V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Animal Production

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	20%		20%	
302	Nutrient Utilization in Animals	20%		20%	
303	Genetic Improvement of Animals	10%		10%	
304	Animal Genome	10%		10%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	10%		10%	
307	Animal Management Systems	20%		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	3.0	0.0	6.6	0.0
Actual	2.6	0.0	7.3	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
132100	0	252817	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
132100	0	252817	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Animal Production

In a current studyon sheep reproductive physiology, ewes giving birth to twins increased 20 %. This would equal to 200 additional lambs for a 1000 ewe flock which would mean an additional $20,000 in potential lamb sales.

Ruminants utilize a symbiotic relationship with microorganisms residing in rumen to digest fiber into volatile fatty acids which can be absorbed and converted by the animal to energy. Ruminal microorganisms use quorum sensing to communicate in the rumen. Quorum sensing allows the microorganisms to organize and build the necessary biofilms on fibrous feedstuff. Cellular communication and the development of biofilms are necessary for the digestion of fiber. If microorganisms are not able to communicate in the rumen, then fiber digestibility decreases. There is a drive in the animal industry to understand what dietary conditions impact intercellular communication and thereby increase digestion of fibrous feedstuffs. Vibrio harveyi BB170 luminesces in response to intercellular communication and has been used in experiments to measure quorum sensing of pathogens. The objective of this study was to measure the impact of ruminal fluid on the growth of V. harveyi BB170. The effect that ruminal fluid had on the growth of V. harveyi BB170 was measured by using turbidity measurements at 600nm and comparing the growth at 24 and 48 hours. Data were analyzed using the MIXED procedure of SAS. Model included effect of dietary treatment on turbidity at 24 and 48 hours. There was no significant effect of dietary treatment on growth of BB170 ($P > 0.19$). Further analysis, such as minimum inhibitory concentration assays could be used to further characterize the response of V. harveyi BB170 to ruminal fluid.

Findings demonstrated that plasma amino acid concentrations decrease in steers exposed to an endotoxin, and suggest that the metabolic demand for essential and non-essential amino acids may increase under conditions in which the immune system is stimulated in growing beef cattle. The research demonstrated that the negative effects of inflammation and stress on nitrogen balance are not alleviated by post-ruminal supplementation of branched-chain amino acids or arginine. However, post-ruminal supplementation of branched-chain amino acids or arginine increased nitrogen retention of both healthy and immune-challenged steers. Additionally, our research demonstrated that supplementation of rumen-protected methionine to growing feedlot heifers increased animal performance and feed efficiency, but did not affect morbidity. This research provides insight towards providing nutrition to target improved animal immunity by identifying those amino acids that are limiting in newly weaned beef calves, thereby providing the opportunity to reduce calf morbidity. If this effort reduces calf morbidity by only 2% annually, savings to the United States beef industry is estimated to be $12 million/year (based on 600 million/year morbidity loss).

Winter wheat pasture (small-grain pasture) is a unique and economical renewable resource in the southern Great Plains. It is available in late fall, winter, and early spring, when other forage sources are low in quality and quantity. For this reason it is the primary forage for young grazing ruminants. Therefore, improvements in performance of cattle grazing winter wheat could have a tremendous impact on producer's income and also on producer's expenses due to reduced days on feed at the finishing phase. Research results suggest that supplementing cattle grazing wheat pasture with dried distillers grains with solubles improves performance because it increases total caloric intake without affecting forage intake and digestibility.

Since whole-herd data collection systems for beef cattle are slowly developing in the U.S., applied genetic research is greatly needed to develop strategies thatprovide enhanced economic opportunities for beef producers. A multidisciplinary team of scientist with expertise in reproductive physiology and genetics

established along-term goal to understand genetic pathways regulating reproductive performance in beef cattle, with the intent of using the information to develop gene-assisted improvement programs for fertility. Research is testing the hypothesis "we can discover and test functionality of markers in chromosomes that are associated with reproductive performance in beef cattle." The markers to be evaluated will be single nucleotide polymorphisms (SNP). Access to data and DNA resources from large beef organizations is available so the hypothesis can be tested by pursuing these objectives:1) Conduct a SNP-based whole-genome scan to identify important chromosome regions associated with heifer pregnancy rate. 2) Develop data and DNA resources from large commercial beef operations for validation and technology transfer. These resource populations will be from varied commercial production systems and environments representing the U.S. beef industry. These resources allow expansion of the research efforts to include other economically relevant reproductive traits such as heifer rebreeding rate and stayability. In the past year, the project genotyped 802 Brangus heifers with the SNP-chip of Illumina (San Diego, CA; bovineSNP). This effort yielded ~54,000 genotypes across the bovine genome for QTL detection. From this effort, QTL were mapped to 30 regions on 12 chromosomes (BTA 3, 4, 5, 6, 9, 14, 16, 19, 20, 25, 26 and 29). Average frequency of the A allele for these SNP was 0.50 in this composite population compared to 0.53 in Angus and 0.47 ± 0.05 in Brahman cattle used to develop this beadchip. Nine regions were new findings for CattleQTLdb (Release 8). Two of the 7 SNP associated with birth weight also associated with longissimus muscle area and rib fat and were on BTA 5. The most notable SNP effect was on BTA 6, and accounted for 2.8% of the phenotypic variation in birth weight (35.2 ± 0.4 kg). This type of analyses were also completed for the binary heifer fertility trait, pregnant as a yearling on chromosome 2. In brief, Bioinformatic tools of www.animalgenome.org were used to visualize informative SNP (SNPlotz), QTL published for the region (CattleQTLdb), and potential candidate genes (gBrowse). Ten QTL and 10 annotations were identified in a 4 Mb region flanking the SNP inferring this QTL. Since hypothalamus is a regulatory tissue of the reproductive endocrine axis, transcriptome of this tissue was sequenced using the Illumina Genome Analyzer II and aligned with bovine genome to evaluate presence and level of expression of potential candidate genes among pre and postpubertal heifers through Alpheus®; Three genes with differential hypothalamic-expression were identified. Ontology of these genes included neuron function and cell signaling. Cummatively, these results indicate that objective 1 is being achieved. For objective 2, the collaborations also collected ~10,000 DNA-blood cards to help build DNA and phenotype resources for technology transfer and development of marker assisted breeding programs in beef cattle. Discovery of functional regions of the bovine genome will assist with design of DNA-based tools for genetic improvement of reproductive traits in beef. These tool have the potential to enhance efficiency and profitability of the beef and dairy industry.

A study was conducted to determine the effects of supplemental dietary lysine on nitrogen retention, plasma amino acid levels, and serum immunoglobulin G (IgG) levels of mature sedentary horses.The results showed nitrogen retention was not a suitable measure to determine dietary lysine requirements in mature horses. However, the observed responses in select plasma amino acid concentrations warrant further study as a means to estimate the actual dietary lysine requirement of mature horses at maintenance. Serum IgG concentrations were not influenced by the amount of dietary lysine in this study.

- 10,000 producers in New Mexico gained knowledge and understanding of lamb carcass grading, feeding and selection through educational seminars.

- Northern New Mexico sheep producers participated in wool marketing strategies to market 80,000 pounds of wool at top market price equaling $95,000.

- Producers reported a 50% increase in crop yield production due to knowledge gained on variety selection, soil preparations, fertilization and harvest practices.

• 475 new producers were certified in the Bovine Quality Assurance program.

• Over 500 cattle producers' state wide attended educational seminars and have an increased understanding of how to identify, treat and eradicate Trichomoniasis.

• Producers that attended weed control workshops and implemented practices resulted in a 90% success rate of eradication.

• Increased awareness of cow efficiency and implementation of artificial insemination techniques resulted in higher profitability.

• Producers across the state are collecting precipitation data to reflect live data in effort to decrease the lack of data going into the national drought monitor.

• 15 trappers/producers participated in the predator control program yielding 115 coyotes resulting in less livestock lost.

• $6,300 range improvements were made as a result of money from the offsite mitigation fund.

• Producers in Northeast New Mexico gained knowledge and understanding in new/innovative DNA marking technology for bull selection.

• Southwestern New Mexico Cooperative Weed Management Area attained grant funding of $166,000 to hire a coordinator to map noxious weed infestations and educate county clientele on identification.

• 90% of producers that participated in range monitoring programs showed an increased awareness of its importance.

• 997 producers across New Mexico gained knowledge in livestock/cattle marketing, vaccinations, nutrition, reproduction, herd health and Trichomoniasis.

• Producers in Northern New Mexico reflected an 80% increase in awareness of equine resources available to them.

2. Brief description of the target audience

The target audience includes: ranchers, feedlot operators, and dairy producers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	5	5	
Actual	5	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Target	Actual
2010	0	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of improved animal varieties
3	# of research publications
4	# of methods, technology, and animal varieties adopted by public and private sectors

Outcome #1

1. Outcome Measures

# of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	2	11

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

of improved animal varieties

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals

Outcome #3

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

of methods, technology, and animal varieties adopted by public and private sectors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	2	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

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

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

Brief Explanation

{No Data Entered}

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}