2016 University of Wyoming Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Agriculture is at a crossroads and faces many challenges and opportunities in the 21st century. New demands are placed on the industry to ensure that agriculture remains profitable and sustainable, while addressing environmental concerns. Issues involving production agriculture, natural resource management, and quality of life generate diverse research and extension directives. Stakeholders play a vital role in identification and prioritization of needs at the University of Wyoming.
The College of Agriculture and Natural Resources has a mission to serve the educational needs of students, Wyoming citizens, and the global community by providing and distributing unbiased, scientifically sound information. Research and Extension programs at the University of Wyoming focus on five initiatives: 4-H and Youth Development, Community Development Education, Nutrition and Food Safety, Agriculture and Horticulture, and Sustainable Management of Rangeland Resources. The five NIFA priority programs added spring 2010 Global Food Security and Hunger; Climate Change; Sustainable Energy; Childhood Obesity; and Food Safety, have been integrated with existing initiatives or have been added as standalone plans. The University of Wyoming Research and Extension efforts have been addressing issues outlined in the new plans for several years. Fiscal year 2016, the University of Wyoming research and extension programs reported success in all initiative areas. The College of Agriculture and Natural Resources is second at the University of Wyoming in total grant dollars brought in for research and extension. In-depth educational programs such as the Ranch Management Institute, Body Works, Food Safety, 4-H After School programs, and Wyoming Municipal institutes report strong impacts for citizens of the state. Each of the above UW Extension programs is multi-session educational classes with 8 to 70 hours of class contact time with participants. These are just a few examples of high impact educational efforts by the University of Wyoming. Research and Extension Centers at UW and across the state are producing research which is relevant and vital to agriculture, families, and communities.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	100.0	0.0	43.8	0.0
Actual	99.0	0.0	30.2	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel

- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The merit review process for extension programs covers all programs conducted by UW Extension. A team leadership model is utilized to review program plans and chart direction for UW Extension educational programs. Program initiative teams develop and review programs on an annual basis. Teams make decisions to maintain, modify, or create new programs to meet the needs identified through external and internal stakeholder input. Five area external advisory boards comprised of stakeholders review extension programs annually. Spring, 2007 UW Extension held a CSREES program review of the total extension program. The review report was used as a guide to move forward with the academic plan for 2009 to 2013. FY 2013 UW Extension completed a comprehensive internal and external stakeholder survey and focus groups to review current programs and develop the 2014 - 2018 academic plan. All projects supported with formula funds (Hatch, Multi-State, McIntire-Stennis, Animal Health) must be approved projects. The project proposal is transmitted to a minimum of two scientific reviewers who are knowledgeable in the field to review the proposal. After a proposal is revised to satisfy reviewer comments and concerns, it, along with appropriate supportive documents, is transmitted to the University of Wyoming Office of Research and Economic Development for signature of the Assurance Statement. The proposal is then approved by the Experiment Station Director before being transmitted to NIFA for final approval. The Wyoming Agricultural Experiment Station also administers an internal competitive grants program using a portion of federal dollars. Proposals are reviewed by a ten member university wide grant panel. Each proposal is also sent to a minimum of two external reviewers. Proposals recommended for funding are transmitted to NIFA for approval following signature of the Assurance Statement and subsequent approval by the Experiment Station Director. Both AES and UW Extension require an outreach plan in proposals which demonstrates integration of research and extension.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

During the past year stakeholder input came to the College of Agriculture and Natural Resources, UW Extension, and Agricultural Experiment Station through a variety of methods. As part of the UW Extension academic plan, a working group has explored methodology to gather statewide stakeholder input. This group recommended moving from traditional area advisory committees to a focus group model which will be rotated between counties in each of the five areas over a five year period. This systematic collection of data will be shared with county, area, and state initiative teams for program planning. FY 2016 five area stakeholder meetings were held which included five concurrent focus groups representing the five initiatives that identified issues of importance. The data was compiled to identify themes common across the state in each extension discipline. In addition, UW Extension gathers on-going input through a variety of methods which is utilized in program planning. This input is summarized and shared statewide with both UW Extension and AES. All counties have had targeted advisory meetings to gather stakeholder input through 4-H Expansion and Review committees to specifically address outreach efforts toward underserved youth audiences. County personnel also utilize collaborative partners to learn the needs within communities of the state. Both Research and Extension went through an academic planning process which was integrated into the College of Agriculture and Natural Resources plan. Each of the four Research & Extension Centers held an advisory committee meeting to gather input on existing research and outreach programs and to identify new priorities in relation to research. UW Extension and AES gathered stakeholder input through targeted meetings and surveys to move forward with the 2017 UW Academic Plan. The College of Agriculture and Natural Resources maintains a separate statewide advisory committee which meets twice annually.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

There are five geographic Extension areas. Modified focus groups meet in each area annually to gather stakeholder input. Selection to participate in focus groups is based on gender, geographic representation, race, national origin, and underserved audiences. In 2016, a variety of both formal and informal methods were used to gather stakeholder input. These methods ranged from written and on-line surveys to discussion groups and targeted meetings to identify program needs. The Wyoming County Commissioners Association has formed an advisory committee of county commissioners who meet with the UW Extension Director during quarterly meetings of their association. Research and Extension Center Advisory Committees and Focus Groups are represented by UW Extension educators, industry leaders, and landowners (government and private) in all counties that they service. Focus Group members are nominated by UW Extension, AES personnel, and or current members of the Advisory committee or Focus Group. Meetings are held one or two times per year. In addition to these systematic methods of gathering stakeholder input, both AES and UW Extension utilize both individuals and groups throughout the state to identify relevant issues of critical importance. Just a few examples include: commodity groups - such

as Wyoming Wool Growers, Stock Growers, Wyoming Wheat Growers, the Wyoming Crop Improvement Association, local and state nutrition councils, and youth organizations such as Big Brothers, Big Sisters, and school districts. These groups and individuals provide input through both formal and informal discussions with both research and extension personnel. Faculty, UW Extension specialists, and educators also gather relevant input from professional colleagues in Wyoming and across the nation.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Stakeholder input is collected through a variety of methods to reach the broadest scope of individuals and groups in Wyoming. UW Extension has utilized annual area advisory meetings which involve both traditional and non-traditional stakeholders. Pilot efforts using on-line surveys, focus groups, Extension cafe' have been explored by UW Extension.
Each stakeholder input session included individual focus groups around the five educational initiatives conducted by UW Extension: Sustainable Management of Rangeland Resources; Agriculture and Horticulture; Community Development; Nutrition and Food Safety; and 4-H Youth Development.
One-hundred and forty-five individuals participated in stakeholder input in Big Horn, Campbell, Laramie, and Lincoln Counties December 2015 through February 2016. Input session results were analyzed to help identify issues that have emerged across the state in the educational program initiative areas.
The AES also utilizes annual advisory meetings to gain input on research activities. Surveys both mail and on-line are used to assess needs. UW Extension educators and researchers target key stakeholders such as agriculture commodity groups, youth organizations, and schools through meetings where discussion is held on needs and issues. University of Wyoming educators and faculty assess needs throughout the year based on individual contact with citizens at meetings and in local communities. Faculty and Extension specialists and educators gather relevant input from professional colleagues through personal contact and interaction at professional meetings.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Stakeholder Input is used by AES and Extension in developing research priority needs, program direction, program improvement, and identification of emerging issues. Stakeholder input gathered through modified focus groups is summarized and shared with county, area, and state initiative teams as they develop and evaluate programs. In addition UW Extension utilizes input from stakeholders in identifying staffing priorities.

A comprehensive list of applied research priorities identified by our stakeholders, identified through stakeholder surveys and meetings, is available at http://www.uwyo.edu/uwexpstn/_files/docs/production-ag-research-priorities.pdf

Brief Explanation of what you learned from your Stakeholders

Sustainable Management of Rangeland Resources

• Access to public lands and a distrust between groups who use those lands lead to scrutiny of public land grazing. Tactics to describe rangeland management and grazing to a recreationist need to be different than discussing the mechanics of rangeland monitoring with a permitee.

• Management of weeds, wildlife, water and grazing management, and stocking rate were identified issues for educational programs and rangeland monitoring.

• The educational needs of small acre landowners are similar to those of rangeland owners: water utilization, ditch responsibilities, weed management, land use and planning.

Agriculture and Horticulture

• Regulations and land policies need to be understood by producers. Help interpreting the guidelines and adapting to the changing regulations is a priority.

• A growing emphasis is being placed on local food production. It includes strategies to quantify local markets, identify niche markets, access to markets, and providing resources about the products consumers demand.

• Cost of production, cash flow and financing options, and optimizing natural resources.

Community Development Education

• Education focused on leadership development for elected officials. Public engagement to encourage elected officials and citizens to collaboratively identify shared concerns, goals, and strategies to address issues.

• Access to technology was cited as a challenge for small business development; city, county, and federal regulations can erect barriers for planning and development; public transportation and affordable housing are challenges for lower income residents.

• Depreciation of the economy will have a major impact across the state. Loss of jobs and stagnant wages will affect families and an anticipated revenue shortfall will affect services provided by government.

Nutrition and Food Safety

• Hectic lifestyles require healthy meals that can be easily and quickly prepared. Convenience was often stated as a primary factor in deciding what to consume.

• The selection of fresh vegetables and fruits is limited in small, rural communities. Cost of perishable food items is also a detriment to purchasing healthier foods in all communities.

• Basic nutrition education for all audiences. Learning to make healthier choices when the options are limited will improve eating habits and lifestyles. Understanding how marketing influences consumer purchases will increase consumer savvy in purchasing decisions.

4-H Youth Development

• Technology and social media can be an effective communication tool, informing youths of opportunities to get involved, however it can also increase peer pressure, reduce social interaction, physical activity, and create dangerous situations when not used safely.

• Lack of parent support and involvement. Encouraging parents to get involved creates a vested interest in the program, and appropriate training is important when parents pursue becoming an approved volunteer leader.

• The cost to participate in youth organization activities can become a financial hardship for families.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1647422	0	2003681	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1647422	0	2003681	0
Actual Matching	1647422	0	2003681	0
Actual All Other	0	0	0	0
Total Actual Expended	3294844	0	4007362	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

4-H and Youth Development

☑ 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
806	Youth Development	100%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	33.0	0.0	0.0	0.0
Actual Paid	32.3	0.0	0.0	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**
537492	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
537492	0	0	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

Activities include volunteer training on the following topics: Ages and stages of youth; Risk Management; Youth Development Concepts; Non-profit Management/Coordination; Financial Management/IRS Issues; Project Training; Learning Styles; Club Maintenance; Recruitment and

Retention.

Traditional 4-H will focus on project or leadership activities; teach and/or facilitate educational programs; recruitment of new members, training, camps, clinics, contests, media, and assessment.

Non-traditional 4-H activities will include: Cloverbuds (pre 4-H); After school programs; School enrichment; Youth Leadership; Marketing; and Camps.

2. Brief description of the target audience

The University of Wyoming College of Agriculture and Natural Resources is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in Extension programs regardless of their race, national origin, gender, age, religion, or disability. 4-H Volunteers will be recruited from the following groups: Adults in the Community, Other Agencies, Civic Groups,Youth Groups, and the General Public.

Traditional 4-H youth audiences will target:

- Youth
- Volunteers
- Families
- Community.

The target audience for non-traditional 4-H will include: Underserved and high risk youth who do not participate in the traditional 4-H Youth program in Wyoming.

3. How was eXtension used?

eXtension was used as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension web site home page. All Extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert" and when appropriate those in the 4-H initiative respond to clientele request.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14214	1582738	43533	791369

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of youth enrolled in the traditional 4-H program. Target is number of youth enrolled in traditional 4-H club programs.

Year	Actual
2016	7908

Output #2

Output Measure

- Number of educational events, camps, training workshops, clinics implemented. Target is number of programs and events.

Year	Actual
2016	1818

Output #3

Output Measure

- Number of volunteers enrolled as leaders in the 4-H program. Target is number of volunteers enrolled in the 4-H program.

Year	Actual
2016	1780

Output #4

Output Measure

- Number of volunteers participating in formal training programs. Target is number of volunteers participating in training programs.

Year	Actual
2016	7179

Output #5

Output Measure

- Number of non-traditional programs established. Target is number of non-traditional programs.

Year	Actual

2016	342

Output #6

Output Measure

- Number of youth enrolled in non-traditional youth development programs. Target is number of youth enrolled in non-traditional programs.

Year	Actual
2016	12647

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Wyoming youth will acquire knowledge which builds life skills including critical thinking, public speaking, teamwork, self-discipline, responsibility, decision making, self-esteem, communication, and leadership. Target is number of youth reporting outcome.
2	Wyoming youth build assets and essential life skills to lead productive, responsible, and healthy lifestyles. Target is number of participants reporting outcome.
3	Non-traditional youth participating in programs serve in leadership roles, serve on governing bodies, act as mentors, and teach other youth.Target is number of participants reporting outcome.
4	Volunteers demonstrate knowledge of youth development principles. Target is number of participants reporting outcome.
5	Trained adult volunteers will demonstrate skills and abilities in which they are able to foster youth to become responsible adults. Target is number of participants reporting outcome.

Outcome #1

1. Outcome Measures

Wyoming youth will acquire knowledge which builds life skills including critical thinking, public speaking, teamwork, self-discipline, responsibility, decision making, self-esteem, communication, and leadership. Target is number of youth reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	38823

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The four concepts of Belonging, Mastery, Independence and Generosity are vital to the growth and development of youth. These essential elements create a positive environment where youth feel nurtured in a safe environment, master new skills and abilities, and are empowered to contribute to their environment and communities in a positive way. Youth, adults, employers, civic organizations, governments and communities all benefit when youth make positive contributions to society.

What has been done
1,818 educational programs were taught and/or facilitated by 4-H youth educators through the traditional 4-H program. 342 non-traditional programs were also conducted by 4-H youth educators and included afterschool programs, programs in alternative schools and special needs classrooms, and community outreach. All programs were designed to meet the learning objectives of the program and appropriate delivery methods for the audience. Delivery methods included short workshops, one day and multi-day camps, multi-session workshops over several weeks, and leadership retreats.

Results
A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from camps, judging programs, and Jr. Leader programs, all of which provide opportunities to build life skills. Each county across Wyoming utilized older youth as camp counselors to help plan and conduct 4-H camp. The camp counselors learned how to work as a team, create safe, inclusive environments for campers, solve problems, and teach younger members. Youth in the judging programs learned how to think critically, make decisions, and effectively communicate their thoughts through oral reasons. Older teens participating in the Jr. Leader programs, also developed a variety of leadership skills and used those skills to implement

fundraising programs, county achievement programs, and county-wide trainings for club officers or how to complete a club record book.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Wyoming youth build assets and essential life skills to lead productive, responsible, and healthy lifestyles. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	13036

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A recent stakeholder survey identified employment and lack of skills associated with gaining employment as a significant emerging issue in rural communities. Academic rigor and increased testing and accountability measures within our schools has left little time for soft skill development and career exploration during the school day. In addition, unlike more urban areas, many rural communities are not populated with fast food chains, department stores, and other businesses that readily employ teen workers. A coordinated effort to connect youth with professionals and employers in the community who can help guide and mentor youth towards educational and career pathways has become an effective way to fill this gap in workforce preparedness.

What has been done
County 4-H Educators have created educational programs in workforce preparation and organized opportunities for youth to gain experience needed for employment. Business Relationship Workshops taught business etiquette, application and interview skills, civil rights and conflict resolution, and customer service. Youth Business Ventures contests provided youth with opportunities to learn how to create a business plan and present their plan to the Chamber of Commerce for potential funding. A community collaboration, "Ready for the Workforce", provided skill training to high school aged youth, then matched them with hands on internship experiences with local businesses and organizations.

Results
All 15 program participants in "Ready for the Workforce" competed the program and were awarded a $500 stipend. A formal evaluation of the program showed youth either strongly agreed or agreed that the information in the program would be beneficial as they apply for jobs and they would recommend the program to others. During informal discussion upon completion of the program youth indicated the experience was very valuable for them in terms of feeling more confident about entering the workforce and four youth indicated is was helpful for them to understand the career options given their practical internship experience.

Participating businesses also indicated they felt the program was a great way to connect youth with professionals in the community and to explore potential career opportunities. Of the responding businesses, all indicated they would participate again and provided ideas to engage even more businesses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Non-traditional youth participating in programs serve in leadership roles, serve on governing bodies, act as mentors, and teach other youth.Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	12647

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Babysitting is one of the most common jobs for teenagers. Babysitters are entrusted with young children and have to care for them, plan activities, watch out for safety issues and deal with other important tasks. It's important for the sitters to learn all they can about safety, first aid and basic care. The responsibility of caring for children can help teens become more mature.

What has been done

One educational program that reaches a non-traditional audience are the babysitter programs for tweens. Two types of educational programs targeted to tweens who want to become babysitters have been offered in five counties: Babysitter Training Certification and a Tween Retreat for Babysitters.

Results
175 youth contacts were reported for the educational programs for babysitters. Participants learned about the proper care and safety of infants and children, how to change diapers, discipline, nutrition, appropriate toys, planning appropriate activities for children, first aid training, CPR, and how to manage a business.

Formal evaluations from two of the babysitting classes demonstrated the impact of program. 100% of the participants (n=26) understand that safety is the primary responsibility of a babysitter. The majority of the participants indicated that the lesson on CPR/First Aid training was their favorite part of the program. 90% of the participants shared they learned new and different discipline strategies. Participants also indicated that the business activities were helpful and gave them ideas on how to have a business with babysitting. 84% of the participants replied they were more confident in completing a parent interview.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Volunteers demonstrate knowledge of youth development principles. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	5997

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the 2015-16 program year there were 1780 adult volunteer leaders enrolled in the Wyoming 4-H Program. Adult volunteer leaders are responsible for managing 4-H clubs, contributing to county project committees and county 4-H councils, and organizing and teaching clinics and

camps. County based 4-H Educators are responsible for recruiting and training the adult volunteer leaders to help deliver the 4-H Youth Development Program.

What has been done
Volunteer training is multi-faceted and designed to meet the needs of volunteers at different stages throughout their involvement in 4-H. New leader orientation is for first time 4-H volunteers and occurs primarily at the county level. This training is available in three different formats: small group meetings; individual work sessions; and/or on-line. Volunteers who complete the on-line training are also required to schedule a face-to-face interview with the county 4-H educator to learn specifically about the county 4-H program.

Results
68 volunteers attended State 4-H Leaders Conference; 946 adult volunteers attended certification trainings about core principles of the Wyoming 4-H Program.

Volunteers who completed the on-line new leader orientation reported the following results: 83% of the volunteers increased their knowledge of the 4-H program structure and funding, and how the 4-H program is directly related to the UW land grant mission. 70% of volunteers increased their knowledge of positive youth development by and understanding of a total positive youth development experience focused on the development of the child rather than education toward a particular event like a county fair or contest. 63% of volunteers showed higher learning in areas of ages and stages of positive youth development and commented on being better able to understand the developmental needs of youth at different ages in the 4-H program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Trained adult volunteers will demonstrate skills and abilities in which they are able to foster youth to become responsible adults. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	3745

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Experienced volunteers assume leadership for training less experienced volunteers in specific project areas as well as to help plan, organize and conduct statewide 4-H events and project workshops for youth. These volunteers participate in regional and statewide training that supplements training provided at the county level. Well-trained volunteers interact more positively with youth members, parents and other 4-H volunteers. Well-trained volunteers also expose the university less risk.

What has been done
Regional and statewide trainings include shooting sports certification, horse raters certification, Wyoming Judges Training, and State 4-H Leaders Conference.

Results
168 certified volunteers were trained in one of five shooting sports disciplines. These volunteers conduct well-organized and safe shooting sports programs in each of the 23 counties in Wyoming. They are also actively involved in conducting the Wyoming 4-H State Shoot in which over 600 youth compete each year.

During the State 4-H Leaders Conference, 16 adults completed the Wyoming Judges Training and registered with the Wyoming 4-H Judges database. These judges are aware of the essential elements of positive youth development, understand the ages and stages of youth, are better able to use experiential learning strategies and provide feedback in a positive manner.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

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.)
- Other (background of participants)

Brief Explanation

External factors, which affect the 4-H Youth Program, remain consistent and include high turnover of staff, financial support from the county partner, changing demographics of potential adult volunteers, lack of parental support, and competing programs for time and financial resources. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data. Across Wyoming, 2,160 educational activities reached 20,555 youth enrolled in non-traditional and traditional 4-H programs. The majority of youth participated in more than one educational workshop, clinic, event, camp, or other educational program. 100% of the youth who participated in these programs reported an increase in knowledge and skills that positively affected their life.

Qualitative evaluations such as focus groups, individual interviews, and observations of adult club leaders and extension educators documented growth of leadership skills in teens who assumed roles as camp counselors, Jr. Leaders, project leaders, and representatives on elected and appointed government boards. Teens who helped plan and lead the hands-on activities gained experience in planning and organizing a large community event, expressing their ideas to their peers, and making group decisions.

Workforce preparedness was an educational focus in both traditional and non-traditional 4-H programs in the 2015-16 reporting year. Business Relationship Workshops taught business etiquette, application and interview skills, civil rights and conflict resolution, and customer service. Youth Business Ventures contests provided youth with opportunities to learn how to create a business plan and present their plan to the Chamber of Commerce for potential funding. A community collaboration, "Ready for the Workforce", provided skill training to high school aged youth, then matched them with hands on internship experiences with local businesses and organizations.

Training for 4-H volunteer leaders was delivered in three formats to meet the needs of current adult volunteers: face to face, individual consultation and on-line. In the 2015-16 program year there were 1780 adult volunteer leaders enrolled in the Wyoming 4-H Program. New Leader Orientation ensured that new adult volunteer leaders understand their role as a volunteer, the philosophy of positive youth development, the structure and funding of 4-H, risk management policies, child abuse and bulling, and basic club meeting / project training strategies. In addition, regional and statewide trainings were provided for leaders regardless of their volunteer role in the program. Examples of those trainings included shooting sports certification, horse raters certification, Wyoming Judges Training, State 4-H Leaders Conference, and Master 4-H Volunteer Training.

Key Items of Evaluation

Youth who attended programs emphasizing Workforce Preparedness are excited to explore potential careers and equipped to enter the workforce. Trained adult volunteer leaders understand their role as a volunteer, the philosophy of positive youth development, the structure and funding of 4-H, risk management policies, child abuse and bulling, and basic club meeting / project training strategies.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community Development Education

☑ 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
601	Economics of Agricultural Production and Farm Management	10%		39%	
602	Business Management, Finance, and Taxation	10%		5%	
604	Marketing and Distribution Practices	0%		9%	
608	Community Resource Planning and Development	50%		32%	
801	Individual and Family Resource Management	25%		5%	
802	Human Development and Family Well-Being	0%		5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	2.5	0.0
Actual Paid	11.5	0.0	2.2	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**
191367	0	145964	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
191367	0	145964	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

Educational and research activities and efforts of the CDE program include:

Development of models to explain the potential impact policy changes have on the ability of communities to capture and retain dollars.

Family resource management programs will reach out to a broad spectrum of constituents throughout Wyoming using a variety of anticipated programs. Outputs include methods such as train-the-trainer workshops, home-study courses, and such approaches as the Internet (www.uwyo.edu/CES/FRM/), and satellite. Also included are publications, meetings, news releases, and feature articles.

Community-based leadership training institutes; (EVOLVE) Extension Volunteer Organization for Leadership Vitality and Education. Skill training workshops; i.e., board training. General public information and educational efforts; i.e., public media materials; information/educational meetings and workshops; books, booklets, bulletins, training materials; providing data. Facilitation of community processes. Analysis of community data and economic impact. Assessments to identify individual strengths and areas to be strengthened to guide personal development and grow talent. Media resources to promote community capital development Extension education and increase awareness of Extension resources.

Outputs for entrepreneurship programs include publications and one-on-one consultations, and web sites.

Training institute for municipal clerks and treasurers to develop workforce and soft skills in developing capacity in their city/county roles.

Research efforts will include economic analysis of potential public land management decisions and rural community planning.

2. Brief description of the target audience

The University of Wyoming College of Agriculture and Natural Resources is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in programs regardless of their race, national origin, gender, age, religion, or disability. The ultimate consumer of the educational products for financial management programs will be all individuals (including youth and senior citizens),

families (including low-income families), and in general people at risk of experiencing financial stress. The group of educators, specialists, and faculty responsible for leading and delivering the outputs in the program is the smallest of the University of Wyoming's Extension initiative teams. A priority for program development is to use methods of information and instruction that make it possible for the most constituents to be assisted while minimizing face-to-face work. Thus the team will emphasize train-the-trainer courses, newsletters, and electronic delivery of information and programming.

Targeted audiences for leadership development include: Elected officials. Members and leaders of formal and informal community organizations. Faith-based leaders and members. Business owners/managers/employees. Trade/produce groups. Educational entities. Federal/state/local agency leaders/members.

Entrepreneurship programs target audiences who will manage or may develop ventures relating to food and agricultural systems, a non-farm extension of a farm business, forestry, home trades, crafts, services, etc. Other audiences through which UW Extension programs may be delivered include: teachers, public and private agencies, business owners/managers/employers, trade/produce groups, educational entities, identified publics, youth groups/students, and small acreage owners.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Community Development Educators and specialists respond to clientele requests around such topics as leadership development, community development, group process, facilitation strategies, family and/or personal finance management, economic analysis, and other topics as appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13512	13492	1263	4497

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total

Actual	1	3	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Family Resource Management programs will ultimately benefit all families in Wyoming. Short term effects may be increased grant funding and increased involvement in regional and multi-state projects.Target is number of programs.

Year	Actual
2016	28

Output #2

Output Measure

- Number of individuals participating in programs. Target is number of individuals.

Year	Actual
2016	5593

Output #3

Output Measure

- Number of programs in group process, leadership, facilitation, and other CD topics delivered. Target is number of programs.

Year	Actual
2016	99

Output #4

Output Measure

- Entrepreneurship output targets include: number of individuals assisted.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Research efforts will include community economic analysis on efficiency of existing firms, ability to capture and retain dollars, potential to attract new businesses, ability to make informed decisions on resource management and community development, and socio-technological change and resource management affecting individuals, families, and communities. Target is the number research publications, bulletins, reports, and presentations.

Year	Actual

2016 29

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Permanent changes in practices as determined by follow-up surveys with those attending meetings, events, and workshops. Target is number of participants reporting positive practice changes.
2	One or more management principles from educational programs on personal finance management are adopted by workshop participants. Target is number of participants reporting outcome.
3	Participants of leadership classes will develop skills and confidence necessary for community participation, find resources to enhance community capital, recognize the needs for community vision, capacity building, and direction, and strengthen inner-community relationships. Target is number of participants reporting positive outcomes through program evaluations.
4	Research leading to the development of decision support tools on resource management and individual, family, and-or community development. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Permanent changes in practices as determined by follow-up surveys with those attending meetings, events, and workshops. Target is number of participants reporting positive practice changes.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	3356

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Leadership development was identified as a need by the Wyoming Rural Development Council's Community Assessments. The Wyoming Business Council has shared their vision of community economic development using a building block model. At the base are three blocks: leadership development, workforce development, and community capacity building.

What has been done
Across Wyoming, 73 participants who were community leaders, business owners, and non-profit board members graduated from a County Leadership Institute in 2015-16. Throughout the year, these participants attended 8 sessions, 2 to 4 hours each, in the following counties: Converse, Park, Albany, and Uinta. Sessions included Team Building and Personality Styles; Leadership Styles; Preventing and Managing Conflict; Problem Solving and Communication; Fish Bowl; Developing and Using Teams; and, Giving and Receiving Feedback. Participants completed an evaluation following each individual session and a 3 month follow-up evaluation after graduation.

Results
On a Likert scale of 1 (poor) to 5 (excellent) the 73 participants rated each individual session as a 4 or 5. The session, Preventing and Managing Conflict, consistently rated a 5 in each of the programs. In the 3 month follow-up evaluation 90% of the participants indicated that the leadership institute helped improve their communication, community knowledge, problem-solving, and decision making skills.

In response to the question "What did you like most about the Institute?" one participant wrote "class interaction, relevance of topics presented and the opportunity to see what is going on in the community". Another participant shared they will use the information [from the Leadership Institute] in their personal and/or professional life to get more involved in public issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

One or more management principles from educational programs on personal finance management are adopted by workshop participants. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	388

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the past decade, Wyoming has experienced significant economic growth from natural resources of gas, oil, and coal which created steady, high paying jobs in the energy sector. Over the past year the decline of the energy sector has led to a significant reduction of those jobs. The most critical need is the management of credit and debt. Seven out of ten low and middle income households report using their credit cards as a safety net. Information collected from UW Extension Area Advisory committees identified retirement planning, estate planning, consumer decision making skills, and family resource management as the top issues in the state.

What has been done
Family resource management courses were taught using a variety of methods from individual consultations, one-time workshops, and multi-session classes to blogs and webinars. The Healthy Money Strategies Series included the following sessions: Basics of Building a Budget; Spring Cleaning Your Finances; Financial Goal Setting; and the Basics of Investment. Financial University was offered through a partnership with a County Public Library and included basic budgeting, spending plans and comparison shopping, strategies and tips to save money. Financial blogs and webinars have been on-going since 2011.

Results

388 youth and adults participated in one or more financial literacy programs. 100% of the participants raised their awareness about basic money management concepts and how emotions can influence spending. 83% of the participants indicated they increased their knowledge about how to create a budget and spending plan. Using a Likert scale of 1 (very poor) to 5 (excellent), over 50% of the participants rated their likelihood of implementing information from the course as 4.5.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Participants of leadership classes will develop skills and confidence necessary for community participation, find resources to enhance community capital, recognize the needs for community vision, capacity building, and direction, and strengthen inner-community relationships. Target is number of participants reporting positive outcomes through program evaluations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2154

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
County-appointed and non-profit board members and elected officials want to complete their assigned duties competently but lack the training needed to do so in an effective manner. County Commissioners and the Wyoming Association of Municipalities have identified the need to provide training to current and new board members so they might properly fulfill their duties and responsibilities.

What has been done
The Community Development Education team offered Board Training: Roles and Responsibilities, and Building Better Boards for county-appointed and non-profit board members across Wyoming. 295 individuals representing county commissioners, city council members, non-profit boards of directors, chamber of commerce members, and administrators have participated in these training opportunities. Topics highlighted basic board roles and responsibilities which include establishing policies, making significant and strategic decisions about the organization's vision, mission and

strategies, and to oversee the organization's activity.

Results
Members from participating organizations reviewed their mission statement, identified goals, increased their ability to effectively work together, and provide good governance for their organization. All of the participants increased their awareness and level of understanding about their responsibilities as a board member. 100% of the participants rated the program(s) as very good or excellent and indicated they were challenged to think critically. 95% of the participants shared they will be more effective because of the training. One participant wrote "I know now that the board I'm on should re-evaluate its by-laws and rules of operation".

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Research leading to the development of decision support tools on resource management and individual, family, and-or community development. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One area of debate that is of particular importance to Wyoming is the economic implications for local communities of alternative Federal land management decisions. Federal management agencies, State government, and local governments in Wyoming and the West all have a need for reliable information on the effects of Federal land management decisions on the economies of local communities.

What has been done

Development of socioeconomic profiles for counties in Wyoming for the Wyoming County Commissioners Association.
Development of a manual on estimating the economic impact of oil and gas development and production for the Bureau of Land Management.
Economic impact analysis for the Wyoming Business Council on the potential impacts of future wind development in Wyoming.

Results
Providing solid economic information helps reduce the emotionalism associated with discussions regarding the management of Federal land. It also improves the decision making process by providing decision makers with more reliable and credible information on which to base their decisions. Finally, these types of analyses allow communities of Wyoming to participate in the planning process by quantifying the issues that are of particular concern to them. The net result is improved decision making with regards to the management of public lands.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (changes in technology)

Brief Explanation

External factors which affected the Community Development Education Initiative team's programming included staff resignations for Area Extension Educators. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left several related positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in the Community Development Education Programs. Community Development Educators conducted 305 educational programs which reached 14,775 youth and adults.
Across Wyoming, 73 participants who were community leaders, business owners, and non-profit board members graduated from a County Leadership Institute in 2015-16. These participants learned about team building and personality styles; leadership styles; preventing and managing conflict; problem solving and communication; developing and using teams; and, giving and receiving feedback. Participants completed an evaluation following each individual session and a 3 month follow-up evaluation after graduation. On a Likert scale of 1 (poor) to 5 (excellent) the 73 participants rated each individual session as a 4 or 5. The session, Preventing and Managing Conflict, consistently rated a 5 in each of the programs. In the 3 month follow-up evaluation 90% of the participants indicated that the leadership institute helped improve their communication, community knowledge, problem-solving, and decision making skills.
In response to the question "What did you like most about the Institute"? one participant wrote "class interaction, relevance of topics presented and the opportunity to see what is going on in the community". Another participant shared they will use the information [from the Leadership Institute] in their personal and/or professional life to get more involved in public issues.
At the end of each Leadership Institute, class members have volunteered to serve on the steering committee for the next class. Anecdotal evidence has shown that more Institute graduates are being promoted at their jobs and getting more involved in their communities through board service and other, informal leadership opportunities.
388 youth and adults participated in one or more financial literacy programs. 100% of the participants raised their awareness about basic money management concepts and how emotions can influence spending. 83% of the participants indicated they increased their knowledge about how to create a budget and spending plan. Using a Likert scale of 1 (very poor) to 5 (excellent), over 50% of the participants rated their likelihood of implementing information from the course as 4.5.
Research: Solid economic information about the management of Federal land improves the decision making process. These types of analyses allow communities to participate in the planning process by quantifying the issues that are of particular concern. The net result is improved decision making with regards to the management of public lands.

Key Items of Evaluation

Participants in the Community Development planned program area will be more effective in their civic leadership roles and more willing to become involved in public issues.
Research: Solid economic information about the management of Federal land improves the decision making process. These types of analyses allow communities to participate in the planning process by quantifying the issues that are of particular concern. The net result is improved decision making with regards to the management of public lands.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Management of Rangeland Resources (SMRR)

☑ 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
101	Appraisal of Soil Resources	5%		5%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
111	Conservation and Efficient Use of Water	5%		5%	
112	Watershed Protection and Management	5%		5%	
121	Management of Range Resources	5%		5%	
123	Management and Sustainability of Forest Resources	5%		5%	
131	Alternative Uses of Land	5%		5%	
132	Weather and Climate	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		5%	
136	Conservation of Biological Diversity	5%		5%	
205	Plant Management Systems	5%		5%	
206	Basic Plant Biology	5%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
213	Weeds Affecting Plants	5%		5%	
306	Environmental Stress in Animals	5%		5%	
311	Animal Diseases	5%		5%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	5%		5%	
605	Natural Resource and Environmental Economics	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	6.0	0.0
Actual Paid	16.4	0.0	6.1	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**
272906	0	404717	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
272906	0	404717	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

Natural resource programs will reach out to a broad spectrum of constituents throughout Wyoming using a variety of sources. Workshops on sustainable rangeland and animal management principles will be offered within each extension area within the state. Provide professional development opportunities for rangeland professionals. Develop written educational materials on rangeland and animal management practices and principles (fact sheets, bulletins, media, presentations, Web). Conduct technical consultation on rangeland and animal management, and monitoring of rangelands. Develop media on rangeland management principles (radio, TV, press). Conduct research and demonstrations on sustainable natural resource management principles. Work with individual rangeland managers on developing, implementing, and evaluating sustainable management practices.

Develop and/or present programs on natural resources at youth activities. Produce or update currently produced educational materials targeted to youth on natural resource education. Produce information/education modules emphasizing natural resource topics for 4-H leader use in 4-H project with large enrollment.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in programs regardless of their race, national origin, gender, age, religion, or disability. The College of Agriculture and Natural Resources is committed to transmitting unbiased scientific-based information to solve local and regional natural resource conflicts involving state, federal, and private resources. All efforts will be made to provide information through direct contact, publications, newsletters, Web sites and other methods. The general public and exurban landowners, agricultural producers and federal and state land management agency personnel are the target audience.

General youth and traditional 4-H are among the target audiences for natural resource youth programs.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Educators in the Rangeland Team, Agriculture and Horticulture Team, and Small Acreage Team answer questions on topics around range livestock production, rangeland management, recreation on rangelands, reclamation of disturbed lands, and wildlife habitat as appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15988	768344	3273	76834

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	48	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of programs implemented. Target is number of programs.

Year	Actual
2016	198

Output #2

Output Measure

- Documented media efforts implemented. Target is number of media efforts such as magazines, TV, radio, newspaper inserts.

Year	Actual
2016	232

Output #3

Output Measure

- Number of individuals participating in educational programs or activities. Target is number of participants.

Year	Actual
2016	5765

Output #4

Output Measure

- Number of agency personnel, range professionals, and general public participating in training. Target is number of participants.

Year	Actual
2016	5765

Output #5

Output Measure

- Number of youth related natural resource programs implemented. Target is number of programs.

Year	Actual
2016	46

Output #6

Output Measure

- Number of youth participating in natural resource educational programs or activities. Target is number of participants.

Year	Actual
2016	1699

Output #7

Output Measure

- Conduct research on sustainable rangeland production and watershed management. Target is number of research publications, bulletins, reports, and presentations.

Year	Actual
2016	186

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Raise the understanding of the general public on the interaction of natural resource use in Wyoming's economy. Citizens will make better informed decisions on natural resource issues and topics. Target is number of participants reporting outcome.
2	Increased participation in 4-H natural resource programs (projects, camps, activities). Target is number of increased youth participation in natural resource programs.
3	Raise awareness, knowledge, and skills for development, implementation and evaluation of land management plans that include management of grazing and browsing animals, and adjusting managment as necessary to meet objectives. Target is number of participants reporting outcome.
4	Conduct research to increase sustainability of rangelands. Target is the number of projects reporting this outcome.
5	Conduct research that will increase appreciation of watershed management. Target is number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Raise the understanding of the general public on the interaction of natural resource use in Wyoming's economy. Citizens will make better informed decisions on natural resource issues and topics. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	5765

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With limited information and experience, the general public can lack an understanding of the natural resource systems, their management and the industries they support. Ranchers, recreationists, conservation groups, hunters, government agencies, reclamation and seed companies, private landowners, radical environmental groups, the energy sector, and politicians can have different perspectives share different messages about what is best. This difficulty in balancing multiple land uses and priorities often leads to conflict and occasional litigation among interest groups that differ on how resources should be used and managed.

What has been done
Extension Educators and Specialist actively contribute to a variety of media efforts to reach the general population in Wyoming. Educators in the Rangeland Team, Agriculture and Horticulture Team, and Small Acreage Team regularly contribute articles the Barnyards and Backyards magazine, which is published 4 times a year. The magazine is also available on-line from the University of Wyoming Extension home page. In addition, a newspaper insert "Barnyards and Backyards" is distributed in over 128,000 newspapers across WY. The newspaper inserts are available at http://insuringsuccess.uwagec.org/BarnyardsAndBackyards/default.htm. Team members also create YouTube videos and blogs.

Results
While it's difficult to measure the public's change in understanding, raising awareness of natural resource issues expands UW Extension's audience base and enhances knowledge for citizens. 14,866 copies of the Barnyards and Backyards magazine were distributed in 2015-16; The Barnyards and Backyards newspaper insert was distributed in over 138,000 newspapers. "Exploring the Nature of Wyoming" includes 410 videos and 608 subscribers on YouTube with 656,917 views over a 5 year reporting period. Three range blogs had 8,211 page views with two

of the blogs having 4,415 unique page views.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
135	Aquatic and Terrestrial Wildlife
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Increased participation in 4-H natural resource programs (projects, camps, activities). Target is number of increased youth participation in natural resource programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1699

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Helping youth connect with the natural resources in Wyoming continues to emerge as a discussion topic during annual Stakeholder Input sessions. Natural resource programs for youth provide opportunities for youth to develop healthy relationships with the land, understanding how natural resources and ecosystems affect each other and how resources can be used and managed wisely. These opportunities also provide an avenue for youth to explore careers in agriculture and natural resources including range management, sustainability and renewable resources, resource planning, management, conservation and education.

What has been done
1,699 youth participated in 46 educational programs in rangeland management and natural resources around Wyoming. A sample of these programs included: Summer Adventure Camp,

Wyoming Resource Education Days, Sage Grouse Trapping and Collaring, Soil Science Scavenger Hunt, Poisonous Plants in Forages, Grass Seedhead Identification, Monitoring Range Pictionary, Birds and Worms Predator-Prey Relationships, Safety and Techniques for Shooting a Rifle.

Results
Youth learned about soil biology, types of soils in rangelands, how soil changed color in different environments, contains iron, and how important soil is to the environment. Students also learned the basic methods for conducting range monitoring, and types of grazing management for different ecosystems through organized filed trips. Youth participants in the camp range contest learned about plant monitoring, soil and range management.

Wildlife management was also an important educational effort. Youth learned about sage grouse biology and how wildlife impact recreation and the economy in Wyoming. They learned how agencies trap, collar, and rack wildlife using radio telemetry.

100% of the youth at the Summer Adventure Camp and Wyoming Resource Education Days indicated they would be interested in pursuing a job in natural resources someday.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
205	Plant Management Systems
206	Basic Plant Biology
213	Weeds Affecting Plants

Outcome #3

1. Outcome Measures

Raise awareness, knowledge, and skills for development, implementation and evaluation of land management plans that include management of grazing and browsing animals, and adjusting managment as necessary to meet objectives. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	273

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sustainable rangeland management equates to economic stability in Wyoming. At least 95% of Wyoming livestock operations utilize rangeland, and many of these operations use public land leases as a portion of their forage base. Rangeland owners and managers require sound, research based information and stewardship incentives to prevent degradation of rangeland resources and ecosystems, and also to enhance resource values. The goal of UW Extension programs in rangeland stewardship is to improve the technical knowledge, innovation and management skills of participants.

What has been done
Comprehensive educational efforts to address the development and use of land management plans include Ecological Site Descriptions, Plant Identification and Rangeland Monitoring classes, Strategic Weed Assessment and Management Program, the Collective Monitoring Project and High Plains Ranch Practicum School. The 99 educational programs (workshops, site visits, field tours, demonstration trials) which included a land management plan aspect reached 2,998 individuals.

Results
Participants in the Strategic Weed Assessment and Management Program organized into teams and practiced skills in the field by mapping invasive weed locations and classifying the patches into severity groups. The participants reconvened to compile filed data and discuss different management strategies for each weed species. Participants expressed an increase in knowledge and the value of a strategic approach to weed management.

The Collective Monitoring Project is designed to increase the consistency in how rangeland monitoring data is collected affecting the overall quality of the information gathered to make informed decisions about how to accomplish successful rangeland seeding in Wyoming. The goal of the Collective Monitoring Project is to have at least one monitoring location in each of the 23 counties. In 2015, data was received from 7 counties and in 2016, 11 counties submitted data.

96% (N=56) of the participants in the High Plains Ranch Practicum School indicated they would improve range management or natural resource management through better use of land management plans.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
121	Management of Range Resources

131	Alternative Uses of Land
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #4

1. Outcome Measures

Conduct research to increase sustainability of rangelands. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Oftentimes when land use planning occurs on Bureau of Land Management and USDA Forest Service managed lands, the economic impact from grazing uses on ranchers and communities is not fully considered. The National Environmental Policy Act calls for such impact analysis and it is usually done at a much broader scale and without specific information than is the case for environmental or ecological impacts.

What has been done
A national survey of ranchers holding Bureau of Land Management or USDA Forest Service grazing permits was conducted. The survey was designed to gather social and economic information from the ranchers and how they would respond to different federal land management agency changes in grazing policy or permitted livestock numbers. Additionally, the survey was intensified in Wyoming so that statistically valid results for Wyoming were obtained as well as some Wyoming-specific questions.

Results
Results of the survey have been presented to various constituent groups to increase their knowledge about what public land ranchers look like and to make them aware of differences among different kinds of public land ranchers. Ranchers and federal agencies can use the information to inform land use plans about the social and economic impacts to ranchers from different domestic livestock grazing alternatives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
136	Conservation of Biological Diversity
205	Plant Management Systems
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Conduct research that will increase appreciation of watershed management. Target is number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The hydrologic and climate communities as well as water managers are continuously trying to improve their ability to understand and predict runoff from mountainous regions in response to land use and climate change.

What has been done
Automated sensor measurements are combined with numerical modeling to better understand water, heat, and carbon fluxes at the plot, hillslope, and watershed scales in cold regions.

Results
Results of this project will improve our ability to predict runoff from snow-dominated mountainous regions in the western US.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
132	Weather and Climate
135	Aquatic and Terrestrial Wildlife

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
- Other (Technology changes)

Brief Explanation

External factors which affected the Rangeland and Agriculture and Horticulture Initiative team's programming included staff resignations for Area Extension Educators. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left several related positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in Sustainable Management of Rangeland Resources. Range Educators conducted 198 educational programs which reached 5,765 youth and adults.
Educational classes, workshops, schools utilized end of session evaluations with informal follow-up to document practices implemented. 100 percent of participants indicated increasing knowledge and skills as a result of educational efforts. Over one-third indicated they had used the information to make a positive change on their land.

A sample of program evaluation data follows:
Youth learned about soil biology, types of soils in range lands, how soil changed color in different environments, contains iron, and how important soil is to the environment. Students also learned the basic methods for conducting range monitoring, and types of grazing management for different ecosystems through organized filed trips. Youth participants in the camp range contest learned about plant monitoring, soil and range management.
Wildlife management was also an important educational effort. Youth learned about sage grouse biology and how wildlife impact recreation and the economy in Wyoming. They

learned how agencies trap, collar, and rack wildlife using radio telemetry.
100% of the youth at the Summer Adventure Camp and Wyoming Resource Education Days indicated they would be interested in pursuing a job in natural resources someday.
Participants in the Strategic Weed Assessment and Management Program organized into teams and practiced skills in the field by mapping invasive weed locations and classifying the patches into severity groups. The participants reconvened to compile filed data and discuss different management strategies for each weed species. Participants expressed an increase in knowledge and the value of a strategic approach to weed management.
The Collective Monitoring Project is designed to increase the consistency in how range land monitoring data is collected affecting the overall quality of the information gathered to make informed decisions about how to accomplish successful range land seeding in Wyoming. The goal of the Collective Monitoring Project is to have at least one monitoring location in each of the 23 counties. In 2015, data was received from 7 counties and in 2016, 11 counties submitted data.
96% (N=56) of the participants in the High Plains Ranch Practicum School indicated they would improve range management or natural resource management through better use of land management plans.
Research: Ranchers and federal agencies use information from the impact analysis to inform land use plans about the social and economic impacts to ranchers from different domestic livestock grazing alternatives.
Research: Automated sensor measurements, combined with numerical modeling will improve the ability to predict runoff from snow-dominated mountainous regions.

Key Items of Evaluation

Range monitoring plans will allow ranchers and farmers to make informed decisions about range land seeding and will improve the sustainability of range land. Youth who have participated in range programs are exposed to the variety of career paths available in range land resources.
Research: Ranchers and federal agencies use information from the impact analysis to inform land use plans about the social and economic impacts to ranchers from different domestic livestock grazing alternatives.
Research: Automated sensor measurements, combined with numerical modeling will improve the ability to predict runoff from snow-dominated mountainous regions.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger, Crop, Livestock and Horticulture Systems

☑ 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	10%		10%	
111	Conservation and Efficient Use of Water	0%		5%	
202	Plant Genetic Resources	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	10%		15%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		0%	
212	Pathogens and Nematodes Affecting Plants	10%		2%	
213	Weeds Affecting Plants	10%		10%	
216	Integrated Pest Management Systems	10%		0%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	10%		5%	
305	Animal Physiological Processes	0%		10%	
307	Animal Management Systems	10%		5%	
311	Animal Diseases	0%		10%	
601	Economics of Agricultural Production and Farm Management	10%		5%	
704	Nutrition and Hunger in the Population	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	24.0	0.0	21.2	0.0
Actual Paid	24.0	0.0	11.6	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**
399375	0	769626	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
399375	0	769626	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

Any or all channels of the media will be used to familiarize the public with UW College of Agriculture and Natural Resources areas of research and extension programming and personnel. Newsletter articles distributed both electronically and through the mail by county offices, area teams, and the University of Wyoming will reach producers locally, regionally, and statewide. Public educational programs by extension specialists and educators presenting research-based information will be held in response to local, state, and national crop and livestock production, horticultural and nutrition issues. Demonstrations of technology and skills training will be included in education curriculum to enhance educational effectiveness. Field tours will be organized to provide producers with the opportunity to observe improved sustainable agricultural practices.

Areas of focus in livestock systems emphasis will be placed on the four main areas: herd management, herd development, cropping systems and livestock development, risk and operation management techniques and alternatives to enhance the stability of Wyoming livestock and crop producers. Fostering development of local food systems, which includes promoting use of local foods, can improve energy efficiency of the food system while yielding many other benefits. UW Extension plans to enhance efficiency within local food systems by improving relationships among local food producers and consumers in Wyoming.

- development and implementation of Wyoming Local Food Expos in at least two communities; development and distribution of the Wyoming Local Foods Guide (print and electronic versions) which will include a directory of specialty crops and other local food products, nutrition and food safety resources, recipes for using local foods, factsheets related to local foods in Wyoming, and tips on sustainable living. The Foods Guide will be uniquely Wyoming but will draw from several existing examples.
- development and implementation of a training module to provide UW Extension educators statewide with the knowledge and skills to successfully promote local foods.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in programs regardless of their race, national origin, gender, age, religion, or disability. All efforts will be made to provide information through direct contact and through publications, newsletters, Web sites and other methods. The general public and exurban landowners, agricultural

producers and specific target audience groups.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Educators in the Rangeland Team, Agriculture and Horticulture Team, and Small Acreage Team answer questions on topics around livestock production, rangeland management, cropland management, local food production, etc.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	32700	1100697	7675	11070

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	3	42	45

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs focusing on global food security and hunger, crop, livestock, or horticulture systems. Target is the number of programs.

Year	Actual
2016	257

Output #2

Output Measure

- Number of participants attending programs focusing on global food security and hunger, livestock, crop, and horticulture systems. Target is the number of individual participants

Year	Actual
2016	15601

Output #3

Output Measure

- Number of partnerships formed with other agencies,or organizations and volunteers integrated into programs. Target is the number of partnerships and/or volunteers.

Year	Actual
2016	43

Output #4

Output Measure

- Increased adoption of sustainable agriculture methods and practices which result in increased production of the food supply. Target is 10 to 20% of total Wyoming Ag Operations participants reporting outcome.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Research publications, bulletins, reports, and presentations on crop, livestock, and horticulture systems.

Year	Actual
2016	135

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased knowledge of agriculture producers on sustainable cropping and livestock systems. Target is number of producers reporting outcome.
2	Improved sustainable agriculture production practices resulting in an increased food supply. Outcome is number of producers reporting outcome.
3	Awareness created through extension and research efforts. Target is number of participants in extension and research programs reporting that they have gained awareness on topic.
4	Wyoming producers will benefit through an increased value of livestock and crops related to improved cropping practices, herd selection, and management. Target is number of producers reporting positive outcome as a result of educational efforts.
5	Increase appreciation of research on plant production systems. Target is the number of projects reporting on this outcome.
6	Increase appreciation of research on animal production systems. Target is the number of projects reporting on this outcome.

Outcome #1

1. Outcome Measures

Increased knowledge of agriculture producers on sustainable cropping and livestock systems. Target is number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	15601

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Range lands compromise over 80 percent of Wyoming's land base, which means sustainable range land management contributes to economic stability in much of the state. One goal of UW Extension programing for range land resource management is to sustain or improve range land health and ranch profitability. Traditionally, Wyoming ranches graze livestock on upland range lands from late spring through early fall while forage is mechanically harvested on the productive irrigated hay meadows. The cost of rolling that forage into bales has increased significantly in the last 20 years. Management-intensive grazing can improve the harvest efficiency of grazing livestock and, subsequently, the productive capacity of the grassland.

What has been done
Management-intensive Grazing (MiG) school provided hands-on experience to area ranchers in MiG and the tools that allow the technique to be implemented on irrigated meadows and higher producing rangelands that are typically harvested for hay. Twenty-nine (29) individuals participated in a management-intensive grazing school in 2014 and 21 in 2016. Participants were able to learn the basics of MiG, how to incorporate MiG into their grazing plans, and how to use the tools needed for successful grazing.

Results
The management-intensive grazing schools resulted in increased knowledge about management-intensive grazing topics and an average savings of $30 per animal, which equated to approximately $419,000 for class participants. Management-intensive grazing influenced approximately 260,000 acres across Wyoming. Participants reported gaining the most knowledge by taking pasture inventories in 2014 and learning about fencing materials in 2016. One participant wrote "I plan to write a drought plan, inventory the grass on my ranch, and possibly add some permanent fence to enable more management".

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems

Outcome #2

1. Outcome Measures

Improved sustainable agriculture production practices resulting in an increased food supply. Outcome is number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	3122

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming and other regional producers who are involved in or interested in USDA organic certification need information and opportunities to network. The market for certified organic products continues to expand, and for producers from the High Plains of Wyoming, Nebraska, and Colorado, it represents a value-added approach that makes their operations more sustainable. In 2015 over 20% of Wyoming winter wheat producers were certified organic. That proportion continues to grow, along with irrigated crop and livestock producers as well.

What has been done
The 2016 High Plains Organic Farming Conference and Certification Workshop drew over 100 people from Wyoming, Nebraska, and Colorado. The conference targets producers for whom crops and/or livestock are their primary source of income and included presentations by researchers, educators, regulators, and producers.

Results
This was the third annual High Plains Organic Farming Conference and the attendance continues to grow which reflects the increased interest in certified organic production. Conference evaluations were overwhelmingly positive, with many attendees listing practices and concepts they learned about that they will use in their operations. There are also many repeat attendees suggesting that the program is valuable.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems

Outcome #3

1. Outcome Measures

Awareness created through extension and research efforts. Target is number of participants in extension and research programs reporting that they have gained awareness on topic.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	20815

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As communities have developed over time, economic and cultural influence have changed the complexion of Wyoming's cities and towns. Agriculture continues to be one of the foundations of the Wyoming economy, yet the general public can lack an understanding of agricultural enterprises, their management and the industries they support. Some residents are skeptical about the value of livestock production because they are not aware of the scientific principles used to support sustainable grazing. The need for an educational opportunity geared toward this segment of extension clientele was identified by consulting with local and state partners, including other extension staff, local ranches, and Teton County Conservation District.

What has been done
The Area Rangeland Educator collaborated with the Lockhart Ranch, and Teton County Conservation District to specifically address what rangelands are, how ranches commonly operate, and the importance of agriculture to landscape conservation at a large scale. The ranch manager provided an overview of daily operation, annual production cycles and their commitment to conservation and responsible grazing practices. The manager answered questions about beef markets, water quality, grass fed vs. grain fed beef, among others. Extension Educators and Specialist also actively contributed to the following media efforts to reach the general population in Wyoming: Barnyards and Backyards magazine, a newspaper insert "Barnyards and Backyards", and YouTube videos and blogs.

Results
20 individuals participated in a workshop and ranch tour to increase their understanding of an ag operation. Fourteen of the 20 participants completed the evaluation and those 14 participants reported a 40% increase in understanding of what rangeland ecosystems are, a 44% increase in knowledge about ranching practices in Wyoming, and a 30% increase in understanding of ranching culture and landscape values.

While it's difficult to measure the public's change in understanding, raising awareness of agricultural issues expands UW Extension's audience base and enhances knowledge for citizens. 14,866 copies of the Barnyards and Backyards magazine were distributed in 2015-16; The Barnyards and Backyards newspaper insert was distributed in over 138,000 newspapers. "Exploring the Nature of Wyoming" includes 410 videos and 608 subscribers on YouTube with 656,917 views over a 5 year reporting period. Three range blogs had 8,211 page views with two of the blogs having 4,415 unique page views.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management
704	Nutrition and Hunger in the Population

Outcome #4

1. Outcome Measures

Wyoming producers will benefit through an increased value of livestock and crops related to improved cropping practices, herd selection, and management. Target is number of producers reporting positive outcome as a result of educational efforts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	375

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The value of agriculture to Wyoming's economy approaches $1 billion each year, and agriculture's contribution to open spaces, wildlife, and recreation is even greater. Livestock and crop producers throughout the state face an ever changing industry with issues such as: increasing cost of production, increasing pressure focused on land conversion, changing requirements for marketing knowledge. All of the issues are coupled with the need for producers to be able to raise agricultural products in a sustainable operation with limited resources.

What has been done
The High Plains Ranch Practicum is a comprehensive ranch management school focused on a systems approach to ranch management. It is an applied learning experience consisting of 8 days over 7 months of combined classroom learning and hands-on field application. In 2015-16, 38 participants completed the practicum.
Sugar beets rank 3rd for crop value in Wyoming ($32.6 million value). Annual losses attributed to Rhizoctonia root and crown rot (RRCR) significantly reduce the value garnered. This disease is reported to affect approximately 30 - 50% of Wyoming's acreage. Test plots are used to introduce strategies to minimize the disease and educate the growers about effective application of fungicides.

Results
Participants who completed surveys (27) from the 2015-16 Ranch Practicum own, manage or have influence over 883,000 acres and 35,000 head of cattle. Producers who attended the practicum reported the class resulted in $546,000 improvement in net income to their operations. One producer wrote "I would like to attempt later calving and de-emphasize hay production. Also, to implement a structure with the grazing that is more organized and clearly defined".

Trials at test plots revealed that when Roundup was co-applied with the various fungicides there were no effects on both herbicide and fungicide efficacy and no evidence of crop injury. RRCR disease suppression in under inoculated conditions was similar between the various fungicides and crop yields were similar to that of the non-inoculated check. The results indicate that growers under moderate disease pressure can manage weeds and RRCR disease with combined broadcast application thereby improving production efficiency with less trips across the field and maximizing yields and farm profitability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
301	Reproductive Performance of Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Increase appreciation of research on plant production systems. Target is the number of projects reporting on this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Annual losses attributed to Rhizoctonia root and crown rot (RRCR) are estimated at 2-3% total sugar loss for 185,000 acres of sugar beet grown in the irrigated High Plains region (CO, MT, NE, and WY). Western Sugar producers have identified this disease as their number one disease concern. Sugar beets rank third for crop value in Wyoming ($32.6 million value) and Wyoming ranks ninth in the nation for sugar beet production. This disease is reported to affect approximately 30 to 50% of Wyoming's acreage, depending on district.

What has been done
Field research and demonstration plots were established at the SAREC near Lingle, WY and PREC near Powell, WY in 2016. Fungicide treatments of Quadris, Priaxor and Proline were both co-applied (tank-mix) and applied separately with Roundup and compared to a non-treated inoculated check and a non-treated non-inoculated check. These 8 treatments were subjected to two inoculation rates in an effort to simulate a low and moderate disease pressure situation. Parameters of RRCR disease and weed control were taken as well as crop injury and final yields.

Results
Trials at SAREC and PREC revealed that when Roundup was co-applied with the various fungicides there were no effects on both herbicide and fungicide efficacy and no evidence of crop

injury. RRCR disease suppression under inoculated conditions was similar between the various fungicides and crop yields were similar to that of the non-inoculated check.
The results indicate that growers under moderate disease pressure can manage weeds and RRCR disease with a combined broadcast application thereby improving production efficiency with less trips across the field and maximizing yields and farm profitability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Increase appreciation of research on animal production systems. Target is the number of projects reporting on this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The beef industry adds value to its product through health programs, nutrition programs, genetic choices, and addressing temperament of the cattle. Genetic testing of cattle is becoming increasingly important to maximize the economic performance of cattle traits coupled with value-adding production practices. Despite the recognition that genetic traits have economic value, and the priority on funding for functional genomics, there is little information on the economic benefits and distribution of benefits among beef industry participants from these scientific investments.

What has been done
To analyze the distribution of benefits among industry sub-sectors, we developed an Equilibrium Displacement Model (EDM) of the U.S. beef industry and its reaction to the adoption of a specific genetic predictive technology. We intend to conduct two analyses. The first analysis uses

myostatin mutation or double muscling in cattle as a representative genetic innovation. The genetic predictions and potential changes in costs and revenues for cattle producers in different segments of the industry have been published, making the development of an economic model feasible. The second analysis, now underway, will use data from research being conducted at SAREC on feed efficiency characteristics in beef cattle.

Results

Because of the extensive documentation of the myostatin mutation, its genomic predictability, and related impacts on physical production, this characteristic was more easily analyzed in an EDM. From this model we estimated the changes in economic benefits for producers and consumers for each industry segment and Wyoming, due to the adoption of the innovation. A conservative, most likely outcome, in terms of costs and benefits indicates overall, cow-calf producers nationally could lose up to $40 million by 100% adoption of this technology, and Wyoming cow-calf producers could lose $323,725 over a 10 year period. However, the feedlot, packing, and retail to consumer segments could all show positive gains from adopting this technology, creating a net positive of $41 million dollars overall for the total U.S. beef industry. Myostatin mutation, which produces double muscling, is a useful case study because it demonstrates clearly how unevenly returns can be distributed across the beef value chain.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

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

External factors which affected the Rangeland and Agriculture and Horticulture Initiative team's programming included staff resignations for Area Extension Educators. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left several related positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in Global Food Security and Hunger, Crop, Livestock and Horticulture Systems. Extension Educators and Specialist in the Rangeland Team and Agriculture and Horticulture Initiative Teams conducted 257 educational programs which reached 15,601 youth and adults.
The management-intensive grazing schools resulted in increased knowledge about management-intensive grazing topics and an average savings of $30 per animal, which equated to approximately $419,000 for class participants. Management-intensive grazing influenced approximately 260,000 acres across Wyoming. Participants reported gaining the most knowledge by taking pasture inventories in 2014 and learning about fencing materials in 2016.
Participants who completed surveys (27) from the 2015-16 Ranch Practicum own, manage or have influence over 883,000 acres and 35,000 head of cattle. Producers who attended the practicum reported the class resulted in $546,000 improvement in net income to their operations.
The 2016 High Plains Organic Farming Conference and Certification Workshop drew over 100 people from Wyoming, Nebraska, and Colorado. Conference evaluations were overwhelmingly positive, with many attendees listing practices and concepts they learned about that they will use in their operations.
While it's difficult to measure the public's change in understanding, raising awareness of agricultural issues expands UW Extension's audience base and enhances knowledge for citizens. 14,866 copies of the Barnyards and Backyards magazine were distributed in 2015-16; The Barnyards and Backyards newspaper insert was distributed in over 138,000 newspapers. "Exploring the Nature of Wyoming" includes 410 videos and 608 subscribers on YouTube with 656,917 views over a 5 year reporting period. Three range blogs had 8,211 page views with two of the blogs having 4,415 unique page views.
Research: Trials revealed when Roundup was co-applied with the various fungicides there were no effects on both herbicide and fungicide efficacy and no evidence of sugar beet injury. RRCR disease suppression under inoculated conditions was similar between the various fungicides and crop yields to that of the non-inoculated check. The results indicate that growers under moderate disease pressure can manage weeds and RRCR disease with a combined broadcast application there by improving production efficiency with less trips across the field and maximizing yields and farm profitability.

Key Items of Evaluation

The management-intensive grazing schools resulted in increased knowledge about management-intensive grazing topics and an average savings of $30 per animal, which equated to approximately $419,000 for class participants. Management-intensive grazing influenced approximately 260,000 acres across Wyoming.
Research: Sugar beet growers under moderate disease pressure can manage weeds and RRCR disease with a combined broadcast application there by improving production efficiency with less trips across the field and maximizing yields and farm profitability.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

☑ 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
104	Protect Soil from Harmful Effects of Natural Elements	20%		0%	
112	Watershed Protection and Management	20%		20%	
132	Weather and Climate	20%		20%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		20%	
205	Plant Management Systems	20%		15%	
306	Environmental Stress in Animals	0%		5%	
307	Animal Management Systems	0%		10%	
605	Natural Resource and Environmental Economics	20%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	2.6	0.0
Actual Paid	2.0	0.0	1.3	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**
33281	0	86251	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
33281	0	86251	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

UW Research and Extension activities will focus on best species and variety selection as well as effectiveness of production practices as aspects of climate changes. Invasive species, and drought will be addressed through educational programs which enhance strategies to control global warming and will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

Basic work in carbon storage in ecosystems, the implications of agricultural and land management practices on storage, and education related to these questions will be addressed. Plant species and variety adaption to the changing ecosystem will be critical to maintaining the agricultural productivity for the state. Educational programs will help producers and land managers understand the implications of drought for grasslands and cropping ecosystem management. The implications of climate change for invasive species and ecosystem management implications are important opportunities for UW AES and Extension.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the climate change program include agriculture producers, commodity groups, and agriculture agencies. Horticulture and small acreage audiences will also benefit from water conservation and risk management components of the program.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Extension educators and specialist answer questions many topics associated with mitigating the effects of climate change, invasive weeds, range management, and weather extremes.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	157	2434	0	285

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	10	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of agriculture producers participating in educational programs. Target is number of program participants.

Year	Actual
2016	157

Output #2

Output Measure

- Number of educational programs conducted targeting climate change. Target is the number of programs.

Year	Actual
2016	6

Output #3

Output Measure

- Research on production practices in the face of climate changes. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2016	3

Output #4

Output Measure

- Research to determine the relationship between climate change and competition among native and invasive plant species. Target is the number of research publications, bulletins, reports, and presentations.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Research on strategies to mitigate release of greenhouse gases into the atmosphere. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2016	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness created through extension and research efforts. Target is the number of participants in extension and research programs reporting that they have gained awareness on topic.
2	Agriculture, horticulture and small acreage participants will increase awareness of climate change and the impact on horticulture production. Target is number of participants reporting outcome.
3	Producers will implement practices in animal and plant production which will mitigate climate change. Target is the number of producers reporting outcome.
4	Research that will create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Awareness created through extension and research efforts. Target is the number of participants in extension and research programs reporting that they have gained awareness on topic.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	157

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming has a semi-arid climate that experiences significant inter and intra-annual weather variability, and extreme weather events. The variability and extremes pose significant risks to Wyoming's residents, industries, and visitors. Therefore, it is imperative for the UW Extension (UWE) to increase the awareness and understanding of the general public about Wyoming's climate, variable weather, extreme events, and how they minimize associated risks and seize potential opportunities. Climate and weather informed decisions increases public safety, and helps mitigate potential impacts to rural economies.

What has been done
Two trainings for Extension professionals highlighted weather and climate tools to enable them to integrate weather and climate information, such as historic trends and forecasts, into existing programming. Extension educators worked with Ag in the Classroom to integrate climate science in the ag sections of the new stewardship curriculum for grades 2-5 in 2106. Ten "Exploring the Nature of Wyoming" Public Service Announcements were aired by local television channels and are also available on YouTube. The PSAs cover a variety of topics including climate, weather, and potential adaptation strategies agricultural producers might adopt.

Results
Qualitative data indicates efforts to date have had positive impacts. The following demonstrate the value of these efforts:

"Cool! I have already sent several of the links to ...." - UWE Specialist

"thanks for showing us the weather and climate data tools...I've been using the SC ACIS site for sorting out data from the winter and looking for some gaps in coverage... A client was asking

about this year's snowpack compared to normal and I used the SC ACIS to build some graphs and passed them along. I attached her thanks below...thanks for the info!" - UWE Educator

"Thank you so much for taking the time to send the link! This is exactly what I was looking for - a comparison of snowfall from year to year" - WY Stakeholder

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Agriculture, horticulture and small acreage participants will increase awareness of climate change and the impact on horticulture production. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	157

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural producers and small acreage landowners face many challenges including climate variability, and weather and extreme events in Wyoming's semi-arid climate. The UW Extension is/has developed programs to increase the awareness of the stakeholders how they can make climate informed decisions to increase the resiliency of their operations (regardless of size), which

is particularly imperative to rural economies and enabling citizens to grow fresh local foods. It is imperative for us to work with professionals who engage these stakeholders day-to-day to ensure a continuous, and consistent message.

What has been done
The monthly Wyoming Drought Impacts and Outlook Summary is a 2-page summary developed in partnership with UW Extension (UWE), Wyoming State Climate Office (WSCO), National Oceanic and Atmospheric Administration (NOAA), and the USDA. The summary includes a climate overview, current drought conditions and indicators, and a short and long-term forecast. The summary is disseminated to 200+ emails by UWE, provided at meetings/conferences, and is available on numerous websites. The WSCO had nearly 3,000 page views between July and October 2016. The quarterly magazine, Barnyards and Backyards, included climate and weather related articles on topics of Collecting Precipitation Data Provides Information for Public Good, and Wyoming Summer Notches High Temps, Low Precipitation.

Results
Qualitative data indicates the summaries are of use to stakeholders throughout the state. The following are examples of data collected to date:

"I have heard feedback about the drought impacts and outlook report...really liked the report and felt it extremely beneficial. Especially the long range outlook. - Feedback was provided to a UW Extension professional by a state employee who works in the agriculture industry

"I'm always interested in additional scientific information that has validity. Thanks for sharing" - WY Rancher

"...really an excellent report. I've been looking for information like this for quite some time it will very helpful to the [USDA] FSA boards and to natural resource planners" - WY Rancher

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Producers will implement practices in animal and plant production which will mitigate climate change. Target is the number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	63

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural producers face many challenges including climate variability, and weather and extreme events in Wyoming's semi-arid climate. The UW Extension is/has developed programs to increase the awareness of producers for how they can make climate informed decisions to increase the resiliency of their operations, which is particularly imperative to sustain rural economies. It is imperative for us to work with professionals who engage with agricultural producers day-to-day to ensure a continuous, and consistent message.

What has been done
Connecting Ag to Climate, a monthly column, synthesizes weather conditions, and monthly and seasonal forecasts. The column includes considerations and resources for agricultural producers to make climate informed decisions. Conducted a one-day workshop for agency professionals who work directly with agricultural producers. Topics included how producers can mitigate the effects of climate, and available federal programs to help off-set the economic impacts of adopting the new practices. A series of presentations about climate, weather, and agriculture were delivered at producer meetings/conferences throughout the state to highlight adaption strategies and mitigation practices for agricultural producers to consider adopting to increase the resiliency of their operation.

Results
The monthly column has been well received based on qualitative data. Numerous readers commented they appreciate the column. The column helps them to think through current conditions and to look ahead as they prepare for the coming month/season.

The presentations and tradeshow booths have proved an effective way to not only provide scientific, unbiased information, but to develop partnerships among organizations and collect stakeholder needs. The following qualitative data demonstrates the value of these efforts:

"By the way, I appreciate everything you are doing to coordinate and get the word out on this topic. You are an enormous help to us". - USDA FSA employee

"Wanted to let you know that your message has spurred no fewer than 26 (!) people to contact us to be added to our mail list for Dashboard Briefings and other WWA updates". - NOAA RISA Western Water Assessment

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Research that will create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is a growing interest among winter wheat growers community to adapt practices that replace repeatedly tilled fallow with winter or early spring planted cover crops. Such practices can yield multiple benefits associated with reducing tillage intensity, providing soil cover, competing with weeds and returning organic matter to the soil. Yet developing best management practices

that incorporate above mentioned principles can pose a significant challenge in areas of low precipitation, strong winds and variable weather, such as southeastern Wyoming.

What has been done
Experiments that test variable cover crop densities and rates of compost applied prior to cover crop planting have been established near Lingle and on fields that belong to farmers-collaborators. Biweekly soil and vegetation sampling have provided insights to cropping system responses that will likely yield long-term benefits to the agroecosystem.

Results
First year results demonstrated that cover crops effectively compete with weeds which helps suppress weeds seed bank and likely reduces weed competition with winter wheat planted in the same location last fall. Remaining soil and plant parameters are still being analyzed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

External factors which affected programming in Climate Change predominantly included changes to the Wyoming economy. The economy in Wyoming has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has increased the workload in other program areas reducing the resources available for programming in climate change.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. One hundred and fifty-seven individuals participated in educational programs where mitigating climate change was one of the topics.
Creating an awareness of and understanding how to use available tools to integrate weather and climate information into existing programming was a focus this year. Climate and weather informed decisions increases public safety, and helps mitigate potential impacts to rural economies.
These educational programs helped producers and land managers understand the

implications of drought for grasslands and cropping ecosystem management.
Research: First year results demonstrated that cover crops effectively compete with weeds which helps suppress weeds seed bank and likely reduces weed competition with winter wheat planted in the same location last fall. Remaining soil and plant parameters are still being analyzed.

Key Items of Evaluation

Understanding how to use climate and weather tools allows land owners to make better informed decisions around extreme weather events. These decisions increase public safety, and help mitigate potential impacts to rural economies.
Research: First year results demonstrated that cover crops effectively compete with weeds which helps suppress weeds seed bank and likely reduces weed competition with winter wheat planted in the same location last fall. Remaining soil and plant parameters are still being analyzed.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

☑ 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	20%		20%	
121	Management of Range Resources	20%		20%	
131	Alternative Uses of Land	0%		20%	
401	Structures, Facilities, and General Purpose Farm Supplies	10%		10%	
402	Engineering Systems and Equipment	20%		10%	
608	Community Resource Planning and Development	30%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.2	0.0
Actual Paid	1.0	0.0	2.0	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**
16641	0	40073	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
16641	0	40073	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

Media will be used to familiarize the public with UW College of Agriculture and Natural Resources areas of programming and personnel in regard to sustainable energy. Media releases in local newspapers, radio spots and television advertisements will inform the public of upcoming extension programs. Newsletter articles distributed both electronically and through the mail by county offices, area teams, and the University of Wyoming will reach general public and agriculture producers locally, regionally, and statewide. Public educational programs with invited speakers and extension specialists and educators presenting research-based information will continue to be held in response to local, state, and national energy sustainability. Demonstrations of technology and skills training will be included in education curriculum to enhance educational effectiveness. Field tours will be organized to provide producers with the opportunity to observe industry procedure (i.e., tour of an ethanol plant).

The Sustainable Agriculture Research and Extension Center (SAREC) located at Lingle, Wyoming will provide a resource base for integrating agriculture production and renewable energy based programs.

Educational programs will emphasize sustainable energy practices such as bio-fuels and wind energy, reclamation and restoration of disturbed lands, and energy conservation practices. Other methods will include individual interaction with landowners educating them on resources available to assist them with sustainable energy practices. UW Extension will provide coordination with other colleges on the UW campus such as Engineering and the School of Energy Resources, state and federal agencies to provide education on this topic, and funding for this effort. UW Extension will also provide educational opportunities for professionals involved with reclamation and restoration of disturbed lands.

The University of Wyoming's College of Agriculture and Natural Resources will conduct research and direct extension programming efforts to help ensure prudent use of the state's precious resources.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in all programs regardless of their race, national origin, gender, age, religion, or disability. Participants will include policy makers for county, state, and federal government agencies, crop producers, livestock producers, energy companies, general public, and the scientific community. An existing secondary audience will be the media, general public, and interest groups not directly involved in production agriculture (i.e., environmental groups). Energy conservation methods will be targeted at both agriculture and general public audiences.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert" and when appropriate those employees who have expertise in Sustainable Energy respond to clientele request.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	138	4869	0	730

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	3	2	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in sustainable energy programs. Target is the number of contacts.

Year	Actual
2016	138

Output #2

Output Measure

- Determine ecosystem services affected by energy development and reclamation efforts. Target is the number research publications, bulletins, reports, and presentations.

Year	Actual
2016	10

Output #3

Output Measure

- Evaluate the potential for production of bioenergy. Target is the number of research publications, bulletins, reports, and presentations.

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of educational programs or activities focusing on sustainable energy by UW Extension. Target is the number of educational programs implemented.

Year	Actual
2016	7

Output #5

Output Measure

- Number of collaborative partnerships formed to address sustainable energy in Wyoming. Target is the number of partnerships.

Year	Actual
2016	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness created focusing on sustainable energy topics. Target is the number of individuals reporting this outcome.
2	Partnerships will be developed with agencies and organizations to expand sustainable energy efforts. Target is the number of partnerships formed.
3	New technologies or devices used in ag production systems and/or farmsteads. Target is the number of new technologies developed.
4	Create awareness of research on ecosystem services affected by energy development and reclamation efforts. Target is the number of projects reporting this outcome.
5	Create awareness of research on the potential to produce bioenergy. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Awareness created focusing on sustainable energy topics. Target is the number of individuals reporting this outcome.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	138

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The State of Wyoming is known as a critical source of the nation's supply of natural resources. Because fossil fuels are essentially an irreplaceable base for Wyoming's energy industry, the College of Agriculture and Natural Resources conducts research and direct extension programming efforts to help ensure prudent use of the state's resources. In addition, Wyoming also possesses abundant renewable energy resources including wind, solar, geothermal, and biomass. Both small-scale, such as solar photovoltiacs or geothermal heat pumps, and utility-scale, primarily wind energy, are important issues.

What has been done
Efforts focus on efficiency and conservation specifically in relation to farm and ag production. In addition, residential and public conservation education is targeted toward the general public and businesses.

Results
UW area educators conducted 7 workshops and demonstrations which reached 138 individuals. 100% of the participants reported an increase in their awareness of the topic.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
131	Alternative Uses of Land

401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
608	Community Resource Planning and Development

Outcome #2

1. **Outcome Measures**

Partnerships will be developed with agencies and organizations to expand sustainable energy efforts. Target is the number of partnerships formed.

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

New technologies or devices used in ag production systems and/or farmsteads. Target is the number of new technologies developed.

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Create awareness of research on ecosystem services affected by energy development and reclamation efforts. Target is the number of projects reporting this outcome.

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Create awareness of research on the potential to produce bioenergy. Target is the number of projects reporting this outcome.

Not Reporting on this Outcome Measure

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

External factors which affected programming in Sustainable Energy predominantly included changes to the Wyoming economy. The economy in Wyoming has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze and also resulted in the elimination of the Energy Specialist position when that employee resigned. This has also increased the workload in other program areas reducing the resources available for programming in sustainable energy.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UW area educators and specialist conducted 7 workshops and demonstrations focusing on efficiency and conservation specifically in relation to farm and agriculture production. One hundred and thirty-eight (138) individuals participated in the educational programs. 100% of the participants reported an increase in their awareness of the topic.

Key Items of Evaluation

UW area educators and specialist conducted 7 workshops and demonstrations focusing on efficiency and conservation specifically in relation to farm and agriculture production.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity, Nutrition, and 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
305	Animal Physiological Processes	0%		25%	
703	Nutrition Education and Behavior	60%		25%	
704	Nutrition and Hunger in the Population	20%		25%	
724	Healthy Lifestyle	20%		25%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	6.3	0.0
Actual Paid	8.8	0.0	5.0	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**
146438	0	331735	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
146438	0	331735	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

Nutrition efforts will focus on educational programs which increase knowledge and skills in nutrition needs of children and incorporate physical activity into lifestyle; media outreach; health fairs; training; assessment/data collection. Programs which teach body size acceptance will also be targeted to youth.

EFNEP adult curriculum taught in a series of lessons; adult one-time lessons; youth curricula taught in a series of lessons and day camps; displays and demonstrations; state and community partnerships with agencies serving the low-income; training for educators; evaluation of program; Ongoing- Updating of curricula and materials.

Research will focus on factors contributing to, and mechanisms associated with, incidences of metabolic disorders and disease. Nutritional strategies will be explored as methods to create healthy lifestyles. Discoveries resulting from explorations of fundamental processes are expected to lead to the development of new therapeutic inventions.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the CNP (EFNEP) program: Low-income adults, Youth in Title I schools.

All other nutrition efforts targeted audience includes: general public, both adults and youth and policy makers.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Questions from clientele receive responses on nutrition topics from Nutrition and Food Safety Educators as appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1742	815410	2330	122311

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	16	17

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs delivered to youth. Target is number of programs.

Year	Actual
2016	72

Output #2

Output Measure

- Number of youth participating in educational program targeting childhood obesity. Target is number of youth participating.

Year	Actual
2016	1939

Output #3

Output Measure

- Number of partnerships formed in local counties of professionals to collaborate on childhood obesity,nutrition, and health issues. Target is number of partnerships formalized.

Year	Actual
2016	12

Output #4

Output Measure

- Conduct research on obesity, nutrition, and health. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2016	43

Output #5

Output Measure

- Number of participants in educational programs offered in Nutrition initiative. Target is number of participants.

Year	Actual
2016	13609

Output #6

Output Measure

- Increased adoption of healthy food practices and participation in regular physical activities. Target is number of participants reporting outcome.

Year	Actual
2016	2850

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improved knowledge of My-plate, serving sizes, and physical activity. Targets are the number of participants reporting outcome.
2	Improved eating behavior practices, food choices, and lifestyle habits. Targets are the number of participants reporting outcome.
3	Individuals gain awareness, knowledge and skills related to: improved attitude about healthy eating; increased knowledge of healthy food choices; improved skills in selection of healthy foods; improved body image. Target is number of participants reporting outcome.
4	Youth incorporate skills and change behaviors related to: increased physical activity; increased knowledge of healthy food choices; improved selection of healthy foods; understanding of serving sizes; improved body image.
5	Youth and families experience: improved nutritional health; reduced medical costs; health improved through community opportunities; healthier weight; decreased risk factors for nutrition-health related problems. Target is number of participants reporting outcome.
6	Create awareness of research on obesity, nutrition, and health. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Improved knowledge of My-plate, serving sizes, and physical activity. Targets are the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	40720

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Seven percent of adults in the US have been diagnosed with diabetes. Rates of diabetes in Wyoming are higher than the national average. For example, in Fremont County the rate is 9.6% and 11% in Hot Springs County. Diabetes is a serious disease, in 2015, it was the 7th highest cause of death in the U.S. Left uncontrolled, diabetes can lead to complications including high blood pressure, heart disease, stroke, kidney disease, and foot complications (which can lead to amputations). Diabetes is also a costly disease, as 1 in 5 health care dollars are spent caring for people with diabetes.

What has been done
Nutrition and Food Safety Educators conducted 257 educational programs that focused on planning healthy menus, portion sizes at home and eating out, how to measure a serving size, adding more fresh fruits and vegetables to your diet, the health benefits of regular exercise and ways to increase activity levels in your daily routine. 1,742 adults participated in one or more of those classes. In addition to the adult programs, 72 educational programs were targeted specifically to youth and offered through school enrichment classes, camps, and 4-H club meetings. Those 72 programs reached 1,939 youth.

Results
Fifteen attendees at the Wyoming Early Childhood Association Conference who participated in the Promoting Physical Activity in Young Children workshop learned new ways to increase physical activity and problem-solved issues through group discussion. All participants increased their level of knowledge regarding the need for physical activity and ideas on how to implement physical activities for young children. 93% of the participants responded that they intend to implement more physical activities for the children under their care.

In Fremont County, 7 participants completed the Dining with Diabetes program. At the conclusion

of the program, 80% of the participants could correctly identify which food raises blood sugar levels the most; 72% could correctly identify how much of their plate should be non-starchy vegetables according to the plate method; their average fruit and vegetable consumption increased from 4 days per week to 6 days per week; 100% of the participants reported eating smaller portions; and 72% reported being physically active on a daily basis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Improved eating behavior practices, food choices, and lifestyle habits. Targets are the number of participants reporting outcome.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Individuals gain awareness, knowledge and skills related to: improved attitude about healthy eating; increased knowledge of healthy food choices; improved skills in selection of healthy foods; improved body image. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	3461

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Americans currently spend about 80% of their food budget on products that are highly processed, offer little in terms of nutritional value, are high in calories, unhealthy fat and sugar. In Wyoming, fast food restaurants have an overwhelming presence and processed foods make up the majority of foods at local supermarkets. When fast food and/or highly processed foods are consumed on a consistent basis people gain unhealthy excess weight and suffer disease directly related to a high-calorie, low-nutrient diet. There is not a program being offered at this time that teaches

people how to eat less processed food and more whole food.

What has been done
The Real Food Wyoming Program is designed to change how Wyoming residents shop, plan, cook and eat resulting in a healthier lifestyle. The program was piloted in urban Natrona County in 2014-15 with 60 participants completing the program. In 2015-16, the pilot for Real Food Wyoming Program continued in 3 rural communities and all the Nutrition and Food Safety Extension Educators completed a train-the-trainer program to be prepared to implement it in their home areas in 2016-17.

In addition, workshops were offered on Super Foods; the 2015-2020 edition of the Dietary Guidelines for Americans; Nutrition and Physical Activity for Adults; Performance Nutrition for Athletes and Coaches; Reading Nutrition Labels; and Measuring Fat, Sodium, and Sugar in foods.

Results
36 participants completed the Real Food Wyoming Program in 2015-16 in rural communities. Prior to the program, 15% of the participants used ingredient lists to choose foods and 38% of them planned meals before grocery shopping most of the time or all of the time. After the program, 100% of the participants used an ingredient list in making those decisions about which foods to choose, and 100% of reported developing a menu prior to shopping for groceries. In a six month follow up evaluation selected quotes included "I cook with more veggies and fruit", and "I am more aware of what is good for us".

23 participants learned about "Super Foods" which are nutrient-dense foods such as kale, grapes, almonds, oats, flaxseed, yogurt, beans, avocados, and sweet potatoes. 100% of the participants gained awareness and increased their knowledge.

224 individuals participated in the class on 2015-2020 edition of the Dietary Guidelines for Americans. Participants were given an overview of the 5 overarching guidelines and key recommendations with specific nutritional targets and dietary limits.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #4

1. Outcome Measures

Youth incorporate skills and change behaviors related to: increased physical activity; increased knowledge of healthy food choices; improved selection of healthy foods; understanding of serving sizes; improved body image.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1981

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A range of studies have demonstrated the importance of healthy nutrition and sufficient physical activity for better school performance and behavior (State of Obesity: 2016). According to a report on the CDC, childhood obesity has immediate and long-term impacts on physical, social, and emotional health. Children with obesity are at higher risk for having other chronic health conditions and diseases. Children with obesity are bullied and teased more than their normal weight peers and are more likely to suffer from social isolation, depression, and lower self-esteem. Youth obesity statistics at the CDC, report high school students in Wyoming who had obesity was less than 10% in 2009. In 2015, the percentage of high school students who had obesity increased to between 10 and 14%.

What has been done
72 educational programs were targeted specifically to youth and offered through school enrichment classes, camps, and 4-H club meetings. Those 72 programs reached 1,939 youth. In addition, Extension Educators, along with Cent$ible Nutrition Educators, taught Grazing with Mary Moose and Munching through Wyoming History to 3-5th graders in qualifying schools. 3,201 students completed all 5 lessons.

Results
Youth learned "we eat with our eyes" and that the bigger the plate or bowl, the more we tend to eat. They also learned what healthy ingredients go into making a smoothie and participated in exercises to reinforce the idea that healthy eating and exercising go hand-in-hand.

Pre-post evaluation data gathered from Grazing with Mary Moose and Munching through Wyoming History indicate that 35% of the participating students increased their consumption of vegetables; 29% increased their consumption of fruits; 30.5% increased their level of physical activity; and 25% eat breakfast more often.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #5

1. Outcome Measures

Youth and families experience: improved nutritional health; reduced medical costs; health improved through community opportunities; healthier weight; decreased risk factors for nutrition-health related problems. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	114

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For many school children when asked where their food comes from they will answer the grocery store. Many children do not realize that lettuce comes from a plant in a field, milk comes from a cow, bacon comes from a pig, tomatoes are a fruit or potatoes grow under the ground at the base of a plant. Since 2010, nation-wide there has been a push towards youth gardening and farm to school education. This movement is designed to teach children where their food comes from and encourage them to try new foods and eat more fresh fruits and vegetables. In addition, educating youth is a stepping stone for many families to make changes in their own household.

What has been done
Good to Grow Farms partnered with Uinta County 4-H to create a program for school age children utilizing a potato as the teaching component. Fifty three (53) second graders in May 2015, and 61 second graders in May 2016, started their farm experience learning about animal food products such as cattle, swine and poultry. The farm tour also included the plant food section with an apple orchard, bee hives, high tunnels and raised beds to learn about fruits and vegetables. Each class had a designated area to plant 6 varieties of potatoes: Dark Red Norlands, Purple Vikings, Red Pontiacs, Adironacks, Yukon Golds, and Russets. The following fall, the students returned to the farm to see how the produce in the orchard, high tunnels and raised beds had grown over the summer and to harvest their potatoes.

Results
114 elementary students have learned about the full life cycle of a potato plant and correlate this to the food that they purchase in the grocery store. The ability to see where a tomato or squash grows help them make a connection between the animal and plants that are part of the food chain. In addition, students learned about the nutritional value of fresh produce, the process of raising food from planting a seed to harvesting and food preparation. 100% of the students

learned about each of the varieties of potatoes they planted, about the nutritional value of the potato, and some fun potato facts. All of the students sampled a new food as none of them had ever had purple mashed potatoes from an Adirondack potato. Additionally the students took samples of each variety of potato home with a cookbook for their families to enjoy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #6

1. Outcome Measures

Create awareness of research on obesity, nutrition, and health. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With the increasing popularity of Hatha yoga, it is important to understand the energy cost and metabolic equivalents (METs) of yoga practice within the context of the national physical activity guidelines established by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA).

What has been done
A systematic review was conducted to evaluate the energy cost and metabolic intensity of yoga practice including yoga asanas (poses/postures) and pranayamas (breath exercises) measured by indirect calorimetry. Of the 17 studies found in PubMed, ten evaluated the energy cost and metabolic equivalents (METs) of full yoga sessions or flow through Surya Namaskar (sun salutations), eight of individual asanas and five of pranayamas.

Results
This work is the first to comprehensively review the published literature evaluating the energy cost and intensity of yoga practice, including individual asanas (poses/postures) and pranayamas (breathing exercises). Based on the ACSM and AHA classification system the intensity of yoga asanas and of full yoga practice ranged from light-aerobic (less than 3 METS) to moderate- (3 to

6 METS) to vigorous-aerobic (>6 METS) with the majority classified as light-intensity. The asanas and sequences of asanas that elicited MET intensities in the moderate-intensity aerobic range included Surya Namaskar (sun salutations) and specific standing and balancing postures including Tuladandasana (balancing stick) and Dandayamana Dhanurasana (standing bow). This highlights that yoga is not typically practiced at an intensity that meets the ACSM/AHA recommendations for moderate-intensity aerobic exercise, and is on average less aerobically intense than brisk walking. In accordance with the guidelines, however, it further highlights that the practice of sequences of asanas with MET intensities above 3 METs (i.e., for ~10 min or longer) can be accumulated throughout the day and count towards daily (or weekly) recommendations for moderate- to vigorous-intensity aerobic activity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included staff resignations for Area Extension Educators and high turnover of staff in Cent$ible Nutrition. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left 2 Nutrition and Food Safety Educator positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. 13,609 individuals participated in educational programs offered through the Nutrition Initiative Team. Seventy-two (72) educational programs were targeted specifically to a youth audience and reached 1939 youths.
Promoting Physical Activity in Young Children workshop learned new ways to increase physical activity and problem-solved issues through group discussion. All participants increased their level of knowledge regarding the need for physical activity and ideas on how to implement physical activities for young children. 93% of the participants responded that they intend to implement more physical activities for the children under their care.
36 participants completed the Real Food Wyoming Program in 2015-16 in rural

communities. Prior to the program, 15% of the participants used ingredient lists to choose foods and 38% of them planned meals before grocery shopping most of the time or all of the time. After the program, 100% of the participants used an ingredient list in making those decisions about which foods to choose, and 100% of reported developing a menu prior to shopping for groceries. In a six month follow up evaluation selected quotes included "I cook with more veggies and fruit", and "I am more aware of what is good for us".
224 individuals participated in the class on 2015-2020 edition of the Dietary Guidelines for Americans. Participants were given an overview of the 5 overarching guidelines and key recommendations with specific nutritional targets and dietary limits.
Youth learned "we eat with our eyes" and that the bigger the plate or bowl, the more we tend to eat. They also learned what healthy ingredients go into making a smoothie and participated in exercises to reinforce the idea that healthy eating and exercising go hand-in-hand.
Pre-post evaluation data gathered from Grazing with Mary Moose and Munching through Wyoming History indicate that 35% of the participating students increased their consumption of vegetables; 29% increased their consumption of fruits; 30.5% increased their level of physical activity; and 25% eat breakfast more often.
114 elementary students have learned about the full life cycle of a potato plant and correlate this to the food that they purchase in the grocery store. In addition, students learned about the nutritional value of fresh produce, the process of raising food from planting a seed to harvesting and food preparation. 100% of the students learned about each of the varieties of potatoes they planted, about the nutritional value of the potato, and some fun potato facts. All of the students sampled a new food as none of them had ever had purple mashed potatoes from an Adirondack potato. Additionally the students took samples of each variety of potato home with a cookbook for their families to enjoy.

Key Items of Evaluation

The health of Wyoming citizens improved through participation in regular physical activity, along with choosing healthy foods and consuming appropriate serving sizes.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

☑ 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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	90%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid	3.0	0.0	2.0	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**
49922	0	225315	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
49922	0	225315	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

University of Wyoming Extension collaborates with the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies in partnership as the Wyoming Food Safety Coalition. Educational efforts include a series of workshops or classes targeting food industry personal. In addition, utilizing ServSafe, the certification course of the National Restaurant Association in depth classes which include end of session certification testing are conducted. Classes, workshops, displays, and demonstrations are used to reach a general consumer audience. Youth are reached through school programs on handwashing and avoidance of cross contamination. ServSafe and ServSafe Starter classes in Spanish are conducted in Western Wyoming

Educational programs on food preservation including pressure and water-bath canning, freezing, and drying foods will be delivered using multiple methods to ensure safety of the end product.

Research will focus on more rapid methods of detection of food-borne pathogens such as E.coli and Listeria. Ultimately delineate genes that promote survival in the environment and result in disease contamination of food.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the CNP (EFNEP) program: Low-income adults, Youth in Title I schools. All other food safety efforts targeted audiences include: general public, both adults and youth and policy makers.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Questions from clientele receive responses on nutrition topics from Nutrition and Food Safety Educators as appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	932	815410	859	122311

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

Patent Applications Submitted

Year:	2016
Actual:	1

Patents listed
Compositions and methods for making and using hydrolytic enzymes for degrading polysaccharides made by foodborne pathogenic bacteria. Applied For 10/29/2015

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	3	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research on the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2016	11

Output #2

Output Measure

- Number of food safety programs which promote safe handling practices in the public and food service industry.

Year	Actual
2016	103

Output #3

Output Measure

- Number of partcipants in educational programs offered by the Wyoming Food Safety Coalition.

Year	Actual
2016	3074

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve personal hygiene such as hand washing. Avoidance of cross-contamination resulting in keeping foods safe. Target is the number of participants reporting outcome.
2	Increased awareness and knowledge of food safety practices. Target is the number of participants reporting outcome.
3	Transfer of knowledge on research evaluating the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of projects reporting this outcome.
4	Food service industry personnel pass ServSafe certification test. Target is the number of participants who complete course and pass test of the National Restaurant Association.

Outcome #1

1. Outcome Measures

Improve personal hygiene such as hand washing. Avoidance of cross-contamination resulting in keeping foods safe. Target is the number of participants reporting outcome.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Increased awareness and knowledge of food safety practices. Target is the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1791

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Though most consumers have a good foundation of food safety knowledge, there are problem areas, complacency, and food safety gaps that still exist. Government research shows that this gap results in increased risk of foodborne illness. Food safety education and awareness are vital components in helping to combat this public health issue. In addition, the altitude in much of Wyoming affects how food is prepared, served, and preserved safely. Research-based, safe, food preservation techniques decrease risk for foodborne illness associated with home-preserved foods.

What has been done
103 food safety programs, which promote safe handling practices, were conducted by Extension Educators. Programs such as Food Safety Works, Food Safety Jeopardy, Food Safety Fundamentals and Preserving Food Safely focused on handling and preparing food safely at high altitudes. 1,791 youth and adults participated in educational programs that featured a food safety component.

Results

33 retrospective pre-/post evaluations were completed for one of the Safe and Nutritious Food Preservation workshops. 92% of the participants indicated an increase in knowledge, with average knowledge rating of 2.4 (low) before the workshop increasing to average knowledge rating of 4.5 (high) after the workshop. Most participants surveyed (86%) indicated intentions to adopt important food safety practices such as proper venting (when pressure canning), correct altitude adjustments, and following tested recipes.

71 adults participated in Water Bath Canning for Beginners and Food Preservation 101. In this retrospective pre-/post evaluation 20% of the participants rated their knowledge of the factors affecting safety and quality of water-bath canned foods as a 4 or 5 (high to very high). After the class, 94% of the participants rated their knowledge level as 4 or 5.

The greatest increase in knowledge through the Food Safety Works class was shown in the temperature danger zone and proper hold holding procedures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Transfer of knowledge on research evaluating the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wildlife are becoming increasingly recognized for their ability to contaminate food with foodborne pathogens via fecal shedding or indirectly through contamination of water, feed and soil. Moreover, wildlife are recognized as carriers and/or hosts of antimicrobial resistant (AMR) bacteria and genes, and can serve to disseminate these AMR bacteria and genes across agricultural operations. Wildlife incursions into industrialized livestock production, specifically

concentrated animal feeding operations (CAFOs), could aid in the perpetuation of AMR, due to the fact that these facilities are recognized as agricultural foci of AMR.

What has been done
In order to determine the wildlife-associated foodborne pathogens problem (especially AMR), our studies couple ecosystem-level understanding of the wildlife-agricultural interface with cutting edge laboratory analyses. Our work has focused on characterizing the extent of the AMR problem by determining the prevalence and distribution of AMR in specific wildlife carriers, food animals, feed, water and environment in order to profile AMR emergence, evaluate transmission dynamics, and for identifying mitigation points for wildlife managers and producers.

Results
Knowledge generated by our studies will be used to devise mitigation strategies to control spread of pathogens and antimicrobial resistance from wildlife to the food supply by using 'sensible' strategies that minimize damage to the environment, wildlife, and agricultural environments and avoid utilization of a 'scorched earth' approach.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

Food service industry personnel pass ServSafe certification test. Target is the number of participants who complete course and pass test of the National Restaurant Association.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	375

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Microbial contamination of food is a serious public health problem: each year in the U.S., food-borne diseases cause approximately 48 million illnesses, 128,000 hospitalizations, and 3,000

deaths. It is estimated that the average cost per foodborne illness is $1,850.

With approximately 60% of food-borne illness outbreaks nationwide attributable to food-service establishments, food-service personnel are key to reducing the risk of food-borne illness.

What has been done
The Wyoming Food Safety Coalition is a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies. Educational programs through the Wyoming Food Safety Coalition target food industry employees, day care providers, and the general public. Coalition team members trained 840 food handlers in the following workshops: Wyoming Food Safety Fundamentals, ServSafe, and other programs for temporary food permits, and sanitation training. ServSafe and ServSafe Starter classes in Spanish were also conducted.

Results
Participants learned valuable food safety principles and skills necessary to prevent foodborne illness through classes offered by the Wyoming Food Safety Coalition. 95% of the participants indicated they were satisfied or very satisfied with the program they attended. Most (67%) indicated intentions to improve food safety behaviors and 56% indicated intentions to improve food safety policies and/or procedures within their workplaces.

375 food service workers participated in a ServSafe training. Of those, 88% had a passing test score for ServSafe certification. Participants reported the highest level of skill improvement in safety practices around cleaning versus sanitizing (47%), identifying the food temperature danger zone (41%) and cooking foods to the proper internal temperature (41%). 30% of the participants indicated they will take additional steps to reduce cross-contamination and use proper time and temperature controls to thaw, cook, cool, and reheat foods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included staff resignations for Area Extension Educators and high turnover of staff in Cent$ible Nutrition. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the

University to implement a hiring freeze which has left 2 Nutrition and Food Safety Educator positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. Extension Educators conducted 103 educational programs to promote safe food handling practices. 1,791 youth and adults participated in educational programs that featured a food safety component.
33 retrospective pre-/post evaluations were completed for one of the Safe and Nutritious Food Preservation workshops. 92% of the participants indicated an increase in knowledge, with average knowledge rating of 2.4 (low) before the workshop increasing to average knowledge rating of 4.5 (high) after the workshop. Most participants surveyed (86%) indicated intentions to adopt important food safety practices such as proper venting (when pressure canning), correct altitude adjustments, and following tested recipes.
71 adults participated in Water Bath Canning for Beginners and Food Preservation 101. In this retrospective pre-/post evaluation 20% of the participants rated their knowledge of the factors affecting safety and quality of water-bath canned foods as a 4 or 5 (high to very high). After the class, 94% of the participants rated their knowledge level as 4 or 5.
Participants learned valuable food safety principles and skills necessary to prevent foodborne illness through classes offered by the Wyoming Food Safety Coalition. 95% of the participants indicated they were satisfied or very satisfied with the program they attended. Most (67%) indicated intentions to improve food safety behaviors and 56% indicated intentions to improve food safety policies and/or procedures within their workplaces.
375 food service workers participated in a ServSafe training. Of those, 88% had a passing test score for ServSafe certification. Participants reported the highest level of skill improvement in safety practices around cleaning versus sanitizing (47%), identifying the food temperature danger zone (41%) and cooking foods to the proper internal temperature (41%). 30% of the participants indicated they will take additional steps to reduce cross-contamination and use proper time and temperature controls to thaw, cook, cool, and reheat foods.
Research: In order to determine the wildlife-associated foodborne pathogens problem (especially AMR), our studies couple ecosystem-level understanding of the wildlife-agricultural interface with cutting edge laboratory analyses. Knowledge generated by our studies will be used to devise mitigation strategies to control spread of pathogens and antimicrobial resistance from wildlife to the food supply by using 'sensible' strategies that minimize damage to the environment, wildlife, and agricultural environments and avoid utilization of a 'scorched earth' approach.

Key Items of Evaluation

Improved food handling behaviors increase the likelihood that food served in Wyoming is safe, and therefore, that lives have been saved, illnesses avoided, health care costs controlled, fewer work days missed, and local businesses and institutions made stronger.
Research: In order to determine the wildlife-associated foodborne pathogens problem (especially AMR), our studies couple ecosystem-level understanding of the wildlife-agricultural interface with cutting edge laboratory analyses. Knowledge generated by our studies will be used to devise mitigation strategies to control spread of pathogens and antimicrobial resistance from wildlife to the food supply by using 'sensible' strategies that minimize damage to the environment, wildlife, and agricultural environments and avoid

utilization of a 'scorched earth' approach.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
1981	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
1	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
375	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
1	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
2	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
2	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.