

FACULTY OF FOOD AND AGRICULTURE

POSTGRADUATE RESEARCH SEMINAR SERIES

THURSDAY 25th April, 2019

PROGRAMME

Thursday 25th April: 8:20am – 2:00pm

Venue: Room B

Presentations:

	Title / Department	Time	Student
1.	An Investigation into the Chemical Characteristics of <i>Leucaena leucocephala</i> and <i>Gliricidia sepium</i> Pods <i>Department of Food Production</i>	8:20-9:00	Mr. Andell Edwards (PhD. Livestock Science)
2.	Econometric analysis of spatial and temporal behaviours of arrivals and prices of major root crops at Namdevco markets in Trinidad <i>Department of Agricultural Economics and Extension</i>	9:00-9:40	Ms. Shamla Maharaj (MPhil. Agricultural Economic)
3.	A Comparison of the Dietary Intakes of Recipients and Non-Recipients of School Lunches in Trinidad <i>Department of Agricultural Economics and Extension</i>	9:40-10:20	Mr. Marlon Francis (PhD. Human Ecology)
4.	Effect of protein supplementation versus nutrition education/counselling on normalized protein catabolic rates in persons on maintenance haemodialysis <i>Department of Agricultural Economics and Extension</i>	10:20-11:00	Ms. Patrice Prout (PhD. Human Ecology)
5.	Prevalence of Coronary Heart Disease and Selected Risk Factors among Educators in Trinidad and Tobago <i>Department of Agricultural Economics and Extension</i>	11:00-11:40	Mr. Wynelle Archer (MPhil Human Ecology)
	BREAK	11:40-12:00	
6.	Dynamics of social media use and misuse: The case of strengthening agricultural extension services in Trinidad & Tobago <i>Department of Agricultural Economics and Extension</i>	12:00-12:40	Mr. Jeet Ramjattan (PhD. Agricultural Extension)
7.	Can soil science support arguments for the natural development of grasslands within a tropical rainforest? <i>Department of Geography</i>	12:40-1:00	Ms. Melissa A. Atwell (PhD Geography)
8.	A Lamb Bank Farming System Model to Mitigate the Challenges of Small-Holder and Landless Sheep Farmers in Tropical Small-Island-State Economies: The Case of the Island of Tobago <i>Department of Food Production</i>	1:00-1:40	Mr. Keith George (PhD Livestock Science)
9.	Preharvest and Postharvest Factors Affecting Quality and Self Life of Moringa Pods (<i>Moringa oleifera</i>) <i>Department of Food Production</i>	1:40-2:00	Ms. Anushka Goordeen (MPhil Crop Science)

Chairs: Prof. Majeed Mohammed, Dr. Anisa Ramcharitar-Bourne (DAEE) & Dr. Priya Kissoon (DG)

LIST OF ABSTRACTS

AN INVESTIGATION INTO THE CHEMICAL CHARACTERISTICS OF *LEUCAENA LEUCOCEPHALA* AND *GLIRICIDIA SEPIUM* PODS

Andell Edwards

Department of Food Production

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Nutritional stress experienced in most dry periods of the year has necessitated the search for alternative feed materials like browse fruits as they are highly nutritive and can be used as nutrient supplements in grass basal diets. This study was therefore conducted to evaluate the chemical characteristics of *Leucaena leucocephala* and *Gliricidia sepium* fruits for potential use in the diets of ruminant animals. Chemical composition was analyzed utilizing the general linear models (GLM) procedures of MINITAB (version 16) in a completely randomized design to test differences between the tree species selected for the research. The fruits were harvested from the University Field Station (UFS) site at Champs Fleurs, dried at 65°C over 72 hours and milled. Higher ($p < 0.05$) crude protein (CP) content (242.4 g/kg DM) and acid detergent fiber (ADF) (463.2 g/kg DM) were recorded for *Gliricidia sepium* fruits. The dry matter (DM) and acid detergent lignin (ADL) did not differ ($p > 0.05$) between the two tree species. *Leucaena leucocephala* had higher ($p < 0.05$) total digestible nutrients (TDN) (552 g/kg DM) compared to *Gliricidia sepium* (495 g/kg DM). *Leucaena leucocephala* fruits had a higher ($p < 0.05$) neutral detergent fiber (566.1 g/kg DM) compared to *Gliricidia sepium* fruits (425.0 g/kg DM). The non-fiber carbohydrates and crude fat for *Leucaena leucocephala* and *Gliricidia sepium* fruits were similar. Higher ($p < 0.05$) calcium and magnesium content were recorded for *Leucaena leucocephala* fruits. There was no difference ($p > 0.05$) in the concentration of phosphorous and sodium across *Leucaena leucocephala* and *Gliricidia sepium* fruits. *Leucaena leucocephala* fruits recorded higher ($p < 0.05$) concentrations of iron (136 ppm) and manganese (22 ppm) when compared to fruits of *Gliricidia sepium*. Similarly, higher ($p < 0.05$) zinc content and copper were recorded for *Leucaena leucocephala* fruits. This study revealed that *Leucaena leucocephala* and *Gliricidia sepium* fruits have appreciable levels of nutrients to support ruminant performance especially in terms of CP content and total digestible nutrients. However, *Leucaena leucocephala* fruits possess higher micro mineral levels when compared to *Gliricidia sepium* fruits.

Keywords: Chemical composition; tree pods; *Gliricidia sepium*; minerals; *Leucaena leucocephala*;

Supervisor: Dr. Upoor Krishnamoorthy

ECONOMETRIC ANALYSIS OF SPATIAL AND TEMPORAL BEHAVIOURS OF ARRIVALS AND PRICES OF MAJOR ROOT CROPS AT NAMDEVCO MARKETS IN TRINIDAD

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Price instability due to changes in both the demand and supply side among agricultural crops is a matter of interest on a national and international front, especially among developing countries that rely heavily on their agricultural sector. The major objective to tackle the topic is “to analyze spatial and temporal behaviours of arrivals and prices of major root crops and vegetables at NAMDEVCO markets in Trinidad”, that is, to determine its wholesale prices, to detect its price behaviour, to assess its relationship between arrivals and price behaviours and to forecast the same. The methodology steps are as follows: description of selected markets, research philosophy, approach and data collection, analytical tools and techniques applied for each objective, formulation of regression models, regression analysis.

Supervisor: Dr. Kathiravan Gopalan

A COMPARISON OF THE DIETARY INTAKES OF RECIPIENTS AND NON-RECIPIENTS OF SCHOOL LUNCHES IN TRINIDAD

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PhD. Human Ecology

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This study evaluated the differences in dietary intakes between recipients and nonrecipients of the National Schools Dietary Services Limited (NSDSL) school lunches and compared the nutrient content of NSDSL lunches with meals packed from home. We conducted a case control study among 319 children attending primary schools in Trinidad. Students were administered a Nutrient Intake Survey that comprised of demographic information, a food frequency questionnaire and lunch kit survey. Dietary data was analysed using Food Works College Edition, characteristics of participants and differences between groups were assessed statistically using chi square, linear regression and independent t-tests. 155 school meal recipients and 164 non-recipients participated in the study. Thirty-seven percent of participants had BMI \geq 85th percentile of the US age- and sex reference standards. More lunch recipients met dietary guidelines for peas and beans ($38.24\% \pm 48.77$ vs $20.44\% \pm 40.47$; $p=0.001$) and had higher mean vegetable intakes ($4.04\% \pm 2.52$ vs $3.66\% \pm 2.21$; $p=0.001$) than nonrecipients. Higher intakes of saturated fat were reported among lunch recipients. School lunches were significantly higher in protein, fibre and most micronutrients compared to packed lunches. Packed lunches were significantly higher in calories, sodium and fat compared to NSDSL meals. Lunch recipients reported better nutrient intakes than non-recipients. NSDSL lunches made a positive valuable contribution to the dietary intakes of children who receive school meals. There is need to improve the nutrient profile of lunches packed from home. The NSDSL, supported by nutrition education and policy initiatives can promote positive dietary practices among school aged children in Trinidad.

Supervisor: Dr Selby Nichols

EFFECT OF PROTEIN SUPPLEMENTATION VERSUS NUTRITION EDUCATION/COUNSELLING ON NORMALIZED PROTEIN CATABOLIC RATES IN PERSONS ON MAINTENANCE HAEMODIALYSIS

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Protein-energy wasting is common among persons with ERSD. In this study, we compared the effects of a 6-week protein supplementation versus weekly nutritional education/counselling on protein intakes, indexed by normalized protein catabolic rates (nPCR). Participating centres were randomly selected and persons visiting those centres during the study period were invited to participate. Participants had nPCR, anthropometry and biochemical variables measured at baseline and two occasions 1-month apart during each intervention. In addition to routine care, the intervention group (IVG) received daily protein supplement containing 36g of whey protein for 6-weeks. Following a 2-week washout period, they received personalized weekly nutrition education/counselling. The control group (NIVG) received only routine care. Participation was voluntary. The study was approved by University's Ethics Committee. Sixty-nine persons (IVG=33; NIVG=36) participated in the study. There was no difference in nPCR between IVG and NIVG at baseline ($p = 0.76$). Mean nPCR among participants was 0.84 ± 0.18 mg/kg/day. IVG had significantly higher levels of mean nPCR than NIVG during protein supplementation phase ($p < 0.001$) but not during nutrition education/counselling ($p = 0.02$). Compared to baseline, mean nPCR increased with protein supplementation ($p < 0.001$) but not nutrition education/counselling ($p = 0.75$) without significant changes in biochemical variables. Overall mean nPCR was lower than the recommended 1.1mg/kg/day for person on haemodialysis. Protein supplementation but not intense nutrition education/counselling significantly increased nPCR without adversely affecting biochemical or inflammatory markers. Daily supplementation with proteins of high biological value provides an effective mode of improving nPCR among participants.

Supervisor: Dr. Selby Nichols

PREVALENCE OF CORONARY HEART DISEASE AND SELECTED RISK FACTORS AMONG EDUCATORS IN TRINIDAD AND TOBAGO

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MPhil. in Human Ecology

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Coronary heart disease (CHD) contributes to large and rising burdens of disease mortality and disability in Trinidad and Tobago. Internationally, research conducted among educators at various educational levels revealed a high prevalence of many CHD risk factors. However, due to an apparent absence of published data, little is known about CHD and its risk factors among educators in Trinidad and Tobago. As such, the main objective of this research is to determine the prevalence of diagnosed CHD and selected risk factors among educators, aged 25 to 65 years old, at primary, secondary and tertiary institutions. This study will employ a cross-sectional survey design. A sample size of 341 was calculated. Simple random sampling will be used to select a 1:2 ratio of government and government assisted secondary and primary schools. Purposive sampling will be used to select the two largest tertiary institutions in Trinidad and Tobago. A convenience sample of educators from selected primary, secondary and tertiary institutions will be utilized; 60% of the total sample will be primary and secondary school educators meanwhile, tertiary educators will comprise 40%. The data collection instruments will include a 50-item semi-structured questionnaire, the Brief Job Stress Questionnaire and the International Physical Activity Questionnaire. Anthropometric measurements and blood pressure values will be collected using hand-held devices. Diet will be assessed via the Rate-Your-Plate simplified FFQ and 24 hour recalls. Statistical analyses will include Spearman's correlations, cluster analysis, multivariate logistic regression analysis and repeated measures ANOVA. All data will be analysed using SPSS version 21.

Supervisor: Dr. Isabella Granderson

DYNAMICS OF SOCIAL MEDIA USE AND MISUSE: THE CASE OF STRENGTHENING AGRICULTURAL EXTENSION SERVICES IN TRINIDAD & TOBAGO

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With internet penetration rates growing in both rural and urban areas in Trinidad & Tobago, individuals and organizations are increasingly turning to social media to share information and form online communities. Agricultural extension stakeholders, such as producers, input dealers, advisory services, producer organizations, and non-profits are also increasingly using social media to share their concerns, discuss agriculture-related issues and deepen their knowledge and expertise. Connected through social media, these various stakeholders are also forming so-called Communities of Practices (CoPs), which are at the core of this research. ICT- based agricultural development strategies and the introduction of digital ICT's including social media into professional practice is important in enhancing productivity. Understanding the impact of ICT's in agriculture extension service provision remains a priority for strengthening agricultural extension services. While social media and CoPs provide numerous benefits, there are also many risks due to the alarming rise in the circulation of misinformation across various social media platforms. Misleading and contradictory information related to food, produce, technology and policies quickly circulates among stakeholders. Misinformation can lead to confusion, fear and conflicts, creating barriers for making informed decisions by farmers, industry partners and policy makers. By applying a mixed-method approach, the proposed initiative seeks to answer the central question of how agricultural CoPs are using social media for learning and relationship-building, while dealing with misinformation related to sensitive topics, such as genetically modified crops and sustainable agriculture. The specific objectives of the study are: i) to analyse strategies for mobilizing knowledge and supporting learning through social media, ii) to investigate use of social media for networking and collaboration among members of identified CoP, iii) to identify different misinformation and understand strategies used by CoPs to deal with misinformation, iv) to determine strategies for stewarding social media-based communication strategies. First, we will sample relevant CoPs on Facebook and WhatsApp among agricultural professionals in Trinidad & Tobago. A social network analysis, as well as a manual and automated content analysis will be used to gain insights into the inner workings of these online communities and determine which topics are discussed publicly. To complement and validate our observations, we will identify and interview key informants from each CoPs. Following interviews, a survey will be conducted with members of the selected CoP.

Supervisor: Dr. Wayne Ganpat Co- supervisor; Dr. Ataharul Chowdhury

CAN SOIL SCIENCE SUPPORT ARGUMENTS FOR THE NATURAL DEVELOPMENT OF GRASSLANDS WITHIN A TROPICAL RAINFOREST?

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The term rainforest usually connotes a biome with lush vegetation inhabited by tree species with climate being the dominant control on vegetation distribution, however, natural grass patches have been shown to exist in this tropical ecosystem. The existence of the grass patches clearly shows that factors other than climate control vegetation distribution, these factors remain poorly understood in the tropics. Climate has long been recognized as the major control on vegetation distribution on a large scale, however, at smaller scales edaphic factors may become important in determining vegetation patterns. It is proposed that vegetation patterns in a tropical rain forest is affected by soil parameters that inhibit growth under a uniform climatic system and explains the existence of grassland patches in a rainforest biome. A stratified random soil sampling design was employed to capture three (3) spatial scales (landscape, plot and micro topographic) in the Aripo Savanna Scientific Reserve (ASSR). This involves 3 landscapes \times 6 plots \times 2 micro topography (hummocks and depressions) \times 5 replicates giving rise to 180 soil samples. Soil textural, cation and mineral analyses were carried out to determine patterns and relationships within 3 main vegetation types (forest, palm and grass). Significant physical and chemical differences were found under different vegetation types with grassland soils having the lowest clay content (2.21 %), nutrient (N= 0.04 % , C= 0.53 % , Cu= 0.76 mg/kg, Zn= 0.08 mg/kg, Bo= 0.03 mg/kg) and cation content (Ca^{2+} =0.42 mmol/kg, K^{+} =0.25 mmol/kg, Na^{+} = 0.41 mmol/kg) and forest the highest clay (18.75%), N (0.20 %), C (3.49 %), Cu (6.25 mg/kg), Zn (1.60 mg/kg), Bo (0.06 mg/kg), Ca^{2+} (2.80 mmol/kg), K^{+} (0.96 mmol/kg), and Na (1.08 mmol/kg). Higher nutrient and cation content in forests sites contributed to soil quality while lower nutrient and cation content in grass sites were associated with lower clay content and higher Na:Ca ratios. For most chemical variables measured, growth conditions followed the order forest>palm island>grassland, with nutrient limitations in boron at all sites and copper and zinc in grass sites. Though it is evident that a statistical relation exists between soil properties and vegetation zones, further proof that these variables are decisive for spatial vegetation distribution and the existence of grassland patches in a tropical rainforest biome is still needed.

Keywords: Vegetation distribution, soil nutrients, edaphic, spatial scale, tropical biome, soil texture

Supervisors: Dr. Mark Wuddivira and Prof. Hermann Jungkunst

**A LAMB BANK FARMING SYSTEM MODEL TO MITIGATE THE CHALLENGES OF
SMALL-HOLDER AND LANDLESS SHEEP FARMERS IN TROPICAL SMALL-ISLAND-
STATE ECONOMIES:
*THE CASE OF THE ISLAND OF TOBAGO***

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Tobago is a small island of 116 sq. miles and a part of the small **Unitary State of The Republic of Trinidad and Tobago**. Tobago enjoyed a long history with Tropical Hair Sheep Production. At present there are approximately 20,000 heads of sheep farmed by roughly 400 farmers most of whom are small and/or landless. Within the last 30 years developments in Tobago has resulted in the complete decimation of dairy and beef cattle industries. The Tobago House of Assembly (*Local Government*) in collaboration with numerous local, regional and international agencies namely: UWI, CARDI, IICA, and Winrock International, sought to stimulate development of the Small Ruminant industry with various initiatives. However, farmers continue to experience severe challenges and their income security and survivability is threatened. This study sought to examine trade-offs and synergies with ***“The Lamb Bank Farming Systems Model”*** and addressed the challenges among small, landless sheep farmers in Tobago. The main objectives of the study were: (i) To identify and evaluate the challenges that affected small scale sheep production in Tobago. (ii) To conceptualize strategies to overcome the challenges and (iii) To create The Lamb Bank Farming Systems Model as a farmers’ co-operation strategy to address challenges. The study considered Three hundred post-weaned commercial market lambs of mixed breeds, 2-3 months old, in 6 cycles of 50 lambs each. Lambs were marketed after 60 days treatment. The aim was to optimize growth-performance through strategic management. The questions addressed were: (a) What are the challenges faced by small landless sheep farmers? (b) What are the most appropriate solutions to the challenges? (c) Can a Lamb Bank Farming System effectively address the challenges of sheep production and improve income security for Farmers in the Small-Island of Tobago? Two hypotheses were evaluated: (1) Tropical Hair Sheep would respond in a Lamb Bank Production System (2) Tobago’s Small, Landless sheep farmers would co-operate for the benefits from a Lamb Bank Production System. A Phenomenological Mixed Method Research approach was considered in designing the study that included qualitative and quantitative data collection and analysis. It also supported the environmental scan and the farmers’ invaluable perspective. Keen interest was directed to develop equity capital, marketing and pricing. Four business profitability ratios were considered. Due attention was given to the welfare of animals, and consumers health in order to design a sustainable model.

It was concluded that Tobago farmers can successfully explored the multi-functionality of their sheep and realized improved income security through the Lamb Bank Farming Systems Model despite, their small, landless circumstances.

Key words: *Lamb Bank, Farming System, Small Island State, Smallholder, Landless, multi-functionality, farmers’ co-operation strategy*

Supervisor: Prof. Gary Garcia

PREHARVEST AND POSTHARVEST FACTORS AFFECTING QUALITY AND SHELF LIFE OF MORINGA PODS (*MORINGA OLEIFERA*)

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Moringa (*Moringa oleifera*) production can serve as a source of income for farmers and other stakeholders in the Caribbean. Moringa commonly known as “Saijan” is also referred as the miracle tree in view of its nutritional and medicinal benefits. Despite extensive studies recently conducted on the utilization of the leaves, flowers, seeds, roots, fruits and bark, there is a lack of published reports on post-harvest quality and shelf life of the moringa pods. Investigations will be conducted on growth and development of the pods to determine maturity indices. Data will be collected on two stages of maturity with specific determination of percent fresh weight loss, colour of flesh and skin, firmness, chlorophyll, dimensions of length and width, pH, total titratable acidity, total soluble solids, vitamin C, percentage marketable pods, chilling injury and percentage decay of pods. Post-harvest experiments are currently being conducted to investigate the effects of temperature, storage duration, hydro cooling and calcium chloride dips on the quality and shelf life of moringa pods. Additional studies would be conducted on the rate of respiration, chilling injury sensitivity under refrigerated and simulated marketing conditions. The effects of modified atmosphere packaging, antioxidants and calcium chloride dips on the shelf life of fresh-cut moringa pods will also be investigated. These studies would foster a better understanding on how to manage preharvest and post-harvest losses of moringa pods.

Supervisor: Prof. Majeed Mohammed