

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

**Program # 1**

**1. Name of the Planned Program**

Global Food Security and Hunger - Agricultural Production in a Semi-Arid Environment

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			51%	
301	Reproductive Performance of Animals			16%	
303	Genetic Improvement of Animals			7%	
307	Animal Management Systems			7%	
308	Improved Animal Products (Before Harvest)			5%	
311	Animal Diseases			7%	
601	Economics of Agricultural Production and Farm Management			7%	
	<b>Total</b>			100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	2.9	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
0	0	302319	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	274440	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

NAES scientists are developing region specific wine grapes that with stand early freeze, drought tolerance and high salinity through the uses of genetic modification and selective breeding programs. Merino sheep are being genetically crossbred with US breeds to develop high yielding, extra fine wool while maintaining quality of meat produced in lambs. The University is also working on a range bull culling program that uses DNA fingerprinting to identify sub optimal animals. Finally, outreach efforts are being conducted to provide cattle producers the opportunity to improve management of risk in a variety of areas, including: elimination of drug tissue residues, suitable cull animals selection, manage risk in animal disease through a sound biosecurity program, and improving carcass quality through low stress handling techniques.

### 2. Brief description of the target audience

Our wine research is directed towards those who want to create a boutique wine industry in Northern Nevada as well as the scientific community associated with grape genomics. Both livestock projects are targeted for ranchers located in the Great Basin and surrounding Sierra Nevada Mountains.

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

### 1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	8525	191600	1965	2100

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

#### Patent Applications Submitted

Year: 2010

Plan:

Actual: 1

#### Patents listed

Experimental vaccine for Epizootic Bovine Abortion (Foothill Abortion)

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

#### Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	17	17

## V(F). State Defined Outputs

## Output Target

### Output #1

#### Output Measure

- Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.

Year	Target	Actual
2010	{No Data Entered}	45

### Output #2

#### Output Measure

- Demonstrations and field days conducted

Year	Target	Actual
2010	{No Data Entered}	16

### Output #3

#### Output Measure

- Leveraged Research Projects

Year	Target	Actual
2010	{No Data Entered}	25

### Output #4

#### Output Measure

- Websites created or updated

Year	Target	Actual
2010	{No Data Entered}	8

### Output #5

#### Output Measure

- Digital media created or updated

Year	Target	Actual
2010	{No Data Entered}	3

### Output #6

#### Output Measure

- Manuals and other printed instructional materials produced

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	1

**Output #7**

**Output Measure**

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	92

**Output #8**

**Output Measure**

- Number of graduate students or post-doctorates trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	30

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

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

O. No.	OUTCOME NAME
1	An Alternative Wool Harvesting System For the US Sheep Industry
2	Effects of Alternate Agriculture in Nevada

## **Outcome #1**

### **1. Outcome Measures**

An Alternative Wool Harvesting System For the US Sheep Industry

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	1

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

#### **Issue (Who cares and Why)**

Wool is a dominant product of sheep enterprises in Nevada and other western states. Most of 7 million sheep inventory in the US, are Merino derived wool producing flocks, and are required to be shorn mechanically, which costs \$4-5 per ewe and \$8-15 per ram constituting a substantial expense to wool growers. Shearing is a labor intensive process, and accident and injury prone occupation that requires personal skill and experience that are always in high demand, due to the short and seasonal work. Therefore, a biological wool harvesting procedure may offer a more humane, less stressful, less contaminating, and more environmentally friendly wool harvesting solution.

There are several biological fleece harvesting reagents and procedures in wool sheep and cashmere goats. However, none of these have been approved for use in the United States. The objective of this investigation was to evaluate the efficacy of a biological wool harvesting system BioClip® as an alternative to mechanical shearing of the wool sheep flocks in the US.

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

Following recommendation provided by reagent manufacturer, a research team from the University of Nevada, Reno, selected a small flock of one year old ewes from the University's main merino flock located in central Nevada. Animals were given one injection of BioClip® and fitted with fleece retention netting. For the next four weeks animals were feed normal diets while being kept in holding pens to facilitate monitoring of overall health. Afterwards, fleece was removed using retention netting. Animals were then compared to control groups to evaluated wool re-growth nine weeks after injection.

#### **Results**

Bioclip reagent was developed for biological wool harvesting in Merino breed in Australia. The early trials of BioClip® wool harvesting system (WHS) in Australia have shown improved fleece

quality, animal welfare, labor and textile processing efficiency.

University of Nevada, Reno's team of scientists have found that BioClip® is effective to induce a simultaneous and complete fleece shedding in Merino along with sheep derived from US merino sheep. These findings are now being used as support evidence in the approval process to allow BioClip® usage in the US. If the BioClip® reagent can be licensed and made available in US, the system may serve as an alternative wool harvesting protocol to the traditional shearing for wool sheep enterprise.

#### 4. Associated Knowledge Areas

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

#### Outcome #2

##### 1. Outcome Measures

Effects of Alternate Agriculture in Nevada

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

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

###### **Issue (Who cares and Why)**

Alfalfa has played a crucial role in the development of western agriculture and was once the most widely produced forage in the Great Basin. It is a perennial forage crop typically produced in regions characterized by hot dry summers and cold winters, and in arid regions such as northwestern Nevada, optimum production can only be achieved through irrigation.

Over 50 years of research effort has been devoted towards delineating alfalfa production water requirements in northern Nevada. However, the impending impact of water reallocation has stimulated renewed interest among the agricultural sector, not only in terms of alfalfa production but also with respect to alternative agriculture (e.g., biofuel crops and teff) and the restoration of abandoned agricultural lands. Of equal concern is the response of existing ecosystems to future changes in water availability, allocation, and management.

About 50,000 acres in Lyon County, Nevada are currently devoted to irrigated alfalfa production. Conversion to alternative agriculture could have a significant effect on water resources, the local economies, and ecosystem stability. The overall objective of this study was to determine likely responses by soils and vegetation to changes in water application and consumptive use, water table depth, and soil salinity in common landscapes found in Lyon County's Walker River Basin.

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

Scientists from the University of Nevada, Reno have spent the last four years taking measurements of important soil characteristics and parameters, such as soil moisture depletion and evapotranspiration, susceptibility to wind erosion, salinization, nutrient fluxes, temperature, and organic matter content, as they relate to water treatment and vegetative cover.

Some of the findings include: that by decreasing irrigation to previously irrigated areas a new invasive species (tall whitetop aka pepper weed) could likely take over. A similar issue was found with tamarisk (aka salt cedar).

Salt accumulation due to prolonged irrigation of a given site was able to be washed almost completely clean of nitrates with heavy flushing of irrigated fields.

Following irrigation, the soil temperatures were much cooler, in spite of the fact that temperatures were taken in the middle of the day. Moisture was the most commonly important factor affecting the Carbon and Nitrogen fluxes for both laboratory and field studies. And, overall, the 25% water treatments were far more effective at reducing dust generation and increasing dust deposition than the 0% water treatments and, in some instances more so than even the controls.

#### **Results**

Long-term experiments sometimes yield unexpected results - and this is certainly the case for one component of the Alternative Agriculture and Vegetation Management project. "After two years the teff looked great, but now, in the third year, weeds are destroying our teff crop - and they are the same genus as the teff so we can't use a weed killer" explained Jay Davison (University of Nevada, Reno Cooperative Extension Office).

A group of about 20 Walker Basin ranchers and residents attended the Basin Project Alternative Agricultural Field Day and BBQ. Davison guided participants down the rows of alternative crops, pointing out the advantages and potential disadvantages of each and discussing yields and irrigation regimes. The group also learned about plant behavior in response to changes in temperature, precipitation/irrigation and humidity, with demonstrations of the measuring and monitoring equipment being used on site.

The group then visited plots where cool and warm season biomass production for nine species was being compared, and where weeds were again identified as the major production challenge. The third component of the Alternative Agriculture and Vegetation Management project is a revegetation study, where seeding has resulted in very healthy four wing saltbush shrubs - which show good potential for reducing dust and loss of fine soil particles.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
601	Economics of Agricultural Production and Farm Management

## **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
- Other (Faculty seeking job security elsewhere, department closures)

### **Brief Explanation**

Current State budget shortfalls have narrowed the breadth of research programs in NAES. Fewer research projects will be supported and recruiting graduate students will be difficult. In addition, due to the Governor's hiring freeze, State budget shortfalls, and two department closures within the College of Agriculture, Biotechnology and Natural Resources, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

The closure of the departments of Animal Biotechnology and Resource Economics will most certainly affect how we determine the most important direction of the College/NAES to remain competitive with current research issues.

In addition, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

## **V(I). Planned Program (Evaluation Studies and Data Collection)**

### **1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)

### **Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or

graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. Where appropriate future funding will continue where the results justify continued funding.

### **Key Items of Evaluation**

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.