

V(A). Planned Program (Summary)**Program # 2****1. Name of the Planned Program**

Food Safety -- Animal Health

 Reporting on this Program**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources			10%	
301	Reproductive Performance of Animals			5%	
302	Nutrient Utilization in Animals			6%	
303	Genetic Improvement of Animals			5%	
305	Animal Physiological Processes			5%	
307	Animal Management Systems			10%	
308	Improved Animal Products (Before Harvest)			5%	
311	Animal Diseases			20%	
315	Animal Welfare/Well-Being and Protection			5%	
503	Quality Maintenance in Storing and Marketing Food Products			5%	
702	Requirements and Function of Nutrients and Other Food Components			5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources			5%	
802	Human Development and Family Well-Being			3%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			3%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures			3%	
902	Administration of Projects and Programs			2%	
903	Communication, Education, and Information Delivery			3%	
	Total			100%	

V(C). Planned Program (Inputs)**1. Actual amount of FTE/SYs expended this Program**

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	124.7	0.0
Actual Paid Professional	0.0	0.0	98.1	0.0
Actual Volunteer	0.0	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
0	0	422998	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	2941650	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	8283077	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Created easily accessible databases for researchers and producers making research results available
- Distributed research results at state conferences, field days, county meetings, and conventions
- Prepared research articles, fact sheets, and news releases for scientists and state media
- Held strategic planning meetings with state agricultural groups
- Developed systems enhancing food safety and agricultural security

2. Brief description of the target audience

- Crop and livestock producers in Montana
- State agricultural advisory committees
- Economic development groups
- Participants in extension and commodity group meetings, conventions, conferences, and field days
- State of Montana
- Montana Department of Agriculture, BLM, USFS, and other government entities
- Ranchers, seedstock industry, colleagues, and related stakeholders
- Montana Stockgrowers Association and the Montana Department of Livestock

3. How was eXtension used?

- In-State Extension
- Multistate Extension
- Integrated Research and Extension

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	689	81	201	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	55	105

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of research citations

Year	Actual
2012	7

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Identify critical infection and resistance processes
2	Number of ranches per year adopting enterprise management of animal health issues
3	Number of novel vaccines developed per year
4	Number of activities per year that prevent disease outbreaks or manage diseases of Montana livestock
5	Meetings that maintain or enhance Montana's presence in the production of quality meat products
6	Number of producers that participate in livestock tracking programs

Outcome #1

1. Outcome Measures

Identify critical infection and resistance processes

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A leading scientist with Immunology and Infectious Diseases (ImID) stated digestive and respiratory diseases account for more than 50 percent of non-predator deaths in calves. Researchers must learn more about bovine specific immunity, so they can improve the effectiveness of vaccines. Current knowledge of protective immune responses is primarily based on work done in rodents and humans. While there are similarities with bovine immune responses, there are also clear differences. A key difference is in the immune cells: cattle have far more of a unique T cell called gamma/delta than humans and rodents.

What has been done

Researchers at ImID are studying these special cells which comprise a large percent of the infection fighting cells in cattle and play a vital role in immunology. Researchers are exploring both the compounds and the delivery methods. They want to develop products and procedures that are safe, simple, low cost, and will stimulate immunity in cattle. Researchers also studied the molecular interactions of rotavirus, and they are investigating the incidence and characteristics of Staphylococcus aureus cattle. This year they isolated a chemokine CCL28 that appears to play an important role in mammary immunity.

Results

Scientists are currently testing a compound, Amphotericin B, (AMB) in cattle. AMB is currently used to fight fungal infections in humans. Researchers are testing AMB in calves and dairy cows using different delivery methods like strips that dissolve on the tongue.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources

301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #2

1. Outcome Measures

Number of ranches per year adopting enterprise management of animal health issues

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Consumers are increasingly demanding more information about their food products, especially meat. Producers are therefore working to track their livestock from conception to consumption. Producers are focusing on genetics, disease identification and prevention, and better feed management systems. MSU studies help ensure Montana producers raise safe beef while improving the quality.

What has been done

MSU investigators education and research programs allowed producers to document best management practices for raising and marketing calves. The program provides quality assurance certification, implements and documents bio-security plans on ranches, and provides informational outreach. Sheep and wool producers continued using targeted grazing to increase the competitiveness of Montana lamb and wool in the world market.

Results

While difficult to quantify the number of ranches adopting enterprise management practices, we can report the number of inquiries just to one MSU beef cattle specialist. A researcher reached nearly 800 producers, industry participants and youth and addressed more than 90 inquiries from county agents and producers via phone and email on topics ranging from ration balancing to water quality and young cow reproductive performance. During legislative testimony producers repeatedly shared the impact COA/MAES research had on their operations and how new technologies were saving money and increasing agricultural product quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
301	Reproductive Performance of Animals
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Number of novel vaccines developed per year

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

Number of activities per year that prevent disease outbreaks or manage diseases of Montana livestock

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Animal losses due to environmental stresses, disease, and death create the need for an improved understanding of factors affecting Montana livestock. Infectious disease continues to cause considerable losses to livestock producers by reducing production and by reduced sales because of food safety concerns. Disease outbreaks are closely monitored in Montana to ensure quality and disease-free animals are shipped to other states.

What has been done

This year evaluations of insecticide products applied to sheep to suppress vector blood feeding (biting midges and mosquitoes) resulted in two effective synthetic chemical products that can be deployed in the event biological and climatological conditions suggest a high risk of an epizootic.

Results

The 2012 summer weather patterns were similar to 2007 when epizootics of West Nile virus and bluetongue occurred in the state. Based on surveillance collections, biting midges (bluetongue vector) and mosquitoes (West Nile virus vector) were increasing. MSU researchers and Montana Department of Livestock researchers formed a taskforce to address this concern and develop strategies for vector mitigation. Through a series of conference calls, they developed recommendations and shared the information with participants expected to attend the 2012 ram sale. Fortunately, bluetongue transmission was not detected, but several producers expressed appreciation for the alert and pro-active action taken by MSU and the state livestock department.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #5

1. Outcome Measures

Meetings that maintain or enhance Montana's presence in the production of quality meat products

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Quality meat production is critical for producers, processors, and consumers. Educational programs geared toward specific audiences enhance food safety awareness and increases the quality of meat products produced and processed in Montana.

What has been done

An MSU professor and beef cattle specialist administered the Steer of Merit program, providing feedback on youth beef cattle projects for youth, parents, beef cattle producers, and county agents. The state Steer of Merit Committee meets annually to set industry-reflective standards for the following fair season.

Results

In 2012, 890 carcasses were submitted to the state Steer of Merit program. Experts awarded SOM certificates to eligible carcasses and presented the top 5 awards in carcass and ultrasound divisions at the Montana Stockgrowers Convention in December 2012.

Two professors redesigned a university course in the Animal and Range Sciences Department to include social and video media. They incorporated agriculture and range science advocacy training into the course and as a result one of the three students is actively blogging in advocacy of beef cattle ranching and her blogs have been distributed to a wide audience. The blogs for the course can be seen at <http://msugradstudents.wordpress.com>.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
503	Quality Maintenance in Storing and Marketing Food Products
702	Requirements and Function of Nutrients and Other Food Components
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
902	Administration of Projects and Programs
903	Communication, Education, and Information Delivery

Outcome #6

1. Outcome Measures

Number of producers that participate in livestock tracking programs

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

USDA has encouraged livestock tracking programs for producers as a national effort to mitigate transmission of disease and track animals if there is a disease outbreak.

What has been done

MSU researchers evaluated electronic identification tags and are now emphasizing DNA tracking in the sheep and cattle industry. MSU hired two faculty members in 2012 to enhance DNA and

genetics management and a rumen micro-biologist. At the Northern Agricultural Research Center researchers evaluated 276 replacement heifers and developing bulls through the GrowSafe System. Reproduction, longevity and RFI are evaluated and the data will be used for long-term tracking and monitoring of the livestock.

Results

The electronic identification tags resulted in approximately \$12 per head more income for producers in Montana. Through the use of EID tags producers are receiving carcass information and sometimes even feedlot information, allowing them to identify production characteristics for their herd and for individual bloodlines beyond typical ranch production traits. This information allows producers to position their production for the future and identify specific markets that fit their product.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

MSU COA and MAES experienced significant faculty movement impacting this planned program. Previous projects highlighted in the 2012 Plan of Work included extensive research into brucellosis and prion diseases. The principal investigators in these projects were recruited to larger institutions with significant salary increases, and these projects were terminated.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Montana has 2.5 times more cattle than people providing the foundation for the number one industry in the State - agriculture. It is in this context that researchers design, implement, and conduct research projects within the COA/MAES. Research in the Animal Health Program is critical to the industry in Montana and producers and consumers alike who count on the investigators to promote a healthy industry through their consistent research. Highlights for 2012 were:

- Advancements in knowledge of Staphylococcus Aureus in humans and livestock
- Hired new faculty members, two of which are core users of new molecular tools

- Evaluated 256 animals through the GrowSafe system and added new equipment to MSU research center doubling the capacity of researchers to evaluate residual feed intake
- Conducted webinars, workshops, and seminars to share up-to-date information on animal health and quality assurance reaching audiences in excess of 1,500

Key Items of Evaluation

The Animal Bioscience Building combined with state-of-the-art laboratory equipment assisted in the successful recruitment and hiring of three new faculty members in the Animal and Range Sciences Department for the College of Agriculture. The new faculty include a beef geneticist, a range ecologist, and a rumen microbiologist. The College also purchased an Illumina MiSeq and is using it to help members of the Crow Indian Reservation identify sources of antibacterial resistant E. Coli.