

2017 University of Wyoming Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Demands are placed on the agricultural industry to ensure that agriculture remains profitable and sustainable, while addressing environmental concerns. Issues involving production agriculture, natural resource management, and quality of life generate diverse research and extension directives. Stakeholders play a vital role in identification and prioritization of needs at the University of Wyoming. The College of Agriculture and Natural Resources has a mission to serve the educational needs of students, Wyoming citizens, and the global community by providing and distributing unbiased, scientifically sound information. Research and Extension programs at the University of Wyoming focus on five initiatives: 4-H and Youth Development, Community Development Education, Nutrition and Food Safety, Agriculture and Horticulture, and Sustainable Management of Rangeland Resources. The five NIFA priority programs added spring 2010 Global Food Security and Hunger; Climate Change; Sustainable Energy; Childhood Obesity; and Food Safety, have been integrated with existing initiatives or have been added as standalone plans.

The University of Wyoming Research and Extension efforts have been addressing issues outlined in the new plans for several years. Fiscal year 2017, the University of Wyoming research and extension programs reported success in all initiative areas. The College of Agriculture and Natural Resources is second at the University of Wyoming in total grant dollars brought in for research and extension. In-depth educational programs such as the Ranch Management Institute, Body Works, Food Safety, 4-H After School programs, and Wyoming Municipal institutes report strong impacts for citizens of the state. Each of the above UW Extension programs is multi-session educational classes with 8 to 70 hours of class contact time with participants. These are just a few examples of high impact educational efforts by the University of Wyoming. Research and Extension Centers at UW and across the state are producing research which is relevant and vital to agriculture, families, and communities.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	101.0	0.0	40.0	0.0
Actual	87.8	0.0	36.2	0.0

II. Merit Review Process

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

- Internal University Panel
- Combined External and Internal University Panel

- Expert Peer Review

2. Brief Explanation

Extension educators on the University of Wyoming Extended Term and Promotion (ET&P) Track participate in a peer review process regardless of the initiative team in which they are affiliated. Geographically, Wyoming is divided into 5 Extension areas with 3 to 5 counties in each area. The first level peer review is conducted at the area level and all Extension educators on the Extended Term and Promotion track in that geographic area have the professional responsibility to review the documents submitted by their peers. Reviewers annually receive an orientation and training for their role in the peer review process. Each educator submits his or her vote and written comments as part of the review process.

The second level peer review is a state level review. Each Extension area elects one representative to serve a 3-year term on the state ET&P review committee. Campus specialists also elect one representative to serve a 3-year term on the state ET&P committee. Each member of the state ET&P committee submits his or her vote and written comments also.

Candidates are encouraged to participate in their review to receive positive feedback and constructive suggestions from their peers at both the first and second level review.

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
- Other (Modified Focus Groups across the state)

Brief explanation.

UW Extension gathers feedback from Wyoming citizens through Stakeholder Input. Each stakeholder input session includes individual focus groups around the five educational initiatives conducted by UW Extension: Sustainable Management of Rangeland Resources; Agriculture and Horticulture; Community Development; Nutrition and Food Safety; and 4-H Youth Development. These listening sessions provide opportunities to identify issues important to Wyoming citizens. We value your feedback and strive to provide opportunities for you to identify positive things that happen in your counties and local communities and to share your concerns, and suggestions, which help

direct UW Extension programming.

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

1. Method to identify individuals and groups

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

Brief explanation.

There are five geographic Extension areas. Modified focus groups meet in each area annually to gather stakeholder input. Selection to participate in focus groups is based on gender, geographic representation, race, national origin, and underserved audiences. In 2016-17, 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)
- 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

Brief explanation.

Geographically, Wyoming is divided into 5 Extension areas with 3 to 5 counties in each area. Each year one of the counties in the area host a Stakeholder Input Session. The rotation is such that every 5 years the Stakeholder Input session is conducted in the same county. The Stakeholder Input Session includes a focus group for each of the five initiative teams: Nutrition and Food Safety; Community Development Education; Agriculture and Horticulture; Rangeland Team; and 4-H Youth Development.

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.

One-hundred and forty-six individuals participated in stakeholder input sessions facilitated by UW Extension in Park, Johnson, Albany, Niobrara, and Uinta Counties December 2016 through February 2017. Input session results were analyzed to help identify issues that have emerged across the state in the educational program initiative areas.

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

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

Brief Explanation of what you learned from your Stakeholders

Sustainable Management of Rangeland Resources

Balancing the interests of diverse audiences on public rangelands is a common concern.

- The management and containment of invasive species including education for those who use public lands, ranch managers/owners and agencies where collaboration is most effective.
- Access to use and increased demand on rangelands, grazing permits, extraction, wildlife,

general public, etc.

- Regulations that increase cost to ranchers.

Agriculture and Horticulture

Increased profitability of agricultural operations can be realized in different ways: business management, marketing strategies, niche market production, communication, and networking.

- Increase profitability of agricultural operations by helping a rancher understand and run a successful business. The need for Wyoming-specific scientific research that addresses the unique challenges to increase profitability.
 - Providing opportunities that allow younger generations to assume management and control of their family's agricultural operations.
 - The need for effective collaboration to enhance communication and networking within the agricultural community, including individual producers, stakeholders, businesses, and agencies.

Community Development Education

Limited economic opportunities and struggling industries create hardships for families in rural areas.

- Expand leadership training and educational opportunities outside the traditional school system, such as mentoring, apprenticeships, and journeyman-type opportunities to new industries and sectors.
 - Economic diversity to provide a more stable tax structure and provide well-paying jobs. Training and support for entrepreneurs. Creative promotion to support local economies: shop locally.

Nutrition and Food Safety

Finding creative ways to reach clientele with accurate nutrition, health, and food safety information is important.

- Lack of availability and cost of fresh food are issues in many rural communities.
 - Strategies for individuals and families to prioritize healthy food choices. Includes education where to find reliable and accurate nutrition information, planning menus, cooking from scratch, time-saving food preparation techniques, etc.
 - Organizations and agencies that provide resources for limited income families often subsidize processed foods that are not as healthy as fresh foods.

4-H Youth Development

Marketing the opportunities available in 4-H continues to be important. Some people may see the UW name and associate 4-H with a high cost of programming. This is a perceived barrier that needs addressed through marketing and outreach to connect with new audiences.

- Available economic resources of the family influence the level of parental support and affects how youth might be involved.
 - Competing demands for time and resources of youth and their families in other activities are more apparent in rural areas. Youth in rural areas tend to be involved in all of the extracurricular activities.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1645547	0	2003681	0
Actual Matching	1645547	0	2003681	0
Actual All Other	0	0	0	0
Total Actual Expended	3291094	0	4007362	0

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	4-H and Youth Development
2	Community Development Education
3	Sustainable Management of Rangeland Resources (SMRR)
4	Global Food Security and Hunger, Crop, Livestock and Horticulture Systems
5	Climate Change
6	Sustainable Energy
7	Childhood Obesity, Nutrition, and Health
8	Food Safety

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

4-H and Youth Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
806	Youth Development	100%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	33.0	0.0	0.0	0.0
Actual Paid	32.6	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
611022	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
611022	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Retention.

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

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

2. Brief description of the target audience

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

Traditional 4-H youth audiences will target:

- Youth
- Volunteers
- Families
- Community.

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	25911	2223389	72981	741129

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
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Actual	1	0	1
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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
2017	7886

Output #2

Output Measure

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

Year	Actual
2017	1935

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
2017	2115

Output #4

Output Measure

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

Year	Actual
2017	244

Output #5

Output Measure

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

Year	Actual
2017	294

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
2017	9085

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
2017	11783

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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". With the emphasis on the BIGM (belonging, independence, generosity, and mastery) 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 has 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 1,935 educational activities in the 2016-17 year. Projects that focus on science, technology, engineering and math (STEM) have been recently introduced in the robotics, aerospace and agricultural projects. Hatching STEM Skills is an example of how science, technology, engineering and math emphasis have been taught through an agricultural project. Eight classroom teachers from Goshen Co School District #1 and Valley Christian School participated in the 21 day "Chick Quest". Incubators, egg turners, curriculum and brooder supplies were purchased; local 4-H members donated fertilized eggs, brooders, chick starter and hay.

Results

150 students from Kindergarten to 4th grade participated in "Chick Quest". While "Chick Quest" curriculum uses the hands-on learning model of 4-H to teach students STEM skills, local teachers were very creative and used the chicks to support a variety of other subjects like reading and art. Teachers indicated that completing "Chick Quest" helped improve their student's STEM abilities, expressing that "we are getting quite good at thinking scientifically." A Trail Elementary teacher reported that students "were able to practice using the scientific method and scientific observations. They were also able to practice measurement skills." Teachers also recognize the life skills students were practicing while caring for the eggs and chicks. A teacher at LaGrange

Elementary indicated that participating in "Chick Quest" was very educational and gave the students a sense of responsibility. 100% of the teachers indicated that this program increased the ag literacy of their students, stating "The hatching process was very interesting for them. They were able to make connections between these eggs and the eggs we get at the grocery store."

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
2017	7855

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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". With the emphasis on the BIGM (belonging, independence, generosity, and mastery) 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 has 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 in each county offer Junior Leader programs which target development of essential life skills. A variety of methods are used included camp counselor training, leadership workshops and retreats, and workforce prep events/activities. On-going monthly junior leader meetings provide opportunities for youth to have hands on practice with the leadership skills they are learning. Focusing on developing assets in youth is an objective of all educational activities.

Results

100 percent of youth participating in 4-H youth leadership activities and programs reported increased confidence and skills in decision making, problem solving, team building, and

communication. Throughout the year in the monthly Junior Leader meetings, youth develop yearly goals following SMART goal guidelines, they make decisions about special activities to plan based upon their goals, they develop public speaking and communication skills when they share their thoughts and opinions respectfully, and they develop and repeatedly practice parliamentary procedure to run effective meetings. Career exploration and workforce preparation continue to be important to youth, the general public and local businesses. Youth participated in career fairs and were able to interact with professionals in their career category of interest. Parents of high school youth who participated in the events shared "My daughter loved learning more about livestock genetics research and plans to pursue it in college"; "My son really had no idea all of this [ag careers] existed, he is now super excited to learn more about agriculture".

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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
2017	5369

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

4-H adult volunteers are critical to the delivery and success of the 4-H program. The level of volunteer knowledge and skills has a direct impact on the ability of 4-H program to accomplish its

goal of positive youth development for all participants. The eight essential elements of positive youth development revolve around four concepts which is the BIGM: Belonging, Independence, Generosity, and Mastery.

What has been done

The Wyoming 4-H program has developed materials based around the BIG M and have created learning opportunities for volunteers who can apply their experiences to programming for youth. Volunteer trainings are offered face to face at the county, area and state level as well as on-line delivery statewide. In addition to organizational club leader training, project leader trainings are conducted in 4-H project subject matter like shooting sports, animal husbandry, foods and nutrition, clothing, creative arts, etc. First time volunteers are required to complete a series of trainings to become an official 4-H volunteer. Upon completion of the initial training, volunteers are required to participate in training every five years. However, most volunteers participate in some form of training more frequently than that.

Results

In 2016-17, 244 volunteers took part in state trainings either online or face to face. However 5,369 adult contacts were made through 4-H volunteer trainings offered in the county or neighboring counties. The same adult may participate in multiple trainings and would be counted as separate contacts because the training topic was different. These adults understand the principles of positive youth development and apply the principles to the club and county 4-H programs throughout Wyoming.

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3021

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

4-H adult volunteers are critical to the delivery and success of the 4-H program. Often it is 4-H volunteers who partner with the county 4-H educator to organize, promote, teach, and conduct 4-H club and project experiences for youth. The level of volunteer knowledge and skills has a direct impact on the ability of 4-H program to accomplish its goal of positive youth development for all participants.

What has been done

Appropriate training and support for 4-H volunteers prepares volunteers to effectively provide learning experiences for youth. County 4-H educators coach volunteers and provide supplies and equipment to ensure their success in working with youth.

Results

Adult volunteers demonstrated their ability to provide learning experiences for youth by being actively involved in organizing, conducting, and teaching 668 county activities and events across Wyoming. In addition to the county wide activities and events organized by volunteers, they also provide direct leadership to 384 4-H Clubs which meet regularly year round.

The educational experiences delivered solely by volunteers or co-organized with volunteers and the county 4-H educator, provide far more opportunities for youth to gain new knowledge and develop more skills than Extension employees could ever provide on their own.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data. Across Wyoming, 1,935 educational activities reached 16,971 youth enrolled in non-traditional and traditional 4-H programs. The majority of youth participated in more than one educational workshop, clinic, event, camp, or other educational program. 100% of the youth in the traditional 4-H program expanded their knowledge base, increased their life skills and developed leadership abilities to become responsible, contributing citizens.

Projects that focus on science, technology, engineering and math (STEM) have been recently introduced in the robotics, aerospace and agricultural projects. Hatching STEM Skills is an example of how science, technology, engineering and math emphasis have been taught through an agricultural project. Qualitative evaluations from elementary school teachers who participated in the 21 day "Chick Quest" shared how their students improved STEM abilities, especially given the opportunity to use scientific methods and observations. Teachers also recognized the life skills students were practicing while caring for the eggs and chicks. 100% of the teachers indicated that this program also increased the ag literacy of their students helping the students to make connections between the eggs they hatched and the eggs they get from the grocery store.

100 percent of youth participating in 4-H youth leadership activities and programs reported increased confidence and skills in decision making, problem solving, team building, and communication. Career exploration and workforce preparation continue to be important to youth, the general public and local businesses. Youth participated in career fairs and were able to interact with professionals in their career category of interest. Parents of high school youth who participated in the events shared "My daughter loved learning more about livestock genetics research and plans to pursue it in college"; "My son really had no idea all of this [ag careers] existed, he is now super excited to learn more about agriculture".

4-H adult volunteers are critical to the delivery and success of the 4-H program. Often it is 4-H volunteers who partner with the county 4-H educator to organize, promote, teach, and conduct 4-H club and project experiences for youth. In 2016-17, 4-H youth programming was delivered by 2,115 adult volunteer leaders.

In 2016-17, 244 volunteers took part in state trainings either online or face to face. However 5,369 adult contacts were made through 4-H volunteer trainings offered in the county or neighboring counties. The same adult may participate in multiple trainings and would be counted as separate contacts because the training topic was different. These adults understand the principles of positive youth development and apply the principles to the club and county 4-H programs throughout Wyoming.

Key Items of Evaluation

100 percent of youth participating in 4-H youth leadership activities and programs reported increased confidence and skills in decision making, problem solving, team building, and communication.

Trained adult volunteer leaders understand their role as a volunteer and make positive contributions to the mission of 4-H Youth Development.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community Development Education

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	10%		39%	
602	Business Management, Finance, and Taxation	10%		5%	
604	Marketing and Distribution Practices	0%		9%	
608	Community Resource Planning and Development	50%		32%	
801	Individual and Family Resource Management	25%		5%	
802	Human Development and Family Well-Being	0%		5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	4.0	0.0
Actual Paid	8.7	0.0	2.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
163064	0	145964	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
163064	0	145964	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

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

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

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

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

2. Brief description of the target audience

The University of Wyoming College of Agriculture and Natural Resources is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in programs regardless of their race, national origin, gender, age, religion, or disability. The ultimate consumer of the educational products for financial management programs will be all individuals (including youth and senior citizens), families (including low-income families), and in general people at risk of experiencing financial stress. The group of educators, specialists, and faculty responsible for leading and delivering the outputs in the

program is the smallest of the University of Wyoming's Extension initiative teams. A priority for program development is to use methods of information and instruction that make it possible for the most constituents to be assisted while minimizing face-to-face work. Thus the team will emphasize train-the-trainer courses, newsletters, and electronic delivery of information and programming.

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

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4563	72046	211	0

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	7	7

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
2017	27

Output #2

Output Measure

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

Year	Actual
2017	4563

Output #3

Output Measure

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

Year	Actual
2017	81

Output #4

Output Measure

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

Output #5

Output Measure

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

Year	Actual
2017	24

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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
2017	332

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Since 2015, the state of Wyoming has suffered a severe financial decline in all sectors of the energy industry. The first quarter 2016 report from WY Division of Economic Analyses revealed the loss of 8,680 jobs. Individuals with low financial literacy borrow more, pay more in fees, have less wealth, and more dependence on social services and credit. Many of these individuals do not have an account at a federally insured institution and are considered "unbanked". Unlike those who utilize insured banking services, these individuals often lack the opportunity to accumulate savings and access fair and affordable credit through mainstream banking relationships. These depressed conditions demonstrate the need for Financial Literacy.

What has been done

Twenty seven educational programs, focused on Family Resource Management, were delivered to 302 participants. These educational efforts consisted of programs delivered by Community Development educators to individual clientele, as well as a new statewide program, Master Money Manager Coach (M3C). The aim of M3C is to train community coaches to work with financially at risk participants who are ill prepared to successfully manage their finances. The M3C pilot was launched in the fall of 2017 with 15 people from 6 community organizations participating in the training. Seven financial literacy classes, targeted to a youth audience, were

conducted at Youth Emergency Services and high schools.

Results

43 teenagers learned about the basics of budgeting and the financial management pyramid in the financial literacy classes targeted to youth. Youth were given a demonstration on how to start their own budget and an opportunity to apply knowledge gained by plugging practice numbers into a fictional budget. A reflective post evaluation was used to assess the M3C's participants' knowledge and skills gained and their attitude toward teaching money management at the end of the workshop. As a result of participating, community organizers increased their ability and confidence in teaching money management and coaching individuals toward life change. Only 8% of the respondents marked a 4 or a 5 for their ability to deliver the program before the training while 100% marked a 4 or a 5 for after the training. For their effectiveness in a teaching role, 31% marked a 4 or a 5 for before the training and 100% for after the training. For their effectiveness in a coaching role 25% marked a 4 or a 5 for before the training and 92% for after the training.

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
2017	1226

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

responsibilities.

What has been done

Eighty-one educational programs were delivered to 1,226 participants who were county treasurers, county board members, Chambers of Commerce members, and county and state agency employees. These educational efforts focused on group process, leadership, and facilitation. One example includes training for the Wyoming Department of Transportation. In order to carry out their roles and responsibilities, WYDOT commissioners must have the knowledge and competence about transportation-related topics, as well as board procedure and governance best practices. To operate effectively, commissioners must understand the statutes that define their roles and responsibilities and be able to work together to conduct business.

Results

An evaluation instrument asking WYDOT workshop participants to commit to implementing their learning was used to help them bridge the gap between knowing and doing. The participants were informed that they would be asked about their progress on implementing their learning. At the conclusion of the training the workshop participants were given time to work with their fellow commission members to reflect upon what they had learned and to commit as a group to implement something from their learning. Following are examples of what they committed to do:

- * Be more mindful of lobbying restrictions, state statute and upcoming issues.
- * Develop appropriate legislation for sustainable revenue streams for our mission.
- * Increase communication among commissioners on relevant issues.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Exploiting an older adult's financial resources is the third most common form of abuse. Losing assets that have been accumulated over a lifetime can have devastating financial consequences for the victim and can also lead to greater need for public support like Medicaid. Financial exploitation is often accompanied by other types of abuse and neglect, which can impair the victim's health and shorten their life. Exploitation can also damage the victim's sense of security and trust. Because the perpetrator is often an adult child or other relative, financial exploitation of an elder can have major impacts on entire families.

What has been done

Researchers at land-grant universities across the country are working together to get a more holistic understanding of the personal, family, social, and cultural factors that increase or decrease its likelihood. This work will help protect older Americans from financial exploitation and prevent psychological and economic damage to families and society.

Results

Preliminary results show that power of attorney is often appointed based on convenience, sexism, and emotion, not competence and character. Common factors among perpetrators include childhood rivalries, power struggles, family conflict, poor family communication, antisocial personality disorder, materialistic values, financial strain, expectation of payment for their services, and lack of understanding of fiduciary responsibilities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors which affected the Community Development Initiative team's programming included staff resignations for Area Extension Educators. The Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The

reduced revenue has caused the University to implement a hiring freeze which has left one Community Development Area Educator position vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in the Community Development Education Programs. Community Development Area Educators conducted 152 educational programs which reached 4,774 youth and adults. Programming conducted by Community Development Specialists reached an additional 2,015 clientele.

Twenty seven educational programs, which focused on Family Resource Management, were delivered to 302 participants. 43 teenagers learned about the basics of budgeting and the financial management pyramid in the financial literacy classes targeted to youth. Youth were given a demonstration on how to start their own budget and an opportunity to apply knowledge gained by plugging practice numbers into a fictional budget.

A reflective post evaluation was used to assess the Money Manager Master Coach participants' knowledge and skills gained and their attitude toward teaching money management at the end of the workshop. As a result of participating, community organizers increased their ability and confidence in teaching money management and coaching individuals toward life change. Only 8% of the respondents marked a 4 or a 5 for their ability to deliver the program before the training while 100% marked a 4 or a 5 for after the training. For their effectiveness in a teaching role, 31% marked a 4 or a 5 for before the training and 100% for after the training. For their effectiveness in a coaching role 25% marked a 4 or a 5 for before the training and 92% for after the training.

Eighty-one educational programs were delivered to 1,226 participants who were county treasurers, county board members, Chambers of Commerce members, and county and state agency employees. These educational efforts focused on group process, leadership, and facilitation. At the conclusion of the Department of Transportation training the workshop participants were given time to work with their fellow commission members to reflect upon what they had learned and to commit as a group to implement something from their learning. Following are examples of what they committed to do:

- Be more mindful of lobbying restrictions, state statute and upcoming issues.
- Develop appropriate legislation for sustainable revenue streams for our mission.
- Increase communication among commissioners on relevant issues.

Key Items of Evaluation

Individuals who participated in the financial management programs are better prepared to manage their personal finances in difficult economic times. Professionals who work with clientele with limited financial resources feel more confident in coaching and teaching about financial management practices.

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	6.0	0.0
Actual Paid	14.0	0.0	6.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
262402	0	404717	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
262402	0	404717	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

2. Brief description of the target audience

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

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	18839	808778	1804	42567

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	29	29

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2017	215

Output #2

Output Measure

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

Year	Actual
2017	101

Output #3

Output Measure

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

Year	Actual
2017	18839

Output #4

Output Measure

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

Year	Actual
2017	17035

Output #5

Output Measure

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

Year	Actual
2017	41

Output #6

Output Measure

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

Year	Actual
2017	1804

Output #7

Output Measure

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

Year	Actual
2017	134

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	16013

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Thousands of acres of former ranch, farm or wildlands have and are being subdivided into small acreage parcels. Today, approximately 35,000 landowners own between 5 and 160 acres. These owners can be new to the land and may not have the knowledge, skills or experience to properly manage their properties. In 2015, a small acreage landowner survey yielded 1,297 usable returns which have directed programming for the Small acreage Outreach Project. Small land owners are an important audience to understand the importance of natural resources use in Wyoming's economy.

What has been done

Educational efforts targeted to meet the needs of this clientele to sustainably manage their land include: Rural Living Workshops, Barnyards & Backyards workshops, and Horses, Pastures and YOU!! Hard copy publications are still in high demand for this audience. Examples of stand-alone publications include: Wyoming Rural Living Resources; Plants with Altitude; Promoting Pollinators on your Place; and Wyoming Small Acreage Irrigation. Concise user-friendly informational tools, videos, publications and other resources for landowners, and educational professionals who serve them, are also available on line at www.barnyardsandbackyards.com.

Results

In 2016-17, 1,129 individuals participated in workshops to learn about different topics regarding land management and discuss problems specific to small acreages. Through workshop evaluations, the average self-reported knowledge gain has been 30%. Overall workshop scores have been 4.5 on a 5 point scale with 5 being "excellent". When asked if they would use the information to change what they do on their property, respondents indicated a score of 4.1 on a 5 point scale with 5 equaling "very much".

The award winning Barnyards & Backyards: Rural Living in Wyoming quarterly publication contains articles written by natural resource experts on topics such as; feeding or grazing animals, maintaining pastures, landscaping, irrigation, drinking water quality, growing food and food safety, weed control, septic system maintenance and entrepreneurial activities. Issues also feature landowners who practice good land management. They discuss the challenges faced as landowners in Wyoming and the strategies used to overcome them.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1804

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

planning, management, conservation and education.

What has been done

1,804 youth participated in 41 educational programs in rangeland management and natural resources around Wyoming. Ag Career Extravaganza was introduced to expose high school youth to the variety of careers available in agriculture. Careers in the range field included: Ag Lending and Finance, Ag Mechanics, Water Rights, Irrigation, and Extension Education. A sample of other programs included: Summer Adventure Camp, Wyoming Resource Education Days, Soil Science Scavenger Hunt, Poisonous Plants in Forages, Grass Seedhead Identification, Monitoring Range Pictionary, Birds and Worms Predator-Prey Relationships, Safety and Techniques for Shooting a Rifle.

Results

Youth who participated in the Ag Career Extravaganza gained greater awareness about careers in agriculture by visiting with specialist and asking career related questions. Networking with agricultural specialists was also beneficial. Comments from parents included: "My daughter loved learning more about livestock genetics research and plans to pursue it in college"; "My son really had no idea all of this existed, he is now super excited to learn more about agriculture".

Through other education programs youth learned about soil biology, types of soils in rangelands and how important soil is to the environment. Students also learned the basic methods for conducting range monitoring, and types of grazing management for different ecosystems through organized field trips. Youth participants in the camp range contest learned about plant monitoring, soil and range management.

Wildlife management was also an important educational effort. Youth learned how wildlife impact recreation and the economy in Wyoming.

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 management 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
2017	3450

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture is one of the foundations of the Wyoming economy. Livestock production accounts for 76% of the cash receipts of agriculture and at least 95% of Wyoming livestock operations utilize rangeland. Many of these operations use public land leases as a portion of their forage base. To renew grazing permits on federal land, agencies engage in the National Environmental Policy Act process. The process is long, complicated and difficult to understand for land owners.

What has been done

Grazing Permit Education - Seventy-one people attended two full day workshops to learn about the structure of decision making system for grazing permits. Sessions provided information about the new "NEPA for Ranchers" handbook, a panel of experienced local producers, and open discussion opportunities.

High Plains Ranch Practicum School - This program is a comprehensive ranch management school focused on a systems approach to ranch management. It is an applied learning experience with eight full days spread out over seven months of combined classroom leaning and hands-on field application of the concepts and skills. Twenty individuals committed resources and time to the eight day school.

Results

Following the Grazing Permit Education workshops, 96% of the participants reported a greater understanding of the renewal process. There was a 58% rise in knowledge about how cooperative monitoring plays a role in permit renewal and a 60% increase in understanding how to personally get involved in the process. This program has also led to public land ranchers reaching out to learn more about the land they graze, how to implement a monitoring program, and what records are available about their grazing allotments.

Seventeen of the 20 participants in the High Plains Ranch Practicum School completed a post evaluation and indicated that knowledge gained would influence management of 5,500 beef cattle and 235,000 acres of land. Almost all of the participants indicated they would improve range management or natural resource management through better use of land management plans. One participant shared "I quit the haying enterprise. I began the Management Intensive Grazing system on all the land we own and lease".

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

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wyoming ranks in the top three states with the greatest number of wild horses. This burgeoning horse population is putting increasing pressure on native plant communities, native wildlife populations, and multiple use of public lands.

What has been done

We collared 30 feral mares and are using the latest GPS tracking technology to obtain near-real-time spatial data to determine horse movement on rangeland sites.

Results

This project provides tangible data for resource managers making difficult decisions regarding wild horses in Wyoming and the surrounding region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife

136 Conservation of Biological Diversity
205 Plant Management Systems

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Streamflow from snow-dominated mountainous watersheds is important for cities, agriculture, and industry.

What has been done

Measurements have been taken of snowpack, soil water content and streamflow. This data has been used to conduct numerical modeling of water flow at the plot, hillslope, and watershed scales.

Results

The fate and transport of snowmelt and rainfall was assessed for snow-dominated mountainous catchments in Idaho and Wyoming using hydrological measurements, geophysical surveys, and numerical modeling. Annual water balances were calculated showing that snow sublimation represented 3-10 % of incoming precipitation while streamflow represented 8-24 % of incoming precipitation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors which affected the Rangeland and Agriculture and Horticulture Initiative team's programming included staff resignations for Area Extension Educators. Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left 5 Range and Ag/Hort Area Educator positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in Sustainable Management of Rangeland Resources. Range Educators conducted 215 educational programs which reached 18,839 adult and 1,804 youth contacts. In 2016-17, 1,129 individuals participated in workshops to learn about different topics regarding land management and discuss problems specific to small acreages. Through workshop evaluations, the average self-reported knowledge gain has been 30%. Overall workshop scores have been 4.5 on a 5 point scale with 5 being "excellent". When asked if they would use the information to change what they do on their property, respondents indicated a score of 4.1 on a 5 point scale with 5 equaling "very much".

1,804 youth participated in 41 educational programs in rangeland management and natural resources around Wyoming. Ag Career Extravaganza was introduced to expose high school youth to the variety of careers available in agriculture.

Youth who participated in the Ag Career Extravaganza gained greater awareness about careers in agriculture by visiting with specialist and asking career related questions. Networking with agricultural specialists was also beneficial. Comments from parents included: "My daughter loved learning more about livestock genetics research and plans to pursue it in college"; "My son really had no idea all of this existed, he is now super excited to learn more about agriculture".

Through other education programs youth learned about soil biology, types of soils in rangelands and how important soil is to the environment. Students also learned the basic methods for conducting range monitoring, and types of grazing management for different ecosystems through organized field trips. Youth participants in the camp range contest learned about plant monitoring, soil and range management.

Following the Grazing Permit Education workshops, 96% of the participants reported a

greater understanding of the renewal process. There was a 58% rise in knowledge about how cooperative monitoring plays a role in permit renewal and a 60% increase in understanding how to personally get involved in the process. This program has also led to public land ranchers reaching out to learn more about the land they graze, how to implement a monitoring program, and what records are available about their grazing allotments.

Seventeen of the 20 participants in the High Plains Ranch Practicum School completed a post evaluation and indicated that knowledge gained would influence management of 5,500 beef cattle and 235,000 acres of land. Almost all of the participants indicated they would improve range management or natural resource management through better use of land management plans.

Key Items of Evaluation

Land owners who own small acreages learned about land management and discussed problems specific to small acreages. Public land ranchers learned more about the land they graze, how to implement a monitoring program, and what records are available about their grazing allotments. Youth who have participated in range programs are exposed to the variety of career paths available in rangeland resources.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

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

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
111	Conservation and Efficient Use of Water	0%		5%	
202	Plant Genetic Resources	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	10%		15%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		0%	
212	Pathogens and Nematodes Affecting Plants	10%		2%	
213	Weeds Affecting Plants	10%		10%	
216	Integrated Pest Management Systems	10%		0%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	10%		5%	
305	Animal Physiological Processes	0%		10%	
307	Animal Management Systems	10%		5%	
311	Animal Diseases	0%		10%	
601	Economics of Agricultural Production and Farm Management	10%		5%	
704	Nutrition and Hunger in the Population	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.0	21.0	0.0
Actual Paid	23.7	0.0	20.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
444209	0	769626	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
444209	0	769626	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

producers and specific target audience groups.

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	32960	16507112	5652	2913020

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	6	77	83

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**
 2017 444

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
2017	38612

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
2017	68

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
2017	5791

Output #5

Output Measure

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

Year	Actual
2017	123

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	34748

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

International trade agreements, the 1996 FAIR Act, and the 2014 Agricultural Act (Farm Bill) has dramatically changed the business environment that agricultural producers face. In addition, changing weather, drought conditions, and fluctuating markets increase the level of risk exposure to producers. New tools for managing risk, including new forms of insurance, are complex and difficult to understand. As a result, new educational programs have been developed to help Wyoming farmers and ranchers become sufficiently informed to take advantage of existing and emerging crop insurance products.

What has been done

This project develops and delivers risk management education through onsite programs, media-based education, as well as print and electronic media to explain and facilitate the effective use of crop insurance and risk management tools. Eighteen risk management programs have been conducted for managers of Wyoming farms and ranches to empower them to make more informed decisions regarding production, marketing and financial risk management and increase their confidence in making such decision. Forty-one crop insurance trainings were provided specifically for small, beginning, and limited resource farmers and ranchers. The crop insurance trainings reached 1,306 beginning producers.

Results

Fifty-nine educational programs/webinars reached over 1,561 individuals. Following are specific actions producers indicated they would take as a result of the onsite educational programs: better evaluate sources of risk to their operation; better evaluate alternatives for risk mitigation for their situation; evaluate whether crop insurance is an appropriate risk management tool for their situation; and increase use of both Federally-approved and private crop insurance products.

294,778 individuals received risk management materials via media-based delivery. 89,540 web

visitors accessed risk management materials via the internet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	11583

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Bee Informed Partnership in collaboration with the Apiary Inspectors of American annual survey, shows 21.1% of bee colonies managed in the US were lost over the 2016-2017 winter. Hobby/backyard beekeepers experience the highest losses. According to the Wyoming Department of Agriculture, there are 66,136 hives registered for 5,470 bee yards in Wyoming. There is a need for general to in-depth beekeeping education to help hobby beekeepers (1-10 hives) to small sideline beekeepers (50-150 hives).

What has been done

The Wyoming Bee College Conference, launched in 2014, addresses the education gap for hobby and small sideline beekeepers. Bee College goals have evolved with feedback from beekeepers and past attendees. The goals now include understanding that beekeeping is no longer a casual hobby of collecting honey, but a study of animal husbandry. This animal husbandry approach involves record keeping, disease mitigating, nutrition, and seasonal understanding of honeybees and all pollinator's needs. The conference now offers tracks for beginning bee keepers (beekeeping 101), for years 2-3 (beekeeping 102) and journeyman level beekeeping for years 3-5.

Results

The 2017 Wyoming Bee College Conference has increased to over 300 individuals from Wyoming, Colorado, Nebraska and South Dakota. Twenty-five bee buddies (kids ages 7-15) also participated.

At the end of the conference attendees filled out an evaluation with approximately a 45% response rate. Those participants rated the conference 4.3 with five being the highest rating.

Attendees left with the understanding that the number one problem facing all pollinators is lack of flowers or flora resources. A situation that can be resolved in one or two growing seasons by planting flowers, flowering shrubs and trees - basic gardening for pollinators. An introduction to basic marketing for honey-based and by-products offered attendees opportunities for future endeavors.

Beekeepers are better prepared to take an animal husbandry approach to beekeeping, to take a long-term, multiyear, year-round mindset to habitat development, parasite, disease mitigation, bee nutrition, over wintering and continuing education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	24140

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As communities have developed over time, economic and cultural influence have changed the complexion of Wyoming's cities and towns. Agriculture continues to be one of the foundations of the Wyoming economy, yet the general public can lack an understanding of agricultural enterprises, their management and the industries they support.

What has been done

Extension Educators and Specialists contributed to the following media efforts to reach the general population in Wyoming: Barnyards and Backyards magazine, a newspaper insert "Barnyards and Backyards", and YouTube videos and blogs.

Results

The award winning Barnyards & Backyards: Rural Living in Wyoming quarterly publication contains articles written by natural resource experts on topics such as; feeding or grazing animals, maintaining pastures, landscaping, irrigation, drinking water quality, growing food and food safety, weed control, septic system maintenance and entrepreneurial activities. Issues also feature landowners who practice good land management. They discuss the challenges faced as landowners in Wyoming and the strategies used to overcome them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

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
2017	15444

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

Wyoming Ranch Tools - This website was developed to help producers make more informed marketing and economic analysis decisions. The website originally consisted of 6 calculators or tools with 6 additional calculators developed recently. Meeting the Nutritional Needs of Range Beef Cattle - Interactive workshops assisted beef cattle ranchers in understanding their beef cows' nutrient needs, what to expect from forage of the Northern Great Plains region and how to correct nutrient deficiencies through supplements. High Plains Ranch Practicum School - A comprehensive ranch management school focused on a systems approach to ranch management. It is an applied learning experience consisting of eight full days of classroom learning and hands on field application over seven months.

Results

Wyoming Ranch Tools - In 2016-17, the site recorded 4892 page views representing 1894 user sessions. Wyoming users accounted for 529 sessions and 317 new users. A quote that demonstrates the use of the website follows: "I have conducted a breakeven analysis for the ranch on my own, but the comprehensiveness of the Break-Even Budget Tool, which includes the newly developed partial budget, provides me with a lot more information than my analysis and helps me measure areas I needed to better manage". Nutritional Needs of Range Beef Cattle - A follow up questionnaire asked what participants learned that helped them meet their cows' nutritional needs; management practices they changed; improvements in herd performance and savings in supplemental costs. Participants stated "I have been able to lower my supplement costs by only giving my cows what they needed, especially with regard to protein, and based on what I learned I'm shortening the breeding period and moving calving date back", and "The information helped us balance diets in a year when we had to feed cows using a combination of hay and [range] cake instead of just hay and resulted in a savings of \$0.25 per cow per day". High Plains Ranch Practicum School - Producers reported that the class resulted in \$250,000 improvements in net income to their operations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
301	Reproductive Performance of Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Herbicide use is among the most criticized aspects of modern farming, especially as it relates to genetically engineered (GE) crops. Even the most ardent critics of pesticides recognize their importance, but a perceived over-reliance on herbicides for weed control has sparked debate on how to best incorporate herbicides into sustainable weed management systems. It is of interest to pesticide applicators, as well as the general public and regulatory authorities, whether the risk associated with herbicide use has increased or decreased over the last 25 years.

What has been done

A large analysis of USDA pesticide use data was conducted for six major US crops: corn, cotton, soybean, winter wheat, spring wheat, and rice. Changes in herbicide use patterns in GE and non-GE crops were quantified over the last 25 years in the United States as they relate to (1) the intensity of herbicides being applied, and (2) the relative toxicity of the herbicides that are being used.

Results

Herbicide use intensity, as measured by the number of herbicide applications being made to each field, has increased in all crops analyzed, regardless of whether they were GE or non-GE. Even so, chronic and acute toxicity hazard associated with herbicides has remained constant or even declined in many cases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Confinement swine practices limit sunlight exposure and risk hypo-vitamin D compromising bone health and the immune function of pigs. At a time when natural vitamin D synthesis is limited due to confinement practices, antibiotic use in animal production systems has become common. Antibiotic use in production systems increases production efficiency while decreasing morbidity and mortality but has been increasingly under scrutiny due to increased threat of antibiotic resistant bacteria. Even as antibiotic use has increased in animal production practices, morbidity and mortality, especially in the peri-weaning period, remains a production concern.

What has been done

Previous research in our lab determined limited sun exposure increased serum concentrations of vitamin D in growing pigs, potentially influencing disease resistance.

Results

Annual death loss of pigs is 9.7 million head -- an estimated loss of \$670 million to US producers. Although death loss cannot be eliminated, even small improvements in death loss would increase pork production and help meet growing food demand of the world population. Shared biological characteristics among humans and pigs permit pathogens to cross species barriers. Reducing the overall burden of disease in pigs will be important to decrease the incidence of transmission of disease to humans. The practical application of this research would allow adoption in swine herds within one year of research completion. In an era when many consumers are demanding natural products and antibiotic resistance occurs, this is a favorable time to explore the benefits of limited exposure to UVB on swine health

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors which affected the Rangeland and Agriculture and Horticulture Initiative team's programming included staff resignations for Area Extension Educators. Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left 5 Range and Ag/Hort Area Educator positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data in Global Food Security and Hunger, Crop, Livestock and Horticulture Systems. Extension Educators and Specialist in the Rangeland Team and Agriculture and Horticulture Initiative Teams conducted 444 educational programs which reached 38,612 youth and adults. Fifty-nine educational programs/webinars on risk management education reached over 1,561 individuals. Following are specific actions producers indicated they would take as a result of the onsite educational programs: better evaluate sources of risk to their operation; better evaluate alternatives for risk mitigation for their situation; evaluate whether crop insurance is an appropriate risk management tool for their situation; and increase use of both Federally-approved and private crop insurance products. 294,778 individuals received risk management materials via media-based delivery. 89,540 web visitors accessed risk management materials via the internet. The 2017 Wyoming Bee College Conference has increased to over 300 individuals from Wyoming, Colorado, Nebraska and South Dakota. Twenty-five bee buddies (kids ages 7-15) also participated. At the end of the conference attendees filled out an evaluation with approximately a 45% response rate. Those participants rated the conference 4.3 with five being the highest rating. Attendees left with the understanding that the number one problem facing all pollinators is lack of flowers or flora resources. A situation that can be resolved in one or two growing seasons by planting flowers, flowering shrubs and trees -

basic gardening for pollinators. An introduction to basic marketing for honey-based and by-products offered attendees opportunities for future endeavors

Wyoming Ranch Tools - In 2016-17, the site recorded 4892 page views representing 1894 user sessions. Wyoming users accounted for 529 sessions and 317 new users. A quote that demonstrates the use of the website follows: "I have conducted a breakeven analysis for the ranch on my own, but the comprehensiveness of the Break-Even Budget Tool, which includes the newly developed partial budget, provides me with a lot more information than my analysis and helps me measure areas I needed to better manage".

Nutritional Needs of Range Beef Cattle - A follow up questionnaire asked what participants learned that helped them meet their cows' nutritional needs; management practices they changed; improvements in herd performance and savings in supplemental costs. Participants stated "I have been able to lower my supplement costs by only giving my cows what they needed, especially with regard to protein, and based on what I learned I'm shortening the breeding period and moving calving date back", and "The information helped us balance diets in a year when we had to feed cows using a combination of hay and [range] cake instead of just hay and resulted in a savings of \$0.25 per cow per day".

High Plains Ranch Practicum School - Producers reported that the class resulted in \$250,000 improvements in net income to their operations.

Key Items of Evaluation

Managing risk is crucial to profitability of farms and ranches. Extension has delivered successful programs to provide information and tools for farmers and ranchers to assess and make appropriate decisions around risk.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	20%		0%	
112	Watershed Protection and Management	20%		20%	
132	Weather and Climate	20%		20%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		20%	
205	Plant Management Systems	20%		15%	
306	Environmental Stress in Animals	0%		5%	
307	Animal Management Systems	0%		10%	
605	Natural Resource and Environmental Economics	20%		10%	
Total		100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	3.0	0.0
Actual Paid	1.0	0.0	3.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
18654	0	86251	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
18654	0	86251	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

2. Brief description of the target audience

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1203	0	48	0

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

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	5	15	20

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
2017	1251

Output #2

Output Measure

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

Year	Actual
2017	28

Output #3

Output Measure

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

Year	Actual
2017	17

Output #4

Output Measure

- Research to determine the relationship between climate change and competition among native and invasive plant species. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2017	3

Output #5

Output Measure

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

Year	Actual
2017	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1251

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wyoming has a semi-arid climate that experiences significant inter and intra-annual weather variability, and extreme weather events. The variability and extremes pose significant risks to Wyoming's residents, industries, and visitors. Therefore, it is imperative for the UW Extension (UWE) to increase the awareness and understanding of the general public about Wyoming's climate, variable weather, extreme events, and how they minimize associated risks and seize potential opportunities. Climate and weather informed decisions increases public safety, and helps mitigate potential impacts to rural economies. Additionally, UWE is striving to build their internal capacity while empowering the public to directly access available weather and climate information to make more informed decisions.

What has been done

UW-E had numerous efforts including, but not limited to: delivering 4 presentations to external stakeholders in different communities throughout the state with agency partners including the USDA Farm Service Agency, the National Weather Service, the National Integrated Drought Information System (NIDIS), and the Wyoming State Climate Office, 3 presentations to internal stakeholders, served on several panels, hosted interactive tradeshow booths to engage more directly with stakeholders, and contributed articles to popular press read by stakeholders including a monthly column in the Wyoming Livestock Round-up. These efforts focused on engaging stakeholders in their decision making process by connecting them to weather and climate resources ranging from USDA disaster assistance programs to accessing weather information to mitigate potential impacts associated with temperature inversions.

Results

Although qualitative, it appears there is greater interest in integrating weather and climate information into UWE programming due to efforts in 2016 and 2017. For example, in September 2017 the Agriculture and Horticulture team identified 1) drought relief, mitigation, 2) weather

resilience management and disasters, 3) disaster knowledge, and 4) alternative crops as four of their seven top needs for the coming year. Their top needs resulted in core programming topics, which include: winter livestock feeding and management, understanding water distribution, and alternative crop potential for Wyoming producers - all of which are directly or indirectly affected by weather and climate. Additionally, during 2017 the lead for the UWE Pesticide Applicator program inquired about adding a weather and climate component to pesticide applicator training during the 2018 calendar year.

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
205	Plant 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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1251

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural producers and small acreage landowners face many challenges including climate variability, and weather and extreme events in Wyoming's semi-arid climate. The UW Extension is/has developed programs to increase the awareness of the stakeholders how they can make climate informed decisions to increase the resiliency of their operations (regardless of size), which is particularly imperative to rural economies and enabling citizens to grow fresh local foods. It is imperative for us to work with professionals who engage these stakeholders day-to-day to ensure a continuous, and consistent message.

What has been done

The monthly Wyoming Drought Impacts and Outlook Summary is a 2-page summary developed in partnership with UW Extension (UWE), Wyoming State Climate Office (WSCO), National Oceanic and Atmospheric Administration (NOAA), and the USDA. The summary includes a climate overview, current drought conditions and indicators, and a short and long-term forecast. The summary is disseminated to 200+ emails by UWE, provided at meetings/conferences, and is available on numerous websites.

Results

Wyoming was the first state to produce a state specific drought impacts and outlooks summary. The success of Wyoming's effort drew attention by the US Drought Monitor based at the University of Nebraska-Lincoln. The team invited the University of Wyoming Extension to present about the outlook and summary effort (among other efforts) at the May 2017 US Drought Monitor Forum for the Upper Missouri River Basin in Rapid City, SD. Other states, such as Montana, have started to produce their own drought impacts and outlooks summary.

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
205	Plant 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
2017	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural producers face many challenges including climate variability, and weather and extreme events in Wyoming's semi-arid climate. The UW Extension is/has developed programs to

increase the awareness of producers for how they can make climate informed decisions to increase the resiliency of their operations, which is particularly imperative to sustain rural economies. It is imperative for us to work with professionals who engage with agricultural producers day-to-day to ensure a continuous, and consistent message.

What has been done

Connecting Ag to Climate, a monthly column, synthesizes weather conditions, and month and seasonal forecasts. The column includes considerations and resources for agricultural producers to make climate informed decisions. In addition, Extension educators delivered 28 workshops reaching 1,251 participants where all or part of the agenda focused on practices to mitigate climate change. A series of presentations about climate, weather, and agriculture were also delivered at producer meetings/conferences throughout the state. The presentations (and tradeshow booth materials) highlighted adaption strategies and mitigation practices for agricultural producers to consider adopting to increase the resiliency of their operation.

Results

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

Participants in the workshops are better prepared to plan for drought conditions.

The presentations and tradeshow booths have proved an effective way to not only provide scientific, unbiased information, but to develop partnerships among organizations and collect stakeholder needs - including internal stakeholders.

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
205	Plant Management Systems
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Variable climate has the potential to negatively impact livestock operations. The need to adjust herd sizes to match forage demand to annual supply is both difficult and costly.

What has been done

A Multi-Period Linear Programming model was devolved to estimate the economic impact of climate variability on livestock producers in SE Wyoming. Forage and animal responses to spring precipitation were estimated in conjunction with the USDA Agricultural Research Service High Plains Grasslands Research Station near Cheyenne. Historical weather patterns were used to show how livestock numbers should optimally be altered in order to account for production variability across years. Further, analysis was run with increased variability, but using historical means, to show how increased variability could impact producers in the area. Results show that ignoring climate impacts on production results in an overestimation of profits by 80% or more.

Results

Interest and anecdotal evidence suggests producers are using this information in their decision-making. Many producers have said they will consider our information and may alter their winter management plan and will use our results when making stocking decisions around climatic variability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. Twenty-eight educational programs were delivered where mitigating climate change was one of the topics. Programs delivered by Extension Educators reached 185 individuals and Extension Specialists reached an additional 1,066. Although qualitative, it appears there is greater interest in integrating weather and climate information into UWE programming due to efforts in 2016 and 2017. For example, in September 2017 the Agriculture and Horticulture team identified 1) drought relief, mitigation, 2) weather resilience management and disasters, 3) disaster knowledge, and 4) alternative crops as four of their seven top needs for the coming year. Their top needs resulted in core programming topics, which include: winter livestock feeding and management, understanding water distribution, and alternative crop potential for Wyoming producers - all of which are directly or indirectly affected by weather and climate. Additionally, during 2017 the lead for the UWE Pesticide Applicator program inquired about adding a weather and climate component to pesticide applicator training during the 2018 calendar year.

Wyoming was the first state to produce a state specific drought impacts and outlooks summary. The success of Wyoming's effort drew attention by the US Drought Monitor based at the University of Nebraska-Lincoln. The team invited the University of Wyoming Extension to present about the outlook and summary effort (among other efforts) at the May 2017 US Drought Monitor Forum for the Upper Missouri River Basin in Rapid City, SD. Other states, such as Montana, have started to produce their own drought impacts and outlooks summary.

The presentations and tradeshow booths have proved an effective way to not only provide scientific, unbiased information, but to develop partnerships among organizations and collect external and internal stakeholder needs.

Key Items of Evaluation

Understanding how to use climate and weather tools allows land owners to make better informed decisions around extreme weather events. These decisions increase public safety, and help mitigate potential impacts to rural economies.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

Reason for not reporting

Current financial situation has resulted in the loss of faculty and staff positions who provided leadership to this planned program. Those vacancies have resulted in the elimination of programs in sustainable energy.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	50%		50%	
608	Community Resource Planning and Development	50%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	0.2	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3749	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3749	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

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

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

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

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

2. Brief description of the target audience

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	39	0	0	0

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

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	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
2017	39

Output #2

Output Measure

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

Year	Actual
2017	0

Output #3

Output Measure

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

Year	Actual
2017	0

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
2017	3

Output #5

Output Measure

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

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Faculty members working in this area left or retired and due to budgetary constraints the positions have not been refilled.

Key Items of Evaluation

See above.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity, Nutrition, and Health

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
305	Animal Physiological Processes	0%		25%	
703	Nutrition Education and Behavior	60%		25%	
704	Nutrition and Hunger in the Population	20%		25%	
724	Healthy Lifestyle	20%		25%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	6.0	0.0
Actual Paid	5.6	0.0	3.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
104961	0	331735	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
104961	0	331735	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1935	982995	3108	173470

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	18	18

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
2017	69

Output #2

Output Measure

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

Year	Actual
2017	3108

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
2017	20

Output #4

Output Measure

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

Year	Actual
2017	26

Output #5

Output Measure

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

Year	Actual
2017	5043

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
2017	1009

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5043

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Wyoming, the rates of obesity and Type 2 diabetes are on the rise. According to a recent study, 28% of Wyoming citizens are obese, and .5% have been diagnosed with Type 2 diabetes. Fast food restaurants have an overwhelming presence and processed foods make up the majority of foods at local supermarkets. Adding to this problem is that behavior change is very difficult for many people and they are unaware of how to implement healthy lifestyle changes. There is not a program being offered at this time that teaches people how to eat less processed food and more whole food.

What has been done

Six Nutrition and Food Safety Area Educators provided 313 educational programs across Wyoming, reaching 7,332 adults. Sixty-nine of those programs were targeted to a youth audience and reached 4,543 youth. Educational topics included: dietary supplements, healthful eating behaviors, sports nutrition, adequate diets for specific health issues, menu planning and understanding food labels, serving sizes and tips for not overeating, and strategies to get in more physical activity. The purpose of the Real Food Program is to give people the tools they need to plan, shop, cook and eat foods that are minimally processed, nutrient-rich, easy to prepare and delicious. The introductory pilot to Real Foods was conducted in 2 counties. In 2016-17, the Real Food Program has expanded to eight communities across the state.

Results

Over 60 people completed the 5-week series of classes in 8 communities around Wyoming. Each participant filled out weekly program evaluations in addition to a pre-and post-questionnaire. Participants learned the difference between real and highly processed food, how to decipher packages and read the ingredient list, information on nutrients, meal planning, and finding and preserving real food. The following areas had statistically significant median differences in self-reported frequencies: fruit consumption; whole grain consumption; using nutrition facts label to choose food; using ingredient list to choose food; and percentage of daily intake from processed food. In addition, the majority of participants reported that they have made a least one healthy eating or shopping change since starting the program, included planning more often and eating more vegetables. Written comments from participants included "I'm eating a lot more fruits and vegetables"; "I pay closer attention to the nutrition labels, specifically looking at sodium and sugar content"; and "I've been drinking flavored water and I'm making baked goods from scratch instead of a mix".

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
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2017

3108

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to The State of Obesity: Better Policies for a Healthier America, Wyoming children between the ages of 10 and 17 have an obesity rate at 27.1 percent, which is an increase from over a decade ago. There is a significant need to improve dietary behaviors of children. Cooking is a life-long skill that presents many teaching opportunities, like following directions, measuring, practicing cleanliness, and having fun tasting healthy new foods.

What has been done

Two hundred and 49 youth participated in thirteen hands-on cooking programs. Goals of the cooking programs included: 1) to increase basic food knowledge, 2) to increase basic cooking skills and techniques, 3) to increase cooking at home and, 4) to increase healthful food choices. These cooking experiences helped you learn about ingredients and how to make healthy choices in food preparations. In addition, preparing food independently in a small group setting contributed to personal and social development.

Results

Youth increased their knowledge of nutrition, food safety, and healthy food concepts through hands-on learning activities. Based upon a Yes or No response to the questions, the pre- and post-evaluation revealed the following increases:

- I know the MyPlate food groups: Pre-test: 58% post-test: 91%
- I wash my hands before cooking: Pre-test: 47% post-test: 94%
- I read the recipe before starting to cook: Pre-test: 38% post-test: 92%
- I can measure liquid ingredients: Pre-test: 55% post-test: 95%
- I know how to measure dry ingredients: Pre-test: 60% post-test: 93%
- I like to eat a variety of foods: Pre-test: 43% post-test: 78%
- I ate a bite of each food today: No Pre-test post-test: 82%
- I help cook at home: Pre-test: 53% post-test: 68%

Cooking can also be a springboard to other benefits such as improved health and wellbeing, increased social connections especially when food is shared with family and friends.

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
2017	2796

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

64% of Wyoming adults are overweight or obese and 84% of Wyoming adults do not consume adequate amounts of fruits or vegetables. Wyoming SNAP-Ed and EFNEP programs are delivered through the Cent\$ible Nutrition Program (CNP). The mission of the program is to provide opportunities for positive change in nutrition and physical activity for the limited resource audience through education, multi-level interventions, and community engagement with the goal of decreasing chronic disease and obesity in Wyoming.

What has been done

University of Wyoming Extension CNP educators partnered with 349 agencies and organizations to provide nutritional programs. One example is Grazing with Marty Moose, a youth curriculum delivered to elementary school age youth that was offered in 42 schools. One hundred and twenty-one adult referrals through the Department of Family Services enrolled in SNAP-Ed classes.

Results

Thirty-two (32) partnerships with community gardens, local food producers, and farmers? markets yielded 574 pounds of food grown and donated to food pantries, partner agencies serving a low-income audience, and families with limited resources. One thousand, six hundred and seventy-seven (1,677) adults averaged 7.7 lessons in the SNAP-Ed program and 91% of them showed a 10.1 point increase in the healthy eating index. One participant shared "I learned how to eat healthier and am now making better food choices. We are not eating out as often and I have lost 10 pounds and am more active. My son is also thinning out as well. It is so much easier than I thought to cook from scratch". Laramie County SNAP-Ed participant.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Iodine deficiency is one of the most common nutrition deficiencies worldwide. Although iodine deficiency is thought to be of little public health concern in the US, partially due to iodization of table salt, a high prevalence of suboptimal iodine status and iodine deficiency may exist in certain US subpopulations. These include vegetarians and those who do not use iodized salt, avoid seafood and/or dairy products, or obtain a majority of their meat and produce from regions with iodine-poor soil. Intake of iodine is also influenced by processed food consumption which typically does not utilize iodized salt. Iodine deficiency can lead to a number of health outcomes collectively known as iodine deficiency disorder. These outcomes include hypothyroidism, impaired cognitive function, delayed physical and cognitive development in infants and children, and poor fertility and pregnancy outcomes in women of reproductive age. Since iodine status is not routinely assessed in the evaluation of hypothyroidism in the US, it is possible some cases are due to iodine deficiency and are unnecessarily treated with lifelong replacement with synthetic thyroid hormones.

What has been done

We conducted a pilot study to assess the prevalence of iodine status in 150 young adults living in the Laramie area, and to determine the dietary and lifestyle factors which influence its status. Iodine status was assessed using the gold standard of measurement of 24-hour urinary iodine concentration along with serum thyroid stimulating hormone concentration, a marker of thyroid function.

Results

Preliminary analysis in 63 participants revealed a high prevalence of iodine deficiency in young adults, with 14% being moderately deficient (urinary iodine concentration between 20 and 49 mcg/L) and 32% being mildly deficiency (urinary iodine concentration between 100=199 mcg/L). Work is currently underway to measure iodine status in the full sample and evaluate the dietary

and lifestyle factors which influence its status. The impact of these results will be dependent on the overall findings but may suggest that further investigation of suboptimal iodine deficiency is needed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included staff resignations for Area Extension Educators and high turnover of staff in Cent\$ible Nutrition. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left 4 Nutrition and Food Safety Educator positions vacant for an undetermined amount of time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. Nutrition and Food Safety Area Educators provided 313 educational programs across Wyoming, reaching 7,332 adults. Sixty-nine of those programs were targeted to a youth audience and reached 4,543 youth. University of Wyoming Extension CNP educators partnered with 349 agencies and organizations to provide nutritional programs. The purpose of the **Real Food Program** is to give people the tools they need to plan, shop, cook and eat foods that are minimally processed, nutrient-rich, easy to prepare and delicious. The introductory pilot to Real Foods was conducted in 2 counties. In 2016-17, the Real Food Program has expanded to eight communities across the state. Over 60 people completed the 5-week series of classes in 8 communities around Wyoming. Each participant filled out weekly program evaluations in addition to a pre-and post-questionnaire. Participants learned the difference between real and highly processed food, how to decipher packages and read the ingredient list, information on nutrients, meal planning, and finding and preserving real food. The following areas had statistically

significant median differences in self-reported frequencies: fruit consumption; whole grain consumption; using nutrition facts label to choose food; using ingredient list to choose food; and percentage of daily intake from processed food. In addition, the majority of participants reported that they have made a least one healthy eating or shopping change since starting the program, included planning more often and eating more vegetables. Written comments from participants included "I'm eating a lot more fruits and vegetables"; "I pay closer attention to the nutrition labels, specifically looking at sodium and sugar content"; and "I've been drinking flavored water and I'm making baked goods from scratch instead of a mix".

Two hundred and 49 youth participated in thirteen hands-on cooking programs. Goals of the cooking programs included: 1) to increase basic food knowledge, 2) to increase basic cooking skills and techniques, 3) to increase cooking at home and, 4) to increase healthful food choices. These cooking experiences helped you learn about ingredients and how to make healthy choices in food preparations. In addition, preparing food independently in a small group setting contributed to personal and social development. Youth increased their knowledge of MyPlate food groups, importance of washing hands before cooking, reading recipes, measuring ingredients and trying new foods.

Thirty-two (32) partnerships with community gardens, local food producers, and farmers' markets yielded 574 pounds of food grown and donated to food pantries, partner agencies serving a low-income audience, and families with limited resources. One thousand, six hundred and seventy-seven (1,677) adults averaged 7.7 lessons in the SNAP-Ed program and 91% of them showed a 10.1 point increase in the healthy eating index.

Key Items of Evaluation

Adult participants developed tools they need to plan, shop, cook and eat foods that are minimally processed, nutrient-rich, and easy to prepare. Youth also participated in hands on cooking programs and increased their knowledge about nutrition, serving sizes, food preparation and developed basic cooking skills.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	90%		100%	
Total		100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid	2.0	0.0	2.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
37486	0	265388	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
37486	0	265388	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2260	982995	698	173470

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	12	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2017	6

Output #2

Output Measure

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

Year	Actual
2017	161

Output #3

Output Measure

- Number of participants in educational programs offered by the Wyoming Food Safety Coalition. Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1426

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Though most consumers have a good foundation of food safety knowledge, there are problem areas, complacency, and food safety gaps that still exist. Government research shows that this gap results in increased risk of foodborne illness. Food safety education and awareness are vital components in helping to combat this public health issue.

What has been done

In addition to ServSafe trainings for food industry employees, 37 classes were offered to youth and adults in the general public on hand washing and how quickly and easily germs spread. Those programs reached 1426 youth and adults. Using visuals, participants observed how quickly one germ spreads and multiplies during the day. Participants also compared the effectiveness of using Germ X or Handi-wipes to proper handwashing techniques. With increased interest in local foods, educational programs were offered to producers who need to understand and use safe food handling procedures for packaging, storing, and selling their products for the general public.

Results

Participants learned that just rinsing off their hands does not get rid of germs. Each elementary grade student had the opportunity to practice and demonstrate how to properly wash their hands before handling food.

Panel discussions on local foods as part of Foods Expos addressed challenges and successes within the local foods sector and featured nutrition and food safety considerations. Local producers increased their knowledge about safe food handling practices. The Eat Wyoming Website, highlighting local foods, food safety, and food preservation resources had 178 users and 531 page views in 2016-2017 reporting year.

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
2017	2958

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

It is estimated that one in five households in the United States practices home canning of foods. This accounts for over 44,000 households across the state of Wyoming. Unfortunately, a large percentage of home canners are using unsafe practices that put them at risk for food spoilage and foodborne illness. The University of Wyoming (UW) Extension Safe and Nutritious Home Food Preservation workshops aim to improve safe food preservation practices through research-based canning methods reducing the risk for food spoilage and foodborne illness

What has been done

Nutrition and Food Safety Extension Educators offered 161 Food Safety Programs across Wyoming reaching almost 3,000 youth and adults. The Safe and Nutritious Home Food Preservation workshops provided hands-on experiences and classroom instruction on research-based home food preservation methods. Workshop topics included water-bath and pressure canning, fermentation, and dehydration.

Results

Standard evaluations were collected from 136 participants in the Safe and Nutritious Home Food Preservation workshops. A large majority of the participants indicated an increase in knowledge surrounding core food preservation topics. 84% of participants indicated an increase in knowledge of food safety topics. The average increase in knowledge was over one and one-half points on a five point scale, representing an increase from low/moderate knowledge before the workshop to high/very high knowledge after the workshop. Most importantly, a large percentage

of participants indicated intentions to adopt important food safety practices as a result of these programs. These behavior changes included properly venting when pressure canning, correctly adjusting recipes for altitude, and following tested recipes. Additionally, 67% of participants indicated intentions to preserve more fruits and vegetables at home as a result of this program - an important step towards increasing fruit and vegetable intake.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Listeria monocytogenes is a foodborne pathogen associated with the deadliest foodborne outbreaks in recent US history. Based on the socio-economic impact, listerial infections are the 3rd or 4th costliest infections caused by microbial and viral food-borne pathogens. Factors facilitating listerial survival during disinfection of produce storage and processing facilities are not fully understood. Abrogating listerial ability to tolerate disinfectants is an important means of improving food safety.

What has been done

We have previously shown that Listeria produces a unique protective exopolysaccharide coat that greatly (million-fold) increases its resistance to commonly used disinfectants and improves its tolerance to dehydration. We have identified an enzyme, PssZ, that recognizes and hydrolyzes this exopolysaccharide. We are engineering a PssZ-based probe for detecting listerial exopolysaccharide on produce and in produce storage facilities.

Results

It is expected that detection of exopolysaccharide biofilms, where listeria are particularly well protected from disinfectants, will lead to the use of more intense disinfection regimens and therefore decrease listerial contamination of produce.

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.

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.)

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included staff resignations for Area Extension Educators and high turnover of staff in Cent\$ible Nutrition. In addition, the Wyoming economy has suffered significant reductions in revenue due to reduced gas and oil productions. The reduced revenue has caused the University to implement a hiring freeze which has left 4 Nutrition and Food Safety Educator positions vacant for an undetermined amount of time. The same budget cuts also impacted the Wyoming Food Safety Coalition, a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies which provided ServSafe training and certification to food industry employees.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data from participants. One-hundred and sixty one (161) educational programs delivered by the Nutrition and Food Safety Educators reached 2,958 youth and adults. In addition to ServSafe trainings for food industry employees, 37 classes were offered to youth and adults in the general public on hand washing and how quickly and easily germs spread. With increased interest in local foods, educational programs were offered to producers who need to understand and use safe food handling procedures for packaging, storing, and selling their products for the general public. Panel discussions on local foods as part of Foods Expos addressed challenges and successes within the local foods sector and featured nutrition and food safety considerations. Local producers increased their knowledge about safe food handling practices. The Eat Wyoming Website, highlighting local foods, food safety, and food preservation resources had 178 users and 531 page views in 2016-2017 reporting year.

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Key Items of Evaluation

Participants indicated an increase in knowledge surrounding core food preservation topics for home use and local producers increased their knowledge about safe food handling practices for packaging, storing, and selling their products for the general public.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
1009	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
5791	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.