V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Livestock & Range

☑ 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	50%		10%	
213	Weeds Affecting Plants	0%		15%	
303	Genetic Improvement of Animals	0%		10%	
304	Animal Genome	0%		15%	
307	Animal Management Systems	50%		30%	
308	Improved Animal Products (Before Harvest)	0%		10%	
315	Animal Welfare/Well-Being and Protection	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Paid	9.7	0.0	14.5	0.0
Actual Volunteer	0.6	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**
137735	0	285107	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
137735	0	2851070	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
385490	0	1892338	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Livestock and Range (L&R) Reporting Unit strives for rangeland health, improved animal health and production, industry policy and regulation awareness, and economic sustainability using a broad array of methodologies that provides information, skills, and technology to producers and L&R Unit members. This PRU is designed for Extension Programming for livestock producers, ranchers, and rangeland managers who have, or are striving for, a significant portion of their personal income coming from the farm/ranch. These may be small farms/ranches or larger scale operations. Livestock producers may also integrate cropping production systems into their operation.

2. Brief description of the target audience

Target audiences include youth and adult livestock producers as well rangeland managers and ranchers.

3. How was eXtension used?

Ask an eXpert

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	57609	0	3906	2910

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	605	50	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes, trainings, workshops, demonstrations, field days, technical assistance, etc. conducted

Year	Actual
2014	354

Output #2

Output Measure

- One-on-one direct client contacts by site visit, office drop-in, e-mail, telephone, Ask an eXpert, etc.

Year	Actual
2014	1034

Output #3

Output Measure

- Meetings convened and /or facilitated

Year	Actual
2014	97

Output #4

Output Measure

- Kits or similar resources loaned or provided

Year	Actual

2014	4

Output #5

Output Measure

- Extension-related research and assessment projects

Year	Actual
2014	23

Output #6

Output Measure

- Web hits

Year	Actual
2014	6526

Output #7

Output Measure

- Indirect contacts through Media releases/appearances, newsletters, blog posts, or other non-peer reviewed publications

Year	Actual
2014	50478

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	LR1.1) Livestock and rangeland managers apply newly gained information, technology, or skills to improve animal health and/or animal production.
2	LR1.2) Livestock and rangeland managers apply newly gained information, technology, or skills to improve rangeland health.
3	LR1.3) Livestock and rangeland managers apply newly gained information, technology, or skills to improve economic sustainability.
4	LR1.4) Livestock and rangeland managers develop/write a management plan (i.e. grazing plan, feeding plan, drought plan, business plan, etc...).
5	LR1) Livestock and rangeland managers optimize animal health and production while maintaining/improving rangeland health and economic sustainability.
6	LR2.1) Livestock and rangeland managers apply newly gained information in their decision making process for following or developing new industry policies and regulations.
7	Reduction of low larkspur (Delphinium spp.) abundance and toxicity on Colorado rangelands using targeted competition from seeded forbsColorado Foothills Rangelands
8	Management of Forages in Colorado for Improved Yield and Quality
9	National Genetic Evaluation of Beef Cattle

Outcome #1

1. Outcome Measures

LR1.1) Livestock and rangeland managers apply newly gained information, technology, or skills to improve animal health and/or animal production.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	660

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2007, the National Ag Census ranked Colorado as 5th in the nation for value of cattle and calves ($3.2 billion) which is over half of the total market value of agricultural products sold in Colorado. During the same period, Colorado ranked 2nd in the nation for sheep and goat sales ($85 million). As of January 2012, there were 2.75 million cattle and calves in the state. This is an increase of 150,000 head since January of 2009. However, due primarily to drought in the state, cattle and calve numbers have dropped back to 2.6 million head, as of January of 2013. The economic contribution from cattle is greater than 3 times that of grains, oilseeds, dry beans and dry peas ($1.0 billion). Milk cows in the state, during 2013, were estimated at 135,000 head and average milk production per cow per year is 23,430 pounds. Total milk produced for the state is estimated at 3.16 billion pounds per year. The number of sheep estimated in the state in January of 2012 was 460,000. As of December of 2011, the total estimated number of horses and pigs in the state was 720,000. Overall, rangeland and livestock are among the most important agricultural resources in the state.

What has been done

Results
660 livestock and rangeland managers reported they applied newly gained information, technology, or skills to improve animal health and/or animal production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #2

1. Outcome Measures

LR1.2) Livestock and rangeland managers apply newly gained information, technology, or skills to improve rangeland health.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There are over 30,000 farms and ranches in Colorado consisting of over 30,000,000 acres of agricultural land (land in farms and ranches), 46% of the state-s total land area of 66.3 million acres. Colorado-s agricultural industry has lost nearly 2 million acres of agricultural land over the last ten years. Agricultural land in Colorado is being converted in three primary ways: urban and built up lands, low density non-agricultural rural land, and public open lands. As we continue to lose acres of agricultural land, we also continue to have fewer days spent working on the farm or ranch. 38.5% of operators worked 200 days or more off the farm or ranch.

Agriculture land represents more than 85% of the private, undeveloped land in Colorado. Another 35%, approximately, is federally owned, of which a large percentage is leased for agricultural production.

What has been done
With PLT and WSARE funding, nine on-farm workshops were held for land managers in Delta, Larimer, Boulder, Eagle, Pitkin, Adams, Jefferson, Routt, and Montezuma Counties. The program involved cross-state and cross-agency cooperation. Partners included USDA-NRCS, local Conservation Districts, CO State Forest Service, Denver Water, and local farmers. The program highlighted successful multi-state cooperation with Steve Fransen, Extension Forage Crop Specialist from Washington State University and Glenn Shewmaker, Extension Forage Specialist from University of Idaho Twin Falls Research and Extension Center.

Results
The program above allowed for county agents to work with their communities and local partners

to develop a farm tour appropriate for their location. In total, these educational workshops impacted 220 land managers. Evaluations revealed that as a result, participants expect to save a total of $81,400 over the next 10 years. Sixty livestock and rangeland managers reported they applied newly gained information, technology, or skills to improve rangeland health.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources

Outcome #3

1. Outcome Measures

LR1.3) Livestock and rangeland managers apply newly gained information, technology, or skills to improve economic sustainability.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	391

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results
391 livestock and rangeland managers reported they applied newly gained information, technology, or skills to improve economic sustainability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
307	Animal Management Systems

Outcome #4

1. Outcome Measures

LR1.4) Livestock and rangeland managers develop/write a management plan (i.e. grazing plan, feeding plan, drought plan, business plan, etc...).

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results
52 livestock and rangeland managers reported they developed/wrote a management plan (i.e. grazing plan, feeding plan, drought plan, business plan, etc...).

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
307	Animal Management Systems

Outcome #5

1. Outcome Measures

LR1) Livestock and rangeland managers optimize animal health and production while maintaining/improving rangeland health and economic sustainability.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	102815

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The ultimate goals of this PRU are to promote rangeland health, improved animal health and production, improved policy and regulation awareness, and economic sustainability using a broad array of methodologies that provides information, skills, and technologies to livestock producers, ranchers, and rangeland managers.

What has been done
Members of the Livestock and Range PRU have demonstrated expertise and recognition in areas of livestock and range research and educational efforts. This expertise spans several departments, colleges and disciplines. For example, within the Animal Science Department production expertise in cattle nutrition, reproduction, genetics and meat science are all represented. In addition, members of the work team represent veterinary medicine, rangeland science as well as agricultural economics. The team also has broad representation from both on-campus and off-campus faculty.

Results
102815 animals where health/production was affected/improved
339105 acres on which rangeland health was affected/improved.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
307	Animal Management Systems

Outcome #6

1. Outcome Measures

LR2.1) Livestock and rangeland managers apply newly gained information in their decision making process for following or developing new industry policies and regulations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	104

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture is the second largest economic driver in Colorado, with more than $7.7 billion in agricultural income receipts, according to the 2013 USDA-NASS Colorado Agriculture Overview. Yet, many Colorado residents have little to no understanding of where their food and fiber comes from or how it is produced.

What has been done
Twenty-seven Coloradans traveled to Washington, DC for a series of meetings related to ag policy and ag issues. While in Washington, DC we linked up with agricultural producers & professionals from Kentucky and Montana who were conducting similar meetings. In addition to the Kentucky & Montana groups, the Colorado team met with USDA-Foriegn Ag Service, Environmental Protection Agency, Senator Bennet's office, Congressman Gardener's office, National Association of Wheat Growers, National Cattleman's Beef Association, Humane Society of the United States, Embassy of Ireland, American Farm Bureau Federation, Western Governor's Association, Governor Hickenlooper's DC office, National Farmer's Union, & Major General Michael Edwards.

Some of the key discussions centered around trade, "Waters of the United States", opening international markets and WIC to US potatoes, the Trans-Atlantic Free Trade Area & the Trans Pacific Partnership Free Trade Agreements, Payment in Lieu of Taxes, and GMO food labeling.

Results
104 livestock and rangeland managers reported they applied newly gained information in their decision making process for following or developing new industry policies and regulations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
307	Animal Management Systems

Outcome #7

1. Outcome Measures

Reduction of low larkspur (Delphinium spp.) abundance and toxicity on Colorado rangelands using targeted competition from seeded forbsColorado Foothills Rangelands

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Larkspurs are often considered the most damaging poisonous plants on rangelands in the western United States, and specifically in Colorado. Published accounts of livestock losses over the past 90 years are normally around 3-5%, but sometimes as high as 15% and translate into annual economic impacts of more than $20 million to the livestock industry. Animal death is the easiest economic impact to quantify, but there are others. Larkspur may completely dictate grazing management as producers attempt to minimize or avoid livestock losses to larkspur poisoning.

What has been done
A variety of plots from 2011-2013 were considered in looking at applications of sprayed herbicides 2,4-D and Tordon as well as unsprayed plots to determine larkspur densities and competitive interactions among native and introduced forbs.

Results
Analysis completed on 2013 field data was completed and reported. Major findings include that by 2013, larkspur densities in plots sprayed with 2,4-D in June 2011 were similar to unsprayed plots. Plots treated with Tordon in June 2011 had significantly lower larkspur densities than plots treated with 2,4-D in June 2011. Larkspur canopy cover in 2013 was lower in plots sprayed with Tordon

in June 2011 than unsprayed plots and plots sprayed with 2,4-D in 2011 which did not differ statistically. Considering all results, although both 2,4-D and Tordon may reduce larkspur abundance, it appears that Tordon is more effective at both reducing larkspur and minimizing unwanted damage to existing and seeded forbs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
213	Weeds Affecting Plants
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

Outcome #8

1. Outcome Measures

Management of Forages in Colorado for Improved Yield and Quality

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Forages preserved as hay generally ranks as one of the top 3 field crops in terms of value of production in Colorado. In 2009, hay was the leading crop in Colorado with an estimated value of $633 million, accounting for 31.4% of the total value from all crops. Colorado is experiencing several trends that are creating a need for additional information related to forage production and management.

What has been done
Side-by-side fallowing treatments of three alfalfa hayfields and six grass hayfields located on the Western Slope of Colorado. Treatments on the alfalfa sites include fully irrigated (control), stop irrigating after the first cutting, and stop irrigating after the second cutting. The grass sites include

a fully irrigated treatment and a full season fallow, or nonirrigated treatment.Forage samples for both yield and
quality were taken prior to each hay harvest.

Results
Yield reductions at the season-long fallowed grass sites (4 sites) ranged from 24% to 70% in 2013. In 2014, two additional grass sites were fallowed with yield reductions of 81% to 93% compared to the fully irrigated control. The sites fallowed in 2013 were returned to full irrigation in 2014. Yields at these sites were still 39% to 54% below those of the fully irrigated paired plots after one year of recovery. Data was taken at the Peterson Ranch site in 2012 during the drought and again in 2014. Following 2 years of full irrigation, yields at this site were similar between the fallowed (drought affected) and fully
irrigated plots indicating full recovery. Yield reductions at the alfalfa sites for the treatment where irrigation was stopped after the second cutting ranged from 0% to 54% in 2013 and 4% to 39% in 2014. For the treatment where irrigation was stopped after the first cutting, yield reductions ranged from 42% to 71% in 2013 and 55% to 82% in 2014. The complete fallow treatment, only implemented at the Yellow Jacket site in 2013, showed a 77% yield reduction. Alfalfa appears to be very conducive to partial season irrigation which provides an opportunity for hay producers to reduce consumptive water use while still maintaining partial yields in a given year and stands over time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
213	Weeds Affecting Plants
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

Outcome #9

1. Outcome Measures

National Genetic Evaluation of Beef Cattle

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Economically relevant traits (ERT) will be reviewed to identify those that represent either revenue or cost streams in all sectors of the beef industry to help with the development of new genetic evaluation and selection tools for these ERT in the form of expected progeny differences (EPD) and economic EPD indexes. The development of computational methods for national cattle evaluation for both purebred and crossbred databases to assist in perfuming routine genetic evaluations for beef breed associations and other producer groups.

What has been done
In the past year, we developed a multi-breed stayability genetic evaluation for the incorporation of heterosis and founder breed effects. Heterosis values for stayability to two, three, four and five years of age were calculated. Results of this study showed that a first cross animal has an 5.4%, 9.2% 10.9% and 12.2% greater chance of remaining in the herd until 3, 4, 5 and 6 years of age, respectively.

Results
The CSU Center for Genetic Evaluation of Livestock (CSU-CGEL) has worked to develop, improve and implement largescale genetic evaluations for various livestock populations through incorporating study results into a multi-breed stayability evaluation that included all animals in the breed association registry, regardless of breed percent.. The CSU-CGEL is the close working relationship with various beef cattle breed associations as well as individual producer groups to provide sire selection tools in the form of expected progeny differences (EPD) and corresponding accuracies for over 17 different beef cattle traits.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
304	Animal Genome
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

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

Livestock and range outcomes are dependent on public policies/regulations, climate, disease outbreaks for forages and livestock, and episodic natural disasters such as drought, flooding, blizzards, and wildfire. Additionally, changes in the stock market as well as increasing input costs (e.g. fuel costs) will affect livestock and range outcomes. These external factors will be addressed when possible in education and research efforts, but their influence on outcomes is likely to continue into the future.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A statewide survey has been developed for all Livestock and Range PRU members to use. This survey is divided to represent the 4 quarters of the state, NE, SE, SW, NW allowing an overall summary and area-specific summary for all livestock and range programming needs. This survey also allows participants to list specific programming needs and delivery method. This survey will also allow the PRU to develop an entire statewide programming effort when needed.

Key Items of Evaluation

Extension livestock and range team assists livestock producers to optimize animal health and production while maintaining/improving rangeland condition and economic sustainability. One-on-one direct client contacts by site visit, office drop-in, e-mail, telephone, and/or Ask an eXpert are a vital component of reaching livestock producers. Many prefer this setting as it can enhance their ability to learn, retain, and apply research based information and education.

- "I'm glad I called. That's exactly what I needed to know." -Livestock/Land Owner
- "You did a lot of good today. I'm glad you (Extension) don't mind working with people who have disabilities." -Land Owner
- "I didn't know Extension did this. I feel much better about turning my animals out to pasture." -Land/Livestock Owner