

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

**Program # 6**

**1. Name of the Planned Program**

ANIMAL SYSTEMS

Reporting on this Program

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	30%		15%	
302	Nutrient Utilization in Animals	20%		15%	
305	Animal Physiological Processes	15%		20%	
306	Environmental Stress in Animals	15%		30%	
311	Animal Diseases	20%		20%	
	<b>Total</b>	100%		100%	

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

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

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual Paid</b>	0.6	0.0	3.5	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
57556	0	455461	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
57556	0	455461	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**

#### **Animal Foraging Behavior and Distribution**

##### **Issue**

Animal foraging and distribution problems are a major source of controversy on public and private rangelands throughout the western United States. Arizona is no exception as some individuals and groups call for the removal of livestock from public rangelands. As wild and domestic grazing animals forage across landscapes, they influence biotic and abiotic components of rangelands through the plant species they utilize and the habitats they occupy. Improper grazing distribution can degrade economic and ecological values of watersheds across various hierarchical scales. Control of animal foraging and distribution patterns, whether from wild or domesticated ungulates, is pivotal to successful rangeland management.

##### **What has been done**

Extension workshops, professional papers and abstracts, and peer-reviewed extension and journal articles have been designed and developed to meet the evolving needs of Arizona's citizenry and their awareness of these issues. Research results related to using visual, auditory and olfactory cues to manage foraging behavior and spatial distribution of rangeland livestock have been integrated into teaching, extension and service activities whenever possible. Programming is offered in both oral and written forms and attempts to reach both traditional (rural) and non-traditional (urban) audiences. Audiences of programming efforts are often very diverse and include ranchers, environmentalists, range and wildlife managers, scientists, students, and the general public.

#### **Smartphone Biosensors for Food Safety, Animal Diseases and Human Health**

##### **Issue**

Infectious pathogens from food, animals and humans are widespread and growing public health problems, both in developed and developing countries. Detecting such pathogens usually involves collecting a food/water sample or a blood/urine specimen, sending it to a laboratory and waiting for the samples to be filtered, incubated/amplified, tested and identified under a microscope or gel-doc device. If a critical infection is suspected, say for highly dangerous Ebola, E. coli O157:H7, avian flu or malaria, the pathogen may already have multiplied and spread before the report arrives days later.

##### **What has been done?**

1. Previously, a series of "lab- on-a-chip" (LOC) devices was developed at the Biosensors Laboratory in the College of Agriculture and Life Sciences at the University of Arizona. The silicon-based LOC has been replaced with paper platform, called paper microfluidics, and subsequent optical detection has been made with the use of a smartphone, utilizing its white LED flash as a light source, its digital camera as a light detector, and a software application for data processing. In 2014, this smartphone-based paper microfluidics technology was applied to detect the bacterial pathogens from myriads of field water samples as well as human urine specimens, with the lower limit of detection of 10 cells per mL sample.
2. A new method of conducting polymerase chain reaction (PCR) in much faster assay time has been invented by the Biosensors Laboratory, utilizing automated manipulations of microliter droplets in a portable platform. Further modifications were made in 2014 using the interfacial tension effect to monitor the progress of PCR amplification, called DOTS qPCR (droplet on thermocouple silhouette real-time PCR). While almost all real-time PCR uses fluorescence, DOTS qPCR is the first-ever demonstration of utilizing interfacial tension. With this innovative technology, positive signals were obtained in less than 5 cycles, compared to 15-25 cycles in conventional real-time PCR, significantly reducing the sample-to-answer assay time to less than 5 minutes, as well as simplifying the device layout and design.

#### **Impacts reported in Report Overview**

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

Commodity groups, state agencies, pest management advisors, pesticide applicators, youth, ag ventures program. Plans are underway to attempt to include non-traditional audiences.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	500	3000	94	1500

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

Year: 2014  
 Actual: 1

**Patents listed**  
 Targeted Biocides

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

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	3	62	65

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

**Output Target**

**Output #1**

**Output Measure**

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

**Year                      Actual**

2014 24

**Output #2**

**Output Measure**

- Number of individuals gaining knowledge by participating in educational programs, such as range livestock nutrition workshops.

<b>Year</b>	<b>Actual</b>
2014	594

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

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

O. No.	OUTCOME NAME
1	Number of farmers adopting more sustainable and profitable large scale dairy production practices.
2	Adoption of more profitable breeds of cattle for arid land conditions.

**Outcome #1**

**1. Outcome Measures**

Number of farmers adopting more sustainable and profitable large scale dairy production practices.

**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>
2014	180

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

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

## **Outcome #2**

### **1. Outcome Measures**

Adoption of more profitable breeds of cattle for arid land conditions.

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

#### **Brief Explanation**

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

#### **Evaluation Results**

All programs are currently in the process of being evaluated externally for existing areas to preserve, protect, or enhance, as well as areas to discontinue or modify. We will continue to seek further input from stakeholders, advisory committees, and focus groups utilizing needs assessments with the assistance and expertise of an Evaluation Specialist [hire pending]. See State Defined Outcomes.

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