

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

### Program # 1

#### 1. Name of the Planned Program

Agriculture Profitability and Sustainability

- 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%	20%	10%	0%
111	Conservation and Efficient Use of Water	8%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	10%	0%
202	Plant Genetic Resources	2%	0%	10%	15%
204	Plant Product Quality and Utility (Preharvest)	10%	0%	0%	20%
205	Plant Management Systems	18%	20%	10%	0%
206	Basic Plant Biology	0%	0%	5%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	0%	5%	10%
212	Diseases and Nematodes Affecting Plants	0%	0%	5%	0%
215	Biological Control of Pests Affecting Plants	1%	0%	0%	10%
216	Integrated Pest Management Systems	13%	0%	15%	0%
301	Reproductive Performance of Animals	4%	0%	5%	15%
302	Nutrient Utilization in Animals	0%	0%	5%	15%
307	Animal Management Systems	15%	15%	5%	15%
311	Animal Diseases	0%	7%	0%	0%
315	Animal Welfare/Well-Being and Protection	8%	0%	0%	0%
601	Economics of Agricultural Production and Farm Management	5%	10%	5%	0%
603	Market Economics	0%	13%	0%	0%
604	Marketing and Distribution Practices	0%	15%	0%	0%
606	International Trade and Development Economics	1%	0%	10%	0%
	<b>Total</b>	100%	100%	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>	120.0	10.5	184.4	8.5
<b>Actual Volunteer</b>	3091.0	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
2956616	863127	2802225	1497595
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4274787	1273482	3251423	1947982
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8200815	1774752	35472635	641099

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

**1. Brief description of the Activity**

Conduct research experiments that educate and solve applied problems, establish partnerships to identify needs and develop solutions, conduct workshops, both traditional procedures and hands-on, and meetings to provide training for farmers and educators, organize and conduct state and regional conferences, establish on-farm demonstrations, develop enterprise budgets, develop products, curriculum, and resources for use by educators and directly by producers, and conduct assessments as needed to evaluate progress. Research-based information will be disseminated via media and informational meetings. Decision aids, workshops, detailed curriculum, and distance educational methods will be used to support change in the overall behavior of learners.

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

Commercial producers, 4-H youth, Master Gardeners, state and federal agency personnel, Extension educators, consumers, supermarket chain store buyers, animal owners, youth, allied industry personnel, consumers, policy-makers, academic colleagues, research scientists, government officials, high school teachers, general public, individuals, families, owners and managers of farms, and small businesses; local, state, and federal personnel, private sector service suppliers, advocacy and consumer protection groups and association, health/medical personnel.

**3. How was eXtension used?**

Specialists and agents participated in multiple communities of practice, including Corn and Soybean. Information is shared and supported by involved in several COP's. For example, Animal Welfare, Apples, Bee Health, Beef Cattle, Community, Local and Regional Food Systems, Corn and Soybean Production, DAIReXNET, Farm Safety and Health, Goat Industry, Invasive Species, Pesticide Environmental Stewardship, Precision Agriculture, Sheep, Sustainable Ag Energy, Water Conservation for lawn and

Landscape, and Youth Agriculture.

**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>	369885	564636	100895	6852

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

**Patent Applications Submitted**

Year: 2014

Actual: 5

**Patents listed**

- Plant Variety Protection of Wheat Cultivar 72014415
- Plant Variety Protection of Wheat Cultivar Featherstone 73
- Plant Variety Protection of Wheat Cultivar MCIA Venus
- Plant Variety Protection of Wheat Cultivar Southern Harvest 3200
- Use of Burkholderia contaminans MS14 and occidiofungin as a fungicide against plant pathogens.

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

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	61	249	310

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

**Output Target**

**Output #1**

**Output Measure**

- Number of Extension educational presentations in the form of workshops, field days, demonstrations, etc.

Year	Actual
2014	5203

**Output #2**

**Output Measure**

- The number of peer-reviewed research publications published

<b>Year</b>	<b>Actual</b>
2014	249

**Output #3**

**Output Measure**

- The number of Extension publications published

<b>Year</b>	<b>Actual</b>
2014	7942

**Output #4**

**Output Measure**

- The amount of competitive grant funding received.

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

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

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

O. No.	OUTCOME NAME
1	Peanut Variety and Quality Evaluation program results in increased profits
2	Water Recycling Systems enhance crop health and horticultural sustainability
3	Pesticide Safety Education
4	Beef Quality Assurance Program
5	Increasing Community Garden Activities
6	Small Ruminant Meat Production
7	Introduction of Vegetable Soybean (Edamame)
8	Transporting Fish to Farm
9	Using agro-byproducts to improve growth of forage-fed hair sheep

## **Outcome #1**

### **1. Outcome Measures**

Peanut Variety and Quality Evaluation program results in increased profits

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

- 1862 Research

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

Change in Condition Outcome Measure

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

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

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

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

The Peanut Variety and Quality Evaluation (PVQE) is a key step towards development and release of Virginia-type peanut for Virginia, North Carolina, and South Carolina. In the PVQE small- and large- plot tests, our research group comparatively evaluate performance of all commercial varieties available on the market and a variable number of advanced breeding lines developed by North Carolina State University and Virginia Tech. These peanut genotypes are compared under optimum growth conditions and management practices for yield potential, grade and quality characteristics. As a result of this activity, one or two of the best performing peanut lines are released as new varieties every year. Research shows that location and year have a significant effect on lines' performance; therefore, replicated test plots are conducted at multiple locations and for at least three years before cultivar release. The PVQE is a USDA/AFRI multi-state project funded by the Virginia Tech, North Carolina State University, V-C Peanut Association, and the NC and SC Peanut Growers; it addresses the CALS mission to increase profitability and environmental sustainability through development of better adapted and better yielding peanut varieties for V-C region.

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

Because its effectiveness in development of Virginia-type peanut varieties, the PVQE project has been around for over 40 years. Because of its importance, the PVQE was extended in the past few years to include South Carolina through collaboration with researchers and extension agents at Clemson University. A new stage of the multi-state PVQE with focus on development of high oleic peanut has been recently approved by the USDA to start in Oct. 2013 and end in Sep. 2018 and to include the University of Florida. Results of the PVQE project are equally used by breeders, researchers, growers, shellers and peanut processors, and constitute a base for education of county agents, growers and industry on varietal selection. Educational activities include various field days and presentations at professional and non-professional meetings every

year. Over the years, a number of peanut varieties were released by Virginia Tech through this program. Since I assumed the leadership of the PVQE the following peanut cultivars were released: 'Bailey' in 2008, 'Sugg' in 2009, and 'Titan' in 2010. In 2013, 'Sullivan' and 'Wynne' cultivars possessing the high oleic acid characteristic were released after being tested for three years in the PVQE. This way, not only that financial contribution of the project's participants is secured, but additional dividends are annually collected for the university, Tidewater AREC, and the PVQE & Crop Physiology program.

### Results

Field trials in Virginia, North Carolina, and South Carolina were planted this year at five locations and seven environments. Each trial had 30 genotypes of peanut replicated 2 times. The 2014 results of the PVQE trials were distributed to over 200 participants. Based on these results, decisions on what varieties to be planted in the following year and what new varieties to be released are formulated. The 2008-2010 released cultivars seem to be promising, high yielding and disease tolerant cultivars. For example, Bailey and Sugg have become the predominant cultivars grown in the Virginia-Carolina region worth \$16,842,516 more than other cultivars. 'Titan', a Virginia Tech release, is a specialty peanut with extra-big pods and kernels that yields a much higher proportion of larger kernels than many other Virginia-type varieties. The largest sized shelled kernels are called super extra-large, and are used by the local gourmet industry for shipment around the country and world. Many traditional varieties yield less than 5% super extra-large kernels. Cultivar 'Titan' yields 20% or more "supers". The premiums for "supers" are from \$0.20 to \$0.40 more per pound than for smaller kernels. Data and collaborators on this proposal including county agents, farmers, shellers, processors, and other industry can be identified at <http://pubs.ext.vt.edu/>.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)

### Outcome #2

#### 1. Outcome Measures

Water Recycling Systems enhance crop health and horticultural sustainability

#### 2. Associated Institution Types

- 1862 Research

#### 3a. Outcome Type:

Change in Condition Outcome Measure

#### 3b. Quantitative Outcome

Year	Actual
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2014

0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Safe water recycling is of paramount importance to addressing crop health, water shortage and nonpoint source pollution, three highly interconnected issues constantly facing the nation's \$15 billion ornamental horticulture industry. Capture of agricultural runoff in containment ponds prevents fertilizers, pesticides and other chemicals from being released into the natural waterways while increasing the supply of irrigation water. This practice, however, has the potential to accumulate and spread destructive plant pathogens from isolated infections to an entire farm and from a single farm to other farms sharing the same water resource, destroying entire crops within weeks. To dissociate the crop health risk from water recycling practices, the industry currently uses a chlorination recommendation we developed in 2003. Chlorination still is by far the most cost-effective water treatment, but it has some serious drawbacks. First, its efficacy is subject to water pH, being most efficacious at pH 5 to 6, declining by 25% at pH 7, and by 90% at pH 9. Unfortunately, water pH in containment ponds is mostly alkaline during growing seasons, thus water acidification is often required before chlorination. Second, liquid chlorine is corrosive and chlorine gas is explosive, both present health risk to workers and potentially to residents in the surrounding areas.

#### What has been done

With support from the USDA National Institute of Food and Agriculture and the ornamental horticulture industry, teams of interdisciplinary scientists at Virginia Tech worked with colleagues at six other institutions on how the layout of water recycling systems may impact pathogen survival and the potential economic, social and environmental benefits of implementing better system designs. Specifically, we examined the water quality dynamics in multiple ponds across the mid-Atlantic region and in the Gulf coast states. Using these data as a guide, we designed and performed experiments to determine how major plant pathogens respond to individual water quality parameters such as pH, dissolved oxygen, carbon dioxide, and electrical conductivity under controlled conditions. We also investigated bacterial diversity in nursery irrigation water and selected species and strains for assessment of their biocontrol potential. In the meanwhile, the economics team surveyed approximately 1,500 growers in MD, PA, and VA for their irrigation and disease management practices. These research data were published in scientific journals and presented at professional conferences as well as at extension and outreach venues. To expand our reach and expedite technology transfer to the end user, we also conducted a 14-session monthly webinar series on irrigation pathogens and water quality from October 2013 to November 2014, in collaboration with the AmericanHort and the Society of American Florists.

#### Results

This project has greatly advanced the recycled water science in a broad range of disciplines from biology to agricultural engineering and economics as illustrated in three dissertations, two theses, forty-five plus scientific publications, a large number of conference papers and abstracts, and numerous lectures and extension/outreach presentations (<http://www.irrigation-pathogens.ppws.vt.edu/activities/index.php>). These publications and presentations all support the hypothesis that plant pathogens in irrigation water and their incited crop health risk may be managed by better water recycling system design, providing a foundation for developing long-lasting, reliable, environmentally-sound and economically-viable crop health management tools. The overall potential benefits of implementing these new tools are enormous on a national scale.

new tools, growers will be able to reduce crop losses and, consequently, produce more and better quality horticultural products while conserving water resources and reducing nonpoint source pollution. The immediate benefits are greater profit margins and better public image for the horticulture industry. Disease-free ornamental plants produced with water conservation practices may be marketed and sold at greater prices while adding to consumer satisfaction. These additional benefits, in turn, will put the horticulture industry on a fast track to more profitability and sustainability.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

#### Outcome #3

##### 1. Outcome Measures

Pesticide Safety Education

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	2014

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

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

U.S. Department of Agriculture (USDA) and the US Environmental Protection Agency (EPA) mandate the safe use of pesticides by commercial, private, and public applicators. USDA and EPA ask Cooperative Extension nationwide to address this mandate. The Virginia Tech College of Agriculture and Life Sciences has a key initiative in agricultural and environmental sustainability, and Virginia Cooperative Extension (VCE) has a planned program in pest management. Virginia has several thousand private applicators and tens of thousands of commercial applicators across the commonwealth. There are many others who are interested in occupations that require certification in pesticide application, such as turf management and residential pest control. To become a commercial or private pesticide applicator in Virginia, a person must meet the requirements and successfully pass the certification exam(s).

### **What has been done**

There are 22 different categories of commercial applicators and 2 main categories of private applicators, but ALL commercial and private applicators must take an exam based on the Virginia Core Manual, 'Applying Pesticides Correctly.' This manual, first released in 1994, covers a variety of pesticide safety education issues, such as pesticide laws and regulations, understanding pesticide labels, human and environmental health, and proper application techniques. While the manual has all the pertinent information necessary to pass the core exams, there seems to be a need for additional assistance. Many companies who hire inexperienced people and train them for their jobs request help in preparing employees to take these tests. Others who are starting or expanding their own business seek specific information on how to do so.

The Virginia Pesticide Safety Education Program provides workshops, certification courses, training manuals, electronic media, and web-based education for pesticide applicators. In addition the program provides train-the-trainer workshops for pesticide applicator trainers. Virginia Tech Pesticide Programs (VTPP) has provided multiple types of assistance for those seeking certification since its beginning. As technology advanced and access to computers and online resources increased throughout the commonwealth, VTPP began offering the online course in 2009 for those seeking certification. There have been previous online courses for specific groups of people such as Master Gardeners, but nothing as large and ongoing as the Virginia Online Core Training. The lessons in the online course include videos, presentations and documents that correspond to the units in the Core Manual. There are practice tests for each unit as well. The entire course is housed within Virginia Tech's Scholar system and can only be accessed with an email ID and password after enrollment by the instructor. This course is free to anyone who is studying to take a core exam and has purchased the Core Manual. Some employers sign up using their own emails and then use the course more as an instructional tool than as a self-guided program. Records are kept on names, occupation, and location for evaluation purposes.

### **Results**

Because of Virginia Cooperative Extension's Pesticide Safety Education program, commercial and private pesticide applicators were trained and certified according to state and federal requirements. The program enables over 20,000 agricultural producers and pest managers to maintain certification in 27 different categories of private and commercial pesticide application. This enabled these pesticide managers to legally use pesticides on their farms, in pest management businesses, and through public pest management programs throughout the commonwealth. Trainers are an important part of this effort. In 2013, we sponsored 2 train-the-trainer workshops. The 22nd annual Virginia Pesticide Safety Educators Workshop enrolled 115 Extension agents, specialists, and pesticide investigators. We sponsored 4 online courses to help commercial and private applicators, and registered technicians prepare for certification. We had over 119 different companies, 46 government entities, 4 farms, and 5 schools which resulted in 507 individuals enrolled in three courses. Several instructors used course content as teaching tools.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

## **Outcome #4**

### **1. Outcome Measures**

Beef Quality Assurance Program

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

- 1862 Extension

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

Change in Knowledge Outcome Measure

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

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

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

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

Adding value to Virginia's beef cattle operations is critical to sustainability of Virginia agriculture and rural communities. Adopting improved health, management, and marketing practices for Virginia feeder cattle adds value to the Commonwealth's second largest agricultural commodity. The reproductive performance of a beef cattle herd is the best predictor of profitability. High reproductive performance is challenged by the low cost production systems that must be employed to achieve profitability. New technologies have become available to enhance the use and success of Artificial Insemination in beef cattle. These technologies have the potential to increase both the quantity and quality of beef produced by Virginia beef cattle operations. Reproduction is a key component of successful dairy farming. Getting cows pregnant is the key to future milk production and producing replacement dairy heifers to sustain the dairy operation.

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

Extension Specialists partnered with the Virginia Cattlemen's Association to develop and administer this program which encourages the use of scientifically-based cattle health and management procedures for feeder cattle. The VQA program is a cooperative effort among VCE, the Virginia Cattlemen's Association, VDACS, VMRCVM, and producer organizations. Producers that manage their cattle in this manner are eligible to market their calves through the VQA certified feeder cattle program with purple and gold ear tags.

#### **Results**

In 2014, a total of 14,506 calves were marketed through the VQA program. Producers received a premium of \$81 per calf resulting in \$1.17 million of additional income realized by Virginia beef producers. Since 1997, producers have marketed over 125,000 head of feeder cattle resulting in \$6.4 million in value-added income. An estimated 3,000 bulls received 'Breeding Soundness Examinations' in 2014 and 400 bulls were evaluated for reproductive soundness at the Beef

Cattle Improvement Association Bull Evaluation Centers in Virginia in 2014. Prevention of bull breeding failures resulted in an estimated \$500,000 in pregnancy loss prevention in Virginia. 12% of beef cows in Virginia were exposed to Artificial Insemination in 2014. There has been a doubling in the amount of AI that has been employed in beef cattle in Virginia in the last 10 years. AI is estimated to increase the profitability of each cow by \$270 if she becomes pregnant to this insemination. A 1% increase in cows inseminated artificially would result in 3,400 additional AI pregnancies if a 50% success rate were achieved. This would increase the profitability of Virginia cattle operations by \$918,000 in 2014. Days open on dairy cows were decreased by 5 days in 2014 according to DHIA records. This reduction in days is worth \$2,225,000 to dairy farmers in the state of Virginia. The Central Virginia Cattlemen Association has cooperatively marketed 32,706 weaned, health-certified feeder calves to garner an average premium price per pound over the market of 8.7 cents per pound. The average calf weighed 681 pounds. Since the program has existed the farmers marketing through the program have collectively received over \$1,957,460 in premiums over market for participating. The farmers have purchased 4884 tons of mineral premix and have saved on bulk buying minerals about \$280 per ton for a collective savings of approximately \$1,367,520. This is further compounded by a 35% reduction in the cost of pharmaceuticals and gate purchases. The pharmaceutical savings members achieved totals nearly \$733,000 over a thirteen year period and the gate and equipment savings totals nearly \$185,000. 300 farmers have participated in the cattle classes and meetings held by the extension agents. Evaluation instruments developed measured participants' increase in knowledge and behavior change. The long term impacts of this program has led to enhanced sustainability of the family farms in the region producing \$4,242,980 in cost savings and premiums received for their livestock. During 2014 there were 697 producers either certified or re-certified. These producers came from 79 counties and three surrounding states. We estimate that the certified producers represent over half of the cattle produced in Virginia. Added value of cattle produced on BQA certified farms is estimated to be \$1.5-2.0 million annually.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
601	Economics of Agricultural Production and Farm Management

#### Outcome #5

##### 1. Outcome Measures

Increasing Community Garden 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	0

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

**Issue (Who cares and Why)**

Around the world, educators, governments, political bodies, planners, landscape architects, and engineers refer to the idea of 'sustainable landscapes' as a subject of increasing importance. Sustainability and sustainable development are at the intersection of environment, economy, and society, reflecting the significance and relevance of ecosystem services and limits, fair and durable prosperity, health, and social justice. Sustainable landscapes foster environmental sustainability and the preservation of its relevant functions (e.g., biodiversity, water filtration, energy balance). In addition, sustainable landscapes support ecosystems while providing for human well-being through provision of food, water, timber, and fiber, and by regulating services that affect climate, diseases, flooding, and water quality. These ecosystem services are also tied to the acquisition of cultural services that deliver recreational, aesthetic and even spiritual values, while supporting soil formation, photosynthesis, nutrient cycling, and carbon sequestration. In VCE's Strategic Plan (2011-2016) leading issues of concern emerged, among them, the importance of sustaining Virginia's natural resources and the environment.

**What has been done**

In order to establish a dedicated support effort to new and established community gardens, word was sent out to community garden managers, organizations receiving community garden grants, and to schools that Extension volunteers could provide support in many ways to help. In 2014, 14 site visits were made to community gardens throughout Arlington and Alexandria. Some had been established for several years most were less than 2 years old. Advice was provided on problem solving for everything from tool storage to traffic patterns, weed, disease, and pest management, vandalism and theft. A community gardening database was established with 10 Master Gardener volunteers signing up to provide liaison to these gardens. In 2014 Extension's response to this need was to promote our office as a major source of education on gardening, disease and pest management and plant selection. Free seed distribution was offered alongside advice on selection, the Community Gardens Coaches support team offered support to new and established gardens, VCE partnered with the Arlington Food Assistance Center's community education offerings, our Urban Agriculture education series offered composting, edible landscape, fruit trees/shrubs, vegetable, disease and pest control and ID, and container gardening classes. Along with our community gardens one on one gardening education, we had a yearlong partnership with the Arlington Food Assistance Center's Wednesdays in the Garden programs and a regular series of compost education efforts to support the County's Zero Waste needs.

**Results**

In collaboration with the Master Gardener Coordinator, Master Gardener volunteers craft appropriate projects to assist the community based on community need and the "Sustainable Landscape Management" principles. Classes are centered on teaching the Landscape Best Management Practices (BMPs) developed by the Northern District Horticulture Agents. Centered on landscape BMPs, the 140 Master Gardeners contributed 8,532 hours & contacted 5,239 clients while serving the horticultural needs in the Albemarle community. The financial impact of

the volunteer's work is valued at \$192,396. In 2014 we distributed over 4,500 packages of seeds at special events and community education offerings. Community Gardens coaches made 14 site visits to a collection of gardens that altogether involved over 100 people of all ages. 9 dedicated individual public education classes on Composting were offered alongside compost education displays for 3 community events. Community Garden Coaches Trainer provided 17 of the 28 'Wednesdays in the Garden' workshops in a partnership with Arlington Food Assistance Center Plot Against Hunger. VCE provided 18 programs on vegetable or edible landscaping, and 6 programs on container gardening. Staff and volunteer contacts for this program area are estimated at over 15,000.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
205	Plant Management Systems
206	Basic Plant Biology

#### Outcome #6

##### 1. Outcome Measures

Small Ruminant Meat Production

##### 2. Associated Institution Types

- 1890 Extension

##### 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)**

Many new limited resource farmers are interested in starting a small ruminant meat enterprise due to their ease of handling and an increased demand for their products. For instance, many are unsure as to how to choose the right breed, the facilities and supplies required, what to feed them and how to keep up on vaccinations and proper hoof care.

### **What has been done**

In April, VCE hosted a workshop for farmers interested in small ruminant meat and dairy production and presentation about starting a small ruminant meat enterprise and demonstrate how to perform simple management techniques including hoof trimming, body condition scoring and administering vaccinations.

### **Results**

Following this workshops, 57 participants increased their knowledge on things to consider prior to starting a small ruminant enterprise as well as how to conduct simple management techniques on their farms.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

## **Outcome #7**

### **1. Outcome Measures**

Introduction of Vegetable Soybean (Edamame)

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

- 1890 Extension

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

Change in Knowledge Outcome Measure

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

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

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

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

Since the peanut and tobacco quota buyouts of 2002 and 2004, farmers in Virginia have experienced loss of income and cropland. In the search for alternative crops to replace the two

former mainstays of Virginia agriculture, researchers at Virginia State University (VSU) have identified vegetable soybean (edamame) as a potentially profitable option for former tobacco farmers. Unlike commodity soybean, edamame is harvested green and marketed as a specialty vegetable. Similar to tobacco in that it lends itself to intensive cultivation in small holdings, edamame can, with proper marketing, emerge as a lucrative cash crop. For example, sales have averaged \$2 per pound of fresh in-the-pod edamame, and one grower was able to sell half-pound packs of shelled edamame for \$6.

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

Edamame has a short harvest window and limited shelf life. So far, the biggest challenges to growers have been coordinating a timely harvest of all fields and processing/delivering the crop to market before spoilage occurs. To address these problems, VSU researchers are looking at combinations of planting dates and varieties that will widen the window for planting. Breeding of short-season varieties would greatly benefit this effort. There is also a need to diversify the market for edamame, which includes the use of edamame as raw material for value-added products, such as "ready-to-eat" snack packs, succotash or hummus. The market cannot absorb all the fresh harvest; consequently, preservation methods such as freezing or canning need to be investigated. If all goes as anticipated, edamame will become a new cash crop that will supplement farm income and help small farmers salvage their livelihoods and legacies.

#### **Results**

With support from the Virginia Tobacco Commission, VSU is working with Virginia growers to commercialize three edamame varieties developed by the Soybean Breeding Program at the VSU Agriculture Research Station. So far, 25 growers have been contracted to grow and market edamame. The project has purchased harvesting and processing equipment and set up a centralized processing facility in Farmville, VA.

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

<b>KA Code</b>	<b>Knowledge Area</b>
202	Plant Genetic Resources
206	Basic Plant Biology
601	Economics of Agricultural Production and Farm Management

#### **Outcome #8**

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

Transporting Fish to Farm

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

- 1890 Extension

**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)**

Many farmers do not have any capabilities to transport fish to their farms. Typical fish producers need to transport 500-1,000 fish to their farm. Fish must be transported in a tank designed for hauling fish. An aeration system is needed for keeping fish alive during transport. The use of oxygen is the preferred way for aerating a tank transporting fish. Farmers don't have this capability.

**What has been done**

Since not rental or custom transport exists. VSU has provided technical assistance for farmers with transporting fish. Sometimes a farmer will borrow a small 50 gallon tank, but this has limited capabilities for hauling fish quantities. VSU has provided assistance with larger tanks that has the abilities to transport 1,000 fingerlings, catfish or trout.

**Results**

By assisting fish producers in transporting fish has allowed many farmers to continue their aquaculture efforts. Sufficient fish for their cage operation, they can continue their marketing efforts in the local Farmers Markets. It is estimated that VSU has transported eight thousand fish in the last 2 years for farmers. Until farmers create sufficient capacity, the cost of transport by the supplier is not cost effective, VSU will continue to provide technical support to fish farmers.

**4. Associated Knowledge Areas**

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

**Outcome #9**

**1. Outcome Measures**

Using agro-byproducts to improve growth of forage-fed hair sheep

**2. Associated Institution Types**

- 1890 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)

A comprehensive review of the U.S. sheep industry by the National Research Council in 2008 identified forage-finished lamb, and direct marketing of high quality, lighter weight lambs to the expanding ethnic markets as key opportunities to improve efficiency and competitiveness of the sheep industry. The report also recognized the role of hair sheep in addressing these structural changes in the industry. A report on "Nontraditional Lamb Market in the United States: Characteristics and Marketing Strategies" commissioned by the American Sheep Industry Association in 2010 echoed a similar sentiment and indicated that the greatest potential for sheep industry expansion lies primarily in the area of non-traditional markets, and that alternative breeds, such as hair sheep, are well suited to serve these markets.

Hair sheep can be raised with limited management inputs such as dewormers and lamb readily on pasture, making them the prototype of the "easy care" sheep. Hair sheep lambs should be targeted at consumers and markets that will pay a premium for this type of product (grass-fed, organic or naturally raised). However, mature size and growth rates are generally smaller than in traditional wool sheep, and management tools that will improve growth performance should benefit this industry.

#### What has been done

This project evaluated soy hull and corn gluten feed as supplements for hair sheep lambs fed forage-based diets. These agro-byproducts are sources of highly digestible fiber, and may be better suited for hair sheep than the more expensive traditional grain supplements. Two pen-feeding trials using high quality orchard grass hay as a forage source showed that total feed intake and growth rate of hair sheep lambs increased linearly as supplement feeding increased from 0 to 3% of body weight. Growth rates were higher and adaption to the diet faster in the lambs supplemented with soy hull than with corn gluten feed. When trials were moved to pasture, hair sheep lambs rotationally grazing fescue pasture had higher growth rates when supplemented with soy hull than cracked corn at 2% of body weight. Supplementation with soy hull improved growth rate lambs by 80% compared to lambs grazing pasture only.

#### Results

The project quantified improvements in growth rates derived from supplementing forage-based diets with agro-byproducts. It also identified soy hull as supplement with considerable potential for integration into hair sheep management systems.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
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
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

The gross income derived from farming could be affected by natural disasters, changes in the economy, government regulations and public policy changes. Disasters damage infrastructure and facilities while economic and governance changes influence profitability of production systems. The number of acres of land subject to nutrient management plans/best management practices/conservation plans affected by government regulations and changes in the economy. If greater emphasis is placed on water and environmental quality then even more widespread implementation of these practices will be encouraged. These factors may have immediate impact as they significantly influence items such as production economics, industry infrastructure, marketing systems, and consumer demand. Good economic conditions encourage consumption of value added products. In Virginia, increasing land values in traditional animal production areas around cities and growing towns are a significant challenge. The recent increase in ethanol production and anticipated future growth of this alternative fuel source will likely have major impacts on livestock production practices in Virginia. Scope of such impacts is unknown, but anticipated direction has influenced this planned program.

A recent challenge has been the change in demographics in Virginia. There is an increased demand to offer education resources in Spanish. Employers have a desire to employ non-English speaking workers. The prohibitive, besides the lack of resources to change the training materials and examinations, is that most materials use in Virginia (and most states) are written in English only. Changes in global food production capacity, energy costs, and epidemic diseases could have unpredictable effects. All external factors affecting personal discretionary spending will affect the implementation of environmentally sound BMP's. Natural disasters may affect producers directly but also will affect ag producers, homeowner and commercial landscaping. The general economy, public policy and governmental regulations impact production and sales of horticultural products. Appropriations and competing programmatic challenges affect the dedication of personnel

and programs to the described programs. Population changes affect supply and demand for horticultural products.

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

### **Evaluation Results**

IPM Evaluation: A survey of fruit producers and crop advisors conducted at the 2014 fruit schools indicated that: Ninety-five percent of survey respondents have used information from fruit schools to help guide their application of pesticides. Ninety-eight percent of respondents reported that the fruit schools had been helpful or extremely helpful in improving their ability to manage pest problems. Several growers noted that they were now rotating insecticide classes to reduce resistance; or were using different pesticides, including mating disruption; or had lowered the rates used. Of the 74 participants who answered the question, "How has using the information from Fruit Schools affected the profitability of your operation (or the operations of the growers you consult with)?", 46% reported an increase, 53% reported no change, and only 1% reported a decrease in profitability. Thirteen growers estimated their yearly increase in profitability based on using the information from fruit schools. These estimates ranged from \$300 to \$200,000. The total of these estimates was \$600,600. The Northampton County Insect Monitoring Program received very positive feedback from growers in the county who stated that spray applications were reduced as a result of the program. Funding was obtained from the Virginia Potato and Vegetable Growers Association to support the supplies needed. This program helped growers to determine weekly insect "hot spots" in the county and decide when it was necessary to make an insecticidal application. Due to grower feedback was determined that reduced insecticidal applications constituted a savings of around \$87,000 in unnecessary inputs for Northampton County corn and soybean growers.

### **Key Items of Evaluation**

Use of clickers in training programs to gather data and to report quick feedback.