2013 University of Wyoming Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/02/2014

I. Report Overview

1. Executive Summary

Agriculture is at a crossroads and faces many challenges and opportunities in the 21st century. Agriculture, as well as land-grant institutions, is challenged to compete in a global economy while still responding to the needs of a diverse U.S. population. 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 and information needs of students, Wyoming citizens and communities, 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, Profitable and Sustainable Agriculture Systems, 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 2013, 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 Master Cattleman, the High Plains Ranch Practicum, Range Schools, Food Safety, Youth Entrepreneur programs, and Wyoming Municipal institutes report strong impacts for citizens of the state. Additionally, Local Food Expos held in five locations across the state demonstrate strong interdisciplinary efforts between agriculture, horticulture, and nutrition education to advance whole foods and consumption of local products. 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. Being an energy rich state, UW researchers are looking at possible alternative fuels. Reclamation of mined lands is an important issue being addressed through the Department of Ecosystem Science and Management and UW Extension. The two newer planned programs on Climate Change and Sustainable Energy are not only timely, but very important to the state of Wyoming due to the energy resources which we have in abundance. Since 2009, UW Extension partnered with the UW School of Energy Resources to fund an Energy Extension Coordinator; the incumbent for this position has completed e years. This position has allowed for expanded partnerships within the University and with agencies and organizations both state and federal levels.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	100.0	0.0	43.8	0.0
Actual	100.0	0.0	42.4	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 2013 implementation of the focus groups took place across the state including a pilot in one area, followed by the five area stakeholder meetings. 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 on reaching limited resource audiences in the Cent$ible Nutrition Program which includes EFNEP. County 4-H educators conducted 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. The College of Agriculture and Natural Resources Academic Plan was approved as part of the 2009 to 2013 University of Wyoming Academic 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 2014 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. The 2009 - 2013 Academic Plan recommended revision of structured advisory committees. 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 2013, 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. Beginning 2013 focus groups were conducted in each extension area to identify needs by initiative area. 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 both 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 inititaive teams as they develop and evaluate programs. In addition UW Extenion utilizes input from stakeholders in identifying staffing priorites.

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

4-H and Youth Development

• Increase parent or adult involvement to provide positive adult modeling of behavior and interaction with youth. The program can be a model for family interaction. Mentoring by both adults and peers can be beneficial.

• The foundation of 4-H is life skill development. Provide educational activities utilizing

experiential learning. Hands-on learning opportunities will spark interest in youths and enhance the benefits of participation.

• Youth and adults face competing priorities for their time. 4-H should articulate benefit of participation. Youths can learn to make decisions about prioritizing their time. They also can be responsible and accountable for their time.

• Marketing - many across the state are unaware of the breadth and opportunities for both youth and adults in the 4-H program. Increased marketing will increase participation.

Community Development Education

• Economic development including job creation and infrastructure needs such as affordable housing and transportation. Extension's role may be to facilitate networking and dialogue among government and local agencies to discuss needs and solutions.

• Facilitate opportunities for municipal and county agencies and organizations to meet and form systematic relationships to allow for more collaborative planning in communities. The need for partnering in counties was identified.

• Marketing - provide information broadly which describes what Extension offers in local communities. Examples were leadership programs, financial management for families and individuals, and facilitation.

Childhood Obesity, Nutrition and Food Safety

• Accessibility of food and where food comes from. Many rural communities have limited access to fresh foods. How to prepare and preserve local foods was an issue identified.

• Target youths in education on nutrition and basic food preparation skills. Educating children can assist in developing healthy food and lifestyle choices which will prevent nutrition related diseases and issues. Youth audiences are also a way to reach adults and families with this information.

• Obesity, chronic diseases, time management in relation to cooking at home versus convenience foods and restaurant meals, and food budgeting were also identified as important issues facing Wyoming families.

Global Food Security and Hunger: Profitable and Sustainable Agriculture Systems

• Invasive species: new varieties of weeds and biological controls.

• Land conversion - challenges of new housing tracks in traditional agriculture communities. Economics, respect for land, land use by landowners and livestock.

• Education on how to speak about the agriculture industry; including understanding of how food is grown or raised. More effort is needed to encourage young people to choose production agriculture as a career.

• Government regulations - bridging the gap between industry and government.

Sustainable Management of Rangeland Resources

• There is a need for communication and information dissemination between agencies, (local, federal, and state) and landowners.

• Invasive species, including Cheatgrass, tree/brush encroachment and noxious weeds. The public needs more knowledge on invasive weeds.

• Land conversion needs basic education on all natural resource issues including water rights, seeding, grazing, culture of the West, economics of decisions, and neighbor relations.

• Grazing management, riparian management, water development and consumption uses.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1404950	0	1797347	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1404950	0	1797347	0
Actual Matching	1404950	0	1797347	0
Actual All Other	0	0	0	0
Total Actual Expended	2809900	0	3594694	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
801	Individual and Family Resource Management	10%		0%	
802	Human Development and Family Well-Being	25%		0%	
806	Youth Development	65%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	34.0	0.0	0.0	0.0
Actual Paid Professional	33.0	0.0	0.0	0.0
Actual Volunteer	12.0	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
468317	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
468317	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 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2484	5000	27955	10000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	0	0

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
2013	9724

Output #2

Output Measure

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

Year	Actual
2013	920

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
2013	2484

Output #4

Output Measure

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

Year	Actual
2013	1634

Output #5

Output Measure

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

Year	Actual
2013	425

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
2013	10745

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
2013	9724

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute, 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible, contributing citizens.

What has been done
4-H youth educators conducted 920 educational activities including 4-H camps, Junior Leader programs, leadership retreats and special interest sessions, judging programs, training on public speaking and presentations and implemented Character Counts training statewide. In 2013 youth mentoring programs were implemented in four counties. Additionally UW Extension, with an over $200,000 State Department grant hosted a group of 23 youth and three adults from Mongolia for a month to begin implementation of 4-H in that country. A American Youth Leadership Exchange with Samoa was also implemented with 30 youth from Western states under leadership of UW Extension 4-H.

Results
100 percent of youth participating in 4-H judging programs reported increased confidence and skills in decision making and communication. Junior leaders (youth age 13 - 18) reported through formal and informal evaluations increased awareness and skills in teamwork, decision making, self-discipline, leadership, communication, and responsibility. Youth participating in educational programs, camps, and other activities demonstrate increased knowledge and skills. Youth participating in the Mongolian and Samoa 4-H implementation gained leadership skills and understanding of diverse cultures.

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
2013	3574

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible, contributing citizens.

What has been done
4-H educators work with youth ages 13 - 18 in junior leader programs which target development of assets. A variety of methods are used including training, camps, workshops, leadership retreats, and on-going monthly junior leader meetings. WYLE(Wyoming Youth Leadership Education program)curriculum, funded through the Daniels Fund, was held in all areas in the state with 2 to 3 day retreats for junior leader age youth. Focusing on developing assets in youth is an objective of all educational activities. Bullying has been addressed through programs in schools including peer mentoring. Military partnership programs have also been implemented providing leadership opportunities for youth. Mentoring programs have been implemented.

Results
Junior leader age youth (13 - 18) report through formal and informal evaluation increased skills,

knowledge, and assets such as self-esteem, communication, responsibility, and decision making. Wyoming Youth Leadership Education retreats had the following impact: daily evaluations as well as a final overall evaluation were used to evaluate the overall impact of the program. The evaluations showed that 82 percent of youth said that their knowledge was improved or greatly improved by the True Colors assessment, 75 percent for learning styles, 87 percent for body language, and 94 percent for extreme leadership,40 percent for youth in governance,58 percent for business etiquette,90 percent for senior sensitivity,65 percent for Character Counts, and 90 percent for communication. Mentor programs reported on average mentors and mentees spend between 4 - 12 hours per month together. 100 percent of parents express the positiveness of the mentor/mentee matches. All youth have shown an increase in self-confidence since enrolled in the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
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
2013	2000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible, contributing citizens.

What has been done
4-H educators work with youth ages 13 - 18 in traditional and non-traditional junior leader programs which target development of assets. A variety of methods are used including training, camps, workshops, leadership retreats, and on-going monthly junior leader meetings. Non-traditional efforts include: mentoring programs through a partnership between National 4-H Council and the Office of Juvenile Justice Delinquency Prevention were implemented in addition to mentoring programs as part of anti-bullying initiatives which are structured to develop trusting relationships which offer guidance, support, and encouragement aimed at developing the competence and character of youth. Programs focusing on developing assets in youth is an objective of all educational activities. American Youth Leadership Exchange programs develop cultural understanding in addition to other assets in youth.

Results
On Average mentors and mentees spend between 4 - 12 hours per month together.
- 100 percent of parents express the positiveness and success of the mentor/mentee matches.
- 100 percent of the parents report their children love doing activities with their mentor.
- Family participation nights continue to thrive.
Using a Likert scale both parent and mentor evaluations show:/
- all youth have shown an increase in self-confidence since enrolled in the program.
- all youth's outlook on life has improved since enrolled in the program.
- all youth have shown more positive changes and or positive choices since enrolled in the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
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
2013	2484

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Adult volunteers are the mainstay of the 4-H program. The success of the program depends on the knowledge and skills volunteer leaders have and can then pass on to the youth and parents in their clubs. Leaders can directly accomplish goals of the program for positive youth development of all participants. In the 2012-2013 program years in Wyoming there were 2484 leaders at all stages of experience and expertise. Area advisory meetings, 4-H councils, program assessments compiled over three years revealed the need for leadership training beyond the basics of 4-H.

What has been done
4-H educators and the State 4-H volunteer development specialist teamed to design and implement the Master 4-H Volunteer Training in 2012, which is now offered every other year at the state 4-H Leaders Conference. Resources included curriculum and activities developed to provide hands-on, experiential learning opportunities for volunteers. The program consisted of 11 hours of intensive training. In addition, county youth educators conducted over 113 training sessions for volunteers, reaching over 4400 (includes duplicates) including parents of youth.

Results
100 percent of participants increased knowledge to increase capacity when working with youth as a result of training sessions.
Using a 5-point post retro pre-evaluation - volunteer leads showed increased knowledge in the following areas:
26 percent increase in understanding of the 8-essential elements.
20 percent increase in the understanding of how contributions impact 4-H
15 percent increase in understanding how to help others succeed.
20 percent of the 4-H mentoring program understand the impact on youth.
14 percent increase in understanding how Extension can support volunteers.

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
2013	2484

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Adult volunteers are the mainstay of the 4-H program. The success of the program depends on the knowledge and skills volunteer leaders have and can then pass on to the youth and parents in their clubs. Leaders can directly accomplish goals of the program for positive youth development of all participants. In the 2012-2013 program year in Wyoming there were 2432 leaders at all stages of experience and expertise. Area advisory meetings, 4-H councils, program assessments compiled over three years revealed the need for leadership training beyond the basics of 4-H.

What has been done
4-H youth educators conducted 113 training activities including State 4-H Leaders Conference, project and general leader training. Objectives and goals of 4-H youth development principles are incorporated into all training sessions.

Results
Volunteers stated increased understanding of youth development principles which foster youth to become productive adults. Testimonials from 4-H leaders and youth indicate the positive influence adult volunteers have on the life of 4-H members.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- 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

High staff turnover in the 4-H program also impacts continuity of youth development

programs. Additionally funding support from county partners impacts the 4-H program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A sample of impacts reported: Camp Counselor training prepares youth for real world job.

After two days of training prior to the campers arriving at camp, each camp counselor completed a survey designed to rate their confidence in knowledge gained with life and workplace skills learned while in the training.

Counselors made comments that reinforced their understanding of camp counseling skills and workforce connections:

- "The interview process will help me forever. It was a great first experience. I was really nervous, and now I know that interviews are a place that it's good to be self-confident."
- "I have learned that input from others can be very helpful, sometimes they see things that you don't."
- "What I learned as a camp counselor will help me in the real world."
- "I learned that being responsible is about being aware of more than just you."

A second program business ventures reported the following impact:

Twelve small businesses have been funded for a total of $10,148.42 since inception of the Sublette County 4-H youth business ventures program. Only one of the businesses had less than a two-year survival rate, and two businesses will celebrate five-year anniversaries this spring. One of the youth businesses reported having earned a net income of more than $8,000 since beginning and a 50-percent business growth rate the past two years. Another youth assessed their business as highly successful having earned a total net income of $6,500 and a gross income of nearly $30,000.

When asked specifically what was learned from being a young business owner, the youth reported:

"Being a business owner is tons of work."

"Being a business owner has meant that sometimes I have to work holidays and days I don't want to," and

"I have learned that you have to work really hard to build your business, and sometimes it just doesn't happen very fast."

Key Items of Evaluation

Volunteers contribute significant volunteer time adding nearly $1 million dollars to youth outreach efforts.

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	5%		20%	
602	Business Management, Finance, and Taxation	5%		5%	
604	Marketing and Distribution Practices	5%		20%	
608	Community Resource Planning and Development	50%		25%	
801	Individual and Family Resource Management	25%		10%	
802	Human Development and Family Well-Being	5%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	2.5	0.0
Actual Paid Professional	11.0	0.0	4.4	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**
156105	0	186008	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
156105	0	186008	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. Analyses 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3531	5000	250	1000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	12	17	29

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
2013	29

Output #2

Output Measure

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

Year	Actual
2013	3778

Output #3

Output Measure

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

Year	Actual
2013	154

Output #4

Output Measure

- Entrepreneurship output targets include: number of individuals assisted.

Year	Actual
2013	129

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, and ability to make informed decisions on land management and community development. Target is number of projects.

Year	Actual
2013	4

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: Transfer of knowledge regarding decisions on public land management and community development. Target is number of outputs.
5	Research: Development of impact models that will contribute to community development as well as mitigate unwanted consequences. Target is number of impact models developed.

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
2013	1567

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many county-appointed and non-profit board members and elected officials want to complete their assigned duties yet lack the skills and training needed to perform to the best of their ability. 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. The UW Extension Community Development Education (CDE) initiative team developed materials to support training programs for county boards and Municipal treasurers.

What has been done
The CDE team developed curriculum and educational materials to support the program. Area educators used the materials to develop a four-hour educational program for county-appointed and non-profit boards in the state. The team has partnered the Wyoming Association of Municipal Clerks and Treasurers (WAMCAT). The team received approval from the International Institute of Municipal Clerks and the Association of Public Treasurers for meeting certification and continuing education requirements. In 2013 1567 individuals participated in training including 116 in two comprehensive Wyoming Municipal Institutes.

Results
Over the past six years board training has taken place. A 5-item Likert scale (1=Very Poor 5= Excellent) querying whether workshop series helped improve in the areas of communication, leadership, conflict-management, decision-making, and problem solving. 84 percent believe they are more effective board members, and 53 percent believe their confidence increased. Sixty three percent increased meeting facilitation skills, and 53 percent increased skills in parliamentary law. Fifty eight percent believe they are better at fulfilling their board responsibilities while 50 percent improved in planning and organizing. Thirty-nine percent improved in handling conflict and 77 percent improved in their leadership skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
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

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
2013	234

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the last decade Wyoming has experienced significant economic growth stemming from its natural resources of gas,oil, and coal. Jobs in the energy sector pay well, most residents hold service sector positions that are typically low paying and are often seasonal. The first 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. In Wyoming about 2,500 people file for bankruptcy protection each year. The second critical issue is the spending habits of adolescents. Many adolescents earn income, of which they spend 98 percent, and do not have to pay for many living expenses such as housing. Information collected from UW Extension Area Advisory committees identified retirement planning, consumer decision making skills, estate planning and family resource management as the top issues in the state. Financial blogs were also implemented in 2011.

What has been done

Family resource management courses were taught using a variety of methods from multi-session classes meeting to blogs and webinars. One time workshops on basic finance, planning for succession with agriculture families, and starting over making the most of your money targeted to those filing for bankruptcy were held. Youth were reached through camps and specific courses on money management. A stronger on-line approach is being developed to reach this audience. Youth were reached through a community camp focusing on financial literacy. In 2013 Web trainings were utilized as the method to reach the targeted audience. In addition, a 12 part publication series on estate planning was developed and published.

Results
End of session evaluations indicated over 50 percent of participants increased knowledge and skills in implementing financial principles. Over 50 percent reported adopting at least one financial principal as a result of the classes. These included improved credit management; financial recovery after bankruptcy; and initiating a savings plan. In addition, participants reported developing a plan for transfer of property and discussions with family on estate planning.

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
2013	148

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. The second level has two blocks, existing business development and entrepreneur development, and one block on the top for recruiting.

What has been done
In FY 2013, four EVOLVE leadership institutes were held. Each institute meets monthly for 8 sessions ranging from 6 - 8 hours in length. Topics covered include team-building, communication, and conflict management, a fishbowl simulation of leadership assessment, community involvement, and overall leadership. Educators also conducted assessments for Wyoming LEAD, and marketing sessions for the institutes. Additionally educators have worked with three existing community leadership programs sharing the EVOLVE model.

Results
In 2013, 100 individuals graduated from EVOLVE community leadership institutes in Wyoming. forty-eight individuals served on steering committees to plan the institutes. Weekly session evaluations and an end of course written evaluation indicated 100 percent of participants reported their leadership behavior (communication, conflict management, meeting organization) improved. Over 90 percent reported their participation in community events increased as a result of participation in the program. This program which began in 1995 has become a model for the country. A sample of participant comments:
"I've always been a go-getter and have a habit of doing it "all" myself. The classes have given me tools to organize a team and share responsibilities in reaching a common goal." " The most significant thing I learned is that anyone can develop the skill set, talent and abilities to become a great leader."

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Research: Transfer of knowledge regarding decisions on public land management and community development. Target is number of outputs.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2013 2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The audiences for the outcomes consist of policy makers, landowners, land use planners, land trusts, federal and state agency personnel, other researchers, elected officials and concerned citizens.

Research offers insights into maximizing benefits and minimizing damages and costs from land use decisions. This includes fiscal impacts of development and the ecosystem services implications of land use changes. Exurban sprawl and landscape fragmentation continue to be critical issues with respect to resource management, local governance and rural community development. There are implications for the costs of infrastructure development and public service provision as per the arrangement of people on the landscape and the conversion of extensive agricultural lands into large lot exurban parcels.

What has been done

The research is designed to improve the decision making environment for program provider and participants. Analysis of emerging conservation easement markets was conducted. Stated choice analysis using a random utility model and mixed logit estimation techniques indicated difference between Colorado and Wyoming landowner preferences for conservation easement programs. It also indicates that land trusts have different missions that influence the types of conservation easements they would pursue.

Results

This project relates to open space preservation/conservation issues across a variety of natural resource considerations, particularly land and water resources. The bulk of the work sheds some light onto the outcomes of parcelization and fragmentation of rural lands. Outcomes provide perspectives as per landowner preferences for conservation easements as well as land trust concerns for initiating conservation easement agreements. These results have policy ramifications as per NRCS's and FSA's CPGL, CRP, CSP, EQIP, FRPP, GRP, WRP, WHIP; USFS's Forest Legacy, Stewardship and Land Enhancement Programs; USF&W's Cooperative Endangered Species Conservation Fund and Partnership with Private Landowners for fish and wildlife habitat conservation; LT's and Public PACE programs. The work also has implications for state, county and municipal land use planning efforts as well as property owners.

4. Associated Knowledge Areas

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

Outcome #5

1. **Outcome Measures**

Research: Development of impact models that will contribute to community development as well as mitigate unwanted consequences. Target is number of impact models developed.

Not Reporting on this Outcome Measure

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

Factors external to the College of Agriculture and Natural Resources that will influence programs and results include: formation of collaborations; a shift in demographics; a shift in state and regional economic situations; shifts in local, state, university, and national policy, and changes in technology. External factors which can affect leadership activities include competing public priorities which affect participation; competing programmatic challenges and limited resources. Many communities are under pressure to deal with multiple changes/issues. A significant portion of community members often resist such change or choose to ignore it. Resources will continue to be scarce and may diminish. The CDE team is only one of five UW Extension SIT teams. Consequently, UW Extension resources brought to bear on this objective will be limited. Leadership training has become a popular subject of concern across the nation, which increases the opportunity and need for UW Extension programming, but also increases the competition from other sources offering leadership training and community facilitation.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The CDE team utilizes a variety of evaluation methods to collect outcome data from programs. Board training is a major thrust of the team. A follow up survey was conducted, using a Website developed by the University of Wyoming Survey Tool. Participants of board training were invited to participate in the survey at least 6 months after attendance.

Participants indicated that they have used the training on effective meeting facilitation, parliamentary procedure, roles and responsibilities, open meetings law, and legal responsibilities the most.

In the area of skill enhancement, 90% of respondents felt they were more effective as board members while 75% felt their confidence had increased. In addition, 68% increased their skills in meeting facilitation, and 53% in parliamentary law. Fifty eight percent feel they are better at fulfilling their board responsibilities, while 45% improved in planning and organizing, 39% in handling conflict, and 77% increased their leadership roles. In summary, the involvement of 70% of respondents was strengthened.

Process skills are key to building community capacity. Conflict management classes taught statewide provided the following results. Fifty participants provided feedback on knowledge and skills gained.

The results from the evaluation show that the majority of participants acquired the necessary knowledge and skills to positively manage conflict.

- 84 percent agreed that at the end of the workshop they could list up to three conflict resolution strategies.
- 90 percent agreed that they could successfully compare/contrast interests and positions.
- 88 percent agreed that they had learned how to use strategies to prevent conflict.
- 88 percent agreed that their participation in the workshop would help them to be more effective in their work/personal life.
- 86 percent of the attendees found that the workshop was a valuable or very valuable experience.

End of session evaluations on all programs showed knowledge gained and skills improved. Over half of respondents indicated they planned to make positive changes as a result of classes.

Key Items of Evaluation

Capacity for serving on governmental or non-profit boards increased as a result of educational programming by UW Extension. Over 90 percent report more confidence and skills working on boards.

Extension Volunteer Organization for Leadership, Vitality, & Enterprise (EVOLVE) the curriculum utilized for community leadership programs has become a model for the Western States. In place for over 15 years, the program has success in developing capacity of community members to serve in leadership roles.

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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	6.0	0.0
Actual Paid Professional	14.0	0.0	5.1	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
212872	0	216700	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
212872	0	216700	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 University of Wyoming Extension Web site prominently displays the eXtension link on the home page. Additionally, professional development opportunities through eXtension are publicized for Extension employees.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2897	100000	1783	5000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	12	12	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2013	185

Output #2

Output Measure

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

Year	Actual
2013	60

Output #3

Output Measure

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

Year	Actual
2013	4680

Output #4

Output Measure

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

Year	Actual
2013	2897

Output #5

Output Measure

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

Year	Actual
2013	25

Output #6

Output Measure

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

Year	Actual
2013	1783

Output #7

Output Measure

- Conduct research on sustainable rangeland production and watershed management. Target is number of projects.

Year	Actual
2013	4

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 enrollment 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	Research: Transfer knowledge and increase appreciation of sustainable rangeland production. Target is number of projects.
5	Research: Transfer knowledge and increase appreciation of watershed management. Target is number of projects.

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
2013	100000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many Wyomingites are not directly tied to natural resources and agriculture. This results in lack of knowledge and experience regarding natural resource systems, their management and the industries they support. Unfortunately, a segment of the general public appears to believe that any use of even renewable resources is damaging. There is often conflict and occasional litigation among interest groups that differ on how resources should be used and managed. Natural resources are important to all segments of the Wyoming population.

What has been done
The Sustainable Management of Rangeland Resources initiative team has produced over 321 seventy second TV spots which air twice weekly on commercial TV station in Casper. The segment titled 'Exploring the Natural Wonders of Wyoming' (ENOW) covers natural resource topics to provide education to the general public. The ENOW spots have also been placed on You-Tube to reach a national audience. Articles on natural resource issues appear in Barnyards & Backyards, rural living in Wyoming Magazine quarterly and statewide newspaper inserts.

Results
In the eighth year of airing these spots, the team receives regular feedback from Wyoming citizens and now national viewers on the positive aspects of the spots. The videos have been transferred to DVD's for public distribution and also distributed to schools though the state. The spots posted on You-Tube with viewership growth from 2,400 in 2007 to 57,000 views in 2013. Total views exceed 600,000 since inception. It is difficult to measure impact, though the audience response has generated enough impact that the energy industry now provides partial funding for the segments aired twice weekly. Barnyards and Backyards magazine has over 3000 paid subscribers. Raising awareness of natural resource issues expands UW Extension's audience

base and enhances knowledge for citizens.

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 enrollment 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
2013	1783

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extension is uniquely positioned in that we have existing volunteer youth development programming infrastructure already built in the 4-H program featuring offices in all of Wyoming's 23 counties, several thousand volunteer staff and thousands of youth already acquainted with the 4-H program. These youth present an immediate natural resource education audience and an opportunity to reach the broader youth audience with the educational resources we have. Building stronger natural resource programs, enhancing natural resource teaching opportunities within existing high-interest projects (like market livestock and shooting sports projects) and increasing youth development opportunities are key. This will continue to foster interest in natural resource careers. Science, engineering, and technology emphasis of 4-H align with SMRR educational efforts.

What has been done
Educators conducted 28 educational programs including an ag expo, GPS training, plant anatomy, native plants and noxious weeds, and nature awareness. Alternative energy, windmill science and wind workshops were also conducted. Over half the counties in Wyoming conduct summer camping programs which include natural resource education. Extension educators and specialists actively participate in implementing Wyoming Resource Education Days (WyRED)a joint effort with the Society of Range Management and local conservation districts.

Results
Enrollment in 4-H livestock projects continues to increase. Shooting Sports which is also closely tied to natural resources is also experiencing increased enrollment. All youth participating in targeted natural resource education programs report increased knowledge and skills. The increased awareness and knowledge will enhance natural resource and range career choices for youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
135	Aquatic and Terrestrial Wildlife

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
2013	1763

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rangelands comprise over 80 percent of Wyoming's land base. Range livestock production, recreation, and wildlife habitat are some of the dominant uses of rangelands. Rangelands also provide water for homes and municipalities, irrigation, industries, fisheries, wildlife and livestock. In semi-arid Wyoming, rangeland uses need to be compatible with maintaining the quality and quantity of water resources. Livestock grazing and wildlife habitat management must also be compatible as both are important for the sustainability of the State's rangeland resources and its economy.

What has been done
Extension educators in the SMRR initiative conducted 74 educational programs, tours, or workshops on range monitoring. Most classes were targeted toward permittees reaching 1763 individuals. Reclamation 101 School has been implemented to assist producers and industry in mitigating energy impacts. Annie?s project and Women in Range were new program in 2013 targeting female producers.

Results
100 percent of participants in educational programs reported increased awareness, knowledge, and skills of range monitoring. Over one third of individuals reported implementing or adjusting management plans as a result of the workshops. Participants reported a 20% increase in knowledge and 90% reported their expectations in the course were met. In Rangeland Management Schools over 80% of participants reported gaining some new knowledge, with 10% reporting significant knowledge gained.

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

Outcome #4

1. Outcome Measures

Research: Transfer knowledge and increase appreciation of sustainable rangeland production. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Non-native, invasive weed species threaten the economic and ecological well-being of western rangelands. An invasive weed of particular concern is Russian knapweed, which infests more than 1.5 million acres of rangelands, particularly in Colorado, Idaho, Washington and Wyoming. Russian knapweed is toxic to horses, unpalatable to cattle, and highly competitive with desirable forage grasses. An extremely widespread distribution and deep root system makes Russian knapweed difficult and costly to manage using herbicides. In 2009, a new insect biological control agent became available for management of Russian knapweed. The insect is a fly from Uzbekistan that is specific to knapweed and is anticipated to reduce the seed production and growth of Russian knapweed, if successful.

What has been done
This project has been studying seasonal and annual changes in the population of the new biological control agent at a biological control site near Riverton, Wyoming. The goals of the study are to (a) identify strategies for collecting the fly to introduce to new Russian knapweed infestations, and (b) document one measure of the impact of the fly on Russian knapweed, the percentage of shoots attacked. Population surveys of the fly and of Russian knapweed shoots have been conducted since 2010. This research has shown that the ideal time to collect the fly for release at new infestations is from mid-June to mid-July. In addition, over the 2010-2013 time period, a consistently small fraction of knapweed shoots have been attacked by the fly, however, individual shoots were more heavily attacked and fly numbers were three times higher in 2013 than in previous years.

Results
Determining whether new insect biological control agents are effective is critical for determining whether the costs of implementing biological control by weed managers are justified. The results of this study were shared with weed managers via a presentation at a regional meeting and an article in a popular-press periodical. One of the impacts of this study is to transfer crucial information to weed managers about how to implement biological control of Russian knapweed using the newly available insects. Another impact of this study is to inform weed managers about the types of outcomes they might expect from biological control of Russian knapweed, so that they can make better decisions about how to manage this important invasive weed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

213	Weeds Affecting Plants
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

Outcome #5

1. Outcome Measures

Research: Transfer knowledge and increase appreciation of watershed management. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Landowners and residents of the Green River Basin have begun to look for ways to encourage land management practices that maintain and enhance riparian habitat for wildlife and water quality for downstream users. Payments for Ecosystem Services (PES) is a way to provide financial incentives or compensation to private landholders for engaging in socially or environmentally beneficial activities that might not otherwise be undertaken or continued.

What has been done
Our team has completed a feasibility analysis of establishing a PES market in the upper Green River Basin. We conducted focus groups and interviews with potential buyers (energy companies), sellers (landowners), and regulators of relevant federal and state land management agencies. We have determined that stakeholders are sufficiently interested in a PES market to justify moving forward to establish a PES market in the Green River Basin. Three ecosystem services are of particular interest in the region: Greater sage-grouse habitat, mule deer habitat, and riparian function. We have also engaged the U.S. Fish and Wildlife Service on market design, because the Greater sage-grouse is a candidate species under the Endangered Species Act.

Results
Our initial feasibility analysis has successfully identified locations and specific ecosystem services within the Green River Basin that are suitable candidates for a PES program. Our work thus far has raised landowner awareness in the Green River Basin about the value of ecosystem services provided by ranch operations and spurred discussion among stakeholders about how best to monetize this value.

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
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics

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

UW Extension has experienced several educators resigning during this period. Searches are in progress to bring this team of educators back to full capacity. Weather extremes and funding are factors which impact both Research and Extension efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Educational classes, workshops, schools utilized end of session evaluations with informal follow-up to document actual 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.

Just a sample of program evaulation data collected include:

A survey was developed and administered to assess pre-and post-workshop knowledge about cheatgrass,and what changes participants anticipated making in their management of invasive species,specificall ycheatgrass, as a result of the workshop.

The participants knowledge increased for allof the key points in the pre-and post-self assessment. The three key points that participants reported thei rknowledge increased the

mos on a scale of 1 to 5 (1 is low and 5 is high) were:

Knowledge of th ecurrent options for chemical control: Pre-workshop average knowledge 2.77; Post-workshop average knowledge 4.21

Familiarity with selecting an appropriate monitoring technique for the question of interest: Pre-workshop average knowledge 2.72; Post-workshop average knowledge 4.08

Familiarity wit hways to prioritize locations for cheatgrass management actions: Pre-workshop average knowledge 2.78; Post-workshop average knowledge 4.12

Respondents reported they could apply the information they learned during the workshop to the area they manage (average 4.34 on a scale of 1 to 5) . Additionally, they reported they are more confident in their ability to identify cheatgrass, and to develop a management strategy average 4.29 on a scale of 1 to 5, with1being strongly disagree to 5 being strongly agree).

A eight session series High Plains Ranch Practicum school reported in end evaluations:

- Producers who attended the class resulted in $494,000 in improvement in net income to their operation in total.
- 90 % would use decsiion making skills gained to help them make management decisions.
- 96% reproted they would improve range management or natural resource managment.

Key Items of Evaluation

Permittees have implemented range monitoring plans which improve sustainability of their land.

Natural resource media efforts have enhanced knowledge of Wyoming citizens on rangeland, natural resources, water conservation and preservation of the land.

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890

Plan	24.0	0.0	21.2	0.0
Actual Paid Professional	21.0	0.0	18.9	0.0
Actual Volunteer	5.5	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**
298020	0	801176	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
298020	0	801176	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 pilot-testing 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 used as a resource in Wyoming. The link to eXtension if prominently displayed on the UW Extension Web site home page. In addition, professional development opportunities through eXtension are publicized to Extension employees.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6844	100000	1178	5000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	31	37	68

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
2013	350

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
2013	8022

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
2013	50

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.

Year	Actual
2013	2500

Output #5

Output Measure

- Research projects on crop, livestock, and horticulture systems.

Year	Actual
2013	12

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	Transfer knowledge and increase awareness of research on plant production systems. Target is number of projects.
6	Transfer knowledge and increase awareness of research on animal production systems. Target is number of projects.

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
2013	8022

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 of Wyoming 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
Extension Educators in Profitable and Sustainable Agriculture Systems conducted 350 educational programs including field days, workshops, classes, multi-session courses, and volunteer training. In addition media is utilized to reach citizens through television, newspaper inserts, magazines, news columns and special articles, and radio.
Educators also write educational newsletters distributed by mail and on line. Five local food expos were implemented in 2013.

Results
Formal and informal evaluations were used to determine outcome. 100 percent of agriculture producers participating in educational activities reported increased awareness on Global Food Security, Hunger, Crop, Livestock, and Horticulture Systems.
Written evaluations of the Ranch Practicum School Profitability and Sustainability following the comprehensive eight day course reported:
Forty-nine participants indicated knowledge gained would influence, management for 17,000 beef cattle and 636,000 acres of land. Producers who attended the class reported the class resulted in $440,000 improvement in net income to their operations in total.
40% showed greater increase in time using cow body condition as a management tool.

25% increased their use decision making skills gained to help them make management decisions.
80% indicated they gained moderate to significant knowledge in 25 specific area related to ranch production and management.
70% increased long term profitability and productivity of their cattle enterprises.

Master Gardeners assisted in extending skills and disseminating information to 34,174 contacts and recorded over 10,904.5 volunteer hours contributing $213,073.93 to Wyoming Horticulture outreach efforts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems
502	New and Improved Food Products

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
2013	2500

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. The largest component of Wyoming agriculture is the beef cattle industry, accounting for approximately 70 percent of all cash receipts and 86.5 percent of all livestock production. Sheep, lamb, and wool receipts in 1998 were $29 million. Forage sustains the Wyoming livestock industry. Hay is the leading crop in Wyoming with 1998 production valued at $185 million, mostly marketed through livestock. Crop producers across Wyoming are challenged with increasing production costs, global market competition, environmental pressure, and decreased labor availability. Alternative markets,

improved management practices, and cost efficiency is critical to ensure profitability and sustainability for Wyoming producers. Irrigation is a key factor identified by UW Extension area advisory committees and AES advisory groups.

What has been done
UW Extension educators conducted 350 classes, workshops, tours on crop, livestock, and horticulture systems targeting Wyoming producers and landowners. In addition, educators published articles in local newspapers, newsletters, special newspaper inserts and discussed the topic on radio programs. Topics included pasture management, introduction to irrigation, and the Wyoming Water Conference, and Wyoming Water Association tour. The Master Cattleman Class, which met weekly for eight weeks, provided 24 hours of classroom instruction.Master Sheep Producer course was implemented in 2013 in three locations. Horticulture programs are conducted throughout the state with Master Gardener programs implemented in 17 of the 23 counties.

Results
Participants indicated through formal and informal evaluations that they increased confidence in decision making skills necessary to make needed management decisions. Producers reported increased knowledge and awareness of pasture conditions. 2500 participants in educational activities reported gaining knowledge and awareness of resources and methods of irrigation and cost related to each method. End of 2013 program evaluations reported:
85 percent gained knowledge of production strategies
90 percent gained knowledge of enterprise analysis and risk management
100 percent plan to implement one or more ideas. Sixteen of the ranchers indicated that they now utilize partial budgeting to help in the decision making process.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems
502	New and Improved Food Products

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
2013	8022

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. The largest component of Wyoming agriculture is the beef cattle industry, accounting for approximately 70 percent of all cash receipts and 86.5 percent of all livestock production. Sheep, lamb, and wool receipts in 1998 were $29 million. Forage sustains the Wyoming livestock industry. Hay is the leading crop in Wyoming with 1998 production valued at $185 million, mostly marketed through livestock. Crop producers across Wyoming are challenged with increasing production costs, global market competition, environmental pressure, and decreased labor availability. Alternative markets, improved management practices, and cost efficiency is critical to ensure profitability and sustainability for Wyoming producers. Irrigation is a key factor identified by UW Extension area advisory committees and AES advisory groups.

What has been done

UW Extension educators conducted 350 classes, workshops, tours on crop, livestock, and horticulture systems targeting Wyoming producers and landowners. In addition, educators published articles in local newspapers, newsletters, special newspaper inserts and discussed the topic on radio programs. Topics included pasture management, introduction to irrigation, and the Wyoming Water Conference, and Wyoming Water Association tour. The Master Cattleman Class, which met weekly for eight weeks, provided 24 hours of classroom instruction. Master Sheep Producer was developed and implemented in 2013. Horticulture programs are conducted throughout the state with Master Gardener programs implemented in 17 of the 23 counties. In addition each of the four Agricultural Experiment Stations held field days to disseminate research information to Wyoming producers.

Results

Formal and informal evaluations were used to determine outcome. 100 percent of agriculture producers participating in educational activities reported increased awareness on Global Food Security, Hunger, Crop, Livestock, and Horticulture Systems.

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

214	Vertebrates, Mollusks, and Other Pests 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
502	New and Improved Food Products
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
2013	500

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 of Wyoming 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
Extension Educators in Profitable and Sustainable Agriculture Systems conducted 350 educational programs including field days, workshops, classes, multi-session courses, and volunteer training. In addition media is utilized to reach citizens through television, newspaper inserts, magazines, news columns and special articles, and radio.

Educators also write educational newsletters distributed by mail and on line. Master Wool Grower was implemented. The project was accomplished through five, 4-hour workshop sessions at two Wyoming locations. A total of 18 participants completed the program with at least 15 participants at each session. Additionally, three sessions were presented at the November 2012 Tri-State Wool Growers meeting. More than 50 participants from Idaho, Utah, and Wyoming were taught in these three sessions.

Results
Master Wool Grower:
Impacts:
Participants who completed programs in the two Wyoming locations evaluated the program. Participants were asked to rate each of the eight total topics taught with the following scale: 1 = Poor to 5- Excellent.

* The average score for all eight classes was 4.26. The lowest-rated class received a 3.93, and the highest-rated class received a 4.73.
?Participants were asked if they had used tools or concepts taught in the program to make decisions on their ranches. Ninety-three percent indicated they had used the tools.
Participants were asked to estimate the value created from attending this program. All participants indicated value was created, and 60 percent of the participants indicated more than $5,000 in value gained.

High Plains Ranch Practicum (HPRP) participants report changing management practices, enhanced natural resources, and improved profitability as a result of knowledge gained. Forty-nine operations managing 636,000 acres and 17,000 cattle made management changes that increased profit by more than $440,000, as reported in the survey.

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

Transfer knowledge and increase awareness of research on plant production systems. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Dual-purpose small grains can extend the grazing period without compromising grain yield. Feeding cattle, especially in early fall-winter, is a great challenge because of a shortage of forage during this time. Small grains such as wheat, rye, and triticale are primarily used as grain crops but can also be used as annual forages. They are well adapted throughout the US and southern Canada. Although small grains are primarily grown as winter pasture, they can be used as silage or hay crops. Additionally, small grains, especially triticale and rye, are often used as cover crops or in companion seeding with legumes, particularly with alfalfa.

What has been done
A project was initiated in fall 2008 at the University of Wyoming's James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC), Lingle with the objective to look at forage and grain yield potential of different experimental lines of wheat, rye, and triticale. The lines were collected from the Noble Foundation in Oklahoma. Two experimental lines along with a standard variety as check from each species were used. The lines were seeded into two adjacent plots. The adjacent plots represented forage only use and dual-purpose forage and grain use.

Results
Based on the results of the study, small grain cereal crops could potentially be managed for both forage and grain production in the Central High Plains. This project has a potential impact in extending grazing period or supplying feed at the time when forage production is limited, especially in early fall-winter, and thus may provide economic benefits for producers in reducing feed cost especially during winter and early spring.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
704	Nutrition and Hunger in the Population

Outcome #6

1. Outcome Measures

Transfer knowledge and increase awareness of research on animal production systems. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Feed costs represent approximately 50-70% of total input costs for sheep and beef producers. Furthermore, by 2050 the world population is expected to increase by 50%. Producers face a growing dilemma to reduce current input costs while providing increased outputs (i.e. meat, milk, wool) with reduced resources (land and feedstuffs). A potential solution is to select for feed efficiency traits. Unfortunately, feed intake is difficult and expensive to measure, and is not a trait readily measured by most producers for those reasons. Therefore, alternative ways to assess or predict feed efficiency in ruminant livestock is essential to making genetic gains in this trait of economic importance. Improvements in this trait will benefit producers through lesser feed inputs, or alternatively better stocking rates.

What has been done
Lambs (n = 80) were performance tested using the University of Wyoming's GrowSafe system to determine feed intake, and ultimately residual feed intake, a measure of feed efficiency. Lambs divergent for feed efficiency, being lowly efficient/high RFI (n = 8) or highly efficient/low RFI (n = 8) were selected. Rumen fluid collected from those selected lambs was sent to the University of Missouri's DNA Core Facility for DNA sequencing to determine microbial content. Microbial species associated with feed efficiency are currently being determined using a pipeline analysis procedure.

Results
We expect to develop rumen microbial profiles that can be used to predict an animal's feed efficiency status. If successful, rumen sampling provides a simple, one-time alternative to assessing feed efficiency (as opposed to a lengthy and costly feed intake test). This would allow producers to assess breeding stock for feed efficiency status, and provide them with an additional tool for making genetic selection decisions to impact their herd/flock efficiency, and ultimately their profit potential.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
704	Nutrition and Hunger in the Population

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

Many conditions and situations that exist in Wyoming are similar to those in other parts of the country, for example, the following:

• Food choices made available and advertised to consumers by producers • Access to timely and accurate information • Coordination and cooperation of federal agencies and state partners • Existence of local collaboration • Level of funding at federal, state and local level • Willingness of private sector-funders, such as corporations, foundations, and community organizations, to collaborate with the University of Wyoming Extension.

Weather extremes and drought may affect producers in agriculture or horticulture issues. Funding is vital to this program; changes in appropriations could impact funding. Additionally, global market changes impact both research and extension programs in profitable and sustainable agriculture.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Systematic evaluation utilizing a variety of methods was used to document outcomes and impact to clientele. This program includes four focuses: global food security and hunger, livestock systems; crop systems; and urban horticulture. Each focus has developed a logic model which includes specific evaluation plans and methods. Educational activities use written evaluations following the program, as follow-up; pre-and post -test to measure knowledge and aspirations. Follow-up evaluations either by mail, phone, or

personal visit document medium and long term outcomes.

Multiple methods were used. Sampling was utilized to gather evaluative data from media education efforts. Surveys, by mail, telephone, or on-site were used with program participants. Observation and unstructured interviews were used to determine medium to long term outcomes. Tests including pre- and post- were utilized to measure knowledge gained.

100% of participants indicated increasing knowledge, awareness and skills. Over half of respondents of evaluation surveys indicated aspirations to implement practices that would be an improvement.

Over 90% of individuals enrolling in the master gardener program complete the course and pass the certification test.534 Master Gardeners in 14 counties reported 10,904.5 volunteer hours, 2,216 continuing education hours, and 24,174 contacts. The value of volunteer time as documented by the independent sector shows that MG volunteers contribute $213,073.93 to the Extension program in Wyoming.

Key Items of Evaluation

100% of participants indicated increasing knowledge, awareness and skills. Over half of respondents of evaluation surveys indicated aspirations to implement practices that would be an improvement.

Over 90% of individuals enrolling in the master gardener program complete the course and pass the certification test.

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	10%		10%	
112	Watershed Protection and Management	10%		10%	
132	Weather and Climate	20%		20%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		10%	
205	Plant Management Systems	10%		10%	
306	Environmental Stress in Animals	10%		10%	
307	Animal Management Systems	10%		10%	
605	Natural Resource and Environmental Economics	10%		10%	
608	Community Resource Planning and Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	2.6	0.0
Actual Paid Professional	2.0	0.0	2.8	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**
28383	0	118692	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
28383	0	118692	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.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17240	100000	100	500

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	7	8

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
2013	1724

Output #2

Output Measure

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

Year	Actual
2013	22

Output #3

Output Measure

- Research: Evaluation of production practices in the face of climate changes. Target is number of research projects.

Year	Actual
2013	12

Output #4

Output Measure

- Research: Determine the relationship between climate change and competition among native and invasive plant species. Target is number of research projects.

Year	Actual
2013	5

Output #5

Output Measure

- Research: Evaluate strategies to mitigate release of greenhouse gases into the atmosphere. Target is number of research projects.

Year	Actual
2013	6

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: Create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is number of projects.

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
2013	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming is a rangelands state where small changes in temperature and growing season and amount and timing of precipitation can have a dramatic effect on the success of plant communities in the ecosystem. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. Invasive species are a particular problem in the dry cold desert ecosystem as small changes in climate can shift the competitive relationship among plant species. This can have a significant effect on plant community diversity and rangelands productivity. Periodic and sustained drought is another critical factor in the success of agriculture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

What has been done
UW research and extension activities focus on best species and variety selection as well as effectiveness of production practices as aspects of climate changes. Invasive species, and drought were 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 are addressed. Educational programs presented help producers and land managers understand the implications of drought for grasslands and cropping ecosystem management.

Results

Participants in the 22 educational programs conducted by UW Extension reaching 200 youth and adults reported gaining awareness and knowledge on the subject.

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
2013	128

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming is a semi-arid climate state where small changes in temperature and growing season and amount and timing of precipitation can have a dramatic effect on the success of plant communities in the ecosystem. In urban areas, small acreages, and towns, horticulture has become an important component of UW Extensions agriculture efforts. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. Invasive species are a particular problem in the dry cold desert ecosystem as small changes in climate can shift the competitive relationship among plant species. This can have a significant effect on plant community diversity and rangelands productivity. Periodic and sustained

drought is another critical factor in the success of agriculture including horticulture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

What has been done
UW Extension educators in crop and livestock systems and horticulture address climate change in numerous production programs presented throughout the state. The energy extension coordinator provides programming specific to climate change mitigation. Newspaper inserts, magazines, and newsletters also assist in information dissemination. Landowners with 50 acres or less are targeted in small acreage management programs which is a foci in the state. A new program last year involved a train the trainer model for real estate professionals who are first contact with new residents to the state focusing on soils and climate.

Results
100 percent of participants indicated they had gained awareness and knowledge as a result of educational programs. Over 50 percent of participants in UW Extension programs on xeriscape, landscape design, water conservation, and plant selection and livestock production have made changes in practices as a result of educational efforts.

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
2013	1740

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming is a rangelands state where small changes in temperature and growing season and amount and timing of precipitation can have a dramatic effect on the success of plant communities in the ecosystem. In urban areas, small acreages, and towns, horticulture has become an important component of UW Extension agriculture efforts. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. Invasive species are a particular problem in the dry cold desert ecosystem as small changes in climate can shift the competitive relationship among plant species. This can have a significant effect on plant community diversity and rangelands productivity. Periodic and sustained drought is another critical factor in the success of agriculture including horticulture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

What has been done
UW Extension educators in crop and livestock systems and horticulture address climate change in numerous production programs presented throughout the state. The energy extension coordinator provides programming specific to climate change mitigation. Newspaper inserts, magazines, and newsletters also assist in information dissemination.

Results
100 percent of participants indicated they had gained awareness and knowledge as a result of educational programs. As a new program, significant impact data is not available

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: Create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Although there is growing information on how species and ecosystems may respond to climate change, we still know very little about key underpinning physiological processes of plant regeneration and the response of germination to altered climate conditions. Recruitment from seeds is predicted to be among the most at-risk stages for plant communities in a changing climate.

What has been done
This regional-scale study examining variation in tolerance range for dormancy break and germination of seeds, as well as establishment of seedlings at different spatial scales, will compare contemporary and future regeneration of plants within the context of climate change. Data will allow the evaluation of biological constraints to improve predictions for species range shifts that may impact whole ecosystems under climate change, with consequences for natural resources and range management, and reclamation of native species.

Results
Currently, very little is known on how climate-altered environmental cues will impact plant regeneration, future species distributions and extinction likelihoods. This project addresses the question of how changes in temperature and moisture will affect seed dormancy break, germination and establishment. In particular, this project will characterize the tolerance inherent within population and species to cope with environmental change. The range of tolerance for seed regeneration is not only critical for long-term sustainability, but also for successful reintroduction of species via ex situ seed banks as well as habitat restoration and management.

4. Associated Knowledge Areas

KA Code	Knowledge Area

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Weather extremes and drought often affect program participation. Funding is vital to this new program, changes in appropriations could impact funding. Additionally, global market changes impact both research and extension programs in agriculture.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

End of session evaluations were used to determine outcomes of educational efforts. In addition, small acreage (land conversion) has implemented three land demonstration projects in central and SE Wyoming mitigating soil erosion, and climate change issues. Drought has been an issue for agriculture producers for almost a decade; follow up on risk management is conducted informally.

100% of program participants report gaining awareness and knowledge of the topics covered in educational programs.

Over 50% report that they plan to make positive changes as a result of classes.

Energy audits are being implemented resulting in changes which contribute to money saved and increased efficiency of energy use.

Key Items of Evaluation

100 percent of program participants report gaining awareness and knowlege of the topics covered in educational programs.

Over 50% report that they plan to make positive changes as a result of classes.

Energy audits are being implemented resulting in changes which contribute to money saved and increased efficiency of energy use.

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%		10%	
133	Pollution Prevention and Mitigation	0%		10%	
401	Structures, Facilities, and General Purpose Farm Supplies	10%		10%	
402	Engineering Systems and Equipment	20%		20%	
608	Community Resource Planning and Development	30%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.2	0.0
Actual Paid Professional	4.0	0.0	3.1	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**
42574	0	131410	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
42574	0	131410	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?

The UW Extension energy extension coordinator serves on the eXtension energy community of practice. eXtension is used as a resource for educators and the public. the Web site link is prominently displayed on the UW Extension home page. UW Extension educators are aware of professional development opportunities available through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1100	100000	300	1000

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

Patent Applications Submitted

Year:	2013
Actual:	2

Patents listed

1. Method for Enhanced Fermentation through the Destruction of Mitochondrial DNA. Applied for 12/02/2013.
2. Enhanced Yeast Fermentation Platform using Yeast that Lack Mitochondrial DNA and Containing Growth Improving Mutations. Applied for 04/03/2013.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	3	5	0

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
2013	1400

Output #2

Output Measure

- Determine ecosystem services affected by energy development and reclamation efforts. Target is number of projects.

Year	Actual
2013	146

Output #3

Output Measure

- Evaluate the potential for production of bioenergy. Target is number of projects.

Year	Actual
2013	5

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
2013	35

Output #5

Output Measure

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

Year	Actual
2013	25

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 number of projects.
5	Create awareness of research on the potential to produce bioenergy. Target is number of projects.

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
2013	1400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The State of Wyoming is well known for being a critical source of the nation's supply of natural resources. Because fossil fuels are essentially an irreplaceable base for Wyoming's vibrant 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 precious resources. In addition to fossil fuel resources, Wyoming also possesses abundant renewable energy resources including wind, solar, hydroelectric, geothermal, and biomass. Both small-scale, such solar photovoltiacs or geothermal heat pumps, and utility-scale, primarily wind energy, are important issues. Development of renewable technologies such as specific systems that can be used in agriculture production and/or farmsteads and small-scale power generation where power can be sold such as wind energy are also important issues. Conservation and preservation of our natural resources, both land and water is an ongoing effort for both extension and research.

What has been done

The University of Wyoming College of Agriculture and Natural Resources research and extension efforts in sustainable energy focus on efficiency and conservation specifically in relation to farm and agriculture production. In addition, residential and public conservation education is targeted toward the general public and businesses. In fall 2009, UW Extension partnered with the School of Energy Resources at UW to fund an energy extension coordinator who provides leadership and coordination for extension energy programs in the college. Initial training for field extension educators was conducted; a Western SARE grant ($110,000) was obtained by Montana State University in collaboration with the UW Extension energy extension coordinator to implement a Western Region training on energy issues. In addition to educational programs to raise

awareness and knowledge, UW Extension has developed a Web site for information, publications, and a set of educational videos. To maximize outreach efforts, partnerships have been developed with the College of Engineering and Applied Science, School of Energy Resources, the Wyoming State Energy Office, Wind Energy Research Center, USDA Rural Development, Natural Resource Conservation Service, and the Wyoming Business Council. UW Range specialists and area educators have partnered with the UW Reclamation and Restoration Center to develop and implement Reclamation 101 schools for agriculture land owners and agency personnel.

Results

In 2013, UW Extension initiated an issue team focusing on sustainable energy issues. 100 percent of participants in the 35 programs held reported gaining awareness of the topic and gaining knowledge. Early partnership efforts have resulted in increasing effectiveness of programs through multiple collaborators.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
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.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The State of Wyoming is well known for being a critical source of the nation's supply of natural resources. Because fossil fuels are essentially an irreplaceable base for Wyoming's vibrant energy industry, the College of Agriculture and Natural Resources strives to conduct research and direct extension programming efforts to help ensure prudent use of the state's precious resources. In addition to fossil fuel resources, Wyoming also possesses abundant renewable energy resources including wind, solar, hydroelectric, geothermal, and biomass. Both small-scale, such solar photovoltiacs or geothermal heat pumps, and utility-scale, primarily wind energy, are important issues. Development of renewable technologies such as specific systems that can be used in agriculture production and/or farmsteads and small scale power generation where power can be sold such as wind energy are also important issues. As an energy rich state, conservation and preservation of our natural resources, both land and water is an ongoing effort for both extension and research.

What has been done

To maximize outreach efforts, partnerships have been developed with the College of Engineering and Applied Science, School of Energy Resources, the Wyoming State Energy Office, Wind Energy Resource Center, USDA Rural Development, Natural Resource Conservation Service, and the Wyoming Business Council. The UW Reclamation and Restoration Center, Energy Industry, local partners focusing on local food production are additional partners.

Results

Partnerships have increased resources, both financial and human capital to maximize outreach efforts. Partnerships have leveraged funding to support an innovative energy internal grant program for UW Extension. Integrated program efforts are in progress.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
608	Community Resource Planning and Development

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 number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Domestic energy extraction is critical to national security. Yet invasive species introduced by industry activities limits the agricultural productivity and ecosystem integrity of western wild lands and challenges land managers to return ecosystem services of clean air, water and habitat for wildlife species of concern. Effective reclamation efforts are needed to retain sustainable rangelands for the future and provide our citizens with viable wildlife populations, clean water and natural resources for future generations.

What has been done
A series of research studies on gas-pad extraction sites have been initiated to examine and identify native plant species that are especially competitive with exotic plant invasions. The native species examined will provide a tool to allow successful restoration that enables continued domestic energy production. We examine native populations for their resilience in the face of invasion of exotic species such as Russian knapweed and halogeton which threaten the agricultural productivity of invaded lands.

Results
In identifying native species for use in reclamation we can facilitate continued energy extraction and provisioning of other ecosystem services for future citizens.

4. Associated Knowledge Areas

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

402	Engineering Systems and Equipment
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Fermentation of plant biomass by the yeast Saccharomyces cerevisiae to produce biofuels and high value chemicals is a multi-billion dollar per year industry. Significant research and development efforts have been placed into optimizing the process, with the majority of the efforts being specific for the desired product. The research being conducted will potentially increase the efficiency of fermentation processes used in biofuel production reducing costs, increasing profits, reducing dependence on Federal subsidies, and offsetting costs in other aspects of biofuel production.

What has been done
This increase in fermentation comes at a price, namely slower growth, preventing commercially viable use of such yeast strains. However, researchers have identified genetic changes in yeast lacking mitochondrial oxidative function that allows rapid and robust yeast cell growth while maintaining enhanced fermentative outcomes. This platform technology has the potential to enhance the efficiency of commercial fermentations used for biofuel and gateway chemical production. We have demonstrated a reproducible 25-fold enhancement in ethanol production using laboratory strains. Our goal is to create the same changes in industrial strains of yeast and measure the efficiency of fermentation. Further, we will determine if these mutations have pleiotropic consequences to desirable phenotypes in the industrial strains.

Results
Enhanced production of fermentation products will increase the use of bio-based materials making production economically competitive with traditional petroleum production processes. Ultimately, this could decrease the policy conflicts involved in using plant material that can be used for food in a fuel or chemical production process, largely through enhanced efficiency.

Further, the improved fermentation process has the potential to allow the adoption of non-food plant sources (e.g., cellulosic biomass) more economical and hence more likely to occur.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment

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

Funding for this new program is essential in development and implementation of both research and extension efforts. Weather extremes are a factor in agriculture production outcomes regarding crops for alternative fuels.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

End of session written evaluations were utilized to collect outcome data. In addition personal follow-up with the local educator or UW Energy Extension Coordinator was conducted. 100% of program participants indicated they increased awareness and knowledge as a result of educational efforts. Educators and professional agency personnel who participated in training on renewable energy and reclamation issues reported increased knowledge, skills and increased confidence in disseminating information on these topics.

Program participants reported that in some instances, alternative energy options are not cost effective therefore contributed to decision making which is a positive outcome.

Key Items of Evaluation

Increased awareness and knowledge on sustainable energy issues

Program participants reported that in some instances, alternative energy options are not cost effective therefore contributed to decision making which is a positive outcome.

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%		40%	
703	Nutrition Education and Behavior	10%		20%	
704	Nutrition and Hunger in the Population	80%		20%	
724	Healthy Lifestyle	10%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	6.3	0.0
Actual Paid Professional	11.0	0.0	6.3	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
156105	0	284015	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
156105	0	284015	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.

Since skeletal muscle is the main site for utilization of glucose and fatty acids in the body and insulin resistance in skeletal muscle is the key step in the incidence of type 2 diabetes, we hypothesize that impaired fetal skeletal muscle growth due to nutrient deficiency plays an important role. Our goal is to understand how the development of fetal skeletal muscle affects the properties of skeletal muscle of adulthood, and to develop effective strategies to mitigate or avoid incidence of diabetes and obesity caused by impaired skeletal muscle development due to fetal nutrient deficiency.

UW AES researchers intend to investigate the role of maternal nutrition in programming of pre- and postnatal body composition.

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 with all extension initiatives as a resource. eXtension is prominently highlighted on the UW Extension Web site home page. Additionally, extension personnel are made aware of professional development opportunities offered through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2178	15000	4778	5000

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

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	14	14

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
2013	140

Output #2

Output Measure

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

Year	Actual
2013	4778

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
2013	30

Output #4

Output Measure

- Conduct research on obesity, nutrition, and health. Target is number of projects.

Year	Actual
2013	4

Output #5

Output Measure

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

Year	Actual
2013	10266

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
2013	5000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improved knowledge of food guide pyramid, 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 relationships between obesity, nutrition, and health. Target is number of projects.

Outcome #1

1. Outcome Measures

Improved knowledge of food guide pyramid, 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
2013	4178

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming youth and adults are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables. Additionally, research in Wyoming, Montana, and Idaho documented body dissatisfaction as a significant predictor of self-consciousness keeping respondents from participating in physical activity.

What has been done
A variety of classes (many multi-session) on Steps to a New You, Body Works, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators. Articles were published in newsletters, newspaper columns and educational displays were developed. Youth were reached through series of classes conducted in schools by 4-H, Nutrition and Food Safety and Cent$ibile Nutrition educators.

Results
64 percent of adults and 59 percent of youth reported increased familiarity with MyPlate. 39 percent reported being physically active for at least 30 minutes per day, on four or more days per week, more often.
39 percent reported getting a 'super-sized' portion less often. (A 'super-sized' portion of food or beverage is one that is much bigger but costs only a little more money).
81 percent showed improvement in one or more nutrition practices.
25 percent reported weight loss as a result of changes in eating, meal planning, and increasing physical activity.

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.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3906

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming youth and adults are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables. Additionally, research in Wyoming, Montana, and Idaho documented body dissatisfaction as a significant predictor of self-consciousness keeping respondents from participating in physical activity.

What has been done
A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Body Works, Weight Management and basic nutrition were conducted by nutrition educators. Youth participated in day camps, and in-school curriculum including Grazing with Marty Moose, Munching through Wyoming History, Passports to Food Adventures, and WIN Kids. Articles were published in newsletters, newspaper columns and educational displays were developed.

Results
End of session and follow up evaluations indicated:
39 percent reported being physically active for at least 30 minutes per day, on four or more days per week, more often.

92 percent showed improvement in one or more nutrition practices.
41.5 percent serve more than one kind of fruit and 42 percent serve more than one kind of vegetable each day.
40 percent of youth could correctly identify the physical activity recommendation for children.
25 percent reported weight loss as a result of changes in eating, meal planning, and increasing physical activity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

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
2013	5000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming residents are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables.

What has been done
UW Extension educators conducted over 400 classes which emphasized a holistic approach including proper nutrition, increasing physical activity and healthy food choices. Strong Bones - Strong People, basic nutrition, and Steps to a New You were all programs focused on objectives. Youth curriculum developed by the UW Cent$ible Nutrition program was also implemented in

schools across the state.

Results
5000 individuals participated in 400 classes of which 10 were multi-session with four to eight sessions in length. Over 50 percent, or 2500 participants reported improved eating behavior practices, food choices, and lifestyle habits through end of session evaluations.

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
2013	4500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Approximately 13,000 of 57,000 Wyoming children ages 10 to 17 years (22.9%) are considered overweight or obese according to BMI for age standards. Wyoming ranks third among the 50 states and D.C. in overall prevalence.
* Only one in six (16.3%) Wyoming children in higher income families are overweight or obese. The state ranks third in prevalence among higher income children.
* One in five (20.2%) Wyoming children with private health insurance are overweight or obese.
* Wyoming children are more likely than their counterparts nationwide to be physically active for at least 4 days per week, and less likely to spend 2 hours or more in front of a television or computer screen.

What has been done
UW Extension utilized EFNEP youth curricula taught in a series of lessons and day camps; displays and demonstrations; Other nutrition efforts focused on educational programs which increase knowledge and skills in nutrition needs of children and adults and also incorporate physical activity into lifestyle; educators use media outreach (newspapers, newsletters, radio); health fairs; Programs which teach body size acceptance also are targeted to youth.
A variety of classes (many multi-session) on Steps to a New You, Body Works, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators. In addition 4-H educators partner with Cent$ible Nutrition to implement special interest classes in the school system.

Results
Results of the educational programs (several were series of 5 - 8 weeks) reaching 4500 youth included:
81 percent showed improvement in one or more nutrition practices.
36% could identify healthy snacks.
50 % increased their knowledge about carbohydrates as a source of energy.
38% reported eating a variety of foods;
Over 59% increased their knowledge of MyPlate food groups;
22% could identify missing food groups in meals;
30.5% could identify physical activity recommendations for their age;
35% are physically active for at least 30 minutes per day during four or more days per week.
30% increased their knowledge of body size diversity.

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	5000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Approximately 13,000 of 57,000 Wyoming children ages 10 to 17 years (22.9%) are considered overweight or obese according to BMI for age standards. Wyoming ranks third among the 50 states and D.C. in overall prevalence.
* Only one in six (16.3%) Wyoming children in higher income families are overweight or obese. The state ranks third in prevalence among higher income children.
* One in five (20.2%) Wyoming children with private health insurance are overweight or obese.
* Wyoming children are more likely than their counterparts nationwide to be physically active for at least 4 days per week, and less likely to spend 2 hours or more in front of a television or computer screen.

What has been done
UW Extension utilized EFNEP youth curricula taught in a series of lessons and day camps; displays and demonstrations; Other nutrition efforts focused on educational programs which increase knowledge and skills in nutrition needs of children and adults and also incorporate physical activity into lifestyle; educators use media outreach (newspapers, newsletters, radio); health fairs; Programs which teach body size acceptance also are targeted to youth. A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Weight Management, Dining with Diabetes, and basic nutrition were conducted by nutrition educators.

Results
Results of the 400 educational programs (several were series of 5 - 8 weeks) reaching over 5000 youth and adults included:
92 % showed improvement in one or more nutrition practices.
95.5% had a positive change in any food group.
63% reported using the Nutrition Facts label to make food choices more often.
Over 64% increased their knowledge of MyPlate food groups;
24% could identify missing food groups in meals;
45% could identify physical activity recommendations for their age;
39% are physically active 30 minutes per day, four or more days a week.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #6

1. Outcome Measures

Create awareness of research on relationships between obesity, nutrition, and health. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Obesity is increasing at an alarming rate worldwide, and in the US it is estimated that 68% of the population is overweight or obese. Of pregnant women in the US, 18-35% are estimated to be clinically obese. Further, children born to overweight/obese women are at an increased risk of developing symptoms of metabolic syndrome which include obesity, insulin resistance, hyperglycemia, hyperlipidemia, hypertension, and cardiovascular disease. Scientific evidence has accumulated suggesting that an adverse in utero environment can alter normal growth and development leading to an increased chance for obesity and other related diseases in postnatal life. Further, evidence has been presented which demonstrates that the consequences of an environmental insult such as maternal overnutrition/obesity may not be limited to their immediate offspring (F1 generation), but may be transmitted epigenetically to future generations.

What has been done
For this study we used adult F1 female lambs whose obese mothers had been fed a highly palatable diet to excess throughout pregnancy (OBESE females), and F1 female offspring from lean ewes fed the same diet only to requirements (CONTROL females). During pregnancy, the OBESE ewes exhibited markedly greater increases in body weight and adiposity, in association with increased insulin and leptin resistance than CONTROL ewes fed only to requirement. Data from this study are consistent with the hypothesis that normal weight OBESE F1 ewes fed only to requirements are predisposed to exhibit the same metabolic disturbances as their obese/overfed mothers when these females are exposed to the stresses of pregnancy. As a result, OBESE F2 lambs are programmed to exhibit the same developmental and hormonal abnormalities as their OBF1 mothers, demonstrating a true multigenerational effect.

Results
These data demonstrate for the first time in a large precocial species similar to humans that maternal obesity not only affects the health of mothers and their offspring, but also impacts the

health of their granddaughters, demonstrating a true multigenerational effect. At present, we don't know how many generations will be effected, but research is ongoing. It is imperative that we devise clinically relevant methods to intervene in obese pregnancies to assure the birth of a normal healthy baby and prevent the worldwide obesity epidemic.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
703	Nutrition Education and Behavior
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

Many conditions and situations that exist in Wyoming are similar to those in other parts of the country, for example, the following:

Food choices made available and advertised to consumers by producers; Access to timely and accurate information; Coordination and cooperation of federal agencies and state partners, schools and other youth agencies; Existence of local collaboration; Level of funding at federal, state and local level; and Willingness of community organizations, to collaborate withThe University of Wyoming Extension.

If EFNEP funding is decreased, appropriations will impact program delivery. Population changes impact limited resource audiences eligible for program.

Availability of funding for research in childhood obesity.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UW Extension Nutrition and Food Safety educators teach curricula which uses a holistic approach to nutrition and health. All participants completed a pre- and post-questionnaire, enabling to measure new attitudes gained such as, living a life focused on health, honoring hunger, and enjoy physical activity every day. The following are significant impacts reported by them.

50% Participants increased physical activity purposely. 39 percent reported being physically active for at least 30 minutes per day, on 4 or more days per week more often.

90% of participants now stop eating when they start to feel full.

Research data have provided conclusive evidence that changes in individual lifestyles and behaviors can lead to improved health status (Centers for Disease Control andPrevention, 1997; Canadian Nurses Association, 1992).

Adults who participate in programs complete end of session evaluations. Those in series of lessons complete a pre- and post-survey and/or follow up evaluations. 4000 adults completing lessons reported the following.

Nutrition Practices and Food Intake

- 92 percent improved in one or more nutrition practices.
- 90 percent had a positive change in any food group.
- 64 percent use the MyPlate to make food choices more often.
- 41.5 percent serve more than one kind of fruit, and 42 percent serve more than one kind of vegetable to their families each day more often.

Physical Activity Practices

- 36 percent are physically active for at least 30 minutes per day during four or more days per week

2468 youth participating in Grazing with Marty Moose, Munching Through Wyoming History, Passports to Food Adventures, and WIN Kids curricula reported the following through pre- and post-assessments to capture behavior changes.

Specific questions for each curriculum showed the following after the lessons.

- 50 percent improved their knowledge of MyPlate food groups.
- 31.5 percent more correctly identify the number of food groups in a meal and 22.2 percent more correctly identified missing food groups in a meal.
- 44.9 percent tried new fruits and 37.4 percent tried new vegetables more often.
- 29 percent could correctly identify the physical activity recommendation for children.
- 81 percent of all youth improved knowledge or skill(s) necessary to choose foods consistent with the Federal Dietary Guidelines.

Key Items of Evaluation

Research data have provided conclusive evidence that changes in individual lifestyles and behaviors can lead to improved health status (Centers for Disease Control and Prevention, 1997; Canadian Nurses Association, 1992).

100 percent of participants gained knowledge and raised awareness of the role nutrition and physical activity play in health.

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%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	90%		90%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid Professional	3.0	0.0	1.4	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
42574	0	59346	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
42574	0	59346	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 deliniate 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 both to educators and clientele. The University of Wyoming Extension Web site prominently displays eXtension on its' home page. eXtension professional development opportunities are publicized to all extension personnel.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1272	15000	216	1000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	7	7

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 number of projects.

Year	Actual
2013	3

Output #2

Output Measure

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

Year	Actual
2013	98

Output #3

Output Measure

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

Year	Actual
2013	1501

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.
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.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1617

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 percent of food-borne illness outbreaks nationwide attributable to food-service establishments, food-service personnel are key to reducing the risk of food-borne illness. Additionally, home food preparers and consumers are important groups to reach with food safety education because their behaviors greatly affect the safety of food that they serve to others and/or eat themselves.

What has been done
UW 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 (WFSC). 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 hand washing and avoidance of cross contamination.

Results
Based on data from an evaluation project conducted by UW Extension for the WFSC, this year 97 percent of participants made at least one change related to cleanliness, for example, washed their hands more often. Eighty percent made at least one change related to cooling foods. Another 78 percent made at least one change related to food preparation, for example, prevented cross-contamination by keeping raw meats, cooked foods, and fresh produce separated. Seventy-five percent made at least one change such as monitored critical control points more closely. Improved food handling behaviors increase the likelihood that food served in Wyoming is

safe and, therefore, that lives have been saved, illnesses avoided, healthcare cost controlled, fewer work days missed, and local businesses and institutions made stronger.

4. Associated Knowledge Areas

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

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
2013	12297

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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. Additionally, home food preparers and consumers are important groups to reach with food safety education because their behaviors greatly affect the safety of food that they serve to others and/or eat themselves.

What has been done
98 classes ranging from ServSafe certification courses, ServeSafe Starters, food safety classes for food service handlers, consumer food safety classes and school workshops on proper hand washing methods were conducted. Additionally classes on safe food preservation were taught statewide. In 2013 numerous courses were also taught in Spanish in Western Wyoming.

Results
100 percent of participants reported through both formal and informal evaluations increased awareness and knowledge of food safety practices.

97% made at least one change in regard to cleanliness.
80% made at least one change in regard to cooling food.
78% made at least one change related to food preparation.
75% made at least one change such as monitored critical control points more closely.
70% made at least one change related to cooking food.
Improved food handling behaviors such as those listed above 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.

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.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Listeria monocytogenes is a foodborne pathogen that causes hundreds of cases of the severe disease known as listeriosis every year in the USA. Listeria contamination of foods also causes substantial losses to food producers due to product recalls.

What has been done
We have identified genes responsible for synthesis of an extracellular listerial carbohydrate (exopolysaccharide, EPS) and shown that this EPS is responsible for the protection of L. monocytogenes cells from disinfectants and desiccation. We also are in the process of purifying

and chemically characterizing the structure of the EPS. Recently we determined the composition of the sugar monomer subunits that make up the EPS polymer.

Results
The characterization of the listerial EPS will be important to the development of strategies to control the growth of the bacterium on food surfaces and in food processing facilities. Thus, the research ultimately will be important in reducing contamination of food by this bacterium.

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
2013	479

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. With approximately 60 percent 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
UW 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 (WFSC). 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 are also being taught in Spanish in Western Wyoming.

Results
Of the 479 participant's in WFSC's ServeSafe and ServSafe Starters workshops : 92% passed the certification exam.
97% (464) made at least one change in regard to cleanliness.
80% (383) made at least one change in regard to cooling food.
78% (373) made at least one change related to food preparation.
75% (359) made at least one change such as monitored critical control points more closely.
70% (335) made at least one change related to cooking food.
Improved food handling behaviors such as those listed above 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.

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

Turnover of personnel offers challenges in Wyoming; Food Preservation as part of food safety also requires specialized training to provide competency in that subject area.

Populations changes (immigration, new cultural groupings, etc.)
Economy
Appropriation changes
Government Regulations

Competing Programmatic Challenges
Public Policy changes

V(I). Planned Program (Evaluation Studies)

Evaluation Results

End of session questionnaires, follow up surveys were used to document outcomes.

100 percent of participants reported through both formal and informal evaluations increased awareness and knowledge of food safety practices.

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Key Items of Evaluation

UW Extension is a key leader with the Wyoming Food Safety Coalition (WFSC) started in 1995. WFSC is a multi-agency, multi-disciplinary partnership that has become the primary source of food-safety education throughout the state. The heart of WFSC is a core of local trained teams, most of which include area UW Extension Nutrition and Food Safety.