquatic plants, monitored lakes for illegal plant harvesting and provided peer training experiences, according to post-event assessments. 2) Little Sand Lake Association members mapped plan communities in Little Sand Lake, conducted lake plant monitoring and developed an aquatic invasive species detection protocol. 3) After Lake Washburn Association members were trained to detect and identify invasive plants and, the Department of Natural Resources received fewer erroneous reports of invasive plants. 4) In Stocking Lake, information led to action. A farmer reduced runoff from his fields; individuals accepted responsibility for upgrading inadequate septic systems and the association opened membership to all watershed residents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #4

1. Outcome Measures

Homeowners will modify or change their habits regarding home water and product use to better protect their on-site septic systems. (Measure expressed as a percentage of those evaluated.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	98

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A properly designed, installed, operated, and maintained septic system provides cost-effective and effective sewage treatment. Properly treated sewage today prevents future generations from incurring the cost of cleaning up the health or environmental problems that contamination may create. Daily activities impact the quality of ground and surface water resources. Proper handling and treatment of sewage protects water and people from contamination.

What has been done
The Homeowner Operation and Maintenance Education (HOME) program provides basic education related to septic system components, operation of those components and maintenance of individual and cluster septic systems. Between 2003 and 2009, seventy-six HOME classes were conducted for septic system owners.

Results
In 2010, a survey assessed the long-term outcomes of 26 of those classes, measuring whether the program had resulted in better care and maintenance of septic systems that are critical to environmental protection. Surveys were sent to 326 participants. Nearly 98 percent (of the 48 percent who responded) reported at least one change, and 65 percent made multiple changes in how they care for their septic system based on information provided in the program. These changes not only protect a valuable investment on the part of the homeowner, but help protect public health and the environment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #5

1. Outcome Measures

Small communities will develop a viable plan for onsite sewage treatment--plans that are affordable and address onsite sewage treatment. (Target expressed as number of communities per year.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	3	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Minnesota has thousands of rural unsewered communities incorporated and unincorporated areas located on prairie, forest and shore lands. These areas include the residents of many small towns, hamlets and shore lands that are currently not served by centralized waste water collection and treatment systems. Residents and leaders of these communities need viable waste water treatment solutions that meet environmental, financial and social concerns.

What has been done
The On-site Sewage Treatment team leads communities through a careful process that engages community members, provides unbiased information in easy-to-understand ways, and makes solving infrastructure needs more possible.

Results
Eight communities developed new plans to deal with waste water management in 2010. These plans made communities safer while coping with budget concerns using outside links to outside funding resources and economically viable solutions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #6

1. Outcome Measures

Research will develop information to help reduce erosion impairing surface waters.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sediment is the most common pollutant imparing surface waters in the U.S. Sediment in surface waters, rivers, streams, lakes, ponds, reservoirs and wetlands adversely affects fish and native aquatic plant species. It adversely affects commercial shipping and recreational activities.

What has been done
Through the use of sediment fingerprinting technology, it is now understood that cultivated fields generate only about 30 percent of the sediment load in the Minnesota River Basin, while the remainder comes from near-channel sources such as erosion along bluffs, ravines, and erosion of streambanks. Researchers developed estimates of sediment load from these near-channel sources using methods of GIS analysis and field measurement techniques. They used the results to predict an erosion rate.

Results
Knowledge about sediment sources in the Minnesota River Basin has improved dramatically during the past decade due to the development of better methods for measurement/quantification

of the erosion processes and better modeling tools. The results of this research are being used by the Minnesota Pollution Control Agency and the Minnesota Board of Soil and Water Resources to evaluate and recommend Best Management Practices for reduction of sediment in the river.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #7

1. Outcome Measures

Research will develop methods to mitigate the effects of agricultural chemicals on water quality.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Atrazine is a selective herbicide that is widely used by farmers in the U.S. to control broadleaf weeds and grasses. More than half of the U.S. corn acreage, for example, is treated with atrazine. The EPA has long required water systems to test and treat for atrazine. In recent years the safety of atrazine has been the subject of much debate among scientists, and the EPA recently began a new scientific evaluation to determine whether current regulations need to be stregenthened.

What has been done
An MAES researcher, working with a U of M biochemist, has developed an atrazine remediation technology to serve as the basis for a start-up company.

Results
The start-up will offer a biocatalyst-based drinking water filtration technology that can reduce atrazine concentrations to acceptable levels. Enzymes developed by the research will serve as a catalyst to initiate bacterial metabolism of atrazine, decomposing it into harmless by-products. The process does not produce a water waste stream, and it can treat to much lower levels of atrazine than can be achieved with the current solution, activated carbon.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #8

1. Outcome Measures

Research on pheromones in fish will provide information to help deal with invasive species.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Asian carp is one of the world's most rampant invasive species. Weighing up to 100 pounds and eating half of their body weight daily, Asian carp have the ability to decimate fish populations indigenous to the Great Lakes.

What has been done
Attempts to control the spread of the Asian carp through closing waterways have proved politically difficult. A research solution could be more effective. MAES researchers have developed a hormonal implant that stimulates the production of sex pheromones in fish. Researchers have identified 260 chemical substances in the pheromones of common carp.

Results
A test trial using pheromones to lure carp into traps is being conducted in a lake in Australia. Experts expect the lake to be carp free within five years. Policies on invasive fish mangement are being re-written by the Minnesota Department of Natural Resources because of this work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Research will develop new strategies for agricultural drainage.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Flooding during the 2010 growing season only exacerbated an agricultural drainage problem. Excess water sends nitrates and sediment downstream. Good drainage systems allow easier and more timely access to fields for planting, less crop damage from saturated soils along with reduced surface runoff and soil erosion, and improve downstream water quality.

What has been done
MAES researchers conducted a field study to determine if constructed wetland that temporarily stores the water drained from cropland via surface runoff or subsurface tile drainage systems can improve the water reaching streams and rivers.

Results
The research provides an example of "precision conservation" and a good example of how environmentalists and farmers can work together to balance profitable crop production with water quality, wildlife habitat and environmental aesthetics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Public priorities

Brief Explanation

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 16

1. Name of the Planned Program

Forestry

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	40%		50%	
124	Urban Forestry	25%		10%	
125	Agroforestry	25%		30%	
133	Pollution Prevention and Mitigation	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.1	0.0	90.8	0.0
Actual	8.4	0.0	39.8	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
457104	0	133347	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1535018	0	2062291	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
635089	0	3449091	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Extension Forestry Team works in urban and rural Minnesota to maintain the health and longevity of Minnesota's ample forestlands. Because much forested land is stewarded by private landowners, collaborative education with those owners is critical. The Forestry Team has created responsive educational programming to help private owners be more successful.

Two major efforts responded to critical issues this year. First, educational programming helped new Minnesota legislation effectively incent land owners to create viable plans for their forest lands. Through a collaboration with the Minnesota Department of Revenue, Minnesota Department of Natural Resources, and the Board of Water and Soil Resources, Extension designed and delivered educational training and on-line materials that described changes in property tax laws, and cleared confusion about an array of options woodland owners had available to them. Over 1,500 landowners were trained, and a vast majority reported taking steps to create management plans. Thus, Extension is responsible for helping the state achieve the spirit and intent of new legislation.

Second, the Emerald Ash Borer program about which we reported impacts last year continues to manage a multi-organization collaborative. Its name has been changed to the "Forest Pest First Detector Team" because its outreach and influence has moved beyond the emerald ash borer. The team has maintained its considerable public awareness campaign and technical assistance training that has helped to minimize the effects of emerald ash borer. No further outbreaks were detected this year, and the team focused on maintaining the collaboration and adding new disease management to the collaborative team's work.

MAES forestry research in 2010 focused on several threats to the northern forests of Minnesota due to invasive species and climate change, as well as opportunities to better manage forest land and both use and protect forest resources including its wildlife. Some of those opportunities relate to the Sustainable Energy issue, and are reported under that program in this report. Some examples of forestry research results in 2010:

- Researchers developed a landscape-level model of oak wilt spread and predicted the economic damage of tree mortality from oak wilt spread in the absence of management. Oak wilt is a significant disease of oaks in the central U.S. Research showed that without management efforts, over the next 10 years up to 266,000 trees will be infected and removal costs at discounted rates would be $60 million.
- Collection of fungi species has allowed researchers to preserve a strain collected about 20 years ago that has had its genome sequenced as part of the Assembling the Fungal Tree of Life project. This genome is important in understanding the evolution of wood decay in Basidiomycota.
- Other genetic preservation work is collecting ash seeds from all across Minnesota to save the ash tree species in the face of the invading emerald ash borer. Minnesota's 900 million ash trees vary widely genetically and have evolved differently depending on location.
- One beneficial impact of invading insects was identified in research on the importance of recurring forest tent caterpillar and spruce budworm outbreaks in promoting species diversity within mixed-species aspen stands.
- Research in forest management and forest wildlife relationships has documented that proposed changes in forest management by the Minnesota Department of Natural Resources could have substantial negative impacts on ruffed grouse density if landscape composition is not considered in management decisions. The information has been provided to policymakers.
- An outcome of wildfire preparedness work has improved national and local communication about how to develop and implement Community Wildfire Planning Projects.

Reviewers may note that the difference between projected FTEs and actual FTEs for research are significant related to this planned program. However, the 2010 actual FTEs are consistent with 2009 actuals. Projections were based on assumptions that have changed. Several forestry research projects are reported under Sustainable Energy and under Climate change planned programs. Many of the peer-

reviewed publications are also counted under those planned programs rather than this one.

2. Brief description of the target audience

Forestry education and outreach influences all of those who work, live and own Minnesota's woodland acres.

Target audiences for MAES forest research include public and private forest land managers, state natural resources agencies, state and federal policymakers, other forestry researchers, Extension educators, Minnesota Tree Improvement Cooperative, and Native American nations.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3175	23000	47	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	17	21

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshops, tours, and demonstration projects will increase awareness of landowners, volunteers, loggers, natural resource professionals and businesses involved in forestry, agroforestry, urban forestry and forest products. (Target expressed as the number of events.)/

Year	Actual
2010	108

Output #2

Output Measure

- Print and digital publications will provide answers to questions about sustainable management of Minnesota's natural resources. (Target expressed as number of publications distributed.)

Year	Actual
2010	22000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Landowners will implement new forestry, agroforestry and urban forestry management practices. (Target expressed as number of acres on which new land management was improved.)
2	Landowners that implement new management practices will improve management of a significant number of acres. (Target expressed as number of acres on which management was improved.)
3	Natural resource-based businesses will become more profitable. (Target expressed as dollars earned or saved by natural resources enterprises.)
4	Minnesota legislation will be more effective in providing incentives forest land owners to create management plans. (Target expressed as percentage of participants who acted to create management plans.)
5	Research will provide information on costs and benefits of public forest land to guide public policy decisionmakers.
6	Research will provide information to support strategies for control of invasive species in vulnerable northern forests.

Outcome #1

1. Outcome Measures

Landowners will implement new forestry, agroforestry and urban forestry management practices. (Target expressed as number of acres on which new land management was improved.)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Landowners that implement new management practices will improve management of a significant number of acres. (Target expressed as number of acres on which management was improved.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	18000	882585

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Private landowners are often stewards of Minnesota's forest land. Knowledge of research-based land management practices helps conscientious landowners make informed decisions.

What has been done
Workshops and consultations educate landowners about current issues and practices in forest management.

Results
Landowners report changed practices on their acres of forest land, totaling a large number of acres in 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

124	Urban Forestry
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Natural resource-based businesses will become more profitable. (Target expressed as dollars earned or saved by natural resources enterprises.)

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Minnesota legislation will be more effective in providing incentives forest land owners to create management plans. (Target expressed as percentage of participants who acted to create management plans.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over the past three years, Minnesota legislature made changes in property tax laws affecting forest land. The legislation created new land designations for landowners who obtain a management plan, phased out a past program designation called "Green Acres" and created the Sustainable Forest Incentive Act which offered incentive payments. This mix of laws created a confusing array of options for owners. Some were vulnerable to higher taxes if they did not follow complex requirements. No agency was informing land owners about trade offs among the laws.

What has been done
In partnership with a number of organizations, Extension's Forestry team: 1) educated forest landowners in northeast and southeast Minnesota about their property tax options, 2) trained county assessors, soil and water conservation district staff and foresters about their roles, and 3) offered classes to family forest landowners. In all, classes for land owners were taught in 17 locations. Total attendance was 1,507 -- the largest adult audience drawn for any forestry subject.

Results
Six months later, a survey was sent to 792 participants. The response rate was 58 percent, and only 8 percent of this sample had NOT acted. The program clearly helped new legislation achieve its goal of encouraging land management plans. Respondents reported these actions: 1) 56 percent talked to their county assessor's staff about property tax classification or options; 2) 30 percent talked to a friend or neighbor to help them understand property tax and incentive programs; 3) 18 percent talked to a plan writer; 4) 16 percent notified the assessor they plan to enroll forest land in a program; 5) 12 percent enrolled forest land in Class 2c Managed Forestland and 3 percent enrolled in the Sustainable Forest Incentive Act Program; 6) 11 percent completed a management plan; and 7) 74 percent visited Extension's myminnesotawoods.org to get information about forest land tax and incentive programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #5

1. Outcome Measures

Research will provide information on costs and benefits of public forest land to guide public policy decisionmakers.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There are almost 3 million acres of tax-forfeited forest land managed by county land departments in 12 northern Minnesota counties. Policymakers need information about the costs and benefits of this land to their counties.

What has been done
A study evaluated the financial and economic implications of retaining Minnesota tax-forfieted forest land. It described how the management and use of this land changed following their sale from public to private interests and described and quantified the financial and ecomomic impacts associated with retaining that land in public ownership versus selling it to private interests.

Results
The study showed that on average, counties generate about $5 per acre annually from management of the land, prinicpally through the sale of timber stumpage. The forests also provide substantial forest-based recreation opportunities. The study concluded that public ownership of Minnesota's tax-forfeited forest land cannot be justified on the basis of the land's ability to generate revenue; however, when the full range of forest values and services were considered the economic benefits far outweigh the economic costs. The study's findings have been used by county land commissioners to explain to their county board members the economic tradeoffs associated with management or selling this land.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #6

1. Outcome Measures

Research will provide information to support strategies for control of invasive species in vulnerable northern forests.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Earthworms are attacking the soils of the northern forests, killing off understory plants and changing the makeup of the forest ecosystem. Once introduced into Minnesota's forests, which are not home to any native species of earthworms, the pests can travel up to five miles per year on their own. But they are spreading much more quickly around the state's many great fishing lakes. In forests, worms actually make the ground firmer, threatening valuable tree species like sugar maple and black ash.

What has been done
Researchers reviewed legislative and regulatory policy for managing invasive earthworms in Minnesota and found that current policy would not protect most of the northern hardwood forests in Minnesota. Turning their attention to how the earthworm is spread, researchers reviewed how

demand for earthworms by anglers changes over the season. Changing their handling of earthworms appears to be critical to slow the introduction of the pest into forests.

Results
In collaboration with the Leech Lake Bank of Ojibwe, the researchers are working with bait shops at four fishing resorts in northern Minnesota to test the effectiveness of different combinations of informational signage and stickers on bait containers. They are analyzing bait purchase and disposal rates. The work has raised the interest and cooperation of northern Minnesota resort owners who now understand the potential of invasive earthworms to damage the northern hardwood forests.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Competing Public priorities

Brief Explanation

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

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 17

1. Name of the Planned Program

Housing Technology

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	2.8	0.0	0.0	0.0
Actual	2.2	0.0	1.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
326922	0	33135	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1319142	0	131455	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
476192	0	416	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

As the housing crisis continues to reverberate throughout Minnesota, the market for new construction is slow. Existing homes, however, are being refurbished and the remodeling industry is integrating new technology into old structures to conserve energy. Courses to support remodelers in this technology adoption was a major effort for Housing Technology Extension specialists in 2010.

Research for housing technology programs comes from housing specialists within the Extension Center, and from other University resources. Experiment Station support is not typically allocated for housing technology issues.

2. Brief description of the target audience

The overall target audience for this information is builders, remodelers, contractors, mitigaters and others involved with avoiding and resolving problems in homes. Considerable effort was invested in remodelers in 2010.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1678	4600	0	0

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	4	0	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Educational courses will be delivered to the target audiences.

Year	Actual
2010	85

Output #2

Output Measure

- New research will result in the development of new and revised educational materials. (Target expressed as the number of new or revised curriculum materials.)

Year	Actual
2010	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve the durability of new homes by working with builders. (Target expressed as the number of builders trained.)
2	Improve the availability of healthy and affordable housing through the mitigation of indoor environmental risks. (Target expressed as number of homes affected.)

Outcome #1

1. Outcome Measures

Improve the durability of new homes by working with builders. (Target expressed as the number of builders trained.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	30	217

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The durability of homes has an impact on the stability of neighborhoods, as well as the financial and physical well-being of families. Education for builders can assure that builders who remodel have the education and information they need to build secure homes.

What has been done
Certification and re-certification courses were held for builders. Four day workshops taught remodelers, energy consultants and code officials about: 1) testing homes for combustion safety issues; 2) baseline blower door testing in retrofit work; 3) identifying moisture concerns before retrofit.

Results
Over 200 builders received the education and updates they need to build secure homes. There was a 52% increase in knowledge of combustion safety issues, a 34% increase in baseline blower door testing, and a 32% increase related to evaluating homes to identify moisture concerns.

4. Associated Knowledge Areas

KA Code	Knowledge Area
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #2

1. **Outcome Measures**

   Improve the availability of healthy and affordable housing through the mitigation of indoor environmental risks. (Target expressed as number of homes affected.)

   Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

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

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 18

1. Name of the Planned Program

Horticulture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	5%		10%	
132	Weather and Climate	5%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	5%		25%	
204	Plant Product Quality and Utility (Preharvest)	20%		10%	
205	Plant Management Systems	50%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		15%	
213	Weeds Affecting Plants	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	13.8	0.0	40.2	0.0
Actual	8.2	0.0	64.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
465448	0	659750	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1548243	0	6567249	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
893315	0	7766997	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2010 MAES research continued to make progress in providing new cold hardy fruits, flowers and woody plants to support Minnesota's horticultural industry and gardeners. Research also progressed on Minnesota's major horticultural crops, including potatoes, sweet corn and other vegetables. Some results of research this reporting year:

- Three recent rose cultivars, Northern Accents Lena, Ole and Sven continue to sell well in retail nurseries in the upper Midwest. Crosses, evaluations and selections of deciduous azalea and broad-leafed rhododendron in Minnesota represent the most comprehensive effort to develop USDA Zone 4 hardy cultivars for the upper Midwestern U.S. landscape nursery industry.
- Traditional approaches to invasive horticultural crop control have had limited effectiveness because these approaches do not address the industry's complexities and economic incentives. Research on contributing factors and risk assessment points to the need for consumer education.
- The use of polymer coated urea in vegetable and fruit crop production has increased in recent years to increase nitrogen use efficiency. However, the polymer is susceptible to fracturing or cracking. Research on best management practices has given growers different methods of application to reduce damage of the coating.
- Research as part of a North Central project to address the emerald ash borer infestation has led to recommendations used to develop local management guidelines in Minnesota.
- A new patented little bluestem grass variety is being propagated by several growers and work is underway to license this cultivar in Europe.
- Work on several fronts is continuing to study the advantages of high tunnel growing of fruits and vegetables, and is supporting Extension efforts discussed further under outcomes. One recent finding of research is that the protection from rain and wind in high tunnels allows for significantly higher yields.
- Potato breeders have been exploring cryotherapy as a method to eliminate potato viruses in vitro. They have had success regenerating four lines using this technology. Cryotherapy has the potential to reduce the virus eradication time-line by up to 1.5 years.
- Applying comparative genomics methods to identify disease resistance genes found in wild potato species has been fruitful. Researchers now have a library of more than 100 candidate disease resistance gene sequences isolated from a disease resistant wild potato.

Horticulture programs at the University of Minnesota Extension mobilize citizens to create green space where they live, work and play. Special projects this year brought community groups together to beautify schools, public housing facilities, neighborhood spots where gardens now grow, and even prison settings. Commercial horticulture programs have created a strong horticulture industry. Outcomes from commercial horticulture initiatives this year have improved the earning power of minority farmers, growers taking advantage of new technologies, and the food processing industry.

2. Brief description of the target audience

Audiences for commercial horticulture education and research are fresh market producers, including growers of fruits and vegetables for processing, the processing industry, associated agribusiness turf professionals, nurseries and garden centers, and landscape professionals. Several of these groups have high representations of new immigrants.

Audiences for consumer horticulture programs and research are those who grow in yards, gardens, landscapes and community spaces.These include audiences where information is needed in a timely fashion and those who want to build basic knowledge about horticulture and environmental stewardship over time.

Other specific research audiences include plant biologists, geneticists and pathologists, state and regional fruit and flower growers, vegetable processors, potato growers, the local regional and national wine industry, nurseries and beekeepers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	296611	1600000	107840	0

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

Patent Applications Submitted

Year: 2010
Actual: 2

Patents listed
20100013 MN Prairie Junegrass Population 1
20100122 MN Albino Blueberry

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	19	40	59

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshops, classes and seminars will provide information to targeted audiences. (Target expressed as number of events.)

Year	Actual
2010	8732

Output #2

Output Measure

- Master Gardeners, trained by Extension, will deliver hours of educational service to the residents of Minnesota. (Target expressed as the number of volunteer hours committed by Master Gardeners in a year.)

Year	Actual
2010	137381

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Participants of Horticulture program events will achieve significant learning gains regarding horticulture. (Target expressed as the percentage of participants who achieved learning gains.)
2	Participants of Horticulture program events intended to improve participant horticulture practices will improve practices as a result of attending events. (Target expressed as a percentage of participants that changed one or more horticulture practice.)
3	Growers will continue to adopt high tunnel technology to expand their growing season. (Target expressed as number of high tunnel users.)
4	Wine grape research will provide growers with cold hardy varieties to support the U.S. wine industry.

Outcome #1

1. Outcome Measures

Participants of Horticulture program events will achieve significant learning gains regarding horticulture. (Target expressed as the percentage of participants who achieved learning gains.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One example of educational outreach to growers is programming for local and immigrant farmers. Due to an influx of new immigrants and increased unemployment, more are investigating the possibility of producing fruits and vegetables to supplement incomes. Education makes these growers aware of risks and benefits and informs decisions. Also, as Americans add more fresh fruits and vegetables to diets, safe handling in production and distribution is important.

What has been done
Through educational conferences for Minnesota growers of small fruits, apples, potatoes and diverse vegetable crops, novice and experienced growers increased profitability and enhanced food safety. At least 70 conference participants were new immigrants. Also, tomato variety trials were performed at a farm operated by the Minnesota Food Association, which works with immigrant farmers.

Results
Over 40 percent of program participants who were not currently farming stated that what they learned would help them initiate new farming practices, especially in relation to disease management and getting safe and high-quality produce to market. Also, 50 - 80 percent of attendees at the annual fruit and vegetable growers' conference stated that the programs would help them initiate new practices, including ways to save energy, good agricultural practices and growing root crops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)

211 Insects, Mites, and Other Arthropods Affecting Plants

Outcome #2

1. Outcome Measures

Participants of Horticulture program events intended to improve participant horticulture practices will improve practices as a result of attending events. (Target expressed as a percentage of participants that changed one or more horticulture practice.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Industry professionals need to connect with research to understand latest developments that affect the processing of, for example, sweet corn, peas, corn, beets, carrots and potatoes. Processors can apply information about production efficiency, environmental sustainability and emerging issues such as herbicide label changes, antibiotic update potential from manure-applied soils, and more.

What has been done
Members of the horticulture team developed and delivered a tri-state conference (Wisconsin, Minnesota and Illinois) sponsored by the Midwest Food Processors Association. Over 100 representatives from processing companies located throughout the region participated in the two-day conference. A field day was held in June, and ongoing research was discussed.

Results
The impact of the partnership has led to greater production efficiencies through the adoption of new integrated pest management strategies and reduced inputs without compromising quality. The processing industry has reduced by half insecticide use on sweet corn, with an estimated cost savings of $1.6 M per year. The information generated has also had a positive influence on policy that impacts the industry's competitiveness. Processors estimate that research alone saves them $10 / acre on $5,000 acres per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants

Outcome #3

1. Outcome Measures

Growers will continue to adopt high tunnel technology to expand their growing season. (Target expressed as number of high tunnel users.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Harsh and long winters challenge the profits of growers of fruits and vegetables in Minnesota. High tunnel technology allows growers to bring produce to market sooner and to continue production later in the season, potentially giving a higher return. This is a relatively new production practice in Minnesota, meaning that growers and other interested individuals have not had access to information about how to implement the technology and practice.

What has been done
The horticulture team conducts educational programs to advance skills in high tunnel use. Additionally, to continue to educate growers the team developed a web site to make research information available quickly. (http://hightunnels.cfans.umn.edu) Videos and list-serves also reach interested users. Working with the USDA Natural Resource Conservation Service, the team is teaching growers about cost sharing through the EQUIP program in Minnesota, which makes high tunnels more economically feasible.

Results
As a result of these efforts, the number of high tunnels in Minnesota has grown in the past two years from less than 100 to over 250. Growers in northern Minnesota are now selling high tunnel-produced tomatoes and are enjoying increased annual income.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems

Outcome #4

1. Outcome Measures

Wine grape research will provide growers with cold hardy varieties to support the U.S. wine industry.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The northern U.S. wine producers needs hardy varieties that produce quality wine to build their industry and meet consumer demand.

What has been done
MAES supported research to develop cold hardy wine grape varieties has produced several varieties that have been enthusiastically accepted by growers and vineyards. Marquette is a descendant of the pinot noir and can survive temperatures as low as 35 degrees below zero. La Crescent is another extremely cold-hardy grape with excellent quality. Frontenac gris, the white wine version of Frontenac, one of the first of the wine grape releases, is also very popular.

Results
Marquette has been planted in wineries from New York to California. One Minnesota winery uses Frontenac gris to produce a wine they've labeled "Minnesota Nice Wobegon White." This wine was recently selected "Best Minnesota White Wine" by Minnesota Monthly magazine. La Crescent's popularity is growing all over the Northern U.S., with vineyards producing great examples from Minnesota, Michigan and Vermont. One vineyard won the Minnesota Governor's Cup at the 2010 International Cold Climate Wine Competition. La Crescent is being introduced overseas, most recently in China.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Improved data collection process.)

Brief Explanation

The numbers of persons served by horticultural programs are increased because more educators and specialists are reporting educational events to an on-line data management tool. Master Gardeners' data base has also improved its data collection.

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

Evaluation Results

Key Items of Evaluation