

# 2008 University of the Virgin Islands Research Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

The work conducted by AES scientists is production oriented. The small size of AES and limited physical and fiscal resources limit our ability to expand into new research areas. One area that we acknowledge being insufficient in is economic analysis of our research results which would aid scientists in determining the impact of their work. All research faculty are encouraged to include an economic analysis, where appropriate, in their projects to help determine the potential benefits the work would have for local producers. In some cases this is not possible due to the nature of the project or the area of research. In other cases it is due to a lack of expertise in this area within AES. The second issue has been addressed by developing collaborations with outside resources (VI Dept of Agriculture, UVI Small Business Development Center, professionals at other institutions) for economic and marketing analysis.

The AES Animal Science Program initiated two new Hatch projects. One will evaluate the effect of late weaning on lamb and ewe productivity in an accelerated lambing system. The other project will evaluate cow and calf production traits in beef cattle managed in defined breeding seasons in the USVI. The Animal Science Faculty began collaboration with a CES colleague at the University of Hawaii to conduct small ruminant workshops in Guam and the Northern Marianas Islands as part of a USDA CSREES grant from the Disadvantaged Farmer/Rancher Program. Using information generated at UVI, training and workshops will be provided to livestock producers in the Pacific Islands. Livestock production/management workshops were conducted in partnership with CES and the VI Dept of Agriculture. Information was presented on sheep management to local farmers. The AES cow herd was used as part of a demonstration on low impact animal handling put on by Dr. Ben Bartlett from Michigan State University in cooperation with the VI Dept. of Agriculture Veterinary services office. The Animal Science Program hosted Mr. Ben Forsyth, a Nuffield Scholar, from Australia for several days. Mr. Forsyth was traveling around the globe to visit livestock producers and see how they were working to make their operations sustainable and dealing with a variety of environmental and climate issues. He visited the cattle and sheep research facilities as well as local livestock operations to get an understanding of the issues/problems/limitations/successes associated with livestock production the USVI. Three undergraduate students were mentored in the Animal Science research lab. Two students were supported by funds from the Insular Grants program and another was supported by the VI Dept of Labor. One of the students conducted a research project using thermal imaging as a method to measure of cow body temperature. This project contributed to the data collection for the S-1023 multistate project on heat stress in dairy cattle. The student also presented the results of her research at the UVI Student Research Symposium on the St. Thomas campus in the fall semester of 2008. The vacant staff position in the program was filled and the new person is being trained in the sheep flock management and assisting with data collection. The program joined a multistate project to take over where the Dairy Heat stress project terminated. The research to be conducted will evaluate stress in livestock and how it relates to production traits (W-1173). Hurricane Omar which hit St. Croix in October 2008 had a large impact on the operation of the program. There was a lot of damage to the sheep and cattle research facilities in the form of downed trees, damaged buildings and pens, and broken fences. Some of these repairs have not been completed yet due to slow release of emergency funds and just the magnitude of the damage. It is having some impact on functionality of the programs by limiting pen space in the sheep facility and pastures use in the cattle herd.

The AES Aquaculture Program held its Tenth Annual Aquaponics and Tilapia Aquaculture Short Course on June 15 through 21, 2007. This year's class set an attendance record with 73 students, who came from 14 countries, 13 U.S. states and two U.S. territories (Antigua, Canada, Cyprus, England, Indonesia, Italy, Malaysia, Montserrat, Nevis, Norway, St. Maarten, Trinidad, Zimbabwe, El Salvador, California, Colorado, Florida, Georgia, Illinois, Louisiana, New York, North Carolina, Oklahoma, Rhode Island, Texas, Virginia, Wisconsin, Puerto Rico and St. Thomas). The short course has been renamed the International Aquaponics and Tilapia Aquaculture Course. Over 10 years the Aquaculture Program has trained 362 students from four U.S. territories, 37 states and 44 countries. The training program has led directly to the establishment of aquaponic research programs with systems based on the University of the Virgin Islands (UVI) design at the University of Arizona, University of Guam, Northern Marianas College (Saipan), King Abdul Aziz University (Riyadh, Saudi Arabia), Rutgers University EcoComplex (Bordentown, New Jersey), Crop Diversification Center South (Brooks, Alberta), and Lethbridge Community College (Lethbridge, Alberta). In addition, educational/demonstration systems have been established in Albion, New York and Montello, Wisconsin. Epcot Center, The Land, recently unveiled an aquaponic system that includes some UVI design features. The training program has led directly to the establishment of commercial operations based on the UVI design in Orlando (two operations), Flanagan, Illinois, Kansas City, Hawaii (big island, several operations), Oklahoma City, Wisconsin (two operations), Fort Collins, Colorado, Antigua,

Guadalajara, Mexico, Bogotá, Colombia and North Queensland, Australia. A short course on tilapia culture in aquaponic and biofloc systems was offered to local residents, and 17 members of the Virgin Islands Farmer's Cooperative received a certificate of completion. Another shorter course was held for five students from Trinidad, California and the Virgin Islands. An Italian intern received training for 4 months as part of his M.S. degree research program at an Italian university.

The Aquaculture Program continued to conduct research on aquaponic and biofloc systems for the culture of tilapia. A new direction for the program is research on the utilization of aquaculture effluent (sludge) on the production of field crops. Geotextile membranes were used to separate solid waste from the liquid fraction. The solid waste was incorporated into the field plots and compared with standard inorganic fertilizer treatments. In addition, dewatered solid waste was mixed with compost at different ratios and evaluated as a potting media for production of vegetable seedlings. Two grants were obtained from the Water Resources Research Institute to study aquaculture effluent.

This year marked the 8th year that the Aquaculture Program Leader has written a Question and Answer Column for Aquaponics Journal, a quarterly trade publication with 1,500 subscribers. The advice given is very detailed and has helped the questioners and other interested readers to improve their aquaponic systems. As a result of increased demand for small-scale aquaponic systems, the consulting arm of Aquaponics Journal fabricates and sells aquaponic systems based on the UVI design. Approximately 15 systems have been sold and the demand is growing. The Aquaculture Program entered into a partnership with this group and is evaluating one of their hobby scale systems. In turn the Aquaculture Program will be using it as a demonstration in next year's aquaponics course. The Aquaculture Program Leader was invited to speak in Guadalajara, Mexico at an International Aquaponics Congress and an aquaponics training program, in Brisbane, Australia at an aquaponics short course and in Washington, D.C. at a summit on recirculation systems sponsored by the Food and Water Watch.

The AES Agronomy Program in collaboration with the University of Florida has completed two years of research on the USDA-CSREES Integrated Organic Program research grant entitled "Crop Diversification Complexity and Pest and Beneficial Organism Communities in Humid Tropical and Sub-Tropical Climatic Regimes". This research initiative is a complex multi-system project that examines the effects of legume and grass cover crops, legume and grass cover crop combinations, and crop rotations on insect, weed, nematode, and pathogen communities in tropical organic crop production systems. This project has served as a model for organic crop production, agroecological principles, and sustainable agriculture practices for the U.S. Virgin Islands and the greater Caribbean region. This project has been the focal point of various tours, community functions, and public outreach that has spanned a broad audience that includes school groups, civic organizations, local farmer outreach programming, agriculture researchers and educators, and national agricultural political leaders. This project is the first of its kind in the Caribbean and takes place in conjunction with the Virgin Islands Sustainable Farm Institute, which is the first USDA-NOP certified organic farm in the territory.

In addition, the collaborative SARE grant "Sustainable and Profitable Control of Invasive Species by Small Ruminants" is providing valuable information for the control of invasive plant species utilizing small ruminants as a biological control agent. This year plant samples and data from the on-station studies feeding coral vine (*Antigonon leptopus*, an invasive ornamental prevalent on most Caribbean islands) to St. Croix hair sheep were analyzed in the lab for nutrient content and digestibility. These results have been disseminated to producers. In addition, the second year of research was concluded for the coral vine pen feeding trial in which intake levels and animal performance were measured for two different coral vine feed rations for cut and carry feeding systems.

Two more collaborative research grants were secured over the past year. The first of which is the USDA-CSREES-SARE grant "Integrating Tropical Legumes with Condensed Tannins into Ruminant Grass-Based Diets for Sustainable Production". This initiative is in collaboration with Dr. Elide Valencia at the University of Puerto Rico, Mayaguez. This research will examine the efficacy of condensed tannin rich tropical legumes on internal parasitism in small ruminants. The primary objective of this research is to determine average daily gain and parasite load of lambs creep grazing condensed tannin containing legumes (*Calliandra*, *Desmodium*, and *Pigeon Pea*). The agronomy program has planted *calliandra* in de-wormer legume banks for medicinal creep grazing. The *calliandra* will take approximately 8-12 months to fully establish before grazing trials can begin.

The second collaborative grant secured this year is funded by USDA-CSREES-TSTAR and is in collaboration with Dr. Phil Kaufman (PI), Assistant Professor in the Entomology and Nematology department at the University of Florida, and Dr. Robert Miller, Research Entomologist, USDA, ARS, Cattle Fever Tick Research Laboratory, Edinburg, TX. This project entitled "Resistance in the Southern Cattle Tick, *Boophilus microplus*, to Acaricides Used on St. Croix and Puerto Rico" and seeks to identify the pesticide (acaricide) resistance status of the southern cattle tick, *Boophilus microplus*, a highly capable vector of bovine babesiosis and highly pathogenic blood parasite of cattle that causes 70-100% mortality. Previously eradicated from Florida, this tick is endemic on many Caribbean islands, including St. Croix, in the US Virgin Islands, and Puerto Rico, and its reintroduction to the Southern United States is a continuous threat. The Agronomy program will be cooperating with Dr. Bethany Bradford, resident Veterinarian for the V.I. Agriculture Department, in *B. microplus* collection. Tick samples will then be preserved

and transported to entomology laboratories in Texas and Florida for processing the emergent larvae through their live bioassay protocols for organophosphate, fipronil and ivermectin.

Stuart Weiss, Acting Agronomy Program Leader, completed his final semester of course work to meet the academic requirements for his Doctor of Philosophy degree in Horticultural Science with an emphasis in agroecology and organic crop production at the University of Florida Horticulture Department. Weiss co-instructed for the second year the Sustainable Organic Crop Production course for the Horticulture Department with Dr. Xin Zhao, Assistant Professor and coordinator for the organic crop production degree option. Weiss is in the process of compiling dissertation data into publication format for journal submission.

The Biotechnology Program continued to focus on wind tolerant papaya through the development of early bearing compact papaya plants with fruit set within a meter of the soil surface. The papayas were put to the test in October, when they were exposed to hurricane force winds from 'Omar'. Though the standard sized papayas were heavily damaged, the compact early bearing lines developed by the Biotechnology Program exhibited no stem breakage and few were blown over. These lines are made available to farmers who utilize them to increase papaya production in the Virgin Islands.

Viruses plague sweet potatoes and the continued use of cuttings from established plants compounds the build up of viruses, which lowers production for growers. Virus free sweet potato cultivars were obtained from USDA in two vials for each cultivar. Micro-propagation was used to increase the two vials of plants to 72 vials for each cultivar. From these micro-propagated plants, field trials will be conducted and the best varieties will be recommended to farmers.

Developing and evaluating plant germplasm is important to keep the farming community productive and competitive. Germplasm research focused on two crops: sorrel, Hibiscus sabdariffa, and Bt sweet corn. Due to a late planting, the sorrel lines bore fruit in late January instead of November, the normal production period. Two dwarf lines were found in the germplasm collection. One of the lines produced a fruit twice the size of others. A cultivar from a local farmer produced very deep red fruit. During field tours, local growers were enthusiastic about this culturally important crop. Because corn earworm is a year round pest in the Virgin Islands, Bt sweet corn was evaluated and compared to local roasting corn and Hawaiian tight husked sweet corn. The lines of Bt sweet corn outperformed the locally grown cultivars which were very susceptible to the earworms. However, the Bt sweet corn lines were susceptible to rust, which the local cultivars were resistant to. Future studies will involve a fungicide to control the rust on the sweet corn.

The Horticulture program focuses on vegetable production and variety trials. A study was conducted to evaluate pepper production under field conditions and inside an antiviral screen house. Production in the screen house outperformed the field production and had delayed viral infection and insect infestations which allowed year-long production. There is potential for farmers to incorporate this method in their production.

Due to the semiarid conditions of the islands, drip irrigation is the most efficient use of water. Irrigation studies were conducted on tomato, cucumber and seedless watermelons. These crops are important vegetable crops in the Virgin Islands. Of the three types of cucumbers grown, the pickling type, slicing type and the European long cultivars, the slicing cucumber was the most productive. Consumer preference has migrated to these varieties due to the lack of bitterness as the fruits get beyond maturity. With the watermelon study, the yellow and orange seedless watermelons were a novelty and consumers at first resisted sampling them but eventually found these colors to be equal or sweeter in quality than the red varieties.

#### Total Actual Amount of professional FTEs/SYs for this State

Year:2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	23.0	0.0
<b>Actual</b>	0.0	0.0	17.0	0.0

## II. Merit Review Process

### 1. The Merit Review Process that was Employed for this year

- Combined External and Internal University External Non-University Panel

## 2. Brief Explanation

There has been no change made to the process as described in the initial Plan of Work submitted. A scientific peer review process is followed. Scientists submit three copies of their proposals to the Director, who attaches evaluation forms and sends them to three people who are qualified to judge the proposal. At least one of the reviewers is selected from CES. The reviewers are asked to rate the proposals on a scale of 1 to 5, 5 being the highest score, as to relevance and merit of the proposed project to the agricultural sector (justification). The evaluated proposals are then returned to the Director who gives the reviews to the scientist for any needed revisions. The revised proposal is then returned to the Director who verifies the improvements in writing and gives final approval. Scientists are required to publish their results but sometimes the project is completed before the PI has time to publish the results in a peer reviewed journal, so there is a lag between the project and publications. Because of the small staff size and amount of non-research related work each faculty an staff end up doing, finding time for writing is difficult for some faculty but we are looking at methods to remedy this, such as collaborating with other institutions to train graduate students and put more emphasis on outputs such as publication in the Faculty Annual Evaluation process.

## III. Stakeholder Input

### 1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public

### Brief Explanation

The AES Advisory Council meets to discuss issues of concern to the agriculture community and AES scientists continued to work in close contact with farmers as part of several research projects. The Advisory Council is composed of individuals involved in several aspects of agriculture (horticulture, livestock, and farmer's co-ops) from both St. Croix and St. Thomas. When needed, new members are recruited by the AES Director based on suggestions of the research faculty and existing members of the council. Research faculty present information on current projects and members of the Advisory Council express their concerns and opinions about what they see as the needs of the agriculture community. Issues are prioritized within discipline based on the input of the Advisory Council members in their role as representatives of the agriculture community. One of the high priority issues that has come up is assistance with marketing programs and educational programs for farmers. The VI Department of Agriculture has a marketing program that is supposed to be assisting farmers and this was mentioned to the Advisory Council. Local farmers groups are trying to work with the VI Dept. of Agriculture to keep this program going. The council was told that the Cooperative Extension service has offered short courses in both plant and animal production to local farmers, with the assistance of AES faculty. Other specific issues within a field of study brought up by the Advisory Council were discussed with the appropriate research faculty. Research faculty use the feedback from the council when developing future grants and research projects. Priority is given to those ideas that are researchable within the capabilities of the research programs at AES and funding sources. Because of the small staff size and limited scope of our programs not all areas can be addressed. In cases where the topic is outside of the AES faculty area of expertise efforts are made to get information for the stakeholders from other sources and put the stakeholders in contact with other people, either within UVI or outside, who can provide assistance. The small community and high level of contact with farmers help to provide continuous input and feedback from the community regarding the work being done by AES as well as providing a means for identifying the concerns of the agricultural community. The demographics of the USVI are such that all of our stakeholders would qualify as underserved or underrepresented populations based on factors such as race, gender, economic status and farm size.

Workshops and seminars on various topics (horticulture, animal science, aquaculture and agronomy) were conducted and feedback was received from individuals, cooperatives and agribusinesses. Question and answer sessions at each event are used to allow the community to bring up issues that they feel are important to the agriculture community and this allows the AES scientists to get input on their research as well. Because of the small size of the agriculture community in the USVI, anyone who contacts AES regarding information on agriculture is considered a stakeholder. In most cases, input from stakeholders is directed at a specific program and the program leader is charged with deciding how to consider the input and what action to take. The response may be just a simple matter of providing information to the stakeholder in the form of verbal communication or technical bulletins. In other instances it may involve a visit to the farm to provide technical assistance with a crop (plant or livestock) in conjunction with the appropriate CES personnel.

The newly formed Virgin Islands Farmers Cooperative is taking a different approach to promoting agriculture in the USVI. They are developing plans for small scale crop production and are working with the Horticulture program on this. They are also working with the Agronomy and Animal Science Programs to develop hay production for small livestock production using some of the new, higher quality forages being evaluated.

## **2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

### **1. Method to identify individuals and groups**

- Use Advisory Committees
- Other (Informal contacts with producers)

#### **Brief Explanation**

AES is available to any individual or group who approaches AES with a question or a proposed research idea. Some of these ideas come through the Advisory Council, whose members are on other community groups or co-ops and bring them forward at the meetings. In some cases AES faculty have to mention that we are here for research and we direct people with questions or concerns about outreach activities to the appropriate Cooperative Extension Service staff.

## **2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

### **1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Other (Clients contact AES with specific requests)

**Brief Explanation**

Stakeholder input is collected by the pertinent program, depending on the source and area of interest. In many cases stakeholders come to AES faculty and staff with questions or concerns and we can provide an answer in short order. In other cases we are able to get them the information after doing a bit of searching. We are also able to direct them to outside resources such as the VI dept of Agriculture or other federal agencies or NGOs that may have the information they are seeking.

**3. A statement of how the input was considered**

- To Identify Emerging Issues
- Redirect Research Programs
- To Set Priorities

**Brief Explanation**

Input is used when developing future research projects. In some cases an idea is not really researchable but we make an effort to provide some feedback to the stakeholder on these topics. In other cases where there is a researchable idea brought to us we can incorporate it into current projects or into new projects. Sometimes the lag time between getting an idea and being able to implement the research project to come up with an answer is frustrating to the stakeholders, but when the information is finally generated they are glad to have it.

**Brief Explanation of what you learned from your Stakeholders**

We learned that there is still a good bit of confusion about the roles of AES and CES in the eyes of the stakeholders, both internal and external. The local community as well as the central administration of the University are still not clear on the separate functions of AES and CES as part of the land grant system. In many cases stakeholders approach AES about outreach activities and we have to direct them to the CES offices. In addition, there is some pressure from the central administration for AES faculty and staff to conduct outreach activities in spite of there being no joint appointments between AES and CES that would allow us to do these activities.

We also learned that our stakeholders have very specific ideas of what they would like to see AES doing. They provide valuable input on crop varieties that they would like to see evaluated for local production as well as issues relating to minimizing water usage for crop production.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
0	0	868497	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	0	0	742674	0
<b>Actual Matching</b>	0	0	462353	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	0	0	1205027	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years</b>				
<b>Carryover</b>	0	0	0	0

**V. Planned Program Table of Content**

<b>S. NO.</b>	<b>PROGRAM NAME</b>
1	Animal Science - Small Ruminants
2	Animal Science - Dairy Cattle
3	Animal Science - Beef Cattle
4	Plant Biotechnology
5	Plant Germplasm Conservation and Enhancement
6	Agronomy - Tropical Hay Production
7	Horticulture
8	Irrigation
9	Aquaculture - Biofloc Systems
10	Aquaculture - Aquaponic Systems
11	Whole Farm Systems Research



**Program #1****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Animal Science - Small Ruminants

**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			40%	
303	Genetic Improvement of Animals			10%	
307	Animal Management Systems			50%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual</b>	0.0	0.0	3.0	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
0	0	1037	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	629	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**

- Conduct research project
- Sell breeding stock to local farmers and lambs for meat market
- Present data at conferences and seminars

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

The target audience of this research is sheep producers in the US Virgin Islands and the greater Caribbean area, as well as producers in all tropical areas of the world.

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	1

**Output #2**

**Output Measure**

- Journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	0

**Output #3**

**Output Measure**

- Livestock Production Workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	2

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

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

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Number of local farmers using crossbred sheep
2	Number of sheep producers managing their flocks with an accelerated lambing system

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

Number of local farmers using crossbred sheep

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	10	10

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Local sheep producers want to increase the size and efficiency of lambs produced without increasing costs.

**What has been done**

St. Croix White and Dorper X St. Croix White lambs were weaned at either the standard 63 days of age or 90 days of age in an accelerated lambing system, in which ewes produce 3 lambs crops every 2 years. Lambs were placed on pasture with feed supplementation after weaning.

**Results**

Ewe weight at breeding prior to lambing was not different than at the subsequent breeding (41.7 vs. 40.9 kg, respectively). At the start of the subsequent breeding 80% of LATE ewes were nursing lambs while none of the CONTROL ewes were. Pregnancy rate at the subsequent breeding, determined by ultrasound, was not different between LATE and CONTROL ewes (85 vs. 90.9%, respectively). The ratio of litter weaning weight to ewe weight was greater for dams of LATE lambs than dams of CONTROL lambs (56.7 vs. 42.6 %, respectively). At weaning LATE lambs were heavier than CONTROL lambs (14.8 vs. 10.7 kg, respectively). At 90 d age there was no difference in weight between LATE and CONTROL lambs (14.9 vs. 13.9 kg, respectively) even though the CONTROL lambs had been on feed for 27 d since being weaned. The ADG from birth to 90 days of age was not different between LATE and CONTROL lambs (131.2 vs. 119.9 g/d, respectively). Weaning at 90 days of age can be done in an accelerated lambing system with no detrimental effect on ewe productivity. The later weaning led to a decrease in the amount of time that lambs received high cost, imported feed without a reduction in their growth and would have a positive impact on the economics of producing hair sheep in the tropics.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
307	Animal Management Systems

**Outcome #2****1. Outcome Measures**

Number of sheep producers managing their flocks with an accelerated lambing system

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	4

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Because sheep in the VI do not have breeding seasons they can be bred at all times of the year. This allows producers to get up to 3 lamb crops every 2 years and increase their overall production.

**What has been done**

Local breeds and the crossbred sheep were managed in an accelerated lambing system. Selection pressure included multiple births and a high weaning weight index.

**Results**

The two genotypes had similar levels of production such as number of twins produced, but the crossbred ewes produced larger, faster growing lambs.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
307	Animal Management Systems
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Economy

**Brief Explanation**

Budgets have been flat, which amounts to a decrease with increases in operating expenses (utilities, feeds, fuel, repairs and maintenance of facilities). Sales of sheep to local producers has been slowed by the economy and revenue generation is lower than other years.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Other (Informal discussions and feedback at workshops)

**Evaluation Results**

Local sheep producers are interested in expanding their operations and see the use of the accelerated lambing and crossbreeding as an acceptable method. They still realize that there is some value of the local sheep breeds and are aware of the fact that they can't crossbreed all of their sheep.

**Key Items of Evaluation**

More and more farmers are getting into small ruminant production and they continue to come to AES for advice and input, as well as buying breeding stock from us.

**Program #2**

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

**1. Name of the Planned Program**

Animal Science - Dairy Cattle

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
305	Animal Physiological Processes			20%	
306	Environmental Stress in Animals			80%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.5	0.0
<b>Actual</b>	0.0	0.0	0.5	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	53835	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	37411	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**

- Conduct research project
- Mentor student
- Participate with collaborators
- Present results at a conference

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

Target audiences included cattle producers in the tropics and southern U.S. and other researchers studying heat stress

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts presented

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	1

**Output #2**

**Output Measure**

- Students mentored

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1

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

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

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Number of collaboratrts on the project using coat color in their study design
2	Mentoring students



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

Number of collaborators on the project using coat color in their study design

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	5	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Coat color can impact the ability of a dairy cow to tolerate high heat and humidity.

**What has been done**

Digital images of cattle were collected to use for coat color analysis

**Results**

Images were not analyzed due to staff shortage.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
305	Animal Physiological Processes
306	Environmental Stress in Animals

**Outcome #2****1. Outcome Measures**

Mentoring students

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	1

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Involving students in agriculture research is a way that AES Research Faculty can be involved in student education.

**What has been done**

A student was mentored and conducted a project evaluating the use of thermal imaging as a method to measure body temperature in cattle.

**Results**

The maximum temperature of the area of the whole eye and the center of the muzzle was determined. It was found that both vaginal temperature and rectal temperature were correlated with mean eye temperature. Muzzle temperature was moderately correlated only with the mean eye temperature. Thermal imaging is an effective way to assess body temperature in cattle, thus reducing the need to handle animals. With further study, this could have implications as a non-invasive means of measuring the body temperature in both domestic and non-domestic animals. The student presented the data at a Student Resrecah Symposium.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
306	Environmental Stress in Animals

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

##### External factors which affected outcomes

- Economy
- Appropriations changes
- Other (No dairy cattle the VI.)

##### Brief Explanation

The dairy industry on St. Croix declined and is now out of existence. The multistate project for this research was terminated at the end of FY 08 due to dwindling participation by members of the group.

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

##### 1. Evaluation Studies Planned

- Retrospective (post program)

##### Evaluation Results

The student benefited from this resercah because she was able to present her data at a Student Resercah Symposium. The data was also incorporated into a larger data to be presented at a scientific conference in FY 09.

##### Key Items of Evaluation

**Program #3**

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

**1. Name of the Planned Program**

Animal Science - Beef Cattle

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
305	Animal Physiological Processes			10%	
306	Environmental Stress in Animals			70%	
307	Animal Management Systems			20%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	1.0	0.0
<b>Actual</b>	0.0	0.0	1.0	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
0	0	12229	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	8497	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**

- Conduct experiments
- Present result at conferences
- Partner with collaborators

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

Target audiences would include beef cattle producers in the tropics and southern US.

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	1

**Output #2**

**Output Measure**

- Journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	0

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

<b>O No.</b>	<b>OUTCOME NAME</b>
1	# of farmers using temperament to select cattle
2	# of farmers using managed breeding for their cattle operations in the VI

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

# of farmers using temperament to select cattle

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	1

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Calmer cattle have higher rates of gain and yield higher quality meat. Selecting cattle for calm disposition can lead to higher productivity and a better quality product for the consumer.

**What has been done**

Senepol calves were evaluated at weaning using chutes score and exit velocity as indicators of temperament.

**Results**

It was found that bull calves had a higher rate of gain from birth to weaning (0.9 vs. 0.8 kg/d, respectively) and a higher weaning weight (250 vs. 225 kg, respectively) than heifer calves. Exit velocity and temperament score were not different between bull and heifer calves (2.9 m/sec and 2.5, respectively). More data is scheduled to be collected at 90 days post weaning and at yearling age for the bull and heifer calves.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
306	Environmental Stress in Animals
305	Animal Physiological Processes
307	Animal Management Systems

**Outcome #2****1. Outcome Measures**

# of farmers using managed breeding for their cattle operations in the VI

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	2

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Managing cattle to have specific breeding seasons can be used to increase efficiency of management and production when resources are limited.

**What has been done**

Cow productivity in a controlled breeding program was evaluated. Females were exposed to bulls for 60 days to produce calves in either the spring or the fall.

**Results**

There was no difference in the proportion of females exposed to the bulls that calved between the spring and fall calving herds (72 vs. 66 percent, respectively). Across seasons 70 percent of cows and 69 percent of heifers calved and 94 percent of calves were born alive. The incidence of calving difficulty was below 2 percent overall. More data is being collected as the herds continue their production cycles.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
306	Environmental Stress in Animals
305	Animal Physiological Processes
307	Animal Management Systems

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

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation**

Because of seasonal rainfall and limited forage at the ranch location, cattle are grazing forage that is limited in quantity during much of the year. The herd was donated to UVI and central administration expects it to be self supporting so costs are monitored closely. Priorities are evaluated when it comes to expenses and decisions are made to get the most benefit from the limited funds available.

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

**1. Evaluation Studies Planned**

- Other (informal discussion with local cattle producers)

**Evaluation Results**

Local producers are interested in using managed breeding but in most cases they don't have the required level of management or resources.

**Key Items of Evaluation**

**Program #4****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Plant Biotechnology

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms			20%	
204	Plant Product Quality and Utility (Preharvest)			40%	
206	Basic Plant Biology			40%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	1.5	0.0
<b>Actual</b>	0.0	0.0	1.0	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
0	0	20369	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	13021	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**

- Conduct research project
- Develop genetically enhanced plants
- Develop efficient micropropagation systems
- Present data at conferences
- Develop fact sheets for the local population
- Publish results in scientific journals

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

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.



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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Number of publications

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	2

**Output #2**

**Output Measure**

- Number of journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	2

**Output #3**

**Output Measure**

- Workshop/Seminars

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1

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

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

O No.	OUTCOME NAME
1	Number of local farmers growing micropropagated pineapple
2	Number of local farmers and back yard growers applying the developed techniques to their production systems.

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

Number of local farmers growing micropropagated pineapple

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	2	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)****What has been done**

This project has been terminated.

**Results****4. Associated Knowledge Areas**

KA Code	Knowledge Area
206	Basic Plant Biology
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)

**Outcome #2****1. Outcome Measures**

Number of local farmers and back yard growers applying the developed techniques to their production systems.

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	2

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The Virgin Islands farmers and backyard growers care because they have limited financial and land resource.

**What has been done**

Papayas have been bred for and selected for early bearing with fruit set within one meter from the soil level. The compact and low to the ground fruit set allows for production in a double-row system with plant spacing of one meter by two meters. An evaluation was set up involving standard sized commercial papaya varieties from Hawaii and Taiwan with those developed at the University of the Virgin Islands.

In vitro virus-free sweet potatoes were obtained from the USDA. Due to the fact that they only supply two plants per the eleven varieties, an in vitro system was developed to micropropagate the varieties to increase the numbers to a level applicable to a field variety trial. Rooting and growth of the stems were studied at multiple sucrose concentrations.

### Results

The original purpose for developing the early bearing papaya was to impart wind tolerance. During the October, the papaya field was exposed to hurricane force winds from Omar. The standard sized papayas had damage of 90% due to stem breakage or blown over plants. However, the compact early bearing lines had no stem breakage and less than 15% blown over. This indicates that these new compact early bearing lines are hurricane tolerant. Though there was leaf damage from the winds, the compact papaya continued to flower and produce fruit.

The sweet potatoes grew well on a basic MS medium. Sucrose levels above 6% reduced internodal length and rate of leave development. Nodal segments initiated roots within 3-4 days upon transfer to fresh medium. Sweet potatoes grown on 4% sucrose grew the quickest to produce the most microcuttings for propagation.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
204	Plant Product Quality and Utility (Preharvest)

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

#### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Other (Fed certification of transgenics)

#### Brief Explanation

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

#### 1. Evaluation Studies Planned

- Retrospective (post program)
- Other (Informal discussions)

#### Evaluation Results

#### Key Items of Evaluation

**Program #5**

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

**1. Name of the Planned Program**

Plant Germplasm Conservation and Enhancement

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources			80%	
205	Plant Management Systems			20%	
<b>Total</b>				100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	1.5	0.0
<b>Actual</b>	0.0	0.0	1.0	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
0	0	69176	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	62777	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**

- Conduct research project
- Sell papaya seeds to local framers
- Present data at conferences
- Develop fact sheets for local growers
- Publish results in scientific journals

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

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over three acres.

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Number of publications

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	0

**Output #2**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1

**Output #3**

**Output Measure**

- Workshops/seminars

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	2

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

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

O No.	OUTCOME NAME
1	Number of local farmers growing selected plant varieties

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

Number of local farmers growing selected plant varieties

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	8	8

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The Virgin Islands farmers and backyard growers because they have limited financial and land resource.

**What has been done**

Sorrel was grown on a soil conducive to growth and production as compared to the previous year's high pH soil. Seedlings were set out in the late fall which resulted in a crop past the normal season.

Sweet corn is plagued year round by the corn earworm. Bt sweet corn was evaluated through a season in two week successive plantings. Local corn, used for roasting was used along with cultivars from the Caribbean. Data was collected on plant height, production and worm damage to the ear.

**Results**

The sorrel grew and flowered early before the plant attained a normal size. This also influenced the number and length of branches which normally also flower and set fruit. Two dwarf lines were found in the germplasm collection. One of the lines produces a fruit twice the size of others. A cultivar from a local farmer produced very deep red fruit. Fruit set was 20% lower than normally grown plants started at an earlier date. However, because the crop was late and out of the normal season, a higher price could be obtained from the production which offset the lower yield.

The three lines of Bt sweet corn outperformed the locally grown cultivars. Worm damage was significantly greater on the local corn that had leaves shredded by worm damage and many ears totally destroyed. However, the Bt sweet corn lines were susceptible to rust which the local cultivars were resistant to. The Bt lines of sweet corn were two to three weeks earlier than the local corn as well as being 8-12" shorter.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation**

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```



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

**1. Evaluation Studies Planned**

- During (during program)

**Evaluation Results**

**Key Items of Evaluation**

**Program #6**

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

**1. Name of the Planned Program**

Agronomy - Tropical Hay Production

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
204	Plant Product Quality and Utility (Preharvest)			40%	
205	Plant Management Systems			60%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	4.0	0.0
<b>Actual</b>	0.0	0.0	3.0	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
0	0	142569	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	69422	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**

- Conduct research project
- Sell hay to local framers
- Present data at conferences
- Publish results in scientific journals
- Conduct local and regional seminars

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

The target audience of this research is local and regional crop and livestock farmers in the U.S. Virgin Islands and the greater Caribbean area as well as producers in all tropical areas of the world.

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	1

**Output #2**

**Output Measure**

- Journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	0	0

**Output #3**

**Output Measure**

- Workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Number of local farmers utilizing legume hay and adoption of legume hay production techniques by local area farmers and the USVI Department of Agriculture.
2	Number of farmers who utilize cover crop technologies in mixed crop-livestock production systems and the number of farmers who use the tested cover crops for soil improvement

**Outcome #1**

**1. Outcome Measures**

Number of local farmers utilizing legume hay and adoption of legume hay production techniques by local area farmers and the USVI Department of Agriculture.

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	0

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

**Issue (Who cares and Why)**

**What has been done**

No work was done in this area this year.

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #2**

**1. Outcome Measures**

Number of farmers who utilize cover crop technologies in mixed crop-livestock production systems and the number of farmers who use the tested cover crops for soil improvement

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	15

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

**Issue (Who cares and Why)**

Small farm holders operating under limited external input farming conditions depend on the production of a diversity of farm products to be sold and consumed on the farm and in the extended family community. This includes horticultural and livestock products that are produced in mixed crop livestock systems. Cover crops can provide a crucial link between organic farming and livestock production. When planted during fallow periods between main crops, cover crops can improve soil physical, chemical, and biological properties and consequently lead to improved soil health and yield of principal crops. Livestock incorporation can provide valuable additional revenue to small holder farmers and can serve as a primary source of organic fertilizer through added manure production. This will result in closed system nutrient cycling where the farm is recycling nutrients from cover crop to livestock to cash crop. Therefore, cover crops may be able to serve to build and improve soils for cash crop production, as well as provide forage in the form of principle grazing, stored hay, or cut and carry green chop for livestock production.

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

Tropical legume and grass varieties were tested for use as cover crops in sustainable organic crop production systems. *Crotalaria juncea*, *Lablab purpureus*, and *Sorghum x Sudan bicolor* were selected to determine plant vigor, biomass production, re-growth vitality, weed competitiveness, and plant tissue analysis to determine forage quality. Land is currently being prepared for spring and summer field experiments.

#### **Results**

This research is in its initial year and no research findings are available at this time.

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

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

##### **Brief Explanation**

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

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

- Retrospective (post program)

##### **Evaluation Results**

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

**Program #7**

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

**1. Name of the Planned Program**

Horticulture

**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			30%	
133	Pollution Prevention and Mitigation			10%	
202	Plant Genetic Resources			20%	
205	Plant Management Systems			30%	
216	Integrated Pest Management Systems			10%	
<b>Total</b>				100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual</b>	0.0	0.0	0.5	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	82046	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	49764	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**

- Conduct research
- Present data at conferences
- Publish results in scientific journals

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

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

**Year Target**  
 Plan: 0  
 2008 : {No Data Entered}

**Patents listed**  
 {No Data Entered}

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

**Number of Peer Reviewed Publications**

	Extension	Research	Total
Plan	0	0	
2008	{No Data Entered}	{No Data Entered}	0

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

**Output Target**

**Output #1**

**Output Measure**

- Research publications

Year	Target	Actual
2008	1	0

**Output #2**

**Output Measure**

- Abstracts presented at conferences

Year	Target	Actual
2008	1	0



**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Selection of pest and disease resistant cultivars and effect of cover crops on soil characteristics
2	# of farmers using selected cultivars
3	# farmers adopting sustainable production systems

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

Selection of pest and disease resistant cultivars and effect of cover crops on soil characteristics

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	0

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

**Issue (Who cares and Why)**

**What has been done**

No work was done this year.

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
202	Plant Genetic Resources
133	Pollution Prevention and Mitigation
216	Integrated Pest Management Systems
205	Plant Management Systems

**Outcome #2****1. Outcome Measures**

# of farmers using selected cultivars

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	3	3

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

**Issue (Who cares and Why)**

**What has been done**

Research is described under the irrigation planned program.

## Results

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
202	Plant Genetic Resources

### Outcome #3

#### 1. Outcome Measures

# farmers adopting sustainable production systems

#### 2. Associated Institution Types

•1862 Research

#### 3a. Outcome Type:

Change in Action Outcome Measure

#### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	0

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

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

The Virgin Islands farmers and backyard growers because they have limited financial and land resource.

##### What has been done

A study was set up to evaluate pepper production under field conditions and inside an antivirus screen house. Five varieties of peppers were examined which included sweet Caribbean seasoning peppers to the ultra hot scotch bonnet. Plants were grown for one year and data collected on production, insect population and incidence of viral disease.

##### Results

The peppers started to produce fruit at nearly the same time. Plants in the open field had insect and the onset of viruses within two months. The production of field grown peppers decreased with time and many had succumb to the virus disease within five months. Production in the screen house was maintained throughout the entire duration of the year long production study. During the last two months, insects and viruses did occur in the screen house. The insects are believed to have entered from employees entering the screen house after having harvested peppers from the insect and virus infected open field pepper plot. Production and yield in the screen house was three times the open field production.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
202	Plant Genetic Resources
216	Integrated Pest Management Systems
102	Soil, Plant, Water, Nutrient Relationships

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

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

#### **Brief Explanation**

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

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

- Retrospective (post program)
- During (during program)

#### **Evaluation Results**

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

**Program #8**

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

**1. Name of the Planned Program**

Irrigation

**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			30%	
111	Conservation and Efficient Use of Water			30%	
132	Weather and Climate			10%	
205	Plant Management Systems			10%	
405	Drainage and Irrigation Systems and Facilities			20%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual</b>	0.0	0.0	0.5	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	2137	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1704	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**

- Conduct research projects
- Present data at conferences
- Publish results in scientific journals

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

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

Year	Target
Plan:	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	Extension	Research	Total
Plan	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstract presented at conference

Year	Target	Actual
2008	1	0

**Output #2**

**Output Measure**

- Research publications

Year	Target	Actual
2008	1	0

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Knowledge of evapo-transpiration crop coefficients and water use efficiency in crop production
2	Knowledge of water requirements in shade crops production
3	# of farmers growing shade crops
4	# farmers adopting irrigation strategies based on soil moisture

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

Knowledge of evapo-transpiration crop coefficients and water use efficiency in crop production

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	0	0

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

**Issue (Who cares and Why)**

**What has been done**

Nothing was done due to the program leader vacancy

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
405	Drainage and Irrigation Systems and Facilities
132	Weather and Climate
205	Plant Management Systems
111	Conservation and Efficient Use of Water

**Outcome #2****1. Outcome Measures**

Knowledge of water requirements in shade crops production

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	0

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

**Issue (Who cares and Why)**

**What has been done**

Nothing was done due to the program leader vacancy.



## Results

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
102	Soil, Plant, Water, Nutrient Relationships
405	Drainage and Irrigation Systems and Facilities
111	Conservation and Efficient Use of Water
132	Weather and Climate

### Outcome #3

#### 1. Outcome Measures

# of farmers growing shade crops

#### 2. Associated Institution Types

•1862 Research

#### 3a. Outcome Type:

Change in Action Outcome Measure

#### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	0

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

**Issue (Who cares and Why)**

**What has been done**

Nothing was done due to the program leader vacancy.

**Results**

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
111	Conservation and Efficient Use of Water
102	Soil, Plant, Water, Nutrient Relationships
405	Drainage and Irrigation Systems and Facilities
132	Weather and Climate

### Outcome #4

#### 1. Outcome Measures

# farmers adopting irrigation strategies based on soil moisture

#### 2. Associated Institution Types

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	2	2

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The Virgin Islands farmers and backyard growers because they have limited financial and land resource.

**What has been done**

Drip irrigation was used in variety trials of tomato, cucumber and seedless watermelons. Determinant tomato varieties were set up in a replicated trial with or without a grass hay mulch to conserve water and control weeds. Fifteen varieties of cucumbers were grown to evaluate the amount of water required and the production of new varieties as compared with established locally grown cultivars. Three types of cucumber were grown which included the locally popular pickling type, slicing type and the European long cultivars. Three types of seedless watermelons were grown which include red, yellow and orange cultivars. The seedless watermelons under drip irrigation were evaluated as a value added crop since the seeds can cost as much as one dollar each.

**Results**

Tomato production was similar between the mulched and unmulched sections utilizing drip irrigation. However, there was a greater incidence of diseases on the mulch treatments which was due to the higher level of humidity. The mulched plots were easier to harvest after the frequent rains. Of the three types, the slicing cucumber were the most productive. Consumer preference has migrated to these varieties due to the lack of bitterness as the fruits get beyond maturity. The yellow and orange seedless watermelons were a novelty and consumers at first had resistance to sampling but found these colors of equal or sweeter quality than the red varieties.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
405	Drainage and Irrigation Systems and Facilities
205	Plant Management Systems
111	Conservation and Efficient Use of Water
132	Weather and Climate

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation**

The program leader vacancy (Assistant Professor - Horticulture) affected progress in this planned program.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Retrospective (post program)
- During (during program)

**Evaluation Results****Key Items of Evaluation**

**Program #9**

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

**1. Name of the Planned Program**

Aquaculture - Biofloc Systems

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
307	Animal Management Systems			80%	
403	Waste Disposal, Recycling, and Reuse			20%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.5	0.0
<b>Actual</b>	0.0	0.0	1.5	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	179638	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	109564	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**

- Conduct research project
  
- Conduct training
  
- Present data at conferences
  
- Publish results in scientific journals

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

The target audience is researchers, farmers, entrepreneurs, teachers, development workers and hobbyists. These are categories of people who have accessed our results. The audience is local, national and international.

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	1

**Output #2**

**Output Measure**

- Journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	1

**Output #3**

**Output Measure**

- Short course

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	3

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

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

<b>O No.</b>	<b>OUTCOME NAME</b>
1	Number of new farmers anywhere adopting aquaponic technology

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

Number of new farmers anywhere adopting aquaponic technology

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	1

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Many farmers in the Virgin Islands would like to raise fish commercially as indicating by the fact that 17 farmers completed an aquaculture short course this year. The demand for fish is increasing and prices are skyrocketing with almost a doubling in price for reef fish this year. Using biofloc technology, the feasibility of raising tilapia has been demonstrated. Farmers are interested in adopting this technology.

**What has been done**

A 6-month production trial was conducted in a commercial-scale, 200-m<sup>3</sup> biofloc system. The objective addressed in this trial was to improve survival by completely covering the tank with bird netting supported by a superstructure. The system was stocked with 5,000 tilapia fingerlings (25/m<sup>3</sup>) which were fed twice a day ad libitum with a complete diet of floating pellets containing 32% protein for 6 months. A side stream flow was passed through two denitrification tanks in which thirteen species of aquatic plants were cultured. At the end of the trial all the fish were captured, weighted and counted. The aquatic plants were harvested and weighed.

**Results**

The total harvest weight was 3,711 kg. The fish grew from an average stocking weight of 154 g to an average harvest weight of 745 g. Average daily growth rate was 3.52 g. The final density was 18.55 kg/m<sup>3</sup>. The feed conversion ratio was 2.04. Survival was 99.7%. Only three aquatic macrophytes showed potential by gaining significant biomass. They were green taro (33.7 kg/m<sup>3</sup>), papyrus (16.0 kg/m<sup>3</sup>) and giant sagittaria (6.5 kg/m<sup>3</sup>). The bird netting successfully prevented bird predation. The best previous survival was 86% compared 99.7% in this trial. As a result of high survival, the final density reached an all-time high of 18.55 kg/m<sup>3</sup> for this system. Production was 37 times greater than standard pond culture. An enterprise budget will now be created and made available to farmers.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
307	Animal Management Systems

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation****V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- During (during program)

## **Evaluation Results**

### **Key Items of Evaluation**

**Program #10**

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

**1. Name of the Planned Program**

Aquaculture - Aquaponic Systems

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems			40%	
307	Animal Management Systems			30%	
403	Waste Disposal, Recycling, and Reuse			30%	
	<b>Total</b>			100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual</b>	0.0	0.0	2.0	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
0	0	179638	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	109564	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**



- Conduct research project
- Provide training
- Present data at conferences
- Publish results in scientific journals

## 2. Brief description of the target audience

The target audience is researchers, farmers, entrepreneurs, teachers, development workers and hobbyists. These are the categories of people who have accessed our results. The audience is local, national and international.

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

### 1. Standard output measures

#### Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

#### Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

#### Patents listed

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

#### Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	0	0

## V(F). State Defined Outputs

### Output Target

**Output #1**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	3

**Output #2**

**Output Measure**

- Journal articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	0

**Output #3**

**Output Measure**

- Short Courses

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	3

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

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

O No.	OUTCOME NAME
1	Number of new farmers anywhere adopting aquaponic technology

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

Number of new farmers anywhere adopting aquaponic technology

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Interest in aquaponics continues to grow, and the scope is global as indicated by the number of people from foreign countries and U.S. states attending the International Aquaponics and Tilapia Aquaculture Course. This year aquaculture program personnel trained 95 individuals. Many of these people are constructing and operating aquaponic systems based on the UVI commercial system design. They are interested in any new findings as these findings will be used in preparing business plans and successfully operating production systems.

**What has been done**

A variety trial was conducted for lettuce. During the period of February through April, seven crops of lettuce were produced utilizing 36 varieties of lettuce from five major groups of lettuce (bibb, green looseleaf, red looseleaf, crisphead and romaine). Transplants were grown in a greenhouse for 3 weeks and transferred to the aquaponic system for an additional 4 weeks of growth before harvest. At harvest the roots were cut off and the plants were weighed. Survival was not recorded due to a high rate of mortality immediately after transplanting. It is believed that the transplants were weak due to light limitation in the greenhouse. The fiberglass roof was old and nearly opaque. New greenhouses have subsequently been constructed.

**Results**

In each lettuce group the best two varieties, based on average weight over seven crops, were as follows: Bibb (Buttercrunch, 352 g; Baja, 350 g) green looseleaf (Green Wave, 290 g; Envy, 249 g), red looseleaf (Red Star, 332 g; Red Sails, 273 g), crisphead (Mighty Joe, 248 g; Summertime, 243 g) and romaine (Jericho, 369 g; Ideal, 367 g). These results occurred during the cool season in the Virgin Islands. This trial needs to be repeated as high survival and accurate data on survival is very important in developing business plans and making production projections. A variety trial must also be conducted during the hot season as the results may be different. The system used in this study is outside and subject to ambient temperatures. In environmentally controlled greenhouses temperature will be fairly constant throughout the year and only one variety trial at that temperature may be required.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
307	Animal Management Systems
205	Plant Management Systems

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation**

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

**1. Evaluation Studies Planned**

- During (during program)

**Evaluation Results**

**Key Items of Evaluation**

**Program #11**

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

**1. Name of the Planned Program**

Whole Farm Systems Research

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

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems			40%	
307	Animal Management Systems			10%	
403	Waste Disposal, Recycling, and Reuse			20%	
601	Economics of Agricultural Production and Farm Management			30%	
<b>Total</b>				100%	

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

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	4.0	0.0
<b>Actual</b>	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	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**

- Conduct research project
- Present data at conferences
- Publish results in scientific journals, farmers bulletins and fact sheets

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

Project terminated

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2008	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

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

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- Abstracts presented at conferences

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	0

**Output #2**

**Output Measure**

- Journal articles, farmers bulletins, fact sheets

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	1	0

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

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

O No.	OUTCOME NAME
1	Number of local farmers who adopt some portion of model farm



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

Number of local farmers who adopt some portion of model farm

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1	0

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

**Issue (Who cares and Why)**

**What has been done**

The project has been terminated.

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
403	Waste Disposal, Recycling, and Reuse
205	Plant Management Systems

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

**Brief Explanation**

This project has been terminated.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Retrospective (post program)

**Evaluation Results****Key Items of Evaluation**