

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

**Program # 3**

**1. Name of the Planned Program**

Animals and Their 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	16%		13%	
302	Nutrient Utilization in Animals	7%		25%	
303	Genetic Improvement of Animals	0%		5%	
304	Animal Genome	4%		5%	
305	Animal Physiological Processes	0%		5%	
306	Environmental Stress in Animals	4%		1%	
307	Animal Management Systems	45%		11%	
308	Improved Animal Products (Before Harvest)	6%		3%	
311	Animal Diseases	4%		27%	
313	Internal Parasites in Animals	0%		3%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	2%		0%	
315	Animal Welfare/Well-Being and Protection	12%		2%	
	<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>	11.0	0.0	30.7	0.0
<b>Actual Paid</b>	11.3	0.0	27.5	0.0
<b>Actual Volunteer</b>	0.5	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
444150	0	810073	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
444150	0	834456	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

- Quantify Nutrient Supply for Lactating Cows
- Develop Vaccine Technologies
- Research Methodologies to Increase Reproductive Performance in Animals
- Conduct Research that Leads to Muscle Growth Augmentation
- Determine the Effects of Co-product Based Lamb Finishing Diets
- Conduct Sheep Production Workshops
- Coordinate Value-Based Marketing System for Cow-calf Operations
- Develop Beef Production Workshops
- Conduct Ranch Visits
- Conduct Farm Tours

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

- Veterinarians
- Dairy Producers
- Producers of Ethanol Co-products
- Cattle Producers
- Swine Producers
- Muscle Biologists
- Livestock Nutritionists
- Sheep Industry
- Cow-calf Producers

#### 3. How was eXtension used?

SDSU Extension provided the project manager and Ask the Expert manager for DAIRYeXNET.

### 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>	6314	2268764	1635	3698

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

**Patent Applications Submitted**

Year: 2014  
 Actual: 4

**Patents listed**

1. PRRSV Vaccine Candidate
2. PRRSV Vaccine Candidate
3. Novel Arterivirus Protein and Expression Mechanisms
4. Multiepitope Fusion Antigens and Vaccines and Their use in Treatment of Enterotoxigenic Diarrhea

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

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	10	35	45

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

**Output Target**

**Output #1**

**Output Measure**

- Percentage of all Hatch Research Projects in Animals and Their Systems

Year	Actual
2014	24

**Output #2**

**Output Measure**

- Launch sheepSD as a Learning Opportunity for Sheep Producers  
 Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- Demonstrate Value-Based Marketing to Cow-calf Producers

<b>Year</b>	<b>Actual</b>
2014	0

**Output #4**

**Output Measure**

- Provide Management Tools to Beginning Cattle Ranchers  
Not reporting on this Output for this Annual Report

**Output #5**

**Output Measure**

- Number of Learning Activities for Sheep Producers or Consumers

<b>Year</b>	<b>Actual</b>
2014	17

**Output #6**

**Output Measure**

- Create Learning Opportunities in the Beef Industry

<b>Year</b>	<b>Actual</b>
2014	13

**Output #7**

**Output Measure**

- Published and Disseminated Results of Nutritional Studies in Sheep Diets

<b>Year</b>	<b>Actual</b>
2014	0

**Output #8**

**Output Measure**

- Number of Publications Posted on iGrow Website

<b>Year</b>	<b>Actual</b>
2014	10

**Output #9**

**Output Measure**

- Number of Articles Posted on iGrow Website

<b>Year</b>	<b>Actual</b>
2014	234

**Output #10**

**Output Measure**

- Number of Podcasts Posted on iGrow Website

<b>Year</b>	<b>Actual</b>
2014	11

**Output #11**

**Output Measure**

- Number of Radio Programs Posted on iGrow Website

<b>Year</b>	<b>Actual</b>
2014	118

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

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

O. No.	OUTCOME NAME
1	Number of Animals and Their Systems Hatch Research Projects
2	Number of Sheep Operations Participating in sheepSD
3	Number of Cow-calf Operations Participating in the Calf Value Discovery Program
4	Number of beefSD Participants
5	Number of Individuals Participating in Sheep Production Learning Activities
6	Number of Individuals Participating in Beef Production Learning Activities
7	Enabled Further Research to Explore Diet Formulation Strategies for Feeding Ruminant Livestock

**Outcome #1**

**1. Outcome Measures**

Number of Animals and Their Systems Hatch Research Projects

**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	31

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

**Issue (Who cares and Why)**

Production costs are the determining factor in livestock producer profitability. High feed costs, poor reproductive performance, and disease are primary concerns for producers and scientists.

**What has been done**

Within the College of Agricultural and Biological Sciences, there are 27 Hatch projects that are categorized in the Planned Program of Animals and Their Systems. The research activities in this program are primarily supported by our Department of Animal Science, Department of Dairy Science and our Veterinary and Biomedical Sciences. Projects include but are not limited to research studies in co-product feeds for sheep, genetic architecture of traits in beef cattle, milk production management for dairy cattle, vaccines for viral diseases, and reproductive efficiency in cattle.

**Results**

Through research, we continue to build a scientific knowledge base to improve and understand production efficiency and product enhancement, and to prevent and detect animal and human diseases. Examples include:

Lamb finishing diets of soy hulls, DDG and treated corn stover, methods of controlling estrus and ovulation in cattle, heifer growth performance on reduced fat distillers dried grains, swine and bovine influenza viruses, and feeding strategies to optimize piglet quality and sow longevity. In

addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

#### **Outcome #2**

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

Number of Sheep Operations Participating in sheepSD

Not Reporting on this Outcome Measure

#### **Outcome #3**

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

Number of Cow-calf Operations Participating in the Calf Value Discovery Program

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

- 1862 Extension

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

Change in Action Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2014	11

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

The success of a cow-calf operation can come down to the marketing strategy employed by the producer. Retained ownership is a program that allows producers the opportunity to start with as few as five of their own calves and pool them with other calves to see how they perform in a feedlot. Retained ownership can provide the greatest opportunity to realize the true value of cattle, but it can also have increased economic risks.

#### What has been done

SDSU Extension coordinated the Calf Value Discovery Program, a retained ownership program in which 11 cow-calf operations participated with 164 calves. The calves were vaccinated, dewormed, individually identified, and weighed. They were consigned to a local feed yard where they were fed in a single pen, visually evaluated and sold in semi-load lots.

#### Results

The Calf Value Discover program provides feedback to producers on feeding performance and carcass characteristics of calves. The data provides a benchmark for comparison with cattle from other operations and it also provides useful guidelines for making selection and marketing decisions in the future. Several producers are using the data to influence their breeding program and some producers are using the data to market their calves for a higher price.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

### Outcome #4

#### 1. Outcome Measures

Number of beefSD Participants

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

Number of Individuals Participating in Sheep Production Learning Activities

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	169

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

**Issue (Who cares and Why)**

Sheep and lamb inventory in the United States has been declining over the last few decades. Producers nationwide need to grow their flocks to meet the demands of wool and high quality lamb meat and at the same time keep their operations sustainable. Many beginning operators have limited knowledge and resources for productive sheep enterprise operations, land use management, and business planning. The survival of rural communities is critically tied to productive and profitable agriculture.

**What has been done**

With its partners, SDSU Extension continues to support the sheep industry with producer education and mentorship programs. SDSU Extension's signature program sheepSD helps potential and beginning sheep ranchers enter and expand the sheep industry. The beginning ranchers learn the skills needed for producer efficiency, profitability and sustainability. SDSU Extension hosted the 2014 South Dakota Sheep Growers Association Annual Convention. Extension and research personnel in the four-state region of SD, ND, WY and MT contribute to the success of the sheepSD participants.

**Results**

Fourteen operations, the same as last year, participate in the sheepSD program, but the membership of Growing South Dakota Sheep Producers has grown to 57 people. This group has close ties to sheepSD but is not able to commit as much time to the program. They are comprised of sheep producers, loan officers, sheep shearers and order buyers; participating frequently and contributing to the learning opportunities. Attendance to the South Dakota Sheep Growers Associations Convention has grown from 54 attendees in 2012 to 157 in 2014. Participants at the convention gained knowledge in lamb carcass fabrication, sheep management practices, improving the wool clip, lamb cookery, and the devastating disease, ovine progressive

pneumonia.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

#### Outcome #6

##### 1. Outcome Measures

Number of Individuals Participating in Beef Production Learning Activities

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	16

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

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

There are many opportunities in the beef industry, but there are also many risks involved. As the average age of agriculture producers in South Dakota continues to rise, the industry must recruit more young people. And to be competitive, beginning beef producers need relevant and timely information in the areas of livestock production, natural resource stewardship, marketing, financial management, business, and risk and legal management.

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

Since 2010, when SDSU Extension launched its signature program, beefSD, 59 beginning producers from 29 operations have been enrolled. Sixteen of those producers participated in this reporting period. The participants attended workshops, travel study trips, case studies, web-based interaction, and Facebook forums. The beefSD program also participated in the South Dakota Grazing School and the Calf Value Discovery Program.

###### **Results**

Beef producers have been provided a wide variety of tools to help them make wise management decisions. During a five day travel-study across the Midwest to Chicago, participants gained valuable knowledge in evaluating alternative production systems, market risk management, meat markets, and support enterprises. Webinars and classroom activities provided financial and strategic planning curriculums and case study workshops focused on seedstock and grass fed production. Mentoring relationships, a key component of beefSD, have been established and are leading to the development of management teams.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

#### Outcome #7

##### 1. Outcome Measures

Enabled Further Research to Explore Diet Formulation Strategies for Feeding Ruminant Livestock

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	0

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

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

The rapidly expanding biofuels industry has increased the availability of co-product feeds for sheep. Co-product feeds such as soybean hulls, dried distillers grains, and glycerol are often more favorably priced than traditional feeds, but further evaluation is needed to determine the impact on performance, profitability, and efficiency of co-product based diets.

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

Lamb finishing diets were formulated exclusively with co-products to supply dietary energy and protein. Co-product ingredients were soy hulls, DDG and treated corn stover. Corn stover inclusion was 0, 10, 20 or 40%. Results from this study demonstrated that up to 20% corn stover in a pelletized lamb finishing diet resulted in similar growth performance to animals fed 0% corn stover. However, lamb response to diets formulated with 40% corn stover tended to decrease

intake by 9% and resulted in a lower average daily gain.

### **Results**

Summary results from this research project have been disseminated to producers, feed manufacturers, private consultants, industry representatives, veterinarians, extension personnel and scientists. With the completion of this project, two graduate students have gained valuable experience toward the fulfillment of their Animal Science masters degrees. During their training they published and presented abstracts, proceedings reports, and reviewed publications were accepted or expect to be accepted for publication. The knowledge gained from this project could significantly impact the profitability and sustainability of the sheep industry in the United States.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
307	Animal Management Systems

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

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

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

### **Brief Explanation**

Western South Dakota experienced one its worst blizzards on record, killing an estimated 50,000 or more livestock. Valuable man-hours and resources had to be redirected for both livestock and non-livestock issues.

Salary and benefit increases have eroded the impact of federal funds, deferring vacancy fills in both SDSU Research and SDSU Extension.

Many of the research facilities at SDSU have exceeded their useful life and no longer accommodate the needs of the scientists in the Agricultural Experiment Station. Deferred maintenance and repair of facilities remain a serious limit to research, faculty recruiting and retention.

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

### **Evaluation Results**

#### **Calf Value Discovery Program**

On average, feeding costs were \$528.39 per animal. This equates to a total cost of gain of \$77.67/100 lb. When carcasses were sold on a grid marketing basis, price ranged from \$1,171.22 to 2,414.23 but had carcasses been sold on a dressed basis this range would have been narrower (\$1,302.57 to \$2,364.96). When including the value of the feeder calf, there was a \$850.97 dollar per animal range in return from a loss of \$268.49 to a profit of \$582.48. However, on average total profit was \$263.85 per animal.

**Key Items of Evaluation**