

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

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I. Report Overview

1. Executive Summary

Consistent with higher education and community outreach all across the country, we continue to do more with less. Despite limited appropriated financial support, we continue to make a difference, and are working to better balance our program areas with support.

- Arizona Cooperative Extension engages with people through applied research and education to improve lives, families, communities, the environment, and economies in Arizona and beyond. With offices in all 15 counties and on five tribal reservations, we bring knowledge to people every day to enhance their work and enrich their lives.

- The Arizona Agricultural Experiment Station stimulates learning through exploration and discovery to enhance agriculture, the environment, our natural resource base, family and youth well-being and the development of local communities. We accomplish this mission by the integration, dissemination, and application of knowledge in the agricultural and life sciences. Research is conducted in the various departments and schools on campus, as well as at Agricultural Centers throughout the state. Research generated through the Experiment Station underlies and supports the academic and extension programs.

Arizona's Cooperative Extension System has eight programmatic areas:

1. 4-H Youth Development
2. Agriculture & Food Safety
3. Children & Families
4. Gardening
5. Health
6. Natural Resources
7. Nutrition & Physical Activity
8. Water

The College of Agriculture and Life Sciences (CALS) Research has six programmatic areas:

1. Environment, Water, Land, Energy and Natural Resources
2. Plant Systems
3. Human Nutrition, Health and Food Safety
4. Family, Youth and Community
5. Animal Systems
6. Marketing, Trade and Economics

Environment, Water, Land, Energy and Natural Resources

Tribal Watershed Hydrology (TWH)

- Increased knowledge of hydrology and increased awareness by tribal and non-tribal stakeholders of climate change and climate change impacts on tribal water resources.
- Increased willingness and motivation of tribes to partner with University of Arizona in research related to climate change impacts on tribal water resources.
- Funding for Hauri Native Nations Climate Change Program.

- TEK Guidelines drafted.

Water Wise 2017

- For Water Wise presentations and workshops in 2017, 79% of workshop participants (n=298) who filled out evaluation forms on a scale of 1-4 with 4 being highly valuable, found the workshops to be 'Highly Valuable.' 44% of those surveyed were new attendees, never having attended a Water Wise event.

- Water savings from mini-grant projects implemented by subwatershed businesses estimated at 47,264 gals/year.

- Water savings from Flushometer Water Reducing Valves delivered/installed estimated at 15,572 gals/year for 2017.

- A new Water Wise Website was created and the content from the old, outdated site was transferred. The new website gives users a new experience and ease of use that is uniform with the look and design of all UA websites.

Plant Systems

Field Crops Integrated Pest Management (IPM)

- Exit surveys were conducted during the meetings and field days that I organized. A hundred percent of the audience participants completing the exit surveys at these events indicated that location and facility of the meetings were acceptable. About 90% participants in the surveys reported that the information presented was timely for their operations and increased their knowledge of the subjects discussed during these events. About 77% of the attendees would change their practices based on the information and recommendations given during these events. During these meetings the agent and other presenters used live specimens and effective illustration materials as educational tools for audiences.

- Need assessment surveys in 2011-2012 and alfalfa survey in 2014 and 2015 showed that the pest management practices used to control major insect pests of alfalfa were outdated. There is a need to produce updated science-based information for the low-elevation desert production region of alfalfa hay. Egyptian alfalfa weevil, aphids and hoppers, root rot pathogen and P fertilizer represent major concerns. The program continued the study of efficacy of some chemistries used to combat these pests and the potential of some new and in-pipeline remedies in alfalfa, corn and sorghum in 2017 at MAC. The results of these trials helped guiding the management decision of alfalfa aphids and weevil, sugarcane aphid, corn mites and root rot by growers and PCAs in Arizona and California.

- The investigation of Topguard fungicide against root rot in alfalfa in commercial fields in Arizona are the first ever attempt to combat this pathogen in alfalfa in the southwest. The potential of this trials are ranging from controlling root rot in alfalfa production areas to bringing areas to alfalfa production that have been disregarded due to root rot infection.

- The results from 2014 -2017 Phosphorous trials conducted at MAC and commercial fields established new recommendations in terms of fertilization timing, rate and formula. The new results have been published, with new finding are in several presentations and posters. The Agent and the Program Research Specialist are expanding the research on this topic to investigate timing of application and impacts of other nutrients on the phosphorus intake.

Noxious, Invasive Plants

- The 23rd Annual Southwest Noxious, Invasive Plant Short Course was held in Farmington, NM July 25, 26, and 27, 2017 and was attended by 88 individuals representing 17 different natural resource management organizations.

- The Short Course is attended by individuals from agriculture production, state and federal land management agencies, universities, private organizations, environmental groups, and consulting firms.

- We (Masayeva, Howery, and Orr, 2012) administered a peer-reviewed published survey to 561 past Short Course participants who represented nearly 20 different natural resource organizations/entities. The survey revealed the following major findings: 1) 95% of the participants said that the Short Course had increased their awareness and knowledge of the potential and real negative impacts (both ecological and economic) of invasive weeds, 2) 77% of the participants said that the Short Course had provided new

ways to manage invasive weeds, and 3) 70% indicated that the Short Course would influence their future educational activities and programs related to invasive weeds.

Human Nutrition, Health & Food Safety

Diabetes Prevention Program

- Reduced risk for Type 2 Diabetes in program participants
- Increased understanding of the importance of healthy diets and lifestyles.
- Increased physical activity and decreased body weight of program participants.
- Curriculum (Prevent T2) is provided by the CDC in English and in Spanish
- 14 Extension faculty/staff trained as DPP Lifestyle Coaches.
- Newly trained lifestyle coaches learned facilitation techniques that will be helpful in other Extension programs they deliver.

Healthy Lifestyle Programs: Maricopa County

EFNEP

- 154 Community Partners with 1,272 program families. We achieved 7,632 face-to-face contacts by holding a 6-session series for each graduate.
- In-kind donations valued at \$29,838.
- 160 volunteers giving 1,075 hours of service. A total monetary value of \$55,789 in volunteer hours and in-kind donations.

SNAP-Ed

- 52 Community partner MOUs service nearly 250 sites.
- Achieved 2,142,960 face-to-face educational contacts by holding a class or series with participants
- A total monetary value of \$459,939 in volunteer hours and in-kind donations

Family, Youth & Community

4-H Youth Development

- 137 youth ages 2-16 experienced getting their hands dirty with planting seeds and/or transplanting seedlings. 104 youth prepared a garden, planted and harvested. One youth won a trophy at the county fair for his vegetables, and three girls won ribbons for their plants. These children took part in seed to harvest. They are signed up for 2018 gardening club to continue to learn about growing plants.
- 30 youth participated in a natural resource spring break field trip activity where they captured frogs and macro-invertebrates. They used sorted the specimens, and used field identification books to identify various species who exist around the single perennial stream on Hualapai. 100% of participants enjoyed the experience and would participate with another trip.
- 6 youth utilized the Agricultural facility to raise their livestock projects for county fair. All youth will return to the club to raise another animal in 2018.
- 17 youth and adults participated in a science and/or bookmaking activity. This was a new event for each family involved. Surveys show 100% satisfaction with the event, and intent to participate in a similar event, as long as there was more space to spread out.
- 15 youth participated in a summer camp program. They assisted with set up, daily chores, helping cook, clean and keep up with camping chores in the ponderosa pine forest for three days. The final two days were spent on the CO River, rafting and setting up camp for one night. Natural Resource career options (rancher, forester, entomologist, botanist, elk antler hunter, river rafting guide) were presented to the youth. An entomology exhibit of 15 different species was created by capturing insects with nets, lures, nocturnal lighting. Every child managed to survive without cell phones and/or electronic games for the week.
- 15 attendees participated in AZ Hunters Safety class, with 14 passing their examinations to earn their AZ Hunter Safety certificate.

Nutrition and Physical Activity

- SNAP-Ed Participants increased their knowledge of nutrition and how to prepare and serve healthy meals to their family on a budget.
- Participants from food demonstrations and hands-on cooking activities increased knowledge and skills to prepare healthy food at home.
- Developed partnerships to allow Cooperative Extension to provide training to child nutrition staff about safely preparing, serving and transporting healthy food to early childhood education sites in Yavapai County.
- 17 youth and adults participated in a science and/or bookmaking activity. This was a new event for each family involved. Surveys show 100% satisfaction with the event, and intent to participate in a similar event, as long as there was more space to spread out.
- Increased community gardens/fruit trees in Yavapai County. Garden at Good Samaritan Village Towers, an affordable house site for older adults. Will be cared for and harvest by residents to use in their meals.
- 15 attendees participated in AZ Hunters Safety class, with 14 passing their examinations to earn their AZ Hunter Safety certificate.

Animal Systems

Rangeland Management and Livestock Production

- Domestic Well Owner Workshop: 49 evaluations were submitted (several participants were couples filling only one evaluation). Respondents rated the workshop an average 9.15/10 overall.
- AZ Society for Rangeland Management Sprint Workshop and Tour (Hualapai): 26 evaluations were submitted for both days. Respondents rated the topics an average of 4.3/5 overall. 73% of respondents indicated they learned a new concept and 19% indicated they would consider implementing a new practice in the next year.
- Range Livestock Nutrition Workshop: 12 evaluations were submitted. Respondents rated the topics an average of 4.4/5 overall. 50% of respondents indicated that they would consider changing a practice as a result of information provided.
- Coconino County Rangeland Monitoring Workshop: 35 evaluations were submitted. Respondents rated the workshop an average 4.5/5 overall. 100% of respondents indicated they learned at least one new concept and 80% indicated they intend to implement a new practice in the next two years.
- In response to the surveys received, areas in northwest AZ were moved from moderate drought or abnormally dry condition to none during the spring. Areas in northwest AZ were moved from no drought to abnormally dry, moderate drought, or severe drought in the latter months of 2017. Drought conditions during the fall and winter months of northwestern AZ did not qualify for payments through the Livestock Forage Disaster Program in 2017.

The Informed Arizona Equestrian

- 200 participants attended the inaugural 2017 Southern Arizona Equine Health Care Symposium (SAZEHS).
- 88.24% agree or strongly agree that they found the information presented useful in the management of their horse's care/operation.
- 82.25% agree or strongly agree that, based on this information, they plan to make at least one change in their horse's daily care, vet decisions, and/or farm/operation.
- Two new articles were submitted in 2017 and are under review (Ionophores and Sand Colic)

Marketing, Trade & Economics

Bird Deterrents to Prevent Crop Loss in Agricultural Fields

- Outcomes of the bird deterrent program include decreased crop loss in fresh produce fields.
- Higher yields, and a lower risk of contamination from foodborne pathogens.
- 6 undergraduate students (most are minorities) are currently gaining experience in scientific design and implementation, and one student is receiving direct support and mentoring.
- Fresh produce growers are open to new ideas in the area of bird deterrents so they are eager to learn

about new, more effective methods, and this project could permanently change the way they deter birds in their produce fields.

Small Acreage Plant Production Systems

- There was a total of 15 respondents of the class evaluations. Of these: 67% said they were planning on growing and selling food in the near future. 47% said they have taken action as a result of their soil/water testing in the beginning class series. 46% said they are utilizing at least 1 to 3 items in their operation or future operation which they learned from taking the class. 60% said the class influenced their direction to stay committed to farming. And 93% said these classes definitely helped them prepare to begin a farm operation.

- 35 participants responded to the forum evaluation. Of these: All said they were satisfied with the overall program. 89% said they learned something new and as a result was going to either make a change or adopt a new practice in their food production systems. To name a couple, some of the respondents said they would implement soil health practices by using a cover crop and others said they would create habitats around the farm for beneficial insects.

- Using pre- and post-formatted questions in the evaluation, the following was determined by the participant's responses: 30% of the participants increased their knowledge on the impact of climate change to agriculture production. 43% increased their knowledge on the benefits of growing food in hoop houses. 53% increased their knowledge of methods used in sustaining soil health. 29% increased their knowledge in grass-fed versus conventional fed beef production systems.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	250.0	0.0	400.0	0.0
Actual	250.0	0.0	400.0	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- Combined External and Internal University Panel

2. Brief Explanation

All new proposed Hatch projects are reviewed by an ad hoc review panel of 3 qualified faculty with no conflicts of interest. All renewal projects are reviewed by a panel of 2 similarly-qualified faculty. The Associate Dean oversees this process and ensures that any suggested changes are made to the satisfaction of the reviewers and the Associate Dean. External review of programs and projects is obtained from County Extension Advisory Boards who meet on a regular basis.

Programs, whether continuing or new, are circulated around Extension and Research leadership to ensure they fulfill the mission of Arizona Cooperative Extension and are set up to deliver on our overall goals and objectives. We also ensure that all stakeholders are considered when implementing the programs. Faculty and their programs are reviewed anonymously by peers initially, then by their supervisors with input from those peer reviews. However, the supervisor has ultimate say in their final review score. Scoring is on a 1 to 5-point scale (5=Outstanding, 1=Needs Immediate Improvement). Next year,

calendar year 2018, the scoring will change to a more subjective method which forces more dialogue and constructive feedback.

III. Stakeholder Input

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

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

Brief explanation.

A major rewrite of the College's Strategic Plan that covers the research, extension, and academic programs of the College was completed in 2013. This effort involved review and comment by all faculty and staff, all advisory boards, major commodity organizations and selected stakeholders across the state. The major input was obtained from our advisory boards and meetings with major commodity organizations and with Extension knowledge.

In addition, Extension conducted its own stakeholder survey to audiences that may not know what Cooperative Extension is, or have only some small idea. The survey instrument was finalized and we continue to implement some of the suggestions while maintaining community engagement to review progress and opportunities.

Finally, an internal Climate Survey was conducted again to gauge the climate of Extension personnel and whether they feel we're hitting our marks as we deliver for our communities. This is the second year that we've incorporated this mechanism. The survey was so successful, the college adopted the practice and is in the process of generating a larger-scale version to capture the entire college. This includes contracting an external vendor to conduct the survey. However, we continue to use the feedback and results to drive programming, operational procedures, and other initiatives for Extension and college personnel.

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.

Over 100 county advisory board members provide input and priorities to county programs on an annual basis. Input for the research program is provided by advisory boards for our outlying Agriculture Centers. These groups, plus numerous meetings with commodity organizations, provide input annually for both Extension and Research programs.

We've also beefed up efforts to collect contact information from program participants and reach out to them to gauge their interest(s) in being involved at a more connected level with Extension to help shape future programming.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (Real-time assessment of programs and offerings)

Brief explanation.

This is normally done by faculty meeting with the stakeholder groups throughout the year and providing them with written materials for their review and input. This may be expanded to a web-based survey available to all interested.

We also utilize past data and experiences to drive participation and create communication and outreach mechanisms/strategies to position Extension as a partner of the Arizona community and drive interest to our programs and offerings.

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.

Input is collected, categorized, filtered, and then disseminated to the appropriate team members to begin incorporating into strategic planning - from program to administrative activities. We see feedback as a gift and welcome all opportunities to obtain the information so we know what we're doing well and where our opportunities are.

Brief Explanation of what you learned from your Stakeholders

All input is considered in all our planning and reporting. We're learning that not everyone wants the same type of information we've provided in the past. And if they do, they don't want it in the same fashion. We're reaching out to younger audiences and the information they're looking for is not the same as what we've provided to earlier generations. So, by soliciting their input, we can fully understand what information is valuable to them and what will initiate further action to be involved. In addition, we're maintaining our relationships with traditional audiences and listening to their pain points in being involved with Extension. We're looking at making things easier for them to be involved. One of the biggest pain points is our Volunteer process. We HAVE to follow all rules set forth by the University, but sometimes, those processes can be lengthy and not easily navigable. So, we're working within the system to deliver training. We're bringing on a Volunteer Coordinator to help with navigating all processes while maintaining compliance.

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	2019509	0	2557649	0
Actual Matching	2019509	0	2457649	0
Actual All Other	0	0	0	0
Total Actual Expended	4039018	0	5015298	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	ENVIRONMENT, WATER, LAND AND NATURAL RESOURCES
2	PLANT SYSTEMS
3	HUMAN NUTRITION, HEALTH & FOOD SAFETY
4	FAMILY, YOUTH, AND COMMUNITY
5	ANIMAL SYSTEMS
6	MARKETING, TRADE, AND ECONOMICS

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

ENVIRONMENT, WATER, LAND AND NATURAL RESOURCES

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	35%		44%	
111	Conservation and Efficient Use of Water	30%		25%	
112	Watershed Protection and Management	15%		10%	
121	Management of Range Resources	20%		21%	
	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	20.0	0.0
Actual Paid	9.7	0.0	802.0	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
871014	0	826638	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
871014	0	826638	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

Tribal Watershed Hydrology (TWH)

Issue

Tribes have unique hydrology and water resources challenges because of their cultural, economic, and federal status. There is a need to translate relevant hydrologic science and research to Native American communities. The objective of this extension program is to bring relevant hydrologic science to Native American communities in a culturally sensitive manner by providing hydrology expertise, transferring knowledge, assessing information needs, and developing applied science projects.

What has been done

This program received \$202,525; in August 2012 by the USGS Science Climate Center under a grant entitled "Climate Change Vulnerability of Native Americans in the Southwest." There are 5 faculty/staff working on this project. Pyramid Lake Paiute Tribe is a primary partner and the tribal and federal employees provided field tours Numana Hatchery, Dunn Hatchery, Koch Cui-ui Hatchery, Lake Operations, and Numana Dam. Three proposals were written which were not funded including "Understanding Sustainable agricultural practices of the Tohono O'odham People and Preserving water-related ecological knowledge", "SWEED Southwest water energy and economic development" and "IGERT:Forecasting water security (FAWSIT)-Integrative water resources research and training for water security in the face of envi and soc".

Water Wise 2017

Issue

Arizona's increasing population has an enormous impact on vast tracts of public and private land. Figures from the U.S. Census Bureau estimates the state's population as of July 1, 2017 to be at over 7 million, increased from 6.3 million in the 2010 Census (US Census Bureau). Suburban development, traditional land uses and other activities all influence natural resources such as surface and ground water quality and quantity. According to the United States Geological Survey (2014), the average American uses between 80 and 100 gallons of water daily. Nationally, residential outdoor water use is about 30%, but due to high temperatures and evaporation rates, it is estimated that on average, outdoor water use in Arizona accounts for over 50% of a residence's total water consumption.

What has been done

The Water Wise program was created in 1995 to address these water issues and is currently comprised of three major program areas: Community Education, Youth Education and Water Wise and Energy Smart (WWES) on Fort Huachuca. All three program areas focus educational and outreach efforts on water conservation, water wise landscaping, irrigation efficiency, water harvesting, storm water management, erosion control, backyard wildlife habitat and other natural resource management practices, using a variety of delivery methods and incentives including mini-grants from the Upper San Pedro Partnership (USPP) to implement water conservation projects with small businesses. The Water Wise and Energy Smart program area also provides energy auditing services to Fort Huachuca to assist them in increasing overall energy efficiency and goals for Net-Zero.

This agent is responsible for a staff of four senior instructional specialists to deliver the program, providing programmatic, budget and human resources oversight, assistance on event planning, website update and maintenance, and maintaining an important connection with the Upper San Pedro Partnership, Fort Huachuca, City of Sierra Vista and other funding partners.

2. Brief description of the target audience

Natural resource managers, Governor's Office and state agencies, municipal organizations and leaders, households, consumers, youth, master gardening and master watershed programs.

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	46908	71425	13322	25878

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	13	55	68

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs

Year	Actual
2017	60230

Output #2

Output Measure

- Number of individuals adopting new technology

Year	Actual
2017	1500

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Effectiveness of research programs will be based on publications, external grant support, and integration into existing extension programs
2	Number of individuals gaining knowledge by participating in educational programs
3	Volunteers completing Master Gardening training
4	Create awareness and increase knowledge

Outcome #1

1. Outcome Measures

Effectiveness of research programs will be based on publications, external grant support, and integration into existing extension programs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of individuals gaining knowledge by participating in educational programs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Volunteers completing Master Gardening training

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Master Gardener program is an important component of our Cooperative Extension program.

What has been done

1,378 volunteers donated their time teaching others.

Results

Master Gardener volunteers donated over 100,000 hours in 2017.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Create awareness and increase knowledge

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All recipients of our programs care about increasing their knowledge.

What has been done

1,378 Master Gardener volunteers shared information directly with 23,596 program participants.

Results

The majority of the recipients consistently indicate a change in knowledge resulting from our programs and materials.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

We've taken steps to conduct user experience evaluations. This gives individuals the opportunity to provide rich feedback about what they enjoy about the program(s) and what they feel we can do better at how we deliver on our mission. Much of the results are qualitative and commentary. However, we're optimistic about what we're hearing and how people continue to be excited about what we're offering.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

PLANT 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
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		30%	
205	Plant Management Systems	25%		15%	
206	Basic Plant Biology	25%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
212	Pathogens and Nematodes Affecting Plants	20%		15%	
215	Biological Control of Pests Affecting Plants	10%		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	11.0	0.0	41.0	0.0
Actual Paid	3.0	0.0	6.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
289194	0	666163	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
289194	0	666163	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

Field Crops Integrated Pest Management (IPM)

Issue

In the United States, less than 1% of the population is engaged in agricultural production and related activities. Meanwhile, the earth's population and its demands for agricultural commodities is increasing dramatically. This places a tremendous responsibility on Land Grant Universities dealing with agricultural research, education and Extension to provide the best available quality education, training and outreach to enable producers to meet the agricultural demands of the human population. The situation is similar in Arizona, with only 1,125 growers, 204 registered Pest Control Advisors (PCA's) and 866 certified private and commercial pesticide applicators (Arizona Department of Agriculture, 2013) are the segment of the state's population responsible for the production of food and fiber. A majority of them are managing over 700,000 acres of field crops valued at nearly 2 billion dollars (USDA National Agricultural Statistics Service [NASS], 2013) and they also support the dairy and livestock industries that are significant contributors to the state's economy.

The agricultural production in Arizona is characterized as a high input, intensive production system with high yields and premium quality. For example, Arizona's high quality alfalfa hay yields of 8.4 tons per acre surpassed the national average of 3.35 tons per acre (NASS, 2015) and Arizona's cotton yield per acre was first worldwide in 2011 (1,548 pounds per acre). As an Area Agent, I serve the three major agricultural counties in central and south central Arizona; Maricopa, Pinal and Pima. The total value of agricultural products of these three counties, including dairy and livestock industries, exceeded two billion dollars (Census of Agriculture - Arizona, 2012). Arizona's agricultural producers and professionals face significant challenges producing high quality food and fiber in desert agroecosystems, including water availability and irrigation issues, crop and pest management questions, and fluctuating markets. Pest management is a continuous struggle that our grower and PCA clientele face season after season. They rely on the timely, unbiased, science-based information provided through University of Arizona (UA) Cooperative Extension to remain productive, profitable, and competitive. Recently, higher commodity prices have caused many growers to switch their operations to grow crops that they are less familiar with or have not produced for a long time. Also, a new generation of growers and PCA's have entered the market with less experience than seasoned veterans. PCA's are professionals who advise growers about pest management decisions, including when and what pesticide treatments are needed to control insects, weeds, and diseases.

What has been done

When I started my job on April 15, 2011, I planned and implemented my program in field crops and Integrated Pest Management (IPM) in central Arizona based on inputs obtained from clientele. Surveys, dialogs at meetings, personal communications, and inputs from my Extension Advisory committee members identified their production interests, their most urgent pest management problems in field crops, and their communication preferences. The research, education and outreach components of the Field

Crops IPM program were developed to address these identified needs through my own research in collaboration with other faculty, scientists, and colleagues from UA, USDA, and other institutions. Various methods were used and continue to be effective to communicate program outputs to all audiences. The communications methods include and are not limited to traditional and short publications, newsletters, phone calls, emails, program website (www.arizonaag.com), social media, audio-videos, Extension meetings, field days, seminars, workshops, and personal contacts.

Noxious, Invasive Plants

Issue

Noxious, invasive plants are harmful non-native species that are regulated by state and federal laws because they threaten agriculture, navigation, fish, wildlife, or human health on both public and private lands. They threaten both urban and rural values because they may: be poisonous, displace native plant species and lessen biological diversity, increase erosion and degrade watershed values, eliminate threatened and endangered species, create problems for recreationists, and negatively impact wildlife habitat and other aesthetic qualities of land or water resources. Noxious weeds have been shown to displace native flora and fauna causing serious economic and ecological problems on rangelands throughout the western United States and Canada.

What has been done

This program is entering its 3rd decade and continues to be a critical issue locally, regionally, nationally, and internationally as evidenced by the recent signing of the 12/5/16 Executive Order -- Safeguarding the Nation from the Impacts of Invasive Species <https://www.whitehouse.gov/the-press-office/2016/12/05/executive-order-safeguarding-nation-impacts-invasive-species>.

My 4 programming areas (Noxious, Invasive Plants, Animal Foraging Behavior and Distribution, Rangeland Natural Resource Ecology and Management, and Work Force Development/STEM) permit me to implement educational programs that embrace the breadth of the range science and management discipline while highlighting my areas of expertise. A programmatic approach that emphasizes these 4 areas has allowed me to design and implement the kind of programs necessary to meet the evolving needs of Arizona's citizenry as stated in the Cooperative Extension Service mission statement (i.e., "the Cooperative Extension Service is constantly changing to meet the shifting needs and priorities of the people it serves"). The development and direction of programming is guided by local needs as well as national concerns and objectives. Extension programs are typically developed and implemented with the help of county extension agents, state extension specialists, as well as state and federal agency professionals.

2. Brief description of the target audience

Commodity groups, state agencies, pest management advisors, pesticide applicators, youth, ag-ventures programs.

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	6400	19000	4000	12400

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	12	80	92

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs

Year	Actual
2017	10400

Output #2

Output Measure

- Number of research projects conducted on all aspects of Plant Sciences, and Agriculture and Resource Economics

Year	Actual
2017	260

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adoption of better management practices for crop production
2	Adoption of alternative crop technologies
3	Adoption of more cost effective means for controlling plant diseases along with insect issues

Outcome #1

1. Outcome Measures

Adoption of better management practices for crop production

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Adoption of alternative crop technologies

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Adoption of more cost effective means for controlling plant diseases along with insect issues

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

With more and more community members seeking ways to create their own gardens, we've experienced an increase in contacts for information and resources with Plant Sciences. This has led to more robust outreach and engagement with the community. Using this feedback as well as data analytics from our web site(s), we're able to capture the topics that stakeholders are seeking and can adapt our planning as such.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

HUMAN NUTRITION, HEALTH & 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
702	Requirements and Function of Nutrients and Other Food Components	10%		40%	
703	Nutrition Education and Behavior	75%		20%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%		40%	
	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	9.0	0.0	10.0	0.0
Actual Paid	2.6	0.0	1.5	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
201749	0	160679	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
201749	0	160679	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

Diabetes Prevention Program

Issue

Chronic health conditions are a nationwide issue that effect every community across the nation. Being overweight or obese are tied to many chronic conditions including diabetes, heart disease and cancer. According to the CDC 36.5% of adults and 17% of youth nationwide are obese (CDC website Overweight and Obesity page: <https://www.cdc.gov/obesity/index.html>). Nationwide physical inactivity and poor nutrition are problematic. In Arizona, it is estimated that 28.9% of adults are obese (<http://stateofobesity.org/states/az/>).

What has been done

The National Diabetes Prevention Program is a federal initiative by the CDC to prevent type 2 diabetes in people at risk for the disease. The CDC oversees the program and provides an evidence-based curriculum free of charge, in English and in Spanish, on their website. The DPP is a year-long program that emphasizes lifestyle changes and moderate weight loss.

Healthy Lifestyle Programs: Maricopa County

Issue

There is a local & national concern about childhood & adult obesity. Schools & other major community entities that serve the public have mandates to teach healthy lifestyles that focus on proper nutrition & physical activity. To address the health concerns & associated mandates, the goals of the Maricopa County Cooperative Extension (MCCE) nutrition programs are to increase nutritional & physical activity knowledge, improve associated behaviors & health through research-based nutrition education programs.

What has been done

Healthy Lifestyle programming was planned & implemented in collaboration & consultation with: MCCE Director E. Martin, CALS EFNEP/SNAP-Ed Director S. Misner (Dept of Nutritional Sciences), & former CALS Associate Director of Programs, L. Houtkooper, along with other faculty, community members, health professionals, & agencies. Additionally, Native American Connections, Maricopa County Department of Public Health, school health advisory boards, food banks, & government housing sites provide input to identify needs for nutrition program planning, strategic planning, & networking. Other sources that aid in this are data from the most recent census, CDC, School Free/ Reduced Lunch Program, & the USDA. Two Healthy Lifestyles nutrition programs being delivered in Maricopa County by this Agent are (1) the Expanded Food & Nutrition Education Program (EFNEP), & (2) the Supplemental Nutrition Assistance Program-Education (SNAP-Ed).

2. Brief description of the target audience

General public, educators, health professionals, extension educators.

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	217714	414060	136491	258787

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	25	30

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Effectiveness of the research program will be based on publications, external grant support, and integration into existing extension programs

Year	Actual
2017	0

Output #2

Output Measure

- School districts, youth, and adults will address obesity issues

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Create awareness and increase knowledge
2	Number of individuals adopting recommendations for nutrition and health
3	Reduce childhood obesity

Outcome #1

1. Outcome Measures

Create awareness and increase knowledge

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	354206

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Number of individuals adopting recommendations for nutrition and health

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	354206

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Reduce childhood obesity

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

There is a strong sentiment that constant and social media are having a factor in people wanting to learn more about human health and nutrition. The health industry is a billion-dollar industry and people are tired of throwing money at it. Instead, they're looking to resources like Extension to fill that gap of scientific-backed information.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

We are learning that more and more individuals are using the power of technology to be at the forefront of the health and nutrition revolution. Wearable technology and smart phones are making information and data on health and nutrition easily accessible. The issue is how much is too much data and information and who is showing people what to do with that information.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

FAMILY, YOUTH, AND COMMUNITY

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
802	Human Development and Family Well-Being	20%		80%	
806	Youth Development	80%		20%	
	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	21.0	0.0	5.0	0.0
Actual Paid	5.6	0.0	0.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
380475	0	101201	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
380475	0	101201	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

4-H Youth Development

Issue

Native American youth are one of the most "at risk" populations in the United States. Hualapai youth in a 2010 AZ Youth Survey, ranked 81% "high risk" category for likelihood of drug use, delinquency, dropping out of high school and violent youth (average rank for AZ youth is 35%). The town of Peach Springs is prepared for this outcome, with their own 30 bed Juvenile Detention Center, despite a population of only 1,100 (2010 census). "Consistent adult leadership, along with structured activities" (Teufal-Shone et al., 2006) are identified as key components to support youth wellness in the Hualapai community. Hualapai 4-H Youth programs offer both of these recommended elements-so the potential to help the community steer youngsters in a positive direction is tremendous.

What has been done

The Hualapai Federally Recognized Tribal Extension Program (FRTEP) was established in 2002, with 4-H Youth Development as an essential component. Our programs have been designed to provide non formal, hands on visual and tactile educational opportunities. Program subject matter and implementation are developed with input by community members and Tribal agencies. The Hualapai Department of Natural Resources, Hualapai Cultural Center and the Hualapai Youth Coalition have provided Tribal leadership into Extension programming through regular meetings, open communication and discussion. University of AZ specialists (notably Jerry Lopez, Betsey Greene & Trent Teegerstrom), County 4-H Agents (Jerry Olson, Cathy Martinez) help with program direction. National FRTEP 4-H agents and our Hualapai Buck-N-Doe 4-H club volunteer leaders and parents give input. Suggestions taken from survey results of participating youth may also help to steer the direction and course of annual programs.

Nutrition and Physical Activity

Issue

According to the Arizona Cooperative Extension Program Stakeholder Survey in Yavapai County, "Promote healthy eating, physical activity and positive self-image" was the top priority for Program Goal 2. In Yavapai County:

- 17% of the population has limited access to healthy foods, (AZ state average of 12%)
- 26% of adults in Yavapai County are obese
- 20% of the population is physically inactive
- Only 18.5% of Yavapai County residents consume adequate amounts of fruits and vegetables.
- 13.4% of the population are enrolled in Supplemental Nutrition Assistance Program (SNAP, formerly Food Stamps), of which: 26.7% include persons 60 or older and 47.8% include children under 18.

What has been done

SNAP-Ed: a nutrition education program designed to improve the likelihood that persons eligible for SNAP will make healthy choices within a limited budget consistent with the current Dietary Guidelines for Americans. The program reached 1649 contacts (534 Direct; 1115 Indirect) and conducted 2 in-service trainings for child care providers and food service staff including food service staff at all Head Starts in Yavapai County and Humboldt Unified School District about safely serving healthy foods to the children in their care and how promote fruits and vegetables. It included 31 food demos, tabled at 8 Head Start family resource fairs; hosted the Prescott Farmers Market Education Booth 15 times; partnered with Master Gardeners to offer a "Gardening 101" class for SNAP recipients; awarded fruit tree grant from the Fruit Tree Planting Foundation.

2. Brief description of the target audience

Parents, educators, youth, community groups.

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	1035	258787	116546	51757

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	45	51

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs

Year	Actual
2017	50000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adoption of essential life skills by Arizona's youth that leads to a responsible, productive, and healthy life-style
2	Adoption of life building skills including self-discipline, responsibility and leadership

Outcome #1

1. Outcome Measures

Adoption of essential life skills by Arizona's youth that leads to a responsible, productive, and healthy life-style

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #2

1. Outcome Measures

Adoption of life building skills including self-discipline, responsibility and leadership

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

We have learned that we can no longer attempt to reach our audiences through solely traditional methods. For example, within 4-H, using a 4-H listserv or newsletter is not the most efficient way to attract and engage children of the Gen Y or iGen categories. They prefer to have their information reach them in the palm of their hand. So, based on our evaluations, we need to become creative with our outreach and reach children where they want to be contacted while still maintaining traditional methods.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

ANIMAL 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
301	Reproductive Performance of Animals	30%		15%	
302	Nutrient Utilization in Animals	20%		15%	
305	Animal Physiological Processes	15%		20%	
306	Environmental Stress in Animals	15%		30%	
311	Animal Diseases	20%		20%	
	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	15.0	0.0
Actual Paid	0.6	0.0	3.5	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
57556	0	455461	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
57556	0	455461	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

Rangeland Management and Livestock Production

Issue

Rangelands provide the principal source of forage for the livestock operations on thousands of American farms and ranches. As human populations increase and demand for food and energy expands, the need for forage and the other range resources will increase (USDA). There is a need to balance livestock grazing with natural resources, particularly as livestock producers have been reducing and managing herds as a consequence of drought conditions for the past two decades. Feedback on rangeland resource needs was gathered through a formal Needs Assessment (2016), comments from program evaluations, trade and stakeholder meetings, and through conversations with ranchers, agency personnel, conservation organizations, and colleagues.

What has been done

A stakeholder Needs Assessment survey with input from K. McReynolds, G. Ruyle, D. Faulkner, J. Schalau and A. Wright was distributed to producers in Mohave and Coconino County. Results indicate a critical educational need for: range cow nutrition, emergency veterinary skills for ranchers, estate planning, plant identification, livestock reproduction, range plant nutrition and toxic plants.

The Informed Arizona Equestrian

Issue

According to the 2012 US Census of agriculture, Sales of equines (horses and ponies) and equids (donkeys, mules, and burros) in Arizona was valued at \$31.8 million (10th highest in the nation). There are approximately 92,384 total equines in the state, up 35% from 68,745 in 2007 (US Census of Ag 2012). Arizona Cooperative Extension equine programming has been fairly inactive (with the exception of county 4-H activities) for the last several years, making it necessary to develop relationships with professionals and clientele as well as identify stakeholder needs and methods for delivery.

What has been done

A statewide livestock and equine survey was developed and distributed in cooperation with A. Wright, D. Faulkner, and D. Diaz. This needs assessment will provide a foundation for equine related extension programmatic planning for the next five years. Programs will be designed to address "popular" topics and still incorporate "unpopular" but important subjects which support good business practices, land and animal stewardship, and horse health, safety, and welfare. Identification and planning will continue to develop through discussions with agents and stakeholders as well as more formal program evaluations from extension events.

2. Brief description of the target audience

Commodity groups, state agencies, pest management advisors, pesticide applicators, youth, ag-ventures programs.

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	517	3100	104	1630

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	2	50	52

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs
 Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of research projects conducted on all aspects of Animal Sciences, and Agriculture and Resource Economics
 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	Adoption of better management practices for animal production
2	Adoption of alternative animal technologies
3	Adoption of more cost effective means for controlling animal diseases along with noxious plant issues

Outcome #1

1. Outcome Measures

Adoption of better management practices for animal production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals

Outcome #2

1. Outcome Measures

Adoption of alternative animal technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
311	Animal Diseases

Outcome #3

1. Outcome Measures

Adoption of more cost effective means for controlling animal diseases along with noxious plant issues

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
311	Animal Diseases

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Through evaluations, we're seeing that not only are our efforts making an impact on the animal systems, but our actions within the human behaviors and how they impact animal systems can be implemented. With adequate training and communications, we have the ability to make a positive difference on how our animal systems are set up for success. We're seeing a bigger need for more of this training in large groups, which adds

tremendous value to the systems.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

MARKETING, TRADE, AND ECONOMICS

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	40%		40%	
605	Natural Resource and Environmental Economics	40%		40%	
608	Community Resource Planning and Development	10%		0%	
610	Domestic Policy Analysis	10%		20%	
	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	5.0	0.0	6.0	0.0
Actual Paid	1.9	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
219521	0	347507	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
219521	0	247507	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

Bird Deterrents to Prevent Crop Loss in Agricultural Fields

Issue

Input from the Food Safety Advisory Council that I formed in 2016, and from the Yuma Safe Produce Council indicated that bird intrusion into agricultural fields is a significant problem for fresh produce growers, resulting in high rates of crop loss due to damage and potential contamination. My training as a Wildlife Biologist led me to explore natural ways to deter birds based on their physiology and behaviors.

What has been done

I worked with the Yuma Center of Excellence for Desert Agriculture (YCEDA) to host a Bird Deterrent Discussion and Design Challenge in which I invited farmers, concentrated animal feeding operation managers, engineers, wildlife experts, golf course and airport managers, and students to a full day discussion of which bird deterrents have been used and which ones are most effective. We also discussed the physiology and behavior of birds to determine the best way to target them with a new and improved deterrent. All participants were invited to a design challenge - they were asked to come up with a new, more effective bird deterrent that they would present to a panel of judges, including a grower, a wildlife expert, an agricultural engineer, and a representative of YCEDA.

I have developed a collaboration with Sonoran Desert Falconry in Scottsdale, Arizona Game and Fish Department in Yuma and Phoenix, and local wildlife rehabilitators to begin a major falconry program in Yuma. The program will include the use of trained falcons and hawks to protect fresh produce fields from nuisance birds, and the construction of owl boxes that will attract owls to manage the rodent populations. We will also be able to make use of rehabilitated wild birds, both for release near designated fields, and to seed a breeding program. I am currently in the process of seeking funding from the Center for Produce Safety to implement a pilot program in 160 acres of fields owned by JV Farms that historically experiences heavy bird pressure. Five other farms have expressed eager interest in participating in the program as well.

Small Acreage Plant Production Systems

Issue

In the 2012 Census of Agriculture by the United States Department of Agriculture and National Agricultural Statistics Service (USDA-NASS, 2012), the majority of farms in Cochise and Santa Cruz counties are between 10 to 49 acres and in Graham County, the majority are 1 to 10 acres in size. It is often difficult for farmers with small acreage to acquire the resources necessary, either in production, harvest, or marketing. Through collaboration with specialists and extension agents at the University of Arizona and other institutions, the need to increase knowledge of farm production, marketing, and sustainable agriculture strategies to these small farmers is critical for their success.

What has been done

The program was developed from input by University of Arizona specialists Ursula Schuch, Russell Tronstad, and Trent Teegerstrom along with Extension agent Mark Apel and this agent. Funding to date is from USDA Beginning Farmers grant and Sustainable Agriculture Research and Education (SARE) funds. Other expertise/professional input sought from University of Arizona specialists (Paula Rivadeneira - Food Safety) and USDA Farm Service Agency staff (Rebecca Burright and Marissa Gorman - Farm Grants/Loans), and also from prominent community members who have tried methods or are leaders in their production. The 4 county newspapers and social media platforms were used to market the workshops and forum.

2. Brief description of the target audience

Commodity groups, ranchers, farmers, government agencies.

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	3000	7800	12900	25750

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	12	28	40

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of economic analysis publications completed
 Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of individuals participating in educational programs.

Year	Actual
2017	15900

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adoption of better management practices for crop and animal production
2	Adoption of alternative technologies
3	New community gardens or farmers' markets

Outcome #1

1. Outcome Measures

Adoption of better management practices for crop and animal production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #2

1. Outcome Measures

Adoption of alternative technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

New community gardens or farmers' markets

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Our evaluation results indicate that there is a huge need for cost-cutting, but not quality-cutting, measures on agricultural entities within the state. Individuals and small farms need assistance with developing new methods and technologies to reduce their costs and other overhead. By delivering our scientific research and other behavioral shifts, we're seeing how these communities are able to save on certain costs and apply them to alternative areas to see their bottom line improve.

Key Items of Evaluation

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	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)	
0	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.