

# 2018 New Mexico State University Combined Research and Extension Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

New Mexico State University College of Agricultural, Consumer and Environmental Sciences (ACES) research, academic, and Extension activities fall into three broad strategic themes, which consist of our planned programs for this Plan of Work. Each planned program is comparable to a NIFA portfolio, with associated Knowledge Areas (KAs). The three college strategic themes are: Agriculture and Natural Resources; Community and Economic Development; and Human Capital. Each strategic theme has administrative support and civil rights functions associated with it. NIFA has developed five mandatory priority areas. We have explicitly addressed two areas (Global Food Security and Hunger; Food Safety) by renaming and reorganizing existing planned programs. The remaining priority areas are reported in our existing research and Extension programs. We have listed those priority areas separately, although we will not report anything in those areas per se.

ACES uses the Academy of Sciences definition of agriculture: the service of producing, distributing, marketing, and consuming food and fiber. This incorporates use, conservation, development, and management of air, land, and water resources. The Agriculture and Natural Resources strategic theme, then, includes the following planned programs: Sustainable Management of Natural Resources; Global Food Security and Hunger; and Food Safety.

The Sustainable Management of Natural Resources planned program contains the KAs covering Soil, Plant, Water, Nutrient Relationships; Management of Saline and Sodic Soils and Salinity; Management of Range Resources; Management and Sustainability of Forest Resources; Urban Forestry; Aquatic and Terrestrial Wildlife; Conservation of Biological Diversity; Waste Disposal, Recycling, and Reuse; Drainage and Irrigation Systems and Facilities; and Natural Resource and Environmental Economics.

The Global Food Security and Hunger planned program contains the KAs dealing with animal genetics and genomics, nutrition, reproduction, physiology, stresses, and management systems; genetics, genomics, stresses, efficiencies, and management systems of plants; and pests and pathogens of plants and animals, weeds, biological control and integrated pest management systems, and animal welfare/protection. The Food Safety planned program incorporates the KAs dealing with new and improved food products and processing techniques, quality maintenance, and protection from pathogens.

The Community and Economic Development strategic theme contains the Agricultural Markets, Trade, and Economic/Business Development planned program. This covers marketing, community development, and economic policy.

ACES' Human Capital strategic theme contains two planned programs: Health and Wellbeing; and 4-H and Youth Development. The Health and Wellbeing planned program covers nutrition and nutrition education, healthy lifestyles, family resource management, family development, and how social changes affect individuals. The 4-H and Youth Development planned program incorporates all remaining programs involved with youth development.

In each POW planned program, ACES has counted only those professional and scientist FTEs funded by Hatch or Smith-Lever 3b&c capacity funds. This has resulted in a significant reduction of reported FTES, compared to previous years. Capacity funds not attached to FTE salaries were expended in program operations

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.0
Actual	2.0	0.0	6.2	0.0

**II. Merit Review Process**

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

- Internal University Panel
- External University Panel
- External Non-University Panel

**2. Brief Explanation**

We use internal faculty review and external advisory group review of our planned programs. As appropriate, departments are reviewed by a panel of NIFA and land-grant university peers.

**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 the general public
- Survey specifically with non-traditional groups

**Brief explanation.**

New Mexico State University uses a variety of methods to inform and collect feedback from our stakeholders. We continually evaluate their effectiveness and consider new ways to communicate with our stakeholders. In 2018 the Dean of NMSU's College of Agricultural and Consumer Sciences, along with the Director of the New Mexico Department of Agriculture, attended three open listening sessions around the state to receive input from our stakeholders. This was in addition to the input we received from Extension and Research advisory boards, legislators, county commissioners, and consumer groups, along with individual members of the general public.

**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.**

New Mexico State University uses a variety of methods to inform and collect feedback from our stakeholders. We continually evaluate their effectiveness and consider new ways to communicate with our stakeholders

**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
- 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
- Meeting with invited selected individuals from the general public

**Brief explanation.**

See above list.

**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.**

See above list.

**Brief Explanation of what you learned from your Stakeholders**

We learned, again, that Federal priorities do not always align with State needs. The College of Agriculture, Consumer and Environmental Sciences needs to align better with industry-- management and developing key relationships. We also need to promote agricultural literacy and awareness by doing better to promote and educate regarding our research and Extension impacts.

**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
<b>Actual Formula</b>	899077	0	832166	0
<b>Actual Matching</b>	899077	0	832166	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	1798154	0	1664332	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Agricultural Markets, Trade, and Economic/Business Development
3	Sustainable Management of Natural Resources
4	Food Safety
5	Health and Wellbeing
6	4-H and Youth Development
7	Climate Change
8	Sustainable Energy
9	Childhood Obesity

**V(A). Planned Program (Summary)**

**Program # 1**

**1. Name of the Planned Program**

Global Food Security and Hunger

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	6%		6%	
202	Plant Genetic Resources	6%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	14%		14%	
204	Plant Product Quality and Utility (Preharvest)	6%		6%	
205	Plant Management Systems	5%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		4%	
212	Pathogens and Nematodes Affecting Plants	6%		6%	
213	Weeds Affecting Plants	10%		10%	
215	Biological Control of Pests Affecting Plants	3%		3%	
216	Integrated Pest Management Systems	2%		2%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	10%		10%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	5%		5%	
307	Animal Management Systems	3%		3%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	1.0	0.0	4.7	0.0
<b>Actual Volunteer</b>	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
827330	0	474300	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
827330	0	474300	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**

High prices for weeding constrain chile production in New Mexico. Chile farmers might be able to reduce weed control expenses by applying the herbicide 'flumioxazin', provided that this herbicide is: (1) proven to be safe, and (2) subsequently registered. From 2015-2017, my research program developed site-specific strategies for minimizing risk of crop injury from post-directed applications of flumioxazin. In 2018, we determined that post-directed applications to chile irrigated with subsurface drip resulted in chile fruits without detectable flumioxazin residues. Although more research is needed, results suggest that post-directed applications of flumioxazin are safe for chile irrigated with subsurface drip.

NMSU lacked a research program on urban entomology that addressed the growing numbers of urban pests in New Mexico. In 2018, I have consolidated an urban entomology research program that responds to the needs of our stakeholders with useful information about effective control methods for urban pests. Our research has impact the way bed bugs, ants and cockroaches is managed by pest control professionals. Impact of this knowledge is measured by talks presented at regional, national and international meetings; and various peer-reviewed publications including a book chapter. New research avenues have opened to other pest such as fleas and flies.

Dr. Lenhoff's current research shows replacing winter fallow with cover crops in a traditional fallow-crop system can have significant advantages for weed control, soil quality and subsequent cash crop yield. For example, numerous weed seedlings germinated but did not survive in the cover crops, reducing the weed seedbank and weed management costs. Also, dry and wet soil aggregate stability increased by 10% and 8% with winter rye and hairy vetch cover crops, respectively, and soil compaction decreased by 53% with a mustard cover crop. Vetch also had a positive impact on sweet corn yield, increasing 55% over fallow plots.

The Soilborne Disease Research Program has provided New Mexico agricultural producers and industries with information on the occurrence of a new fungal pathogen and parasitic plant on pecan, the extent of a beneficial mycorrhizal fungus in pecan, the prevalence and identity of the fungal pathogen causing leaf spot in cotton, and biorational tools for managing soilborne diseases in chile pepper. This information will assist pecan, cotton, chile pepper producers, and other related industries in preparedness to gauge the threat from new diseases and employ appropriate management options to protect and increase the socio-economic benefits from agricultural production in New Mexico.

Leafy spurge, an invasive rangeland weed in New Mexico, can be managed without herbicides using small flea beetles that only eat the weed. Over the past 20 years, beetles have been established on all known populations of leafy spurge in New Mexico by monitoring, collecting and moving flea beetles. Flea beetles commonly reduce weed densities by more than 95%. In addition, beetles can be used as a "biological herbicide" to quickly eliminate small patches of weeds by releasing 15 beetles for every square foot of

weeds.

Pecan weevil is a regulated insect pest that has moved into eastern NM. EPWS in collaboration with the NMDA are working on new techniques to manage and control weevil populations. In collaboration with the Insect Sensory and Behavior Ecology Laboratory (ISABEL), we are developing both chemical attractants, to improve our ability to determine the extent and spread of the pest, and chemical repellants produced by the weevils themselves to protect non-infested pecans. A large percentage of the annual NM pecan crop is exported and it is critical to keep the pecan weevil out of our major pecan growing regions.

Biological Control has the potential to control many insect pests but is frequently undervalued. Control of insect eggs alone is often 80-90% when populations of predators are not disrupted by frequent insecticide applications. Control of alfalfa weevil with parasitoids and predators will save New Mexico growers over \$2 Million per year. Our NMSU farm has maintained good control of alfalfa weevil with biological control for 20 years. Replicating this type of control in just alfalfa, sorghum and pecan will save growers \$6.5 Million per year in reduced losses and control costs.

A sugarcane aphid management program is being developed based on biological control, cultural controls and host plant resistance. Implementation will save growers in New Mexico \$4.6 Million per year in reduced costs and losses as well as \$20 Million in adjacent Texas counties.

Glandless cotton cultivars can increase gross returns from \$876 to \$1,576 per acre. This \$700 increase per acre is due to seed that is free of gossypol which can be used for shrimp feed or even as a protein source in food for human consumption. One of the issues with production of glandless cotton is that gossypol protects cotton from insect pests. Our project is evaluating risk and developing tools to manage this new crop for New Mexico.

**NMSU Extension Specialists Provide Valuable Continuing Education (CEUs) to Clientele.** In NM, licensed applicators must receive continuing education credits (CEUs) annually. Evaluations of Pesticide CEU Workshops in Socorro County indicated that out of 24 attendees, 92% reported that the information that I provided on herbicides, including how mode of action affects herbicide decisions, was exceptionally helpful. Additionally, 83% reported they would make a change to how they make informed decisions when comparing and selecting herbicides. Participants were also asked to assign a monetary value to the free workshop with an average value assigned at \$120.00 per participant, or a total of \$2,880 value for the information provided in the workshop.

**NMSU Research Indicates that a New Herbicide Option is Available for the Management of Difficult-to-Control Weeds in Alfalfa.** As of 2017, alfalfa hay remains the most valuable cash crop in New Mexico with an estimated annual gross of \$168 million. There are currently very limited options for herbicide management of late-season perennial weeds, like plantain, that provide adequate control with limited crop injury. Our 2018 research indicated that Sharpen, a newly labeled herbicide for broadleaf weed control in dormant-season alfalfa, provided increased injury of plantain with no negative impacts to alfalfa yield compared to other labeled broadleaf herbicide options. Research will continue through 2019 to determine if tank-mixes of Sharpen with other herbicides will provide improved plantain control.

The Creamer lab demonstrated that three fungal endophytes (*Alternaria* section *Undifilum*) of locoweeds (toxic legumes of *Astragalus* and *Oxytropis*) exist in a nonpathogenic symbiosis. These endophytes produce the toxin swainsonine, which causes a neurological syndrome (locosim) when the plant is ingested by grazing animals. We found that the fungal mycelia grows in the pith of the plant stem. The fungi caused no pathology to plant cell walls, xylem, or phloem. Mycelial growth of the fungi was significantly faster at 3 days age of culture and slowed considerably after 20 days. This shows the endophytes do not hurt their host plants.

Roundup resistant red root pigweed is becoming a troublesome weed in corn producing area and growers are having hard time controlling it in their fields. Several studies are being conducted at the Center to evaluate red root pigweed control and corn response to several herbicides other than glyphosate. Results showed excellent pigweed control using pre-plant followed by post-emergence herbicides applied early in the season. In addition, corn yield losses due to pigweed competition were reduced by 90 %. Corn growers in our area are using this information to increase their income and reduce pigweed infestation in their fields.



**NMSU led USDA funded 'Coordinated development of genetic tools for pecans' leads to genetic resources for future pecan development.** Researchers from NMSU, HudsonAlpha, USDA, Noble Foundation, University of Georgia, Texas A&M, University of Arizona, and University of Tokyo have made significant strides to unravel pecan tree genetics. We have completed sequencing the pecan genome and are assigning sequences to chromosomes! Genetic analysis of 800 pecan trees from native regions (spanning northern USA to southern Mexico) are highly related to their origin. This research will ultimately allow for the development of pecan trees with desired traits for specific environmental regions. Placental dysfunction is the underlying cause of pregnancy complications such as preeclampsia and intrauterine growth restriction. We developed the first ovine model to study CXCL12-dependent signaling at the placental microenvironment by delivering treatments directly into the uterus. Altering CXCL12 signaling by antagonizing its receptor CXCR4 at the fetal-maternal interface during placentation results in diminished vascularization, suppressed Akt/mTOR signaling, and induction of autophagy, all of which are vital for proper placentation. We propose the CXCL12-CXCR4 axis governs placental homeostasis by serving as a critical upstream mediator of vascularization and cell viability and, if this axis is compromised, impaired placental development transpires.

Long term data collected at the Chihuahuan Desert Research Center show that since the 1970s, forage production has decreased 38%, variability in annual precipitation has increased, summers have become hotter, and monsoon seasons are occurring later. Beef production in the desert SW will need to adapt to this evolving scenario if ranching is to remain viable. Feasibility of raising desert-adapted Criollo cattle is one alternative being researched. During 2018, a Pan-American network of long term grazing studies was launched. It includes sites in the USA, Mexico, Argentina, and Uruguay. At each site, researchers will study potential benefits of raising Criollo vs. improved beef cattle breeds. The network, led by NMSU, is expected to produce highly relevant climate adaptation science benefiting ranchers in New Mexico and beyond.

The Clayton Livestock Research Center has focused on health and performance of newly received beef cattle which costs the industry \$2 to 3 billion annually. Meta-analysis of data for the last 40 years will be conducted with Texas Tech University. A study was initiated with collaboration of the National Animal Disease Center to evaluate preconditioning programs on performance of cattle received on wheat pasture and analysis of nasal samples for *Mannheimia haemolytica* and *Pasturella multocida*. Data will help to identify management factors that had the greatest impact at reducing sickness of newly received beef cattle both in the feedlot and on irrigated wheat pasture.

In humans and livestock, local and circulating estrogen levels influence homeostatic and pathologic pathways including fertility, oocyte competence and the development of various endocrine cancers. Our lab studies signaling molecules regulating estrogen production, and we have found that a novel intra-ovarian signaling pathway converges with FSH to dysregulate estrogen production. Understanding how ovarian signaling pathways converge with other extracellular signals will allow greater perspective on cellular pathways affecting estrogen levels in health and disease.

Infertility and adverse pregnancy outcomes have been associated with infection. Infections resulting in accumulation of lipopolysaccharide derived from Gram-negative bacteria can result in ovarian dysfunction. These types of infections can subsequently cause infertility in women as a result of altered estrogen concentrations, follicular development and compromised oocyte quality. Elucidating the impact of bacterial infections on ovarian function can lead to understanding and management of reproduction and reduce the consequence of disease on female fertility.

Use of cover crop to maintain land cover has many direct and indirect benefits including reduction in soil erosion, improvement in soil quality, and enhanced soil water retention. Recent studies show that the annual social benefit of reducing soil erosion alone can be more than \$20/acre. Our analysis indicates that oats, peas, and a mix of six different crops are the best options. Even at a twenty percent adoption rate,

the total social benefit of incorporating cover crops in current field crop production system in New Mexico would contribute more than \$2 million/year.

The New Mexico Youth Ranch Management Camp has trained over 150 youth in sustainable ranch management practices. In 2017, five of the eight high school seniors went on to attend New Mexico State University in part because of their experience at the NMYRMC. Two students are currently excelling as research assistants for NMSU's Department of Animal and Range Sciences. Another student is now the site manager for the Tucumcari Bull Test. These young people are just a few examples of how this program helps influence their desire to remain in agriculture and contribute to this important industry. In July 2018, the NM-ALIRT program conducted a full scale exercise simulating a livestock emergency event occurring at the Albuquerque International Airport. Seventeen local, state and federal agencies participated in the exercise and received training on how to assist in a livestock emergency response. Since the exercise, New Mexico Livestock Board personnel who were involved in the exercise, had to respond to two different real life livestock emergencies. Both of these emergencies were resolved quickly, and in both instances, NMLB personnel employed tactics and procedures learned and developed through training and exercising with the NM-ALIRT program.

**2. Brief description of the target audience**

The target audience includes: ranchers, feedlot operators, dairy producers. small/medium/large-scale agricultural operations, business, associations, cooperatives, consulting firms and collectives that might or might not be defined as a farm under the USDA economic return criteria, but are land owners, managers, consultants, or students who wish to improve agricultural production and efficiency. Other audience participants include Extension agents, other agricultural specialists, pesticide applicators, Master Gardeners and garden clubs, youth (4H, Future Farmers of America and other groups) and the general public.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2018</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	22	117	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

<b>Year</b>	<b>Actual</b>
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of improved animal varieties
3	# of research publications
4	# of methods, technology, and animal varieties adopted by public and private sectors
5	# Extension publications

**Outcome #1**

**1. Outcome Measures**

# of trained professionals

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

- 301 Reproductive Performance of Animals
- 302 Nutrient Utilization in Animals
- 305 Animal Physiological Processes
- 306 Environmental Stress in Animals
- 307 Animal Management Systems

**Outcome #2**

**1. Outcome Measures**

# of improved animal varieties

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

# of research publications

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	117

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems

#### Outcome #4

##### 1. Outcome Measures

# of methods, technology, and animal varieties adopted by public and private sectors

Not Reporting on this Outcome Measure

#### Outcome #5

##### 1. Outcome Measures

# Extension publications

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
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### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Extension professionals rely on the information in Extension publications.

#### What has been done

Knowledge has been developed and disseminated.

#### Results

Extension professionals have recommendations and knowledge to disseminate.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
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
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

#### Brief Explanation

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

### V(I). Planned Program (Evaluation Studies)

#### Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained



and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

### **Key Items of Evaluation**

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 2**

**1. Name of the Planned Program**

Agricultural Markets, Trade, and Economic/Business 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
511	New and Improved Non-Food Products and Processes	1%		1%	
601	Economics of Agricultural Production and Farm Management	15%		15%	
602	Business Management, Finance, and Taxation	2%		2%	
603	Market Economics	14%		14%	
604	Marketing and Distribution Practices	30%		30%	
608	Community Resource Planning and Development	20%		20%	
610	Domestic Policy Analysis	16%		16%	
611	Foreign Policy and Programs	2%		2%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	0.2	0.0	0.6	0.0
<b>Actual Volunteer</b>	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
16215	0	52264	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
16215	0	52264	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**

State and local governments work to positively impact economic development within their domain. Programs often include strategies such as incentives to entice businesses, campaigns to encourage vacationers, and workforce development. While not explored on a state-wide basis in New Mexico, one economic development strategy used by some states is retiree attraction. 2018 research explored the potential fiscal impact that retirees could have in New Mexico. The analysis showed that one retiree household, in five years, would generate almost \$36,000 in new tax revenue for the state, suggesting a retiree attraction program could have a significant impact on the state's budgets. In today's market, consumers are the deciding factor for product success and failure. Recognizing the importance of understanding consumer behavior, multiple taste tests were completed to evaluate these new to market jujube cultivars. These experiments identified several cultivars as being preferred by consumers for fresh eating cultivars based on seven different taste preferences. These results will be used to further evaluate the new cultivars to assist New Mexico growers with cultivar selection. Water availability represents a challenge to maintaining or improving agriculture in the Southwest. As such, researchers at NMSU (and elsewhere) have been approved for funding on a research project aimed at improving and sustaining water-food systems in the region. The project will characterize key system dynamics and provide information/tools to stakeholders in the region. The system dynamics modeling will be informed by water, plant, economics, and community components to develop decision tools to help producers identify new crop management combinations that simultaneously are economically productive and maintain water supply longevity.

**2. Brief description of the target audience**

The target audiences include agricultural producers, business owners, and policy makers.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Year: 2018  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	5	2	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of research publications
2	# of Extension publications
3	Number of professionals trained

**Outcome #1**

**1. Outcome Measures**

# of research publications

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	2

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
610	Domestic Policy Analysis
611	Foreign Policy and Programs

**Outcome #2**

**1. Outcome Measures**

# of Extension publications

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	5

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Extension professionals rely on the information in Extension publications.

**What has been done**

Knowledge has been developed and disseminated.

**Results**

Extension professionals have recommendations and knowledge to disseminate.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development

**Outcome #3**

**1. Outcome Measures**

Number of professionals trained

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	3

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The discipline needs new professionals to replace retirees.

**What has been done**

New ag economics professionals have been trained.

**Results**

New economics professionals have entered the discipline.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
610	Domestic Policy Analysis
611	Foreign Policy and Programs



## **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**

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

### **Key Items of Evaluation**

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Sustainable Management of 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	10%		10%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
121	Management of Range Resources	20%		20%	
123	Management and Sustainability of Forest Resources	10%		10%	
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	10%		10%	
403	Waste Disposal, Recycling, and Reuse	10%		10%	
405	Drainage and Irrigation Systems and Facilities	10%		10%	
605	Natural Resource and Environmental Economics	15%		15%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	0.3	0.0	2.1	0.0
<b>Actual Volunteer</b>	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
24074	0	235186	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
24074	0	235186	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**

The U.S. Department of Defense has a commitment to conserve natural resources on military lands in ways that are compatible with its primary mission of training forces and testing new weapons. This objective requires information about species at risk that can inform conservation and management plans. The Oscura Mountains chipmunk is listed as threatened by the State of New Mexico and its entire range is contained within White Sands Missile Range. We used remote cameras in a robust study design to determine distribution and key habitat features required by this chipmunk. Our results are being used by WSMR in management plans that will conserve this species and facilitate military readiness.

In 2013, a report commissioned by the NM Dept. of Game and Fish calculated that hunters, anglers and trappers directly spent >\$613 million and that multiplier effects result in 7,900 jobs collectively contributing \$453 million to the State's economy resulting in \$106 million in state revenue. I have two projects germane to the hunters of New Mexico estimating the density and abundance of black bears and mountain lions in the state. This information will assist the New Mexico Department of Game and Fish in setting harvest levels for both species. A third project explores the impact that the energy sector can have on golden eagles throughout the continental U.S. Golden eagles are a protected species and we are amassing information on their movements, relatedness among populations, and on mortality factors which is being used to lessen impacts to golden eagle populations while at the same time trying to determine best management practices to ensure renewable energy development, in particular wind farms. Finally, our work out at White Sands National Monument will result in a citizen science app that visitors can use to enhance their experience at the monument. Over 500,000 visitors annually support ~400 jobs and infuse \$29 million into the local economy as a consequence of the monument.

Working throughout New Mexico to train natural resource students (graduate and undergraduate) to become future land managers. We have worked with approximately 170 students across two major USDA grants. In our first grant 46% of our New Mexico students (n = 68) had a permanent position through the federal pathways program before or shortly after graduation another 21% continued on to graduate school. Others took temporary positions or positions outside the federal pathways program.

Working collaboratively with partners at NMSU, Dona Ana Community College and California State University Northridge to establish the NSF Hispanic Serving Institutions (HSI) HUB to develop HSI research capacity, build national HSI collaborations for STEM research education and infuse HSI STEM research education initiatives with innovative, cutting-edge pedagogy.

Active seeding is a common practice in ecological restoration projects, of which the Bureau of Land Management alone spends nearly 55 million dollars annually. Through partnerships with the US Geological Survey and the Colorado Plateau Native Plant Program a peer-reviewed paper was accepted, and a report for land managers compiled, on how soil texture alters soil seed banks. These documents aid restoration practitioners in directing their seeding efforts to utilize what is present belowground as well as combat unwanted seeds. We are extending this collaboration to look at how fire and shrubs alter seed

banks.

Recent drought events have had significant impacts on New Mexico's water resources and natural vegetation cover, and economy. Evapotranspiration (ET) information is used in this study to provide an improved understanding of water availability and vegetation cover growth condition including pasture and rangeland and its impacts on food production and livestock industry. NMSU researchers in collaboration with others are studying seasonal variability and trends in long-term time-series ET information using remote sensing technology.

Rising temperatures and more frequent droughts are posing new challenges to range livestock producers in the southwestern United States and many other parts of the world. Our objective was to evaluate long-term perennial grass production (PGP) in the Chihuahuan Desert of New Mexico in relation to ambient temperature and precipitation. PGP was correlated with precipitation (mm) and ambient temperature (°C) over a 49-year period (1969 - 2017). They indicate global warming is an increasing process now well underway in the Chihuahua Desert as well as globally. Over the 49-year study period, Chihuahua Desert rangelands at our research site lost 38% of grazing capacity. Honey mesquite canopy cover increased from 4 to 9% during our study. This is well below the 15% threshold above which it suppresses forage production. Nine drought years occurred in the second half of our study compared to two in the first half. Our research supports predictions by climate scientists that more frequent droughts and lower precipitation will adversely impact grazing capacity of rangelands in the southwestern United States.

Sustainable Water Resources (SWR) is a stakeholder-guided and USDA-funded project to address economic development challenges associated with climate-stressed water supplies in the Rio Grande Project area. A significant accomplishment in 2018 was to implement a stakeholder participatory approach to water policy analysis. Tested and refined at several meetings in New Mexico, west Texas, and Northern Mexico, stakeholders are now able to identify and formulate solutions that can potentially achieve several goals. These goals include augmenting water supplies available to agriculture; optimize water allocations among competing demands; and improve water use efficiency and conservation, while reducing environmental impacts. Outcomes of those stakeholder meetings have resulted in the development of a project web portal <https://water.cybershare.utep.edu> to allow stakeholders to experiment with various water policy proposals and address effects of various drought and climate scenarios.

Enhancing water supplies in Southern New Mexico is vital to the economic security and development of the region. Dr. Hurd and his team of researchers are developing new approaches that model economic, social, and environmental impacts and consequences of possible desalination of underlying brackish groundwaters. Cost-effective and time-appropriate development of brackish aquifers will benefit the state and many of the world's arid and semi-arid regions that struggle with water security.

Studies indicate that hands-on activities and experiential learning are effective methods to engage school children and help spark their interest in environmental sciences. Field trips to freshwater systems in New Mexico provided opportunities for kids to have hands-on experience in sampling waters, collecting specimens, identifying them, and measuring water quality. Before the field trips over 75% of the children had never sampled aquatic organisms, but afterwards 100% could identify the basic groups and were able to articulate the importance of aquatic ecosystem health.

Businesses dependent on the 67 million acres of NM rangeland greatly influence socioeconomic health. Invasive plants reduce critical goods and services from this land including food, fiber, habitat, wildlife, recreation, tourism, and taxes. Dr. Young improves natural resource sustainability and socioeconomic health by educating residents. Dr. Young provided information to 900+ persons to help them better manage natural resources. He delivered 300 persons pesticide license, continuing education credits so that they have the tools necessary to control invasive plants. Eighty plus percent of audience members plan to improve their management because of knowledge gained during Dr. Young's presentations. The Forest Service spent over \$2 billion in 2018 suppressing wildfires - the most expensive year on record. These large and severe wildfires threatened lives, property, wildlife habitat, and watersheds. Today's forest managers are seeking solutions to these problems using silvicultural techniques, including prescribed fire. NMSU's forestry and fire research program is providing managers with a demonstration area with more than 10 years of data showing how thinning and burning treatments build forest resilience to insects, disease and wildfire. Evaluations indicated 84% of participants increased knowledge across five

subject areas, and 75% indicated they intended to change a current management practice.

**2. Brief description of the target audience**

Target audiences include:ranchers, farmers, urban landscapers, park departments, state and federal agencies, private homeowners, and recreational users of parks, forests, and waters.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018  
Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	9	48	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

<b>Year</b>	<b>Actual</b>
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of people adopting NMSU recommendations

**Outcome #1**

**1. Outcome Measures**

# of trained professionals

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics



**Outcome #2**

**1. Outcome Measures**

# of research publications

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	48

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

**Outcome #3**

**1. Outcome Measures**

# of Extension publications

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	9

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Extension professionals rely on the information in Extension publications.

**What has been done**

Knowledge has been developed and disseminated.

**Results**

Extension professionals have recommendations and knowledge to disseminate.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

## **Outcome #4**

### **1. Outcome Measures**

% of people adopting NMSU recommendations

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**

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

#### **Key Items of Evaluation**

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 4**

**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
501	New and Improved Food Processing Technologies	50%		50%	
502	New and Improved Food Products	5%		5%	
503	Quality Maintenance in Storing and Marketing Food Products	25%		25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		20%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	0.0	0.0	0.2	0.0
<b>Actual Volunteer</b>	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
4149	0	16597	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
4149	0	16597	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

The two day course "Artisan Commercial Processing: The Art of Dehydration Workshop demonstrated food preservation method of dehydration of fruit and vegetables for commercial operations. The objectives for the course were for participants to understand drying methods of fruits and vegetables in a commercial operation. In addition to demonstrate drying methods of fruits and vegetables using commercial methods, students discussed packaging and storage of dried fruits, vegetables for retail sale in New Mexico. New Mexico foods such as apples plums, green chile, summer squash, kale and mushrooms were dehydrated and evaluated for flavor, texture and methods used.

Innovative Media Research and Extension collaborated with the University of Delaware to create an online, card-based game to help increase knowledge in food safety, food production and consumer health for post-secondary food science classes. With IRB approval, pre-and-post surveys were administered to 513 students; 124 completed both surveys. As a result of playing the game, 83% indicated more awareness of food safety issues, 70% indicated they make an effort to learn more about food safety, and 46% showed further interested in the food science major. The game will further be utilized and tested at the University of Maryland Eastern Shore.

Ninja Kitchen, a food safety game for middle school was played 245,000 times in 2018 and accessed **2.3 million times since 2013**. Ninja Kitchen was a collaboration between food safety scientists at Rutgers (The State University of New Jersey) and NMSU's Innovative Media Research and Extension (USDA-NIFA 2007-51110-03813). Set in a lunch counter staffed entirely by ninjas, the game addresses youth food-handling responsibilities and helps youth develop good habits about cooking and storing foods at the proper temperature and avoiding cross-contamination. A study by Rutgers researchers in 2011 demonstrated that the game is effective in improving food safety knowledge, attitudes and intentions among middle schoolers. The game is distributed on NMSU's website and via the educational website GameUp (part of BrainPOP), used by many schools and districts as a source for educational games and multimedia.

**2. Brief description of the target audience**

Target audience is food processors in Arizona, Colorado New Mexico, Texas, and Utah.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018  
 Actual: {No Data Entered}

**Patents listed**

{No Data Entered}

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of food processors using NMSU for their food product development

**Outcome #1**

**1. Outcome Measures**

# of trained professionals

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	1

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The agricultural disciplines need to replace retiring professionals.

**What has been done**

New professionals have been trained.

**Results**

New professionals have been graduated.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins



**Outcome #2**

**1. Outcome Measures**

# of research publications

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #3**

**1. Outcome Measures**

# of Extension publications

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #4**

**1. Outcome Measures**

% of food processors using NMSU for their food product development

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Economy
- Public Policy changes
- Government Regulations

### **Brief Explanation**

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

### **Key Items of Evaluation**

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Health and Wellbeing

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	20%		20%	
703	Nutrition Education and Behavior	25%		25%	
704	Nutrition and Hunger in the Population	5%		5%	
724	Healthy Lifestyle	25%		25%	
801	Individual and Family Resource Management	10%		10%	
802	Human Development and Family Well-Being	10%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	0.4	0.0	0.1	0.0
<b>Actual Volunteer</b>	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
4909	0	26399	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4909	0	26399	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**

Producers in the country will have an alternative to have value-added products with nutritional and healthy properties. NMSU's Departments of Family and Consumer Sciences and Plant and Environmental Sciences are working on technical aspects to optimize the drying process of the fruit to preserve their antioxidant properties. The drying curves of jujubes are a first step into describing the drying process of the jujube fruit. This project will impact the growth and development of the jujube industry in the United States. Adverse Childhood Experience (ACEs) are traumatic experiences such as child maltreatment or family dysfunction. Higher ACE scores are linked to physical and mental health problems. New Mexico has very high rates of children with three or more ACEs. This research will determine if parenting education is effective in preventing ACEs, thereby reducing the likelihood of children's future school failure, substance abuse, depression, underemployment, and chronic disease. Preliminary information from the research was shared with 52 attendees of the Southern New Mexico Kids Count Conference which focused on ACEs.

**Horses help humans to understand relationships.** Being with and around horses makes us better in our own relationships. In my research and outreach, I use horse behavior and herd dynamics to help humans understand critical aspects of their own relationships. Horses respond in predictable ways to hierarchies, power dynamics, and communication signals. I place participants with horses in interactive, experiential activities to help humans develop understanding about power dynamics, communication, assertiveness, and leadership skills. Participants in this research report happier and more highly-functioning relationships

**Childhood obesity remains a critical public health issue given that it can lead to significant health issues such as diabetes and other cardiovascular issues.** In the research literature some studies examine diverse populations including Latino populations who have increased rates for obesity and other health issues. Yet, these studies concentrate on obtaining quantitative data from adults. New Mexico State researchers have chosen to examine this issue using qualitative interviews and have also chosen to examine the issue from children. The purpose of this is to better understand the perspectives of children while taking into account cultural aspects and design an appropriate intervention.

**Understanding the healthfulness of convenience foods purchased for at home consumption.** Research on diet quality has focused on time-saving foods eaten out, such as fast food, due to the rise in consumption of food eaten out relative to meals prepared at home. However, the majority of food consumed by Americans comes from the grocery store. This research examined the quality of convenience foods purchased at grocery stores by household income and convenience food type. It found that quality varied by type but not by income. This is the first step toward understanding where to focus policy efforts on improving convenience food offerings at the grocery store, which is a growing share of the American diet.

The number one cause of financial stress in New Mexico is debt. With the third-highest unemployment rate in the nation, residents of New Mexico might rely on credit, leading to increased levels of debt.

Between 96-98% of participants in NMSU's debt management and elimination program, "Feeling Free by Eliminating Debt Quickly!" reported an improvement in their knowledge, attitudes and skills regarding how to better manage and eliminate their debt. Taking control of debt, leads to feeling more in control of one's finances, paying less in interest, and keeping more money in one's pocket each month.

Diabetes and prediabetes cost an estimated \$2 billion in NM each year. Diet modifications help manage diabetes. The NM State University Cooperative Extension Service partnered with the NM Department of Health Diabetes Prevention and Control Program and 21 other organizations to provide 37 Kitchen Creations cooking schools. 612 adults participated in the cooking schools. All but one reported that they understood the strategies to plan and prepare healthy meals. This period of Kitchen Creations programming has a potential cost savings of over \$564,000 per year.

Building Healthy Military Communities (BHMC) is pilot project sponsored by the Department of Defense in seven states (Florida, Indiana, Maryland, Minnesota, Mississippi, New Mexico and Oklahoma). The goal of the project is to address challenges faced by geographically dispersed service members and their families by connecting military families to their local community resources. The New Mexico BHMC state coordinator and the Extension Family Life Specialist are working together to identify Extension programs throughout New Mexico that military families can participate in to increase health and wellness for the entire family.

Fruved is aimed to getting college students to increase their fruit and vegetable consumption and encourage healthy eating habits. Student athletes from campus came together and were given a presentation on cooking tips, fiber, and fruit & vegetable consumption. After the presentation, students were able to apply the cooking tips & skills learned on cooking various meals that were high in fiber and low in sodium and fat. Upon completion of the workshop, 68% of the students felt they learned to a great extent that they could cook more efficiently and 53% felt very motivated to cook their own meals.

Cooperative Extension subcontracted through the NM Department of Health Diabetes Prevention and Control Program's statewide efforts to increase participation in, access to, reach and effectiveness of evidence-based programs offered in English and Spanish. With \$45,000 in funding, workshops were offered in Socorro, Dona Ana, Grant, Otero and Sierra Counties reaching close about 110 individuals. Workshop participant: "Thank you for this wonderful class. I need more classes like this one. When I was diagnosed with diabetes, I asked my doctor what to do. His reply was 'look it up on the Internet.' Your class has helped me tremendously."

Financial literacy game Night of the Living Debt immerses players in a zombie world to navigate credit, debt, and choices about housing, education and transportation. Produced by NMSU's Learning Games Lab in the Department of Innovative Media Research and Extension, the game was designed for collaborative play in high school classrooms. In 2016, it won "Best Overall Digital Game" at the Meaningful Play Conference, Gold in the International Serious Play Awards, and was a finalist in the Serious Games Showcase & Challenge. It is available free at the iOS App Store for iPad and was played 7,000 times in 2018.

## **2. Brief description of the target audience**

The target audience includes: teenage mothers, low-income families, families suffering social stress, mal- or undernourished families, diabetics.

## **3. How was eXtension used?**

eXtension was not used in this program

## **V(E). Planned Program (Outputs)**

### **1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Year: 2018  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	0	11	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

<b>Year</b>	<b>Actual</b>
2018	0



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of research papers
2	# of Extension publications
3	# of trained professionals
4	% diabetics adopting NMSU recommendations regarding nutrition

**Outcome #1**

**1. Outcome Measures**

# of research papers

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	11

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #2**

**1. Outcome Measures**

# of Extension publications

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

# of trained professionals

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	16

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The agricultural disciplines need to replace retiring professionals.

**What has been done**

Graduate students have been trained.

**Results**

New professionals have been graduated.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

#### **Outcome #4**

##### **1. Outcome Measures**

% diabetics adopting NMSU recommendations regarding nutrition

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**

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

##### **Key Items of Evaluation**

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to

assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 6**

**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%		100%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	0.2	0.0	0.2	0.0
<b>Actual Volunteer</b>	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
22400	0	27420	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
22400	0	27420	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

Dr. Easterly and Kassandra Simpson, a master's student, worked to examine how teachers utilize curricular resources in their classroom. This study provides a baseline for future investigations that will help researchers understand how to design curriculum that teachers need to make a positive change in

student learning. Their investigation found that teachers use curricular resources differently depending on how the resource is designed and presented. They also found more efficacious teachers use resources that were expertly designed. As a result of their work, the researchers recommended that curriculum designers work to design products that promote teacher agency.

Improving science comprehension among New Mexico middle school students is a focus of Drs. Dormody and Skelton of NMSU. In 2019 they will test their new STEM-based climate science curriculum with 130 Eighth Grade students in Las Vegas, NM. The study will determine pre-test to post-test differences in science knowledge, skills, and reasoning abilities. Another post-test will determine retention of learning. The curriculum has lessons on the water cycle, greenhouse effect, analyzing precipitation data, analyzing temperature data, and mitigating and adapting to weather and climate extremes in agriculture and natural resources.

The Learning Games Lab serves as a user testing space as well as a game research space. Annually, Games Lab staff host youth to test games in development and also offer various workshops and activities on digital media. In 2018, the lab hosted nine sessions with 92 students. With IRB clearance, these "learning games consultants" provided important feedback for games and products in development. Two of the sessions were hosted by iThrive, a non-profit organization focused on building the socio-emotional skills of teens. In these sessions, youth designed and created a game pitch on a specific issue that concerns them. For example, one game was proposed to help teens learn how to counsel their friends who had suffered a loss, another was designed to help families of veterans with PTSD understand the special needs of their loved one. iThrive is working to document the curriculum created in the lab to use nationally in other settings.

According to the New Mexico Department of Health, 30% of youth are not at a healthy weight and 70% do not meet the guideline of an hour of physical activity each day. Grant funding allowed for the New Mexico 4-H program to train over 100 teen leaders to provide comprehensive healthy living programming to 6700 youth through educational experiences related to nutrition and physical fitness. 70% of youth completing surveys reported they learned about healthy food choices and 60% pay more attention to their water intake. 84% of teens report they are now able to teach others what they know.

## 2. Brief description of the target audience

Youth ages 5 to 19 are targeted to learn life, leadership and citizenship skills through: Project Work, Special Interest Groups, School Enrichment, Competitive Events, Fairs, Clinics, Workshops, Record Books, Camps, Community Service, Public Speaking, Elected/Appointed Offices, etc.

## 3. How was eXtension used?

eXtension was not used in this program

## V(E). Planned Program (Outputs)

### 1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3321	0	38586	0

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

Year: 2018  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	3	2	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program. Numbers of students involved in 4-H programs also will be outputs.

Year	Actual
2018	0



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of Research publications
2	# of Extension publications
3	# volunteers trained

**Outcome #1**

**1. Outcome Measures**

# of Research publications

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2018	2

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

# of Extension publications

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	3

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research results published in peer-reviewed journals matter to other professionals in the disciplines, by advancing the knowledge in the discipline.

**What has been done**

Knowledge has been generated and reported.

**Results**

Professionals have a deeper knowledge base from which to draw.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
806	Youth Development

**Outcome #3**

**1. Outcome Measures**

# volunteers trained

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
------	--------

2018

3321

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Volunteers are the life blood of 4H and other youth development programs at NMSU.

#### What has been done

All 4H volunteers are trained to properly instruct and lead youth development activities.

#### Results

We have great support in our local communities for youth development programs, as a result of the training and interactions with NMSU Extension professionals.

### 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
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

#### Brief Explanation

Budget cuts have affected the number of faculty and staff available to generate and disseminate knowledge.

### V(I). Planned Program (Evaluation Studies)

#### Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

#### Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty. Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

**V(A). Planned Program (Summary)**

**Program # 7**

**1. Name of the Planned Program**

Climate Change

- Reporting on this Program  
Reason for not reporting

Climate change research and extension is located under Goals 1 and 3.

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual Volunteer</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

See the section on the Sustainable Management of Natural Resources Planned Program.

**2. Brief description of the target audience**

Undergraduate and graduate students are the target audience.

**3. How was eXtension used?**

{No Data Entered}

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018

Actual: {No Data Entered}

**Patents listed**

{No Data Entered}

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Conduct classes on climate change.

Year	Actual
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of students trained.



**Outcome #1**

**1. Outcome Measures**

Number of students trained.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
{No Data}	null

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Economy
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)**

**Program # 8**

**1. Name of the Planned Program**

Sustainable Energy

- Reporting on this Program
  - Reason for not reporting
  - Energy research is located under Goal 1.

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual Volunteer</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

See the section on the Sustainable Management of Natural Resources Planned Program.

**2. Brief description of the target audience**

Students and producers are the target audiences.

**3. How was eXtension used?**

{No Data Entered}

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018

Actual: {No Data Entered}

**Patents listed**

{No Data Entered}

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of students trained.

Year	Actual
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# students trained.

**Outcome #1**

**1. Outcome Measures**

# students trained.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
{No Data}	null

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Economy
- Government Regulations
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)**

**Program # 9**

**1. Name of the Planned Program**

Childhood Obesity

Reporting on this Program

Reason for not reporting

Child obesity is combined with general obesity activities under Goal 5.

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2018	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual Volunteer</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

See the section on the Health and Wellbeing Planned Program.

**2. Brief description of the target audience**



Children, youth, and families are the target audiences.

**3. How was eXtension used?**

{No Data Entered}

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2018

Actual: {No Data Entered}

**Patents listed**

{No Data Entered}

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2018	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Conduct workshops and classes on healthy food choices.

Year	Actual
2018	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	# of youth adopting healthy food choices

**Outcome #1**

**1. Outcome Measures**

# of youth adopting healthy food choices

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2018	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
{No Data}	null

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Economy

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**VI. National Outcomes and Indicators**

**1. NIFA Selected Outcomes and Indicators**

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