

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
Plan	37800	3800	4000	0
Actual	36543	64000	1514	0

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

Patent Applications Submitted

Year: 2010
 Plan: 1
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	10	74	
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	Target	Actual
2010	200	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	Target	Actual
2010	25	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 complete 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 Scandinavian 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)

1. Evaluation Studies Planned

Evaluation Results

Key Items of Evaluation