

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

**Program # 1**

**1. Name of the Planned Program**

Sustainable Animal Production 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	20%	20%	15%	10%
302	Nutrient Utilization in Animals	20%	20%	30%	10%
303	Genetic Improvement of Animals	15%	10%	10%	10%
307	Animal Management Systems	20%	25%	20%	30%
308	Improved Animal Products (Before Harvest)	15%	10%	15%	10%
315	Animal Welfare/Well-Being and Protection	10%	15%	10%	30%
	<b>Total</b>	100%	100%	100%	100%

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	7.0	4.4	0.0
Actual Paid Professional	11.0	12.0	3.5	1.5
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
504218	494957	176242	262712
1862 Matching	1890 Matching	1862 Matching	1890 Matching
504218	247478	942947	131356
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**

Activities included research on animal health and animal productivity in beef and dairy cattle through integrated resource management. The importance of grazing techniques and the introduction and testing of new forages was an expanding element of animal research initiatives, focused on the production of forage-fed beef.

Researchers identified the key gene involved in lipogenesis in ruminants and then developed strategies to alter lipogenesis and reduce excess fat deposition. Study results show that specific fatty acids regulate fat deposition and that dietary supplements containing these specific fatty acids could target excess fat accumulation in meat-producing animals as well as humans.

Research into the veterinary importance of blood-sucking arthropods was initiated because of the threat of economic losses and disease epidemics in domestic animals. More than 6,600 blood-feeding flies of 54 species in 4 families, predominantly mosquitoes, were collected at three different heights in the state. This suggests that different fly species forage for hosts at different heights.

Animal Production Systems programs were conducted. The Clemson Bull test was conducted. The Clemson test received funding for a new Grow Safe feed monitoring system which allows the measurement of feed efficiency in the testing program. The Clemson test will remain a conventional grain/byproduct based feedlot test in coming years.

Master Cattleman educational series continues. In this fee-based program multiple topics are covered over a five week period for area producers. Beef Quality Assurance certification is offered as an optional program at this Master Cattleman series. The Grass Masters program is a multi-night fee-based seminar series covering the basics of forage selection, establishment, and management. Small ruminant workshops were conducted, including Goat and Sheep Seminars. Extension specialists continue to work with producers in developing cost management strategies for rations, budgets and other input costs. Multiple on farm demonstrations are in place to demonstrate controlled grazing, improved forage varieties, novel legumes etc. Livestock agents and specials also assist with youth programs by teaching livestock management and managing youth livestock activities when needed.

Confined Animal Manure Management trainings/recertifications were conducted across the state. Some 1,231 producers attended the re-certification trainings, each obtaining 2 hours of credit for this year. 100% Presentations on SC Ag Watch, including AgroTerrorism, Biosecurity, Foreign Animal Disease, Food & Business Continuity, were conducted. Specialists taught National Guardsmen for Ag Development Training in Afghanistan. Specialists conducted programs to explain upcoming changes on laws for farm vehicles and to educate producers regarding the national weather service weather program. Agents conducted an emergency pet sheltering drill.

Specialists developed a demonstration project on using natural, closed cell foam insulation for improving the energy efficiency of animal production facilities and provided onsite assistance on ventilation and cooling of an animal production facility. Beekeepers Association meetings were conducted on the topic of bee genetics and morphology research.

The 1890 Extension Small Farm Program livestock production project was designed for socially disadvantaged small, limited resource producers owning and/or raising Beef Cattle and Meat Goats. The focus was on farm/enterprise management, production and marketing as well as providing training sessions, workshops and demonstrations to deliver research based information. Educational activities

included improving herd health practices, animal nutrition, select breeding practices, reproductive efficiency, pasture production and management.

Research is being conducted to study the use of a multi-agent framework to design and implement a computer-based epidemiological simulation model that combines the traditional herd based epidemiological methods with the role of transportation and the interferences of individual objects for herds. An agent will be able to represent any object and its behavior. The object can be an animal, a group of animals (herd), a worker or a transportation unit. The behavior of an agent is decided by the role. For example, the main role of a herd agent is to estimate the spreading of the disease based on its stochastic model in case of infection. Consequently, the behavior of the herd will be changed based on the estimation. To date, the researcher has (1) gained knowledge for the most recent simulation methods and theories, (2) researched the implementation of agent framework on multi-process environment (CUDA architecture with Tesla), researched implementation of simulation tools in CUDA architecture and (4) surveyed stochastic modeling methods and theories. The outcome is reported as a simple test version for implementation (in C/C++ language) of multi-agent framework in CUDA architecture. A more complicated version will be implemented in the next reporting period.

1890 Research was conducted on the molecular genetic analysis of responses to male pheromones in *Drosophila melanogaster*. Several genes were involved in the receptivity to mating of fruitfly females, which were identified on the basis of DNA microarray analysis. Mutants for six of the genes were obtained from the *Drosophila* stock center in Bloomington, IN. The mutations lacked any gene activity caused by insertion of a transposable element in a specific gene. Ten mutations were also obtained from the Vienna *Drosophila* RNAi Center in Vienna Austria. The mutations were caused by RNAi knockdowns, which significantly reduce gene activity and are specific to a single gene. They have been tested to determine whether the mutations affect receptivity to mating. Females that carry each mutation were paired with males from two laboratory strains, Tai-Y and Canton-S. Testing with two different types of males assures any effect of the mutant is general, not specific to any particular strain of male. Females with the same genetic background as the mutants were used as controls. One of the mutants was found to have a significant effect on female mating receptivity as an RNAi mutation and as a transposable element insertion.

Additionally, chemosensory gene variation was identified from the DNA microarrays. The researchers performed a careful search of the microarray data for expression differences between Canton-S and Tai-Y laboratory strain males. The analysis revealed 11 differences in chemosensory gene expression between Canton-S and Tai-Y, all in genes coding for olfactory binding proteins. Olfactory binding proteins are thought to be the first step in the pathway of chemoreception. Analysis of the protein expression by green fluorescence protein (GFP) showed that expression of these chemosensory genes was limited to the antennae and palps, morphological structures involved in pheromone perception. With the results, a strong association between variation in chemosensory genes and differences in the perception of sex pheromones in the fruitfly were shown. Another result showed an inverse correlation between courtship ability of males from a wild line of fruitflies with receptivity to mating by females. The difference was not associated with variation in male pheromones. The number of lines tested was increased from four to 14, and the statistically significant association persisted between courtship effectiveness of males and receptivity to mating of females, substantiating an earlier result.

Knowledge about genes that control receptivity to mating and pheromone perception in fruitflies will provide information about pest species such as mosquitoes and facilitate development of nontoxic pest control measures. For example, inhibitory proteins that reduce the willingness of female mosquitoes to mate could be designed, which would reduce the necessity to spray toxic pesticides in urban/suburban environments. The information from fruitflies could also be applied to Dipteran agricultural pests, and reduce the necessity for toxic pesticide use by farm workers. The project also provided student assistance so top students could gain research experience and attend graduate school. Presentations, articles and a

final bulletin were the result of the research.

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

Producers, Limited-Resource Farmers and Extension personnel, agency personnel, etc.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	13047	9657	124	53

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	2	24	26

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

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

<b>Year</b>	<b>Actual</b>
2012	0

**Output #2**

**Output Measure**

- Licenses

<b>Year</b>	<b>Actual</b>
2012	0

**Output #3**

**Output Measure**

- Number of people completing educational workshops

<b>Year</b>	<b>Actual</b>
2012	7126

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

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

O. No.	OUTCOME NAME
1	Number of publications authored or co-authored (fact sheets, papers presented at Extension meetings, etc.)
2	Number of people reporting increased knowledge

## **Outcome #1**

### **1. Outcome Measures**

Number of publications authored or co-authored (fact sheets, papers presented at Extension meetings, etc.)

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

- 1862 Extension
- 1890 Extension
- 1862 Research

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2012	6

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

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

The Confined Animal Manure Management (CAMM) program seeks to reduce the environmental impact of animal waste in South Carolina.

The identification of genes that control pheromone recognition in *Drosophila melanogaster* can be used to identify homologous genes in pest species, which is beneficial to farmers.

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

Two Extension publications and two presentations relating specifically to CAMM were made at conferences.

One research bulletin is being processed for publishing and dissemination dealing with responses to male pheromones in *drosophila melanogaster*. One journal article was published.

#### **Results**

New technical publications based on CAMM projects:

Massey, H.F., J.P. Chastain, T.O. Owino, R.F. Polomski, and K.P. Moore. 2011. Chemical and Physical Properties of Potting Media Containing Varying Amounts of Composted Poultry Litter. Presented at the 2011 ASABE Annual International Meeting. Paper No. 1110935. ASABE, 2950 Niles Rd., St. Joseph, MI 490859659.

Chastain, J.P. 2011. Hindered Settling of Animal Manure. Presented at the 2011 ASABE Annual International Meeting. Paper No. 1111188. ASABE, 2950 Niles Rd., St. Joseph, MI 490859659.

CAMM Presentations during conferences:

Chastain, J.P., and W. Ferreira. 2011. Does Production of Fuel Crops to Make Biodiesel Provide An Opportunity for Animal Producers? Presentation at Southern Region Water Conference Innovations and Partnerships for Clean Water, September 1316, The Georgia Center, Athens, GA.

Chastain, J.P., H.F. Massey, T.O. Owino, R. F. Polomski, and K. P. Moore. 2011. Chemical and Physical Properties of Potting Media Containing Varying Amounts of Composted Poultry Litter. Presentation at Southern Region Water Conference Innovations and Partnerships for Clean Water, September 1316, The Georgia Center, Athens, GA.

Scott D., Shields A., Straker M., Dalrymple H, Dhillon PK, et al. (2011). Variation in the Male Pheromones and Mating Success of Wild Caught Drosophila Melanogaster. PLoS ONE 6 (8): e23645. doi: 10.1371/journal.pone.0023645.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

#### Outcome #2

##### 1. Outcome Measures

Number of people reporting increased knowledge

##### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1890 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2012	5310

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

**Issue (Who cares and Why)**

The Extension program aims to improve the production efficiency, environmental sensitivity, and profitability of animal production systems and reduce the environmental impact of animal waste in South Carolina.

### **What has been done**

Some 7,126 people participated in Animal Production Systems programs. The Clemson Bull test received funding for a new Grow Safe feed monitoring system which allows the measurement of feed efficiency in the testing program. The Clemson test will remain a conventional grain/byproduct based feedlot test in coming years.

Producers and community members were concerned about healthy animal production on the small farms. Producers and community members, also, had questions about herd health management, breeding, pasture management, animal sales and making a better profit. In an effort to assist the community with improving the overall quality of the meat production within the farming community, the 1890 Extension staff, in collaboration with a Cooperative, held workshops addressing herd health management and best farming practices. One workshop dealt with rotational grazing, soil fertility and implementing forages and legumes to allow grazing throughout the year.

Programs such as Master Cattleman classes were offered in Clemson and the Pee Dee region via polycom. Beef Quality Assurance certification is offered as an optional program at this Master Cattleman series; the Grass Masters program, a fee-based seminar series covers the basics of forage selection, establishment, and management. Basic concepts of rotational grazing are also covered along with weed management; goat and sheep seminars were attended by producers from across the state; Extension specialists continue to work with producers in developing cost management strategies for rations, budgets and other input costs; multiple on-farm demonstrations are in place to demonstrate controlled grazing, improved forage varieties, novel legumes etc. We also assist with youth programs by giving livestock management information and help with managing youth livestock activities; Confined Animal Manure Management (Camm) trainings/recertifications were conducted. In addition, specialists presented to poultry, dairy, cattle producers for Camm on Biosecurity, Foreign Animal Diseases & Business Continuity. Presentations on SC Ag Watch, including AgroTerrorism, Biosecurity. Specialists taught National Guardsmen for Ag Development Training in Afghanistan. Specialists conducted presentations to explain upcoming changes on laws for farm vehicles, to educate producers regarding the national weather service program, and for an emergency pet sheltering drill. They developed a demonstration project on using natural, closed cell foam insulation for improving the energy efficiency of animal production facilities, and provided onsite assistance on ventilation and cooling of an animal production facility; evaluated a broiler farm to test air-to-air heat exchanger technology. Beekeepers Association meetings were conducted on the topic of bee genetics and morphology research.

### **Results**

Over 73% reported gained knowledge. Producers reported improved breeding, health and reproduction methods. They implemented recommended grazing management systems. Eighteen producers marketed 932 calves in truckload lots. All calves were vaccinated for respiratory disease, preconditioned for a minimum of 45 days and were source and age verified through USDA Process Verified Program (PVP). Of the 1,010 calves sold, 681 were sold directly off farm and 329 were sold in commingled truckloads comprised of cattle from small farmers. Cattlemen selling on the commingled loads averaged 22 head per farmer, allowing small producers the

opportunity to maximize profitability by selling in truckload lots. This year source and age verified truckload lots sold for \$0.11 per pound more than traditional weekly livestock auctions resulting in \$78,780 in additional income for area cattle farms (\$4,376 per farm).

Bulls at the Clemson Edisto REC are actively grazing small grains/ryegrass pastures and have gained well 28 days into the official test. Interest in this forage only program continues to grow and consignment costs continue to be about 60% lower than in previous years.

Some 1,231 CAMM producers attended the re-certification trainings, each obtaining 2 hours of credit for this year. 100% reported knowledge gain.

As a result of the 1890 workshops, 59% of the participating members planned to put in place the knowledge and skills gained from the workshops. Of the identified percentage total, 15% have scheduled de-worming and rotational grazing as well as used a higher quality of grazing pasture. Ninety percent of the producers who received training planted annual forages, legumes and small grains to reduce their hay requirements, increase animal growth rate and increase profitability.

#### 4. Associated Knowledge Areas

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

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

##### External factors which affected outcomes

- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

##### Brief Explanation

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

##### Evaluation Results

It was determined that the work in forage-fed beef had the potential currently to benefit approximately 10% of the growers in the state, based on that product capturing 10% of the market, regionally.

Bulls at the Clemson's Edisto REC are actively grazing small grains/ryegrass pastures and have gained well 28 days into the official test. Interest in this forage only program continues to grow and consignment costs continue to be about 60% lower than in previous years.

After providing educational information to farmers, they were able to plant winter annual forages, legumes and small grains to reduce their hay requirements, increase animal growth rate and increase profitability.

Knowledge about genes that control receptivity to mating and pheromone perception in fruitflies provided information about pest species such as mosquitoes and facilitate development of nontoxic pest control measures. The information from fruitflies could also be applied to Dipteran agricultural pests and reduce the necessity for toxic pesticide use by farm workers. The information from fruitflies could also be applied to Dipteran agricultural pests, and reduce the necessity for toxic pesticide use by farm workers. The information from fruitflies could also be applied to Dipteran agricultural pests, and reduce the necessity for toxic pesticide use by farm workers. The information from fruitflies could also be applied to Dipteran agricultural pests, and reduce the necessity for toxic pesticide use by farm workers. The information from fruitflies could also be applied to Dipteran agricultural pests, and reduce the necessity for toxic pesticide use by farm workers.

### **Key Items of Evaluation**