

House Committee on Agriculture
Subcommittee on Biotechnology, Horticulture, and Research
Resiliency of Agriculture in the US Virgin Islands

Wednesday June 12, 2019

Testimony of Robert W. Godfrey, Ph.D.

Introduction

Good morning Chairwoman Plaskett, Ranking Member Dunn and Members of the Subcommittee. Thank you for this opportunity to provide testimony for this subcommittee.

My name is Dr. Robert Godfrey and I am the Director of the Agricultural Experiment Station (AES) at the University of the Virgin Islands. Our faculty and staff conduct research in the disciplines of Agroforestry, Agronomy, Animal Science, Aquaculture, Biotechnology and Horticulture. The Cooperative Extension Service (CES) provides outreach to the community in Agriculture & Natural Resources, 4-H/Family & Consumer Sciences and Communications, Technology & Distance Learning.

Most of our research projects incorporate climate and the environment as a necessity due to our location. Currently we have research projects evaluating micro-irrigation to enhance water use efficiency for crops, mulching systems and cover crops to minimize external inputs for soil improvement, evaluating adaptive traits of local livestock breeds such as Senepol cattle and St Croix White Hair sheep and selecting and developing field crop varieties for enhanced production in the tropics.

Overview of Agriculture in the US Virgin Islands

It is estimated that the US Virgin Islands imports 90 to 95% of its food items indicating that there is an enormous potential market opportunity for local farmers to tap into. Farming in the US Virgin Islands is characterized by small farms averaging less than 5 acres in size¹. Most agricultural production inputs are imported and high shipping costs contribute significantly to the costs of operating a farm.

Based upon the USDA definitions, the majority of the farmers in the US Virgin Islands are limited resource and socially disadvantaged farmers. They face many constraints that are unique to small scale tropical agriculture such as seasonal rainfall, high incidence of pests and diseases, high organic matter turnover in soils, high temperature and humidity, increasing frequency and intensity of extreme weather events, limited market, and limited access to financing for farm support.

Impact of Extreme Weather on Agriculture in the US Virgin Islands

In September 2017 two category 5 hurricanes devastated the US Virgin Islands only 12 days apart enhancing the level of destruction and hampering recovery efforts. After Hurricane Irma

devastated St. Thomas and St. John, St. Croix farmers, AES, CES, the Virgin Islands Department of Agriculture and community groups collected and shipped relief supplies to our sister islands by commercial and private boats. St. Croix also served as a base of operations for federal support efforts with cargo and personnel being flown back and forth between the islands' airports. Then St. Croix and Puerto Rico were hit by Hurricane Maria and suffered severe damage. The ports of St. Croix, St. Thomas and Puerto Rico were all shutdown, even just temporarily, at the same time which limited the access to relief and recovery resources.

Many crops were lost due to wind damage and saltwater contamination. Livestock farmers suffered damage to fences, animal pens and loss of animals from airborne debris. As an example, the University sheep research flock lost a third of the breeding ewes in its flock. the lack of local resources available such as irrigation supplies, seedlings, fence wire, fence posts and animal feed made recovery efforts for all farmers difficult.

In addition to hurricanes, there have also been periods of drought in the US Virgin Islands. The average annual rainfall is 51 inches² but in 2015 we received less than 25 inches of rain. The Virgins Islands Department of Agriculture was able to offer some livestock feed and imported hay at reduced fees but their ability to provide other services and water for farmers was very limited. The ability for livestock farmers to sell animals was hampered by the limited capacity of the one federally inspected abattoir on St. Croix. The abattoir on St. Thomas is still not operating after suffering damage during Hurricane Irma.

Response to Extreme Weather Events

The field research facilities of the Agricultural Experiment Station were severely damaged and limited our ability to conduct research for most of 2018 after the Hurricane Maria. Our research programs are slowly coming back online but we still have a long way to go.

A proposal has been submitted by AES to the FEMA Hazard Mitigation Grant Program to develop an Agricultural Hazard Mitigation and Resiliency Plan. It will coordinate with the territory-wide comprehensive Hazard Mitigation and Resiliency Plan managed by other units within the University.

In response to stakeholder needs after the recent storms and drought, CES has offered training to help livestock producers rehabilitate their pastures, training on the use of composting, micro-irrigation, and soil conservation, and workshops on restoring trees damaged by storms and droughts using proper pruning techniques. AES and CES staff joined an ad-hoc advisory committee that developed a plan for recycling the large amounts of vegetative/wood debris left by the hurricanes by making mulch that is available for distribution farmers and the community.

Conclusion

In conclusion, I want to say that agriculture in the US Virgin Islands will continue to be impacted by climate change through increased frequency and intensity of extreme weather events. These types of extreme events only serve to highlight the importance of food security and accessibility in a remote island location such as ours. As the University of the Virgin Islands

continues to support and develop agriculture in the US Virgin Islands by working with our local stakeholders and regional and federal partners, the impact of climate change will play a significant role in the development of our resiliency, mitigation and sustainability plans.

Thank you for the opportunity to testify before this subcommittee. I look forward to your questions.

Supplemental Information

- St. Croix is the largest US Virgin Island of approximately 84 square miles displaying relatively flat topography. St. Thomas, 40 miles to the north, is approximately 32 square miles and is well known for its mountainous terrain and excellent harbors. Three miles east of St. Thomas, St. John is approximately 20 square miles, and two-thirds of this island has been designated a U.S. National Park.
- The University of the Virgin Islands was named as an 1862 Land Grant institution in 1972, and is also a Historically Black College and University (HBCU).
- The U.S. Virgin Islands have been impacted by several hurricanes in the past 30 years. The most impactful storms to hit the US Virgin Islands in recent history were Hurricane Hugo in 1989, Hurricane Marilyn in 1995, Hurricane Georges in 1998, Hurricane Lenny in 1999, and Hurricanes Irma and Maria in 2017.
- The most recent data for agriculture in the US Virgin Islands from the 2007 Census of Agriculture¹ indicated between 2002 and 2007 the number of small farms increased, both in number (23%) and acreage occupied (15%). Farm size is small with 64% of farms in the Virgin Islands being 4 acres or less. There has been no Census of Agriculture survey conducted in the US Virgin Islands since 2007 so newer data is unavailable.
- The limited availability and high cost of arable land is a major drawback to farm ownership in the US Virgin Islands. Land ownership is also a concern as 41% of farms, occupying 29% of the total acreage of lands in farms, are on land rented from either the Virgin Islands Department of Agriculture or private individuals.

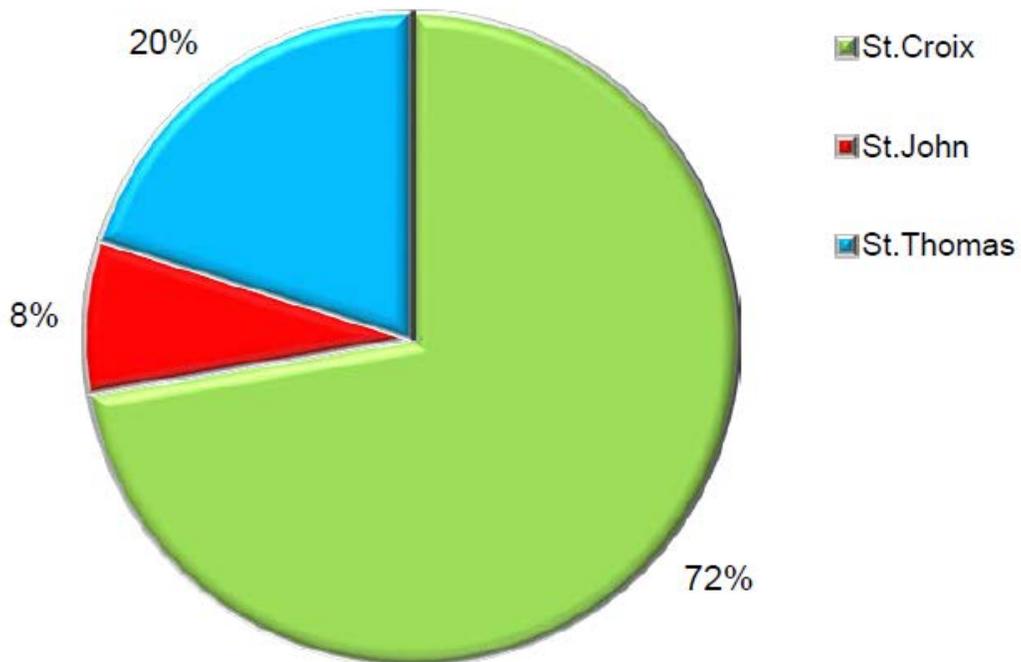


Figure 1. Location of farmers in the US Virgin Islands³

Table 1. Total acreage of farms in US Virgin Islands (in percent) from survey conducted by UVI in 2018³

Response Category	St. Croix	St. Thomas & St. John	Total
Number of respondents	132	49	181
Less than 2 acres	44.2	53.0	44.2
2 to 4 acres	19.9	24.5	19.9
5 to 9 acres	9.4	8.2	9.4
10 or more acres	26.5	14.3	26.5

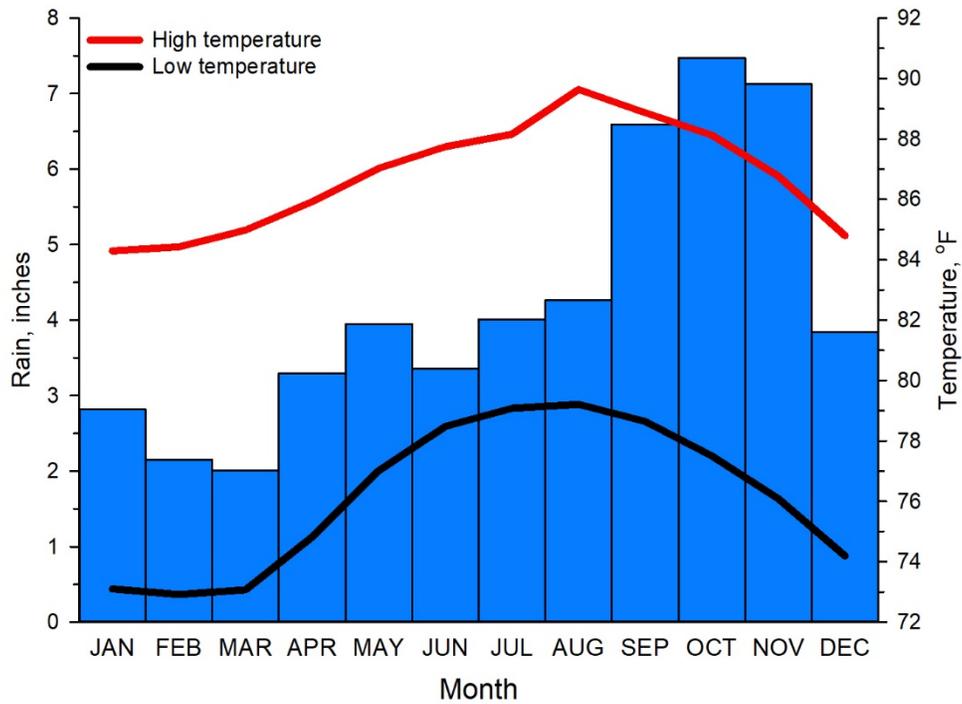


Figure 3. Monthly average rainfall and high and low temperatures on St. Croix (1987-2011) measured at UVI-AES Sheep Research Facility²

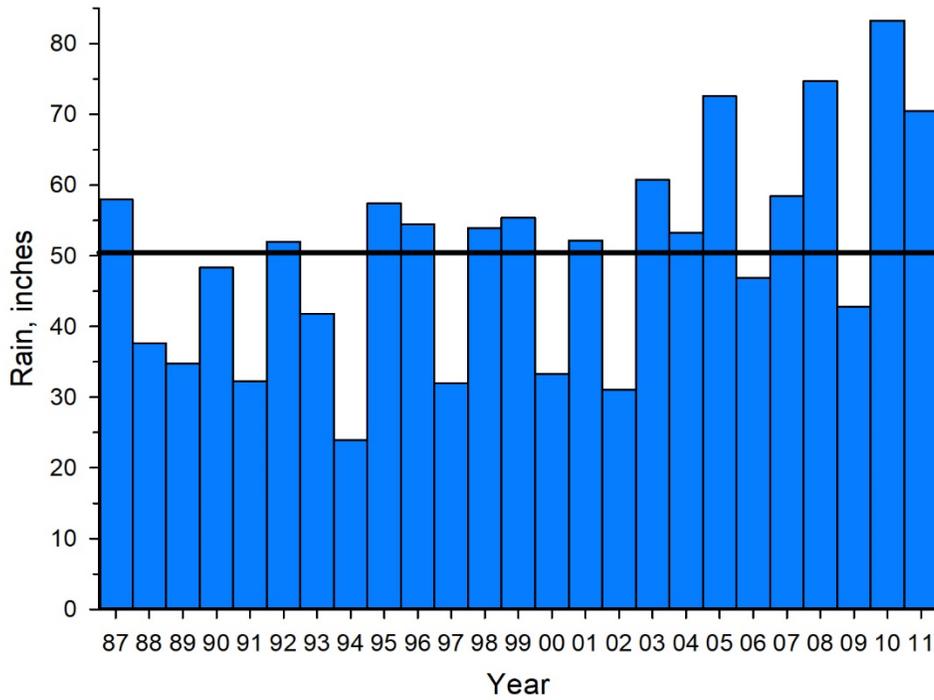


Figure 4. Annual total rainfall on St. Croix (1987-2011) measured at UVI-AES Sheep Research Facility²

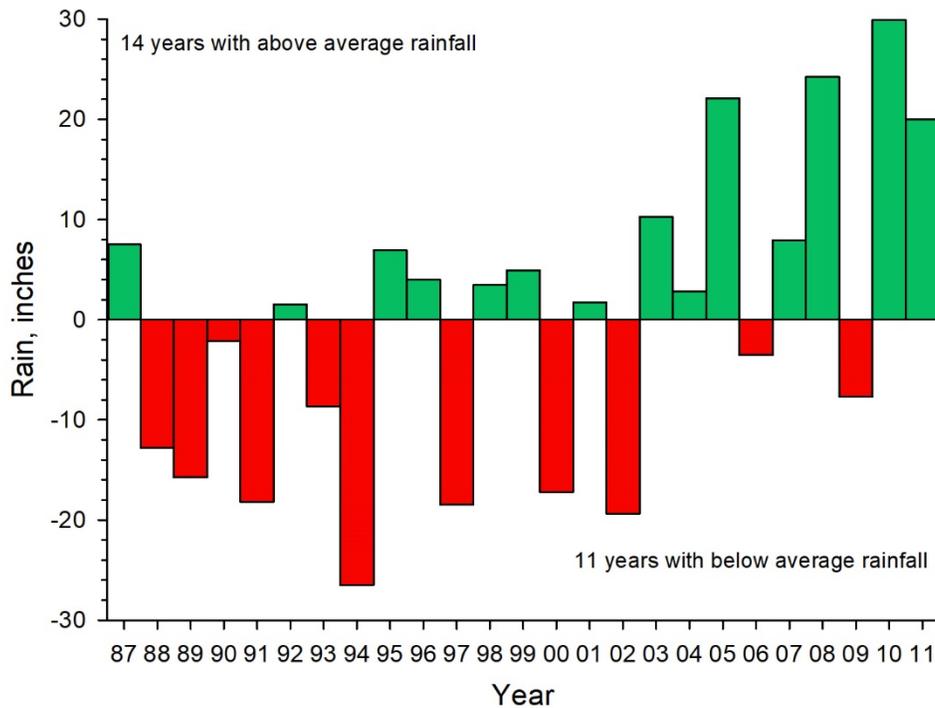


Figure 5. Comparison of annual total rainfall to average on St Croix (1987-2011) collected at UVI-AES Sheep Research Facility²

References

¹2007 Census of Agriculture. United States Department of Agriculture National Agricultural Statistics Service, Issued February 2009

²Godfrey, R.W. Impact of Drought on Livestock. USVI Drought Monitoring Forum. August 30, 2016. Sponsored by: USDA Office of the Chief Economist, National Drought Mitigation Center, NOAA National Weather Service, USDA Farm Service Agency, USDA Natural Resources Conservation Service, UVI Cooperative Extension Service, VI Department of Agriculture, VI Climate Council

³United States Virgin Islands Agro Processing/Packaging Plant Feasibility Study. 2018. University of the Virgin Islands, Institute for Leadership & Organizational Effectiveness

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Education:

- Texas A&M University, College Station - Ph.D., May 1987, Physiology of Reproduction
- Texas A&M University, College Station - M.S., Dec. 1982, Physiology of Reproduction
- Kansas State University, Manhattan - B.S., May 1980, Animal Science and Industry

Professional Experience:

2011 - present Director, University of the Virgin Islands, Agricultural Experiment Station, (80% Administration-20% Research)

2010 - 2011 Acting Director, University of the Virgin Islands, Agricultural Experiment Station

2001 – 2011 Assistant Director, University of the Virgin Islands, Agricultural Experiment Station, (60% Research; 40% Administration)

2006 – present Professor - Animal Science, University of the Virgin Islands, Agricultural Experiment Station, (100% Research)

2006 – present Adjunct Faculty, Department of Animal and Dairy Sciences, Mississippi State University

1998 – 2006 Associate Professor - Animal Science, University of the Virgin Islands, Agricultural Experiment Station, (100% Research)

1993 - 1998 Assistant Professor - Animal Science, University of the Virgin Islands, Agricultural Experiment Station, (100% Research)

1992 - 1993 Research Associate, Texas A&M University, College of Veterinary Medicine, Department of Veterinary Anatomy and Public Health

1989 - 1991 Rhinoceros Research Coordinator, Cincinnati Zoo and Botanical Garden, Center for Reproduction of Endangered Wildlife

1987 - 1989 Post-Doctoral Research Affiliate, ARS Roman L. Hruska U.S. Meat Animal Research Center, Reproduction Research Unit

1981 - 1987 Graduate Research/Teaching Assistant, Texas A&M University Agricultural Research and Extension Center and Department of Animal Science, (M.S. and Ph.D.)

1978 - 1980 Student worker in Department of Animal Science and Industry, Kansas State University

Professional Organizations:

American Society of Animal Science (ASAS) - 1980-Present
American Society of Andrology - 1985-1988
Society for the Study of Reproduction - 1986-2008
International Embryo Transfer Society - 1989-1991
American Association of Zoological Parks and Aquariums - 1989-1991
American Association of Small Ruminant Practitioners – 2003-Present

Caribbean Food Crops Society – 1994 – present

Service Assignments and Administrative Committees:

- Ad hoc reviewer for Journal of Animal Science, Theriogenology, Animal Reproduction, Livestock Science, Domestic Animal Endocrinology, Tropical Animal Health and Production, Journal of Dairy Science, Small Ruminant Research, Sheep and Goat Research Journal, New Zealand Journal of Agriculture Research – 1998 - present
- Ad hoc reviewer for USDA SBIR grants, USDA BARD grants and University of Rhode Island College of the Environment and Life Sciences CARES proposals
- UVI Representative on administrative board for **USDA Tropical and Subtropical Agriculture Research (TSTAR)** grant program in Caribbean basin - 2001-2012
- Volunteer for **Land O'Lakes International Development Division** (USAID funded) in Nigeria for cattle and small ruminant workshops – 2001, 2002
- Volunteer for **Winrock International Farmer to Farmer Program** (USAID funded) in Bangladesh for small ruminant workshops – 2002
- UVI representative to consortium of **Insular Land Grant Institutions in the Caribbean and Pacific (CariPac)** - 2004-present
- Project Manager for **Student Mentoring Program in AES** – 2005 - present
- **Reaccreditation Self-Study Task Force Chair for Research and Public Service** component - July-December 2005
- Member of **UVI Faculty Integration Committee** - 2007-2008
- Secretary-Treasurer Elect, Secretary-Treasurer, President- Elect, President, Past President of the **Southern Section ASAS** - 2009-2013
- Administrative Advisor, and participant, for **SCC-081(Sustainable Small Ruminant Production in the Southeastern U.S.)** – 2011 – Present
- Administrative Advisor for **S-1061(Nutritional Systems for Swine to Increase Reproductive Efficiency)** – 2018 - Present
- AES representative on the **UVI Institutional Effectiveness and Assessment Advisory Board** 2012-present
- **Strategic Planning Subcommittee** Southern Section ASAS - 2012-2013
- Member of organizing committee for the first **UVI Research Day** activity held on St. Croix and St. Thomas campuses – 2012
- Insular Land Grant Institutions representative on the **Association of Public and Land-grant Universities Board on Agriculture Assembly Policy Board of Directors** - 2013-Present
- Peer Review Panel for **USDA-NIFA 1890 Capacity Building Research Grants** - 2015
- Technical committee joint meeting for **HATCH Multistate Project S-1064 and WERA-1** Host – St Croix, VI - 2016
- Annual **SAAESD, ASRED and Southern CARET and AHS** Joint Meeting Location Co-Host – St Thomas, VI - 2016
- Co-Program Director for APHIS sponsored **AgDiscovery** at UVI – 2016 to present
- UVI representative on the **Virgin Islands Industrial Hemp Commission** – 2017-present
- Chair of the **UVI AES-CES Merger Task Force** – 2016-2017
- Chair Elect and Chair of the **Southern Association of Agricultural Experiment Station Directors (SAAESD)** – 2015 to 2017
- Member of the **UVI Agriculture Academic Degree Committee** – 2016 to present
- Member of **UVI Research Policy Committee** – 2016

- **Experiment Station Committee on Organization and Policy (ESCOP)** liaison to the **Extension Committee on Organization and Policy (ECOP)** – 2018-present
- Co-chair of **UVI 2018-2023 Strategic Plan Development** task force for **Leadership and Excellence in Academics, Research and Public Service Focus Area** – 2018
- Member of **Committee of the University of the Virgin Islands Institute for Leadership and Organizational Effectiveness** in association with the **USVI Economic Development Authority Enterprise Zone Commission** to conduct a “Feasibility Study to Analyze the Potential of Establishing a Processing and Packaging Plant in the Virgin Islands” – 2018-present

Awards and Honors:

- University of the Virgin Islands, Research and Public Service, **Outstanding Service Award** – 2003
- Lifetime membership in the **St. Croix Hair Sheep International Association** – 2014
- **Food Systems Leadership Institute (FSLI)** Fellow (Cohort 12 - 2016-2018); Leadership Institute conducted by the Association of Public and Land-Grant Universities; APLU)
- **Fritz E. Lawaetz Award** from the Senepol Cattle Breeders Association recognizing years of service to the Senepol breed - 2018

Teaching/Mentoring Experience:

- Mentored 6 Student Scholars supported by the National Institutes of Health Minority Biomedical Research Support - Research Initiative for Scientific Enhancement (MBRS-RISE) program in collaboration with the College of Science and Math at UVI
- Mentored 3 volunteer students
- Mentored 3 students at UVI as part of National Student Exchange (students from Louisiana State University and Oregon State University)
- Taught BIO 339 – Vertebrate Structure – Fall 2005
- Mentored 2 students enrolled in BIO 495 – Directed Independent Research in Biology as part of grant on Resident Instruction in the Insular Areas; Students
- Mentored 15 undergraduate and 1 graduate student supported by Insular Funds for Resident Instruction in the Insular Areas – (2005 – present)
- Served as graduate committee member for 2 M.S. candidates at Mississippi State University
- Ad-hoc reviewer of 2 graduate student thesis and dissertations – University of the West Indies, University of Queensland

Research Interests:

- Factors that influence fertility in domestic livestock, male and female (i.e., environment, behavior, nutrition)
- Endocrine influences on reproductive competence in domestic livestock relating to gamete production

Grants Received: (\$2,837,172 total funds)

- USDA Minority Summer Internship Program (USDA, Summer 1995, \$2,110)
- Development of Artificial Insemination Procedures for Use in Hair Sheep (USDA-CBAG, 1995-1998, \$151,406)
- Enhancing Fertility in Heat-Stressed Cattle (USDA-CBAG, 1995-97, \$94,743)
- Effect of Supplemental Nutrition at Breeding or Lambing on Hair Sheep Production (USDA-

- TSTAR, 1998-2001, \$104,547)
- Performance of Lambs Sired by Dorper and St. Croix White Hair Sheep in the Tropics. (USDA-TSTAR, 2001-2004, \$103,057)
 - Evaluation of Feeding Regimens to Alleviate Heat Stress in Ruminants in the Tropics (USDA-TSTAR, 2004-2007, \$150,000)
 - Evaluation of Alternative and Conventional Small Ruminant Finishing Systems for the Tropics (USDA-TSTAR, 2005-2008, \$147,387)
 - Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean Islands (USDA-CSREES, 2005-2007, \$39,500)
 - Phase II Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2006-2007, \$51,750)
 - Phase III Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2007-2008, \$52,615)
 - Phase IV Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2008-2009, \$79,334)
 - Phase V Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2009-2010, \$86,468)
 - The effect of hair color and type on heat tolerance, tick resistance and growth rate of cattle under grazing conditions (USDA-TSTAR, 2008-2010, \$120,000)
 - Extension outreach and assistance in improved pasture and livestock management practices for pacific islanders (USDA-NIFA, 2008-2011, \$297,224)
 - Evaluating the influence of genotype and phenotype of Senepol cattle and hair sheep on physiological adaptations to the tropical environment (USDA-TSTAR, 2010-2013, \$120,000)
 - Outreach and Assistance in Tropical Pasture and Livestock Management for Pacific Islanders, (USDA- Office of Advocacy and Outreach 2010-2011, \$400,000; \$34,534 sub award)
 - Phase VI Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2010-2011, \$99,500)
 - Outreach and Assistance in Tropical Pasture and Livestock Management for Pacific Islanders (USDA-Office of Advocacy and Outreach 2011-2012, \$337,841 (Sub award of \$34,534))
 - Phase VII Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-CSREES, 2011-2012, \$99,862)
 - Phase VIII Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-NIFA, 2012-2013, \$98,375)
 - Phase IX Developing Resident Instruction in Food and Agricultural Related Sciences at Land Grant Institutions in the Pacific and Caribbean (USDA-NIFA, 2013-2014, \$97,125)
 - Experiential Learning as a Form of Resident Instruction for Students at the University of the Virgin Islands (USDA-NIFA, 2013-2014, \$159,143)
 - Enhancing Undergraduate Students Education through Experiential Learning in Agriculture Research (USDA-NIFA, 2015-2017, \$162,733)
 - Evaluation of the Relationship between Body Temperature and Grazing Behavior in Livestock in the Tropics (USDA-NIFA, 2015-2017, \$157,475)
 - Innovative Educational Approaches to Addressing Climate Change in the Caribbean (USDA-NIFA, 2016-2018, \$132,000)
 - Increasing opportunities for undergraduate students via experiential learning in agriculture (USDA-NIFA, 2016-2018, \$125,000)

- Rainwater Harvesting, Storage, and Micro-Irrigation for Water Self-Sufficiency (USDA-NIFA, 2017-2019, \$144,750)

Publications:

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4. Godfrey, R. W., R. D. Randel and N. R. Parish. 1988. The effect of using the breeding soundness evaluation as a selection criterion for Santa Gertrudis bulls on bulls in subsequent generations. *Theriogenology* 30:1059-1068.
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- the dry and wet seasons in the U.S. Virgin Islands. *J. Anim. Vet. Adv.* 2:184-190.
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1. Godfrey, R.W. and R.E. Dodson. 2006. Alternative methods of controlling parasites in small ruminants. Pages 62-70 in *Alternative Health Practices for Livestock*. T.F. Morris and M.T. Keilty, eds. Blackwell Publishing, Ames, IA.

Invited Presentations:

1. "Production of hair sheep using accelerated lambing and an extensive management system in the U.S. Virgin Islands: A 10 year summary". 3rd Annual Barbados National Agriculture Conference hosted by the Ministry of Agriculture in Barbados, July 17-20, 2005.
2. "Hair sheep Production and Management in the Tropics". Sheep Producers Association of Hawaii, Sheep Producer's Grazing Management Workshop, Kamuela, HI, October 20-21, 2005.
3. "Performance of Dorper and St. Croix White Crossbred Lambs and Ewes in the Tropics". Sheep Producers Association of Hawaii, Sheep Producer's Grazing Management Workshop, Kamuela, HI, October 21, 2006.
4. "Senepol Research in the U.S. Virgin Islands: A summary and future work". Panama Senepol Association, World Senepol Symposium, Coronado Beach, Panama November 16-17, 2007.
5. "Senepol Cattle in the US Virgin Islands: History and Current Research" International Conference on the Senepol Breed and its Crosses, Medellín, Colombia, November 21- 22, 2009.
6. "Physiology of Adapted Livestock in a Tropical Environment". Kansas State University as a part of the ADVANCE Distinguish Lecture Series, sponsored by the K-State Office for the Advancement of Women in Science and Engineering, March 25-26, 2014.
7. "The Impact of Weaning Age on Productivity of Hair Sheep Ewes and Lambs in an Accelerated Lambing System in the Tropics". 8th Small Ruminant Conference, Alabama A&M University, Eufaula, AL, July 23-24, 2015.
8. "Physiology of Adapted Hair Sheep in a Tropical Environment". 8th Small Ruminant Conference, Alabama A&M University, Eufaula, AL, July 23-24, 2015.
9. "Managing Reproduction in Hair Sheep." 9th Annual Small Ruminant Conference, Alabama A&M University, Orange Beach, Alabama, August 26-27, 2016.

10. "Gastrointestinal Parasite Resilience of Hair Sheep Breeds." 9th Annual Small Ruminant Conference, Alabama A&M University, Orange Beach, Alabama, August 26-27, 2016.
11. "The impact of weaning age on productivity of hair sheep ewes and lambs in an accelerated lambing system in the tropics." Annual Meeting of the St. Croix Hair Sheep International Association, Nashville, IN, Aug 18-19, 2017.
12. "Gastrointestinal parasite resilience of hair sheep breeds." Annual Meeting of the St. Croix Hair Sheep International Association, Nashville, IN, Aug 18-19, 2017.
13. "Livestock Reproduction Meets Modern Technology" session Moderator at USDA Ag Outlook Forum, Washington, DC, Feb 22-23, 2018

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Truth in Testimony Disclosure Form

In accordance with Rule XI, clause 2(g)(5)*, of the *Rules of the House of Representatives*, witnesses are asked to disclose the following information. Please complete this form electronically by filling in the provided blanks.

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