

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Sustainable Energy: Land and Livestock

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
102	Soil, Plant, Water, Nutrient Relationships	5%		0%	
111	Conservation and Efficient Use of Water	5%		5%	
121	Management of Range Resources	10%		5%	
122	Management and Control of Forest and Range Fires	5%		0%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
205	Plant Management Systems	12%		0%	
213	Weeds Affecting Plants	5%		10%	
215	Biological Control of Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	5%		0%	
301	Reproductive Performance of Animals	5%		15%	
302	Nutrient Utilization in Animals	8%		0%	
305	Animal Physiological Processes	5%		10%	
306	Environmental Stress in Animals	5%		0%	
307	Animal Management Systems	10%		10%	
308	Improved Animal Products (Before Harvest)	10%		10%	
405	Drainage and Irrigation Systems and Facilities	0%		5%	
601	Economics of Agricultural Production and Farm Management	0%		5%	
605	Natural Resource and Environmental Economics	5%		8%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		5%	
901	Program and Project Design, and Statistics	0%		2%	
	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	8.9	0.0	5.0	0.0

Actual Paid	13.1	0.0	4.0	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
361751	0	328649	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
361751	0	328649	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
448722	0	2408239	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Planned activities include beef schools, forage schools, range-in-school, grazing academy, BQA workshops, weed workshops, monitoring workshops, demonstration/applied research trials, Extension publications, popular press articles, tours, field days, faculty training sessions, web sites, CD-ROM based learning modules, office visits, and farm/ranch visits. The focus of these efforts will depend on stakeholder input, questions, and needs. When appropriate, information generated by the team will be presented in scientific journals and at professional meetings.

Alfalfa and Annual Forage Production and Harvesting planned activities include:

- Alfalfa variety trials
- Annual forage variety trials
- Irrigation management trials and demonstrations
- Idaho Hay and Forage Conference
- Local forage and pasture schools and workshops
- Documenting quality of forages from different production environments
- Investigation and reporting of suitability of alternative forage species and their utilization in livestock production systems to extend the grazing season.
 - Popular press and journal articles
 - Forages website
 - Extension publications

Efficient Production Management and Marketing of Livestock planned activities include:

- Beef Quality Assurance workshops
- Vaccine storage and handling studies and reports
- Intermountain Rangeland Livestock Symposium
- Lost Rivers Grazing Academy
- Local Winter Beef Schools
- Alternative forage production trials to extend the grazing season

- Pasture management workshops
- Baseline survey of beef cattle producers on grazing and feeding practices
- Popular press and journal articles
- Beef website
- Extension publications

Rangeland Resource Management and Utilization planned activities include:

- Intermountain Rangeland Livestock Symposium
- Collaboration with the University of Idaho Rangeland Center
- Wolf-cattle interaction research and workshops
- Regional fire cycle/cheatgrass workshop,
- Collaboration with the Idaho Rangeland Resource Commissions public perception surveys
- Development of a public policy curriculum
- Local rangeland demonstrations, workshops and tours
- Popular press and journal articles
- Range-In-Service
- Extension Publications

2. Brief description of the target audience

The target audience most likely to participate in and benefit from these programs are:

Beef cattle producers, beef industry participants and allied industry representatives, land owners, range/pasture livestock producers, local government and resource management agency personnel.

Livestock and forage producers are likely to be positively impacted by new and improved production practices that will improve their profitability and ecological sustainability.

Alfalfa and grass seed producers are likely to be positively impacted as many improved practices may involve the planting of new varieties with high productivity and pest resistance.

Supplies of a variety of production input are likely to be positively impacts since improved practices may include the use of new materials, machinery or other production inputs.

Small acreage land owners will have a great understanding of the biology of their land and livestock resources, and will be less likely to be impacted by weed invasion or be taken advantage of by unscrupulous input suppliers.

3. How was eXtension used?

use of eXtension is determined as individual faculty identify useful resources for their programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21737	43744	3406	3939

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	11	22	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Producer schools. (number of schools: multiple sessions of instruction on multiple subjects)

Year	Actual
2014	16

Output #2

Output Measure

- Workshops (including BQA).

Year	Actual
2014	85

Output #3

Output Measure

- Demonstrations and applied research projects.

Year	Actual
2014	37

Output #4

Output Measure

- Popular press articles.

Year	Actual
2014	54

Output #5

Output Measure

- Newsletters; number of issues.

Year	Actual
2014	51

Output #6

Output Measure

- Field days

Year	Actual
2014	12

Output #7

Output Measure

- Presentations at producer meetings

Year	Actual
2014	250

Output #8

Output Measure

- Budgets developed to improve clientele decision making

Year	Actual
2014	12

Output #9

Output Measure

- Curricula developed

Year	Actual
2014	1

Output #10

Output Measure

- Surveys conducted

Year	Actual
2014	3

Output #11

Output Measure

- Tours conducted

Year	Actual
2014	13

Output #12

Output Measure

- Websites created or significantly enhanced (number of sites)

Year	Actual
2014	9

Output #13

Output Measure

- Blogs created and maintained

Year	Actual
2014	9

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	O: Learners will adopt new, accepted, or recommended production practices. I: Number of participants indicating in post-program surveys that they have or intend to adopt recommended practices.
2	O: Learners acquire knowledge and understanding of new, approved, or recommended practices. I: Number of participants citing change in knowledge on evaluation instruments(pre- post-test results) [number of evaluations administered and examined.
3	O: Learners are aware of new, accepted, or recommended production practices and emerging technologies and issues (BQA, NAIS, etc.) I: Number of participants at educational events.
4	O: An increase in the number of trained graduate students prepared to enter the workforce. I: Number of M.S. and Ph.D. candidates relevant to this topic team.
5	O: Producers possess skills and knowledge about beef quality assurance (BQA). I: Number of Idaho Beef Quality Assurance (BQA) Program certificates awarded.

Outcome #1

1. Outcome Measures

O: Learners will adopt new, accepted, or recommended production practices. I: Number of participants indicating in post-program surveys that they have or intend to adopt recommended practices.

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)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals

307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

O: Learners acquire knowledge and understanding of new, approved, or recommended practices. I: Number of participants citing change in knowledge on evaluation instruments(pre- post-test results) [number of evaluations administered and examined.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6170

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Issue. Livestock producers operate on a relatively narrow margin. Consequently, small changes in reproductive performance, animal growth, feed efficiency, animal health, and a dozen husbandry practices can have significant impact on the net return to the producer. Animal agriculture also can have significant adverse impacts on the environment and resource sustainability that can be reduced or mitigated through improved knowledge and the implementation of best management practices by the producer.

What has been done

To help increase awareness of end-product quality and provide education on the "meat" side of the industry, the Idaho Beef Summit was created. It was a 3-day educational program that focused on end-product quality and featured speakers, tours, and hands-on workshops on topics ranging from beef quality assurance to meat science 101. Two 4-day hands on grazing workshops were presented (Lost Rivers Grazing Academy). Three new "Cowboy Schools" were developed and delivered to teach producers about different pregnancy checking options, a new castration method and new antibiotics. A cover crop grazing trial in northern Idaho has been used for educational field days.

Results

143 beef producers attended the Idaho Beef Summit and evaluations have been positive. 100% of attendees stated they are more aware of end-product quality after attending the Summit, and

98% of attendees said they would consider end-product quality when making management decisions on the ranch. 35 Participants in the grazing academy demonstrated an increase in knowledge based on pre and post testing. Many participants rated the workshop as "the best they ever attended." A physicist with an interest in carbon sequestration suggested that "every state and federal legislator should take this class." Due to the results of the cover crop grazing trials, 10 producers adopted this technology into their management system and grazed the forage with their cattle. One producer indicated that adopting cover crop grazing generated \$300 net return per acre in pounds gained by his cattle.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

O: Learners are aware of new, accepted, or recommended production practices and emerging technologies and issues (BQA, NAIS, etc.) I: Number of participants at educational events.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4653

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reproductive efficiency of the cow/calf herd is essential to sustainability and profitability of the beef operation and the beef industry in Idaho. Beef cattle are the 2nd largest ag industry in Idaho, and beef cattle production occurs in every county in the state. Water use for forages such as alfalfa or corn are among the highest for crops grown in Southern Idaho. In years of reduced water supply, proper maintenance of irrigation systems can reduce water losses due to leaks, worn nozzles or poor system uniformity, resulting in desired crop performance with less applied water, and in reduced energy costs. The invasive grass *Ventemata dubia* has resulted in \$22,000,000 loss to the economies of eastern Washington and Northern Idaho.

What has been done

The Land and Livestock Team reported more than 30,000 educational contacts associated with 47 schools and workshops in 2014 and through another 153 educational presentations at producer meetings and other venues where the target audience could be reached. Field tours showed producers and agency personnel how cover crops can be adopted and which crops can be used to achieve varying producer and government program goals. Workshops/seminars were focused on principles of cow/calf management and beef cattle reproduction. Research was conducted to identify strategies for invasive plant control and workshops were held to describe the strategies. Range monitoring workshops attracted ranchers and agency personnel to learn and discuss how monitoring tools are used to improve livestock management.

Results

Producers increased their knowledge and understanding of beef reproduction, beef quality management, animal nutrition, grazing management and alternative forages, rangeland monitoring, animal husbandry, and pest management. 1,282 pesticide recertification credits were distributed to license holders associated with forage classes. Twenty new licenses were issued for both private and professional applicators. Professional licenses allow holders to find employment or advance in current employment. Evaluation of extension programs teaching about *Ventemata dubia* control indicated that 10% of the survey respondents no longer had on their property. The remaining landowners who had reported problems controlling *ventemata* indicated a 50% improvement in the success of weed control efforts on their property.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

O: An increase in the number of trained graduate students prepared to enter the workforce. I: Number of M.S. and Ph.D. candidates relevant to this topic team.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable livestock production depends on efficient growth of muscle throughout the animals' lifespan to yield the maximum quantity of meat for a given amount of input costs. The optimization and efficient use of feed is critically important to the sustainability and profitability of livestock production. Therefore, understanding the physiological mechanisms associated with optimal growth and muscle accretion and how to efficiently produce animal muscle (beef and trout) that yields the best quality is scientifically important. This research is specifically relevant to the US beef industry and the US aquaculture (rainbow trout) industry.

What has been done

Students have received training in the context of muscle physiology and the molecular evaluation of gene expression of myogenic transcription factors and their role in muscle growth. This

includes in vitro muscle cell culture, treatment and RNA isolation using both whole cell and laser assisted catapulting of individual cells.

Results

We have further characterized the pax7 gene paralogs expressed in teleost (fish) species as well as their respective promoter domains. Additionally, we have utilized bovine muscle cell clones to examine their response and cross-talk with bovine intra-muscular adipocytes (fat cells). These results improved characterization of the physiological mediation of myogenesis and the bovine muscle cell niche.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
305	Animal Physiological Processes
306	Environmental Stress in Animals
308	Improved Animal Products (Before Harvest)
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

O: Producers possess skills and knowledge about beef quality assurance (BQA). I: Number of Idaho Beef Quality Assurance (BQA) Program certificates awarded.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	440

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
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

strong meat prices have a significant impact on producer motivation to adopt changes in management.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Due to the results of the cover crop grazing trials in Idaho County, 10 producers adopted this technology, included it in their management system and grazed the forage with their cattle. One producer reported that, by adopting cover crop grazing, he generated \$300 net return per acre in pounds gained by his cattle. The alfalfa variety trials are in their 2nd production year. Results have shown that there is one variety that is out producing all the others in two locations. Due to this finding, an estimated 3,000 acres have been seeded to this variety.

Key Items of Evaluation