



## IICA PROJECT

Competitiveness and Sustainability of Agricultural Chains

A Business Plan and Marketing Strategy

for the Development of the Dairy Goat Industry

in Trinidad and Tobago



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## Executive Summary

The small ruminant industry in Trinidad and Tobago has remained largely underdeveloped and subsistence in nature, save for a few large commercial farms, notwithstanding many attempts in the past, mainly public sector interventions to develop the sector. The Trinidad and Tobago Goat and Sheep Society (TTGSS) recently has been at the forefront of efforts to improve the dairy goat sector, by partnering with the Inter American Institute for Cooperation in Agriculture (IICA).

There is now a willingness on the part of the industry to introduce better business and management approaches into the industry in order to take the industry to another level and for attaining their goals of a more vibrant and sustainable industry. The TTGSS, however, lacks the capacity to effect the required changes in management envisioned for a modern and sustainable sector.

The IICA has commissioned the preparation of a business plan inclusive of a marketing strategy for the Trinidad and Tobago Goat and Sheep Society which will provide a framework for a more structured development of the dairy goat industry in Trinidad and Tobago, to the extent that the industry achieves its goals of increased production; productivity and market access for its products.

Currently, the TTGSS comprises seventy-five (75) active members, including farmers, processors, technical and corporate representation. There are thirty-seven (37) dairy goat farmers including fifteen (15) small farmers with less than ten (10) does, seventeen (17) medium farmers with 10-30 does and four (4) large farmers with numbers ranging from 30 to over 50 does. Noteworthy, there is one very large commercial farm (Marilissa Farms) with over 1000 does.

A market analysis of the dairy goat industry reveals a rapidly growing local demand for goat's milk and cheese over the past six (6) years. This demand is however met mainly by imported products. The data shows that the value of imported goat's milk rose from over TT\$7 million in 2010 to over TT\$12 million in 2012, and to over TT\$20 million in 2014. The 2015 import data as at September 2015 shows that approximately TT\$15 million was already imported. The import of goat cheese showed a similar dramatic rise in demand for the same period. The rise in demand for goat milk and its value added products worldwide is attributed to its benefits of alleviating the problems of lactose intolerance and other health issues which arises with consumption of cow's milk products. Simultaneously, there is also a significant rise in demand for alternative non-dairy milk products made from soy, rice, almond and coconut, which poses a direct competition to dairy goat products. There are however, many significant advantages of goat's milk over cow's milk products and the non-dairy products that makes it a superior product and in demand by a growing niche market.

An analysis of a local market survey of supermarkets, restaurants, hotels and supermarket customers shows a very low demand among the respondents interviewed mainly because

consumer are not aware of the advantages and virtues of goat's milk products. Nevertheless, the import data (2010-2015) and sales data at a selected supermarket chain (2013 and 2014) shows an increasing trend. This suggests that a growing niche market exist for these products. There is also an increasing presence of the range of products on local supermarket shelves, including UHT milk, powdered milk and an array of goat cheese.

The size of the local dairy goat industry makes it imperative for the TTGSS to re-organise itself and its strategies to significantly upgrade the sector to tap into this lucrative market at the local level. The business plan adopts the conceptual framework of the value chain and cluster approach to meet economies of scale and coordinate production and marketing in a structured way to penetrate the local mainstream markets. The value chain approach deals with the effectiveness in the distribution of tasks, risks, responsibilities and margins along the market chain. The cluster-approach on the other hand deals with interdependent relationships between the businesses and levels of cooperation and development of businesses within the cluster.

The business plan therefore presents a coordinated approach to production and marketing of local goat milk products under the ambit of the TTGSS as the core of the cluster. The strategy designs a development programme for small and medium farmers together and the large farms individually. The TTGSS will establish a central pasteurization facility to collect, pasteurize and market milk produced by small and medium farmers. The TTGSS will be re-structured to adopt a business approach to manage the commercialization of the industry.

The marketing plan proposes to target 25% of the current demand now met by imported milk and produce an average of 10,000 litres per month initially from the central pasteurization facility and increased incrementally over a five (5) year period, using improved technologies. Most of the large farmers, led by Marilissa Farms are already pasteurizing their milk and have penetrated the local mainstream supermarkets with fresh and individually local milk. It is estimated that the large farms can currently produce 100 – 150 litres per day, and increase incrementally with adoption of improved technologies. The business plan proposes to strengthen this initiative using a joint promotion and educational programme.

The marketing plan hinges on a multiple cluster marketing strategy, including promotion and branding, segmentation into niche markets, market penetration, a value-based pricing strategy and a new product development programme into value added products.

The production plan designed is market-led and is meant to fulfil the market demand projected in the marketing strategies outlined. The objective of the production plan is three-fold: coordinating production on small and medium farms to collectively provide the throughput for the central pasteurization facility and meet the market demand, improve the productivity of milk yield per doe on all farms, and improve the quality of milk to international food safety standards on all farms from farm to table.

The financial plan shows that the pasteurization facility is estimated to generate after tax net revenues of TT\$1,533,522 in year 1 and increasing incrementally to TT\$4,437,585 by year 3 and



to TT\$6,807,799 by year 5. It is expected that the revenue generated by the pasteurization facility will meet the expenditure of all TTGSS operations. However, collaboration with institutions with pasteurization facilities (such as Aripo Livestock Station and Sugarcane Feed Centre) will become necessary in the first 1-2 years. Taking this arrangement into consideration, TTGSS can net TT\$389,122 in year 1, TT\$1,098,680 in year 2, \$80,241 in year 3 and increasing to almost TT\$2 million by year 5.

An analysis of the share of the returns to value added pasteurized milk along the value chain shows the small farmers receiving approximately 17% of the returns, while the medium and large farmers receive about 21% and 28% respectively. Approximately 18% of the margin share goes to the TTGSS facility and 16% to the supermarkets.

Small farms with an average of 5 does in milk and delivering about 62% of their milk to the pasteurization facility, 21% for community deliveries and 17% to be fed to kids, can realize a progressive net income starting at TT\$1,430 in year 1 increasing to over TT\$18,000 by year 2 and progressing substantially on an annual basis. Medium and large farmers with an average of 20 does and 50 does in milk can similarly net an annual return starting at TT\$34,731 and TT\$632,713 in year 1 respectively.

The success of this business plan relies heavily on the cooperation and team effort of members of the TTGSS and the formation of the cluster. A value chain and cluster development plan is incorporated into the business plan to support the development of the dairy goat cluster and the implementation of initiatives of the business plan and marketing strategy. The plan involves a series of capacity-building training workshops in value chain and cluster development.

# **A BUSINESS PLAN AND MARKETING STRATEGY FOR THE DEVELOPMENT OF THE DAIRY GOAT INDUSTRY IN TRINIDAD AND TOBAGO**

## **1. INTRODUCTION**

### **1.1. Background**

The small ruminant sector, inclusive of the dairy goat sector, is regarded by the Ministry of Agriculture, Land and Fisheries, as a sector with great potential for contributing to the food security effort, as well as for generating sustainable employment opportunities in rural communities. Notwithstanding many attempts in the past, mainly public sector interventions to develop the sector, it remains, to a large extent, underdeveloped and subsistence in nature, save for few larger commercial farms.

The subsistence nature of the industry further implies that there are deficiencies in the level of management and organization of the sector, and by extension its capacities to operate more efficiently and in a more organized and strategic manner. Specifically, limitations within the industry have stymied its ability to produce and market goat's milk and value added products which are acclaimed to have many health and nutritional benefits. Gaps in local production of those commodities are being increasingly filled by imported substitutes which are appearing with greater frequency on the shelves of larger supermarkets.

The Trinidad and Tobago Goat and Sheep Society (TTGSS) recently has been at the forefront of efforts to improve the dairy goat sector, by partnering with the Inter American Institute for Cooperation in Agriculture (IICA). The process involves programmes to improve the production and productivity of dairy goat farms, by focusing on improved breeding management; nutrition; diseases and sanitation management; investments; product development and marketing. Attempts are also being made to improve the organizational structure and management of the TTGSS.

There is now a willingness on the part of the industry to introduce better business and management approaches into the industry in order to take the industry to another level and for attaining their goals of a more vibrant and sustainable industry. The TTGSS, however, lacks the capacity to effect the required changes in management envisioned for a modern and sustainable sector.

## **1.2. Objectives**

The objective of the consultancy is to prepare a business plan inclusive of a marketing strategy for the Trinidad and Tobago Goat and Sheep Society which will provide a framework for a more structured development of the dairy goat industry in Trinidad and Tobago, to the extent that the industry achieves its goals of increased production; productivity and market access for its products.

## **1.3. Methodology**

The methodology engaged in developing the business plan and marketing strategy included:

- (a) Review of the TTGSS philosophy, vision and mission
- (b) Review of the socio-economic environment of the dairy goat industry
- (c) Review of stakeholders and linkages
- (d) Review relevant market studies and other relevant data (including trade data)
- (e) Market visits (including supermarkets and restaurants)
- (f) Literature review including previous studies, reports, policies and general documentation
- (g) Interview key personnel and institutions involved in policy, production, marketing, etc
- (h) Regular meetings with TTGSS
- (i) Develop a comprehensive marketing strategy for the dairy goat industry
- (j) Develop a 3-year business plan, designed to execute the marketing strategy and based on the research findings.
- (k) Consultation and Presentation of the comprehensive business plan and marketing strategy.

## **2. OVERVIEW OF THE TRINIDAD AND TOBAGO GOAT AND SHEEP SOCIETY**

The Trinidad and Tobago Goat and Sheep Society (TTGSS) is a registered Non-Profit Organization, which serves as an industry group with a developmental role in the small ruminant sector. The TTGSS acts as a co-ordinating body, offering 'one voice' for the small ruminant industry in establishing policy, lobbying the private sector and Government and serving as a catalyst for the future growth and long-term sustainability of the sector. It is primarily concerned with the viability and professionalism of all local producers of sheep and goat products; technical, primary, and value-added. The TTGSS is committed to improving the small ruminant sector through educational, infrastructural and technical support to its members.

The TTGSS is the recognized organization representing producers in the goat and sheep industry in Trinidad and Tobago. It is made up of approximately 100 members, representing just over 50% of the goat and sheep farmers in Trinidad and Tobago. The membership is not confined to farmers but also includes veterinarians, milk and meat processors, research scientists and agricultural chain suppliers. The TTGSS farmers are not solely involved in sheep and goat production but also produce other forms of livestock such as cattle, pigs, poultry and rabbits. In addition, many farmers also participate in crop production.

Membership Composition of TTGSS are as follows:

- 75 registered members
- 52 farmers (37 rear goats).
- 4 Hobbyist
- 4 Processors
- 2 Corporate members
- 21 Technical personnel
- 19 Females and 56 Males

### **2.1. Mission Statement**

The Trinidad and Tobago Goat and Sheep Society acts as a coordinating body, offering 'one voice' for the small ruminant industry in establishing policy, lobbying the private sector and Government and serving as a catalyst for the future growth and long-term sustainability of the sector

## **2.2. Vision Statement**

The Vision of the TTGSS is to build a locally driven, viable, sustainable, fully integrated small ruminant sector through promotion, advocacy and training whilst protecting the livelihoods of our most vulnerable members.

## **2.3. Business initiatives of the TTGSS**

The Trinidad and Tobago Goat and Sheep Society recognizes the need to build bridges between the primary producers and the processors, and also sees the need to educate farmers on the need to becoming processors themselves in hopes of making their businesses both profitable and efficient.

As such, the TTGSS has embarked on a number of initiatives towards building a new business model for the organization. Some key initiatives taken by the TTGSS include:

- (i) Establishment of a model farm to demonstrate the use of improved technologies in goat and sheep production, with assistance from CARDI – starting with 100 sheep and 50 goats.
- (ii) Improving the productivity of goats and sheep through a breeding programme with imported stock and distribution of kids and lambs to members using a “revolving stock building” concept. The TTGSS has partially financed this initiative with valuable assistance from CARDI. The project operates on three (3) on-farm “breeding farms” owned by members of the society.
- (iii) Collaborating with key institutions such as UWI, CARDI and IICA to improve and build capacity of its members. For example, a capacity-building training programme is currently being conducted by IICA for members of TTGSS.
- (iv) A Youth Arm of TTGSS is being exposed to a series of training programmes offered by UTT and UWI.
- (v) TTGSS is negotiating collaboration efforts with UWI Field Station, Sugarcane Field Station (SFC) and Aripo Livestock Farm for use of their respective pasteurization facilities to promote pasteurization of milk produced by members of the society.

## 2.4. Key Characteristics of the TTGSS dairy goat cluster

### (a) Categories of producers

Table 1: Categories of Dairy Goat Producers of the TTGSS

Category	Amount	Number of Does
Small farm	15	<10
Medium-sized farm	17	10-30
Large farm	4	>30 (as high as 60)
Sub-Total (small – large farms)	36	814
Average stock size		22
Average production (small-large farms)		60-80 litres/day
Estimated Annual Production (small-large farms)		18,000 – 24,000 litres/year
Very large farm	1	>1000
Average production (very large)		2670 litres/day
TOTAL	37	1814
Total Estimated Annual Production		816,000 litres/year

### (b) Key common characteristics of TTGSS dairy goat enterprises:

- Mixed production of goats and sheep
- Sheep production for meat
- Goat production is mainly dual purpose - milk and meat production
- Major dairy goat breeds - Anglo Nubian, Toggenburg, Saanen, Alpine, Boer
- Varying levels of productivity and technology practiced across the small, medium and large farms.

### (c) Characteristics of the **small** dairy goat enterprises:

- Stock size less than 10 does.
- Forage is main source of feed.
- Low level of technology practiced.
- Milking by hand mainly; no milking machines
- Unpasteurized milk sold - mainly within the community
- Low milk quality standards
- Average production - 1 to 1.5kg/doe/day.

### (d) Characteristics of the **medium** dairy goat enterprises:

- Stock size is between 10 - 30 does.
- Forage is main source of feed, supplemented by concentrate feeds.
- Relatively higher level of technology (e.g. forage choppers, milking machines).
- Breeding programme with imported breeds.
- Milking mainly by hand; milking machines in a few cases.
- Mainly unpasteurized produced and sold within communities. A few farmers sell pasteurized milk at selected outlets.
- Average Production – 1 to 2 kg/doe/day.

(e) Characteristics of the **large** dairy goat enterprises:

- Stock size more than 30 does; as high as 60 does.
- Forage is main source of feed, supplemented by concentrate feeds
- High level of technology (e.g forage choppers, milking machines)
- Breeding programme with imported breeds.
- Milking by milking machines
- Milk pasteurized, branded and sold at selected supermarkets
- Average production – 2 to 2.5 kg/doe/day.

(f) Characteristics of the **very large** dairy goat enterprises:

- One farm in this category (Marilissa Farm).
- Stock size between more than 1000 dairy goats
- Forage and concentrate are the main sources of feed.
- High level of technology (e.g. forage choppers, milking machines)
- Substantial breeding programme with imported breeds.
- Milking by milking machines
- Milk pasteurized, branded and sold at selected supermarkets
- Average Production – 2.5 to 3 kg/doe/day.

### **3. CONCEPTUAL FRAMEWORK OF THE BUSINESS PLAN AND MARKETING STRATEGY**

The TTGSS sees itself as a coordinating body and serves to lead the development of the goat and sheep industry and its stakeholders in Trinidad and Tobago. Over 85% of the members of TTGSS comprise small and medium-size farmers with under 10 and 30 animals respectively, characterized by relatively low production and sale of unpasteurized milk at the community level. These producers face the usual challenges of economies of scale in competing with foreign products. An overview of the small ruminant sector in Trinidad and Tobago as well as the rest of the Caribbean suggests an absence of quality market led products and a relatively weak value chain.

Analysis of the market for dairy goat milk and its value added products (mainly cheese) reveals that there is a budding and lucrative niche market in Trinidad and Tobago and a recent increase in importation of foreign products in response to the demand. A preliminary analysis shows that with improvement in efficiency and productivity, TTGSS producers can compete with foreign producers in the local market. In order for the TTGSS to tap into this market, these weaknesses (among other constraints) must be addressed in a fundamental and structured manner.

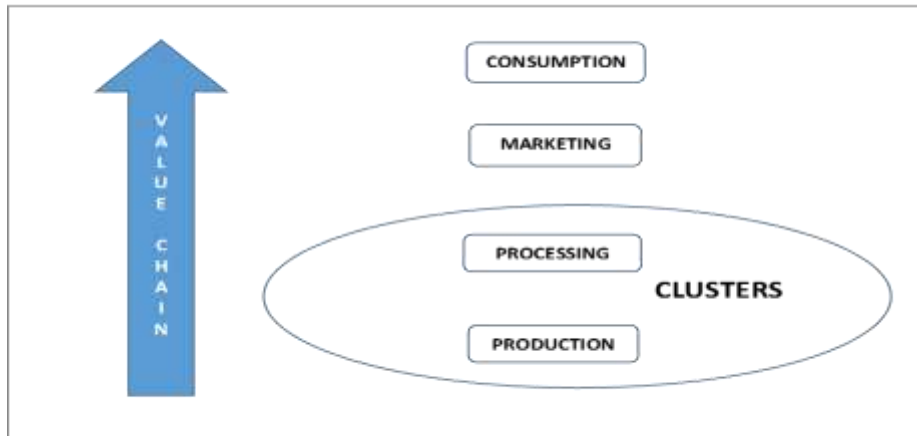
An overview of the TTGSS composition, governance structure and its current business initiatives suggest that the way forward for the TTGSS best fits under a business cluster development approach within a value chain structure to develop efficiencies within individual farms and clusters as well as the consistency and sustainability in the market within a value chain system. As such, a business cluster/value chain approach is adopted in the development of this business plan.

A value chain is an approach used to describe the process by which businesses receive raw materials, add value to the raw materials through various processes to create a finished product, and then sell that end product to customers. The overall goal of a value chain is to deliver maximum value for the least possible total cost and create a competitive advantage. Clusters are “geographical concentrations of inter-connected enterprises and associated institutions that face common challenges and opportunities”. (UNIDO).

A value-chain approach deals with the effectiveness in the distribution of tasks, risks, responsibilities and margins along the market chain. A cluster-approach on the other hand deals with determining interdependent relationships between businesses and levels of cooperation and development of businesses within the cluster. Both value chains and clusters are key organizing principles that enable firms to become more competitive. The recent literature on clusters is optimistic about the possibility of fostering competitiveness through local cooperation and governance activities. Value chain literature, in contrast, emphasizes that globalised lead firms coordinate the value chains in which clusters operate. Cluster firms are seen to be increasingly incorporated in national and global value chains rather than having only relations at regional level. Figure 1 illustrates how clusters and value chains are interconnected.



Figure 1: The Business Cluster/Value Chain Approach



Adapted from Riedel B et al (2009).113<sup>th</sup> EAAE Seminar.

Businesses in a cluster are independent, but mutually dependent on each other. Businesses enterprises within clusters share many common features. They may use the same suppliers of raw materials and other inputs, cater to the same markets and clients, share the same territory, infrastructure, services, and common cultural identity and may face the same obstacles, and challenges. Clusters may comprise the individual businesses of an industry, suppliers, intermediaries and institutions which play a key role in the industry.

In clusters, members engage in joint actions to improve their collective efficiency and develop the growth potential of clusters and their members. Clusters build critical mass in one location or region - strength in numbers!

Examples of joint actions between cluster enterprises may include joint bulk purchasing of inputs, joint advertising, shared use of equipment and so on. Examples of joint action between enterprises and support institutions may include technical assistance by business associations or international agencies or provision of infrastructure by the public sector.

Competitive advantages in a global economy lie increasingly in local things—knowledge, relationships, motivation—that distant rivals cannot match. Businesses in a cluster can reduce many input-cost disadvantages through collective sourcing of inputs from anywhere in the world! Competitive advantage also rests on making more productive use of inputs, which requires continuous innovation. Clusters members can collectively come up with new innovations (at lower costs) to address common challenges, to explore new opportunities or to deal with threats to their industry.

Joining a cluster does not mean giving up or sharing your business enterprise. What happens inside businesses is important, but clusters reveal that the immediate business environment outside businesses also plays a vital and critical role as well. Clusters is simply a way to cooperate

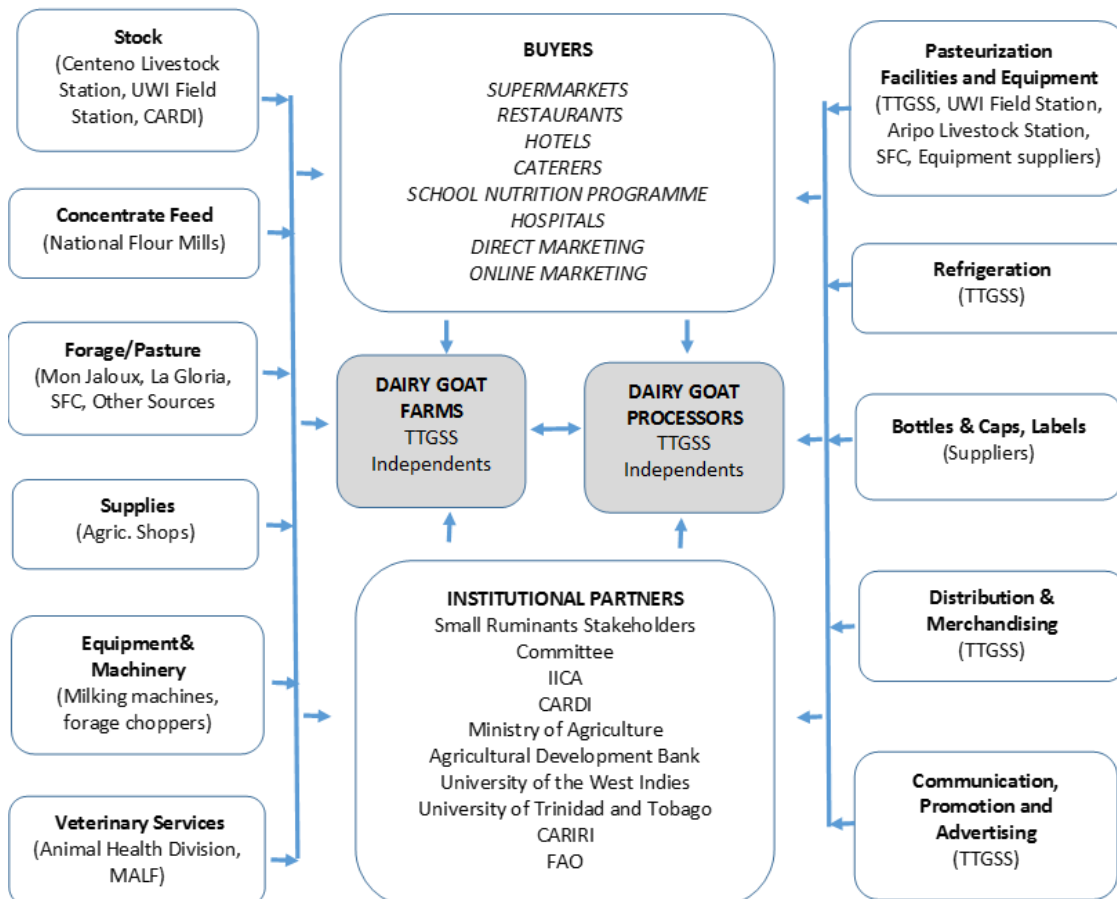
with your rivals in the same business to improve your individual efficiency and grow the business sector and the cluster as a whole.

The closeness of businesses and institutions in one location—and the regular interaction among them—fosters better coordination and trust! Clusters are not formal linkages such as networks, alliances, and partnerships. They are independent and informally linked companies and institutions. They represent a robust form of organization that offers advantages in efficiency, effectiveness, and flexibility. Businesses in a cluster are independent, but mutually dependent on each other. This cluster characteristic fits well with the well-known cultural feature of local farmers who fiercely guard their autonomy and individual business identity.

### 3.1. The TTGSS Dairy Goat Industry Cluster

The TTGSS dairy goat industry cluster will comprise the TTGSS as the core of the cluster and its fresh milk producers and value added processors making up the supply component of the cluster (Figure 2).

Figure 2: The TTGSS Dairy Goat Cluster Map



The demand/consumption component of the cluster includes the major buyers - the supermarkets, restaurants and hotels. To complete the cluster, the institutional partners making up the support component of the cluster includes the small ruminant stakeholders committee, IICA, CARDI, UWI Field Station, the Ministry of Agriculture (Aripo Livestock Station, Centeno Livestock Station, Sugar cane Feed Centre). The TTGSS dairy goat cluster map is illustrated in Figure 2.

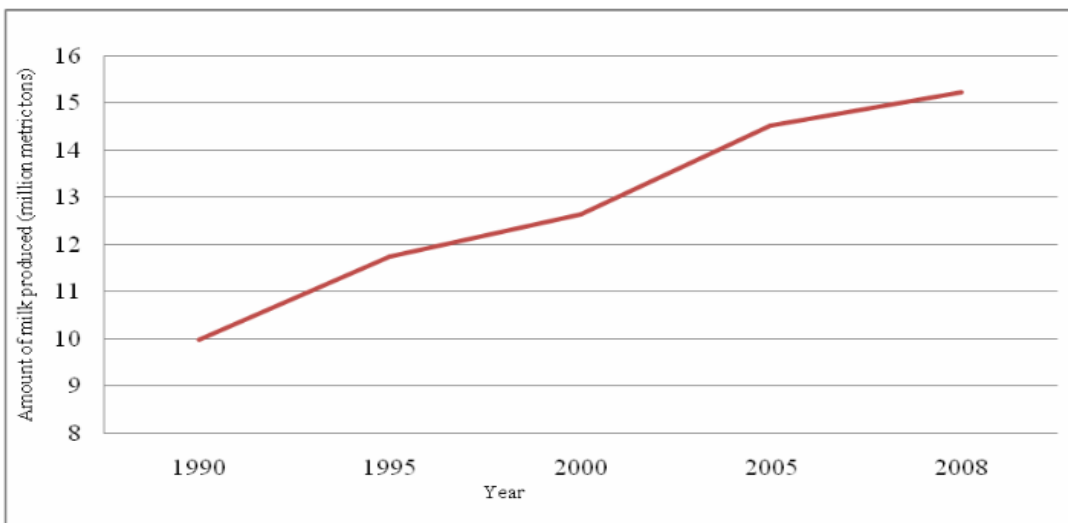
The Small Ruminants Stakeholders Committee facilitated by IICA already constitutes the basic elements of the cluster by its composition, which consist of the TTGSS, major buyers and key institutions.

## 4. OVERVIEW OF THE DAIRY GOAT INDUSTRY

### 4.1. A socio-economic analysis of dairy goat industry

World production of goat milk has been steadily increasing over the past two decades as shown in Figure 3 and Figure 4. This increasing production is in direct response to the dramatic rise in demand and consumption of goat milk and its products around the world. Nevertheless, most of goat milk is used for self-consumption, which is typical in the Asian and African countries. A smaller percentage of world goat milk is sold as fresh milk and this is specific to the American continent. A very small amount of world milk (less than 5%) is processed in cheese and other dairy products and mainly in the EU countries.

Figure 3: Total amount of Goat Milk produced between 1990 -2008.

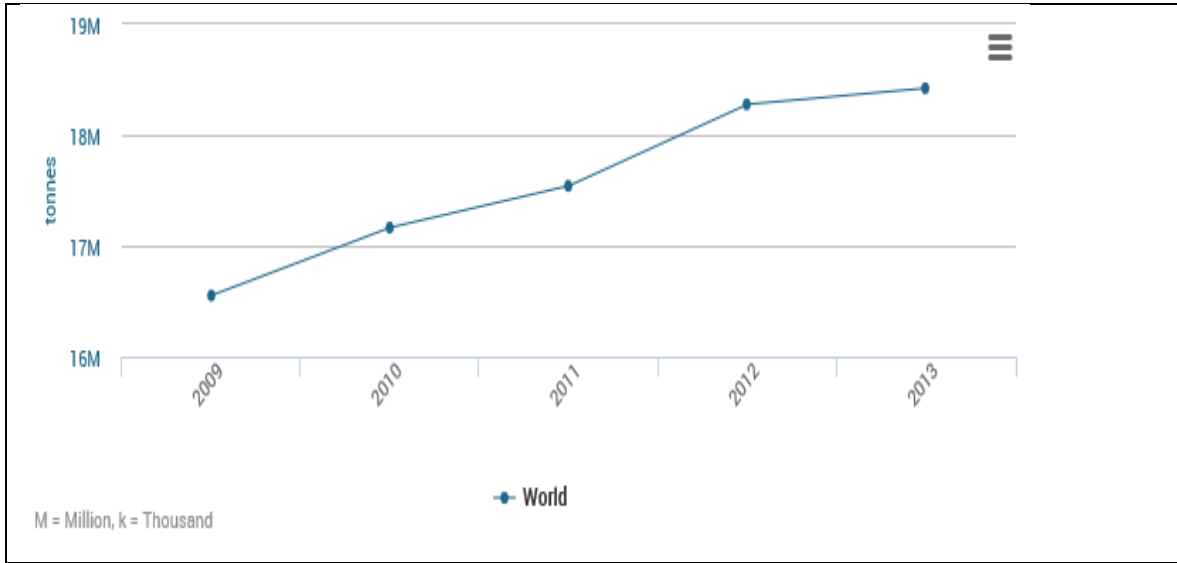


Source: FAOSTAT 2008

Apart from cow and buffalo milk, goat milk has an exceptional quality by its chemical composition rich in various nutrients. It is well tolerated by individuals sensitive and allergic to cow milk and has a beneficial effect on health and a high digestibility. Goat milk can be consumed fresh or processed in cheese, butter, ice-cream, yogurt, condensed milk, evaporated or powdered milk, kefir, etc. It has also recently become more popular as a gourmet milk, as cheese, yoghurt, soap, moisturisers and in fine dining restaurants.

In the US, dairy goat milk and goat cheese (chevre) continue to see slow, steady growth trends as consumers are becoming more aware of the higher protein and lower cholesterol levels found in the products. Goat milk is regarded as a natural source of nutrients, an alternative to cow's milk and easy to digest.

Figure 4: Total production of Goat Milk (2009-2013)

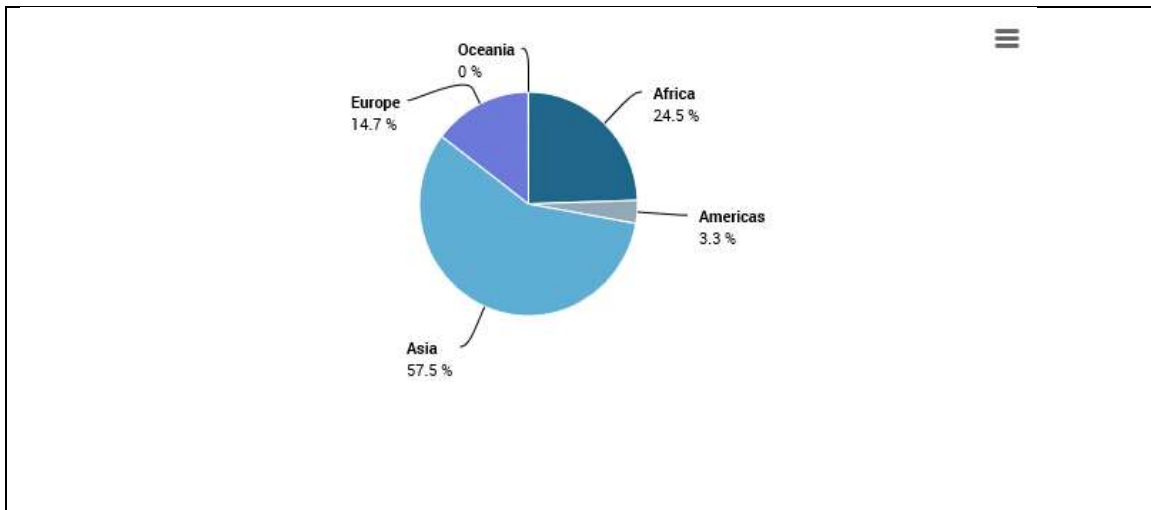


Source: FAOSTAT 2016

The major producing regions include Asia producing 57.5% and Europe producing 14.7% of world's production between 2009 and 2013. The Americas produce only 3.3% of world's production during this period. The remaining 24.5% is produced by countries comprising the African continent. (See Figure 5).

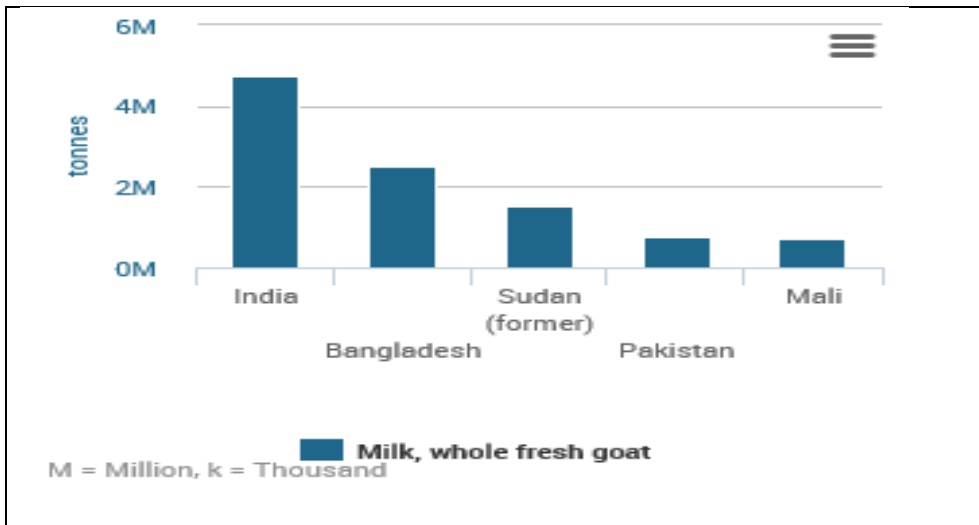
The top five producers of goat milk include India, Bangladesh, Sudan, Pakistan and Mali with production ranging from 696,653 tonnes in Mali to 4.7 million tonnes in India (See Figure 6).

Figure 5: Production of Goat Milk by Region (2009-2013)



Source: FAOSTAT 2016

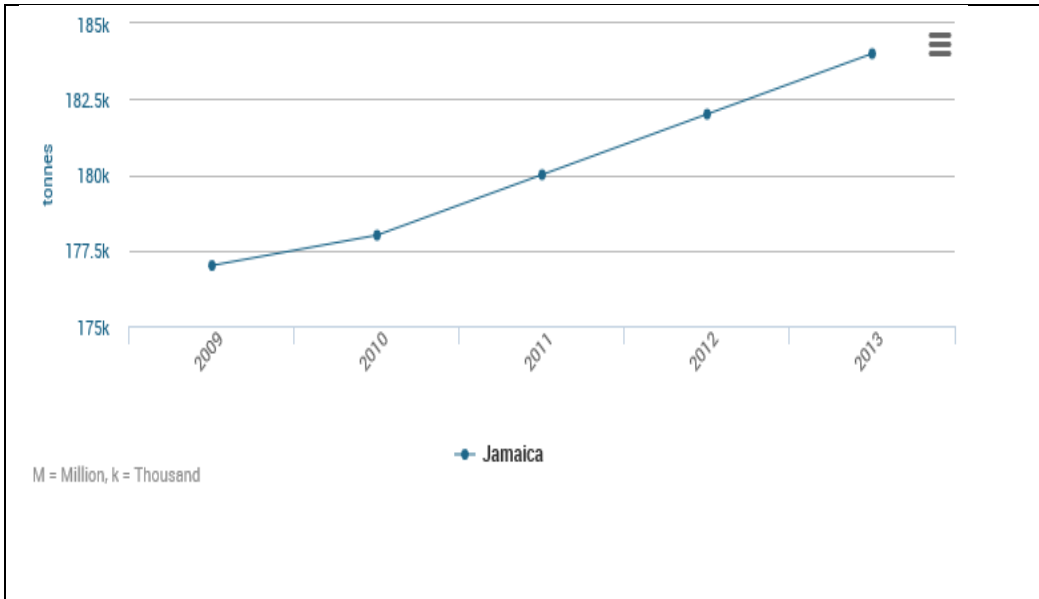
Figure 6: Top Five Goat Milk Producers (2009-2013).



Source: FAOSTAT 2016

Goat milk production in the Caribbean region is led by Jamaica with production ranging from 177,000 tonnes in 2009 and 184,000 tonnes in 2013. (See Figure 7).

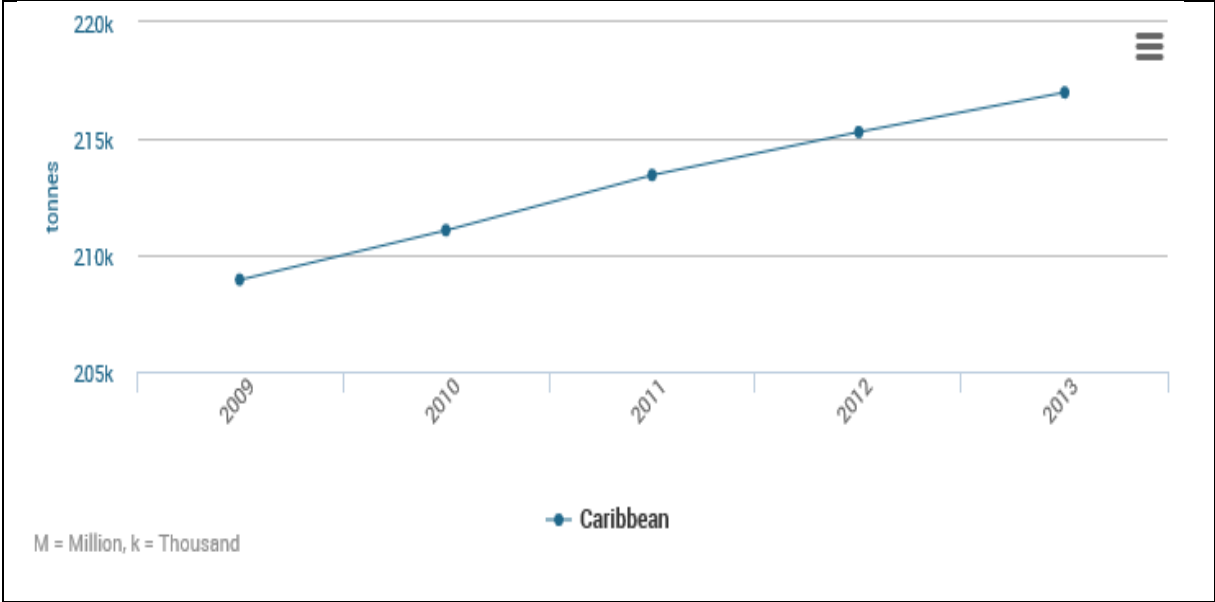
Figure 7: Production of Goat Milk by Jamaica (2009 – 2013)



Source: FAOSTAT 2016

The Caribbean region collectively also showed an increasing goat milk production trend ranging from 208,946 tonnes in 2009 to 216,984 tonnes in 2013. (Figure 8). The available data for the Caribbean in Figure 6 also suggests that Jamaica is by far the major producer of goat milk in the region. By extension, according to this data, the rest of the Caribbean collectively produced only 31,946 kg in 2009 and 32,984 kg in 2013.

Figure 8: Production of Goat Milk in the Caribbean Region (2009 – 2013)



Source: FAOSTAT 2016

Goat milk production data for Trinidad and Tobago was not available. The Ministry of Food Production Action Plan 2012-2015 estimated that the annual production of goat milk in Trinidad and Tobago is approximately 20,000 kg. However, an analysis in the AMCHAM TT presentation by John Borely in 2014 suggests that in 2008 annual goat milk production approximated 53,400 kg, followed by a dramatic increase to 253,200kg in 2012 (See Section 6.1 and Table 9).

The survey conducted by the TTGSS in September 2016 indicated that of the 16 farmers interviewed, an annual production of 50,720 kg of goat milk was recorded. The survey data also shows that approximately 70% of the farmers interviewed produced less than 2400 kg per year (presumably the small farms with less than 10 does).

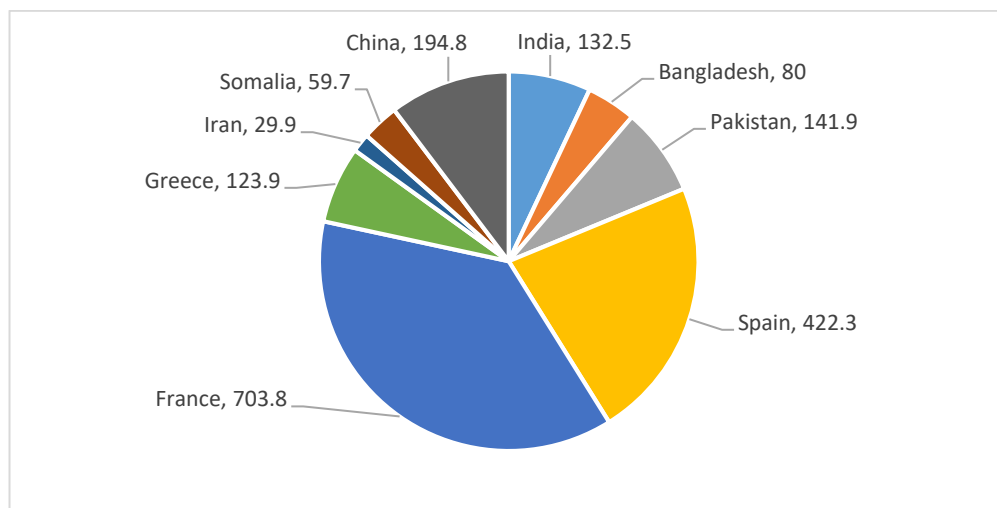
The disparity in production figures for goat milk in Trinidad and Tobago from several sources points to the absence of an organized data collection system for the dairy goat industry; possibly due to the greater priority given to small ruminant meat production at the expense of the dairy goat industry.

## 4.2. Diagnostic analysis of the dairy goat industry cluster in Trinidad and Tobago with reference to TTGSS.

### 4.2.1. Production Levels

The TTGSS survey (2016) shows that the average annual milk yield per doe among the members surveyed of 97.5 kg can be considered competitive when compared with three of the top 10 world producers (Bangladesh, Somalia and Iran) as shown in Figure 9.

Figure 9: World's Top Producers Average Milk Production per Doe/Lactation (kg)



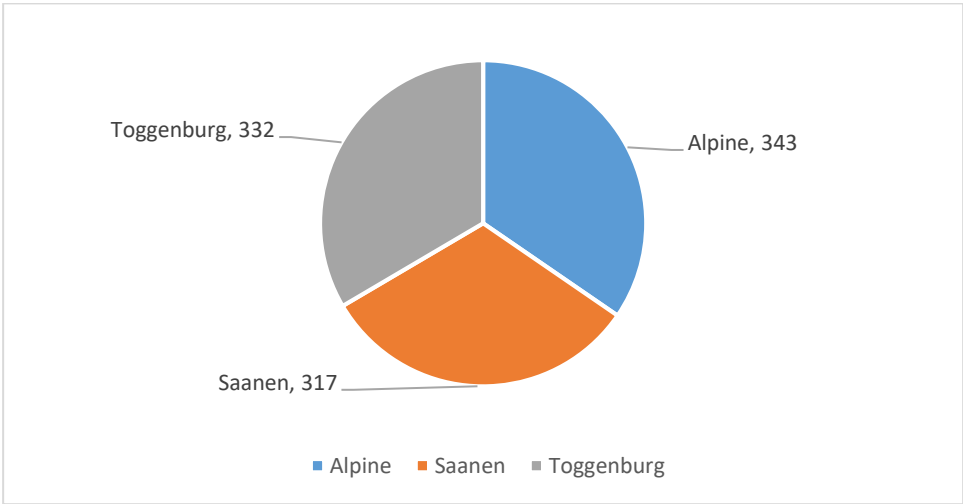
Source: Lohmann Information. Vol 45 (2). Oct 2010. Present Status of the World Goat Populations and their Productivity p. 45.

The milk breeds- Saanen and Alpine - constitute the main breeds in France and Spain which shows milk yield per doe per lactation as high as 703.8kg and 422.3kg per doe per lactation respectively. In general, on a regional basis, the average milk yield (litres) per doe per year for the continents of the world are as follows: Asia (88.3), Africa (60.6), Americas (64.3), and Europe (265.7).

Interestingly, a study by Thomas et al (2013) shows that in Barbados, milk yield per doe of three common dairy goat breeds, namely Alpine, Saanen and Toggenburg were recorded at 343kg, 317kg and 332kg respectively per lactation in a 200-day lactation period. (Figure 10). In Jamaica, the average yield per doe/year is 382.6kg (FAOSTAT 2016).



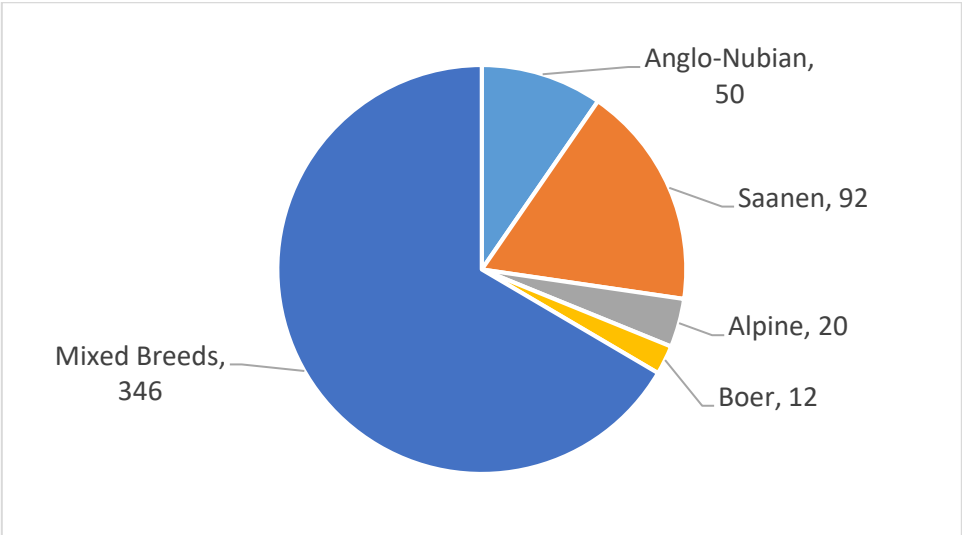
Figure 10: Average Milk Yield/Doe/Lactation in Barbados (kg) (2013)



Source: Thomas, G; Rollins, D; Lallo, C.H.O (2008). Performance of Three Dairy Goat Breeds Reared on an Intensive Pasture-Based System at Greenland Livestock Research Station Barbados.

The vast majority of does among the farms in the TTGSS survey constituted mixed breeds (345). Saanen and Anglo-Nubian breeds were the most common imported pure breeds found on these farms; 92 and 50 does respectively. Only 20 Alpine does were reared on the farms surveyed. (See Figure 11). The Barbados results suggest that productivity of the pure breeds among the TTGSS farmers can be considerably improved.

Figure 11: Distribution of the Number of Does of the Popular Breeds reared by Respondents in the TTGSS Survey (2016)



Source: TTGSS Dairy Goat Survey 2016.

#### 4.2.2. Cost of Production and Returns from Goat Milk

The estimated cost of producing 1 kg of goat milk ranges from TT\$14.61/kg for a large farm with over 50 does, TT\$18.51/kg for a medium-sized farm between 10-30 does to TT\$20.46/kg for a small farm with less than 10 does respectively (Table 2). The data shows that the small producers are least productive among the three categories of producers; also, productivity levels increase as the level of technology and economies of scale increase on the larger farms. This points to the need for a development programme to raise productivity levels and production in general among the small and medium farms. The detailed cost of production models for small, medium and large producers are shown in Appendix 1, 2 and 3 respectively.

At an average retail price of \$28.82/kg, the small, medium and large producer of fresh milk can realize a net revenue of TT\$8.36/kg, TT\$10.31/kg and TT\$14.21/kg respectively. A large farm operation is almost twice as productive as a small farm. It is evident therefore that priority be given to improving the productivity of the smaller farm operations.

Table 2: Estimated cost of production of goat milk on small, medium and large farms in TT.

Farm size	Operating cost (TT\$/kg)	Net Revenue (TT\$/kg)
Small (10 does)	20.46	8.36
Medium (30 does)	18.51	10.31
Large (50 does)	14.61	14.21

In comparison, a 10-doe operation in US cost an average of TT\$7.70 to produce a 1kg milk; an average of TT\$4.00/kg for a 100-doe operation and TT\$1.43/kg in a 500-doe operation.

An average of US\$6.26/kg and US\$13.98/kg have been recorded as the international export price for goat's milk and goat milk powder respectively. ([www.Zuaba.com](http://www.Zuaba.com)).

## 5. MARKET ANALYSIS

The methodology employed in the market analysis involved a review of the following secondary data sources:

- (i) IICA Market Study for Value Added Meat and Dairy Products from Small Ruminants (2013),
- (ii) Trade data relating to the importation of dairy goat products in Trinidad and Tobago (2010-2015).
- (iii) EUROCHAMTT Tobago Good Foods Project - Presentation on Opportunities for Dairy Goat Farming in Tobago (by J. Borely, 2014).
- (iv) Review of TTGSS data and interviews with TTGSS Executives.

### 5.1. Review of the IICA Market Study (2013)

The Inter-American Institute for Cooperation on Agriculture (IICA) commissioned a market study of the small ruminant industry in 2013 to provide market intelligence on meat and milk products from small ruminants, with the objective of improving the competitiveness of the small ruminant sub-sector in Trinidad and Tobago. The market study was conducted in Trinidad and Tobago amongst 47 supermarkets, 45 institutions (hotels, restaurants, and caterers) and 169 consumers via direct interviews and review of secondary data. The supermarkets, hotels and restaurants selected represented approximately 20% of the respective populations as listed in the Trinidad and Tobago Telephone Directory. The breakdown of the sample frame utilized is shown in Table 3.

Table 3: Sample Design for the IICA Market Study (2013)

REGIONS	% OF POPULATION	SUPER-MARKETS	INSTITUTIONS	MEAT VENDORS	PUBLIC
North West	12.3	12	19	3	43
East/North East	36.4	15	9	4	48
Central	18.2	11	6	2	29
South West	19.0	2*	5	1	21
South East	9.8	4	0	1	13
Tobago	4.3	3	6	2	5
<b>TOTAL</b>	<b>100</b>	<b>47</b>	<b>45</b>	<b>13</b>	<b>169</b>

*\*The low numbers for the South West was due to lack of cooperation by a number of Supermarkets in that region -12 were selected for the survey*

The findings of this market study were reviewed to provide insights into the market demand and potential specifically for dairy goat products (milk and cheese in particular) and consumer behavior in relation to the use and preferences for these products.

The key relevant findings of the IICA market study with respect to supermarkets, institutions and consumers are described as follows:

### **(a) Analysis of Supermarkets Survey**

#### Description of Demand

Twelve (26%) of the 47 supermarkets surveyed sold goat milk, while 13 (28%) sold goat cheese. The majority of the supermarkets stated that they did not sell goat milk (57.6%) and goat cheese (75%) respectively because of low demand or lack of requests by customers and were too expensive. Approximately two thirds of respondents (24 of 38) were willing to stock both milk and cheese products providing that there was a demand by the customers.

#### Quantity Demanded

The majority of supermarkets described sales as flat for both goat milk (66.7%) and cheese (91.7%). The quantity of milk sold was not reported since the data captured did not differentiate between the two units of quantity, litres and grams; as such it was not possible to provide weekly sales figures. However, an average of 20.63kg of cheese were sold weekly at the supermarkets surveyed.

#### Source of Supply

Approximately 86.7% of the milk sold at the supermarkets was imported while only 6.7% came from local producers. Similarly, 69.2% of the supermarkets sold only imported goat cheese, while the other supermarkets either sold local cheese (23.1%) or both local and imported cheese (7.7%).

### **(b) Analysis of the Institutions Survey (hotels, restaurants and caterers)**

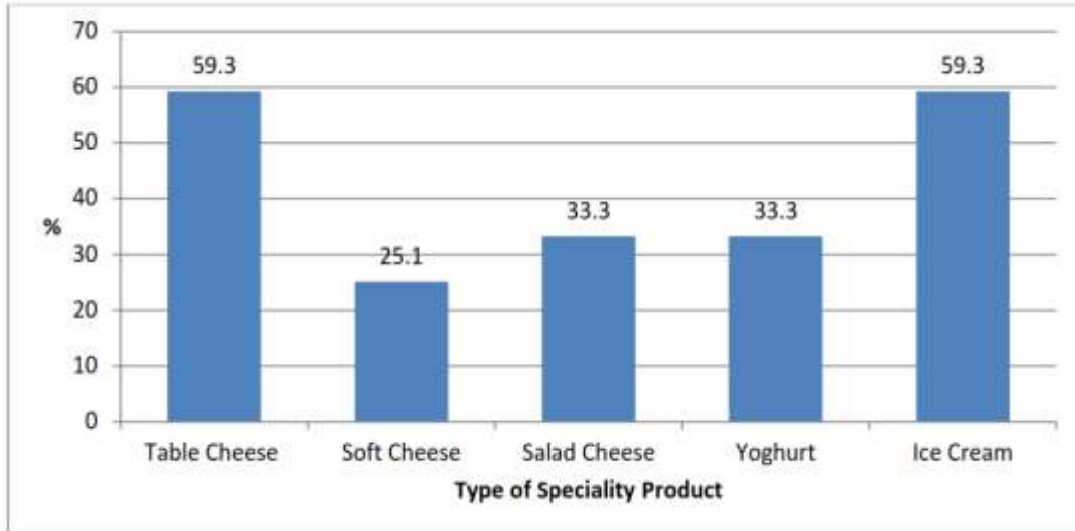
#### Description of Demand

Ninety five percent (95%) of the institutions did not use goat milk, because it was not an ingredient required in the menu, nor was it demanded by customers. Only 2 of the 44 respondents used goat milk if required for a particular menu. Generally, goat's milk was not an ingredient required in the menu, nor was it demanded by customers, hence its low usage.

Twenty two (22%) of the institutions used goat cheese mainly for salads. Cheese and ice cream made were the two main products of used by the institutions (27 respondents). Other products used were, salad cheese, yoghurt and soft cheese. The data shows that only 10 of the 44 respondents used goat cheese in the preparation of their dishes. The main use for this product was in salads. The reasons for non-usage were that the product

was not part of the menu nor was it demanded by customers. Figure 12 shows the distribution of uses of dairy goat products among the 22 institutions who use the products.

Figure 12: Percentage Usage of Specialty Dairy Goat Products among Institutions Surveyed



Interestingly, the majority of respondents were not prepared to continue using either goat milk (76.3%) or goat cheese (59.5%). The reasons given were that it was not demanded by customers, nor was it part of the menu.

#### Quantity Demanded

An average of one case (12-one litre packs) of goat milk was used per week among the institutions surveyed. The average weekly consumption of goat cheese was 8 kgs.

#### Source of Supply

The sources of supply for goat milk were split between local and imported, whereas the majority of goat cheese was from imports (89.7%).

### (c) Analysis of Consumer Behaviour Survey

A total of 169 consumers were surveyed; selected from 5 regions in Trinidad and Tobago as listed in Table 4. The numbers surveyed in each region were based on population distribution. The demographics of the consumers surveyed indicate that 56.5% were less than 39 years of age, 61% were female, 67.4% earned less than TT\$70,000 annually and 91.6% attained secondary or tertiary level of education.

Table 4: Number of Consumers Surveyed by Region (IICA Market Study)

Region	Frequency	Percentage
North West	43	25.4
East/North East	58	34.3
Central	29	17.2
South West	21	12.4
South East	13	7.7
Tobago	5	3.0
Total	169	100

#### Description of Demand

Only 17 of the 136 consumers interviewed (12.5%) either consumed or purchased goat milk and cheese. They bought goat milk because they liked the taste. A number of reasons were put forward from the respondents for non-consumption, such as not knowing about the product, high price, taste and availability. The key factors that would influence consumption of goat milk/cheese were promotion, price and taste.

A number of reasons were put forward from the 118 respondents for non-consumption. The main reasons given were: they did not know about the products, were not interested in using alternative products, or they did not like the taste. Table 5 describes the reasons for non-consumption of goat milk and goat cheese by consumers interviewed.

Table 5: Distribution of Reasons for Non-Consumption of Dairy Goat Products by Consumers Interviewed

Reasons of non-consumption	Number of Respondents
Not knowing about or not interested in an alternative milk product	24
Don't like the taste	22
Never bought the product	15
Price too high	13
Not available	12

Approximately 28% members of the consumers (36 respondents) who do not currently purchase/consume the products have done so in the past. They did so because it was either given to them by someone else or they drank goat's milk at young age. The other respondents (96 respondents) that never tried the products indicated that in the case of milk they had no interest. As for cheese, they never knew about its availability. The other reasons given were preference for cow's milk, high scent and high prices.

### Quantity Demanded

A very small number (8) of the consumers provided data on the purchase of goat milk, with only five of them purchasing 1 litre of milk per week. The weekly purchases of cheese varied from 112 to 450grams. The average expenditure per week was approximately \$37 for milk and \$36 for cheese.

### Description of Potential Demand among Consumers

Of the 112 respondents, 39% and 42% of the consumers surveyed will continue to use goat milk and goat cheese (112 respondents). Price and availability were the two key factors that would influence increased consumption of goat milk and cheese. Table 6 shows the consumers response to the factors which would influence increase in consumption of the dairy goat products on a scale of 1 to 5, with 1 for very strong influence and 5 for least influence.

Table 6: Factors influencing increase in consumption of Dairy Goat Products by Consumers in the Future

Product	Factors			
	Availability	Price	Taste	Promotion
Milk	1	1	3	4
Cheese	1	1	2	4

The key factors that would influence consumption of goat milk were promotion and taste. The price of the product and promotion were the key factors with regards to influencing consumption of goat cheese. Table 7 shows the consumers response to the factors which would influence their future consumption of the dairy goat products on a scale of 1 to 5, with 1 for very strong influence and 5 for least influence.

Table 7: Factors influencing adoption of consumption of Dairy Goat Products by Consumers in the Future

Product	Factors			
	Availability	Price	Taste	Promotion
Milk	4	2	1	1
Cheese	4	1	2	1

## 5.2. Review of Trade Data on importation of Dairy Goat Products

Import data relating to dairy goat milk and its products were obtained from the Central Statistical Office (CSO) in Trinidad and Tobago for the period 2010 to September 2015. However, the product categories represented by international HS codes do not disaggregate the data specifically for dairy goat milk and cheese and other products derived from goat's milk from those of cow's milk and cheese and other products derived from cow's milk. In fact, in many cases the same HS codes represents both cow and goat milk and their products.

Nevertheless, interaction with personnel with the CSO, Ministry of Trade and Industry and the Ministry of Agriculture suggest that the HS Codes selected for analysis represent the dairy goat products imported into the country. The bulk of cow's milk and its products imported are represented by other HS codes and shows significantly larger import values than the categories which represents dairy goat milk products. This is indicative of the fact that the demand for cow's milk and its products is significantly higher than the now emerging demand trend for dairy goat products. The values for these products were not included in the analysis on the assumption that they represent mainly cow's milk products.

Table 8 and Figures 13 and 14 shows that the values of imported goat milk (liquid UHT milk and powdered milk) has shown an overall increasing trend over the past 6 years. Data on the corresponding volume of imported items was not available from CSO. An interesting development also, is the increasing appearance of powdered goat's milk on local supermarket shelves. Figure 13 shows a dramatic increase in demand and resulting importation of powdered goat's milk.

Table 8: Value of Imported Dairy Goat Products between 2010-2015 (TT\$)

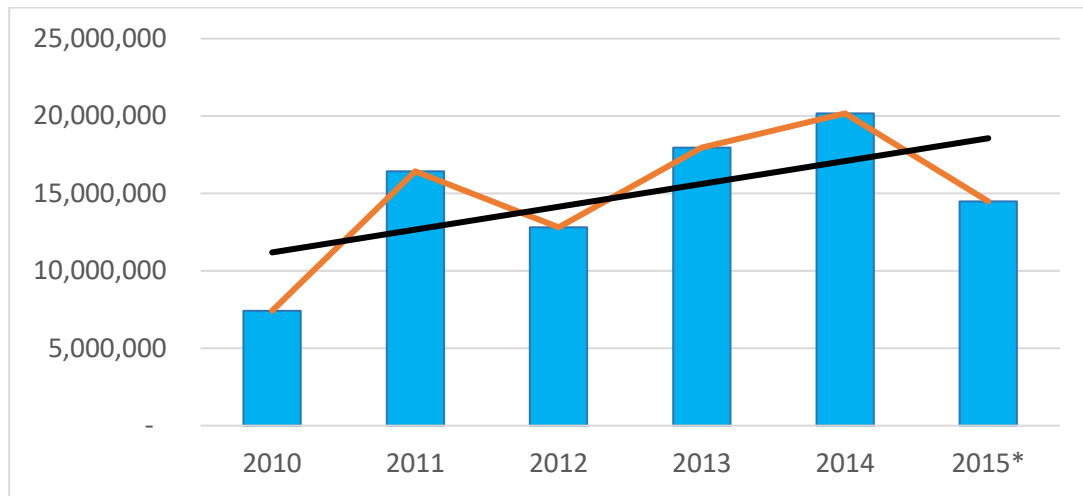
Product Description	Value of Imports (TT\$)					
	2010	2011	2012	2013	2014	2015*
Other Milk and Cream, Unsweetened (HS Code: 040291000)	7,421,233	16,439,034	12,805,565	17,956,265	20,171,476	14,476,394
Other Milk Sweetened -Full Cream Goat Milk Powder HS Code: 04029990	2,589,078	3,141,968	3,338,013	4,303,120	4,332,120	5,184,747
Cheese processed not grated or powdered (HS Code: 04063000)	6,211,532	8,562,204	21,021,503	19,576,024	24,044,181	16,788,665
Other Cheese (HS Code: 04069000)	164,518,358	196,803,116	191,971,774	232,016,287	266,539,418	162,064,378

\*January to September 2015



It must be borne in mind therefore that the increase in values from year to year also includes increases in international prices and cost of shipping from year to year. However, even in the absence of data on the quantities imported, it can safely be assumed that demand for goat milk in Trinidad and Tobago has been steadily increasing over this period.

Figure 13: Value of “Other Milk and Cream Unsweetened” Imported 2010-2015 (TT\$)



With respect to goat cheese, the CSO data records three HS categories of cheese which may include goat cheese. Figure 15 shows the values of the category which includes goat cheese products which also shows an overall increasing trend between 2010 and 2015, suggesting an increase in demand among local consumers.

Figure 14: Value of “Other Milk Sweetened/Full Cream Goat’s Milk Powder (2010-2015) TT\$.

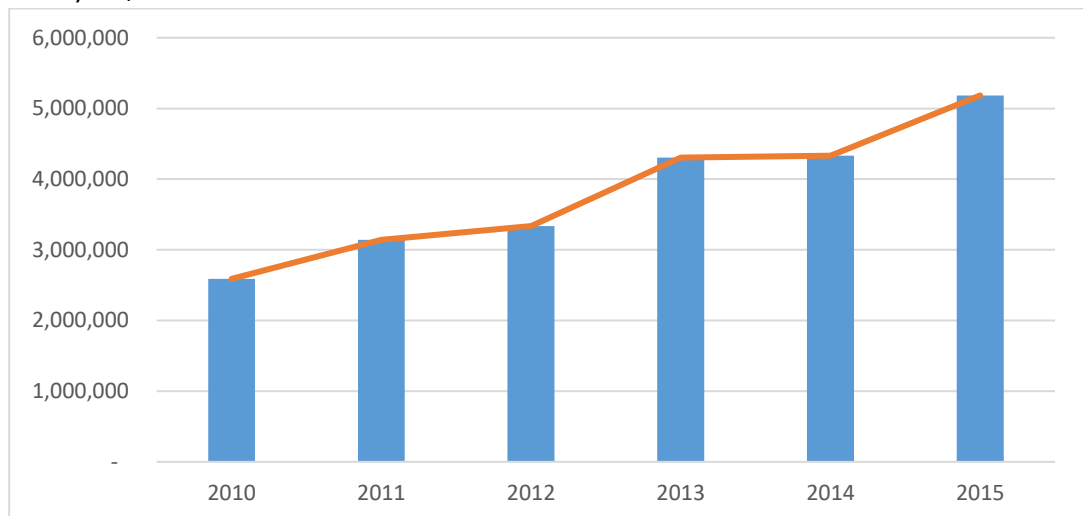
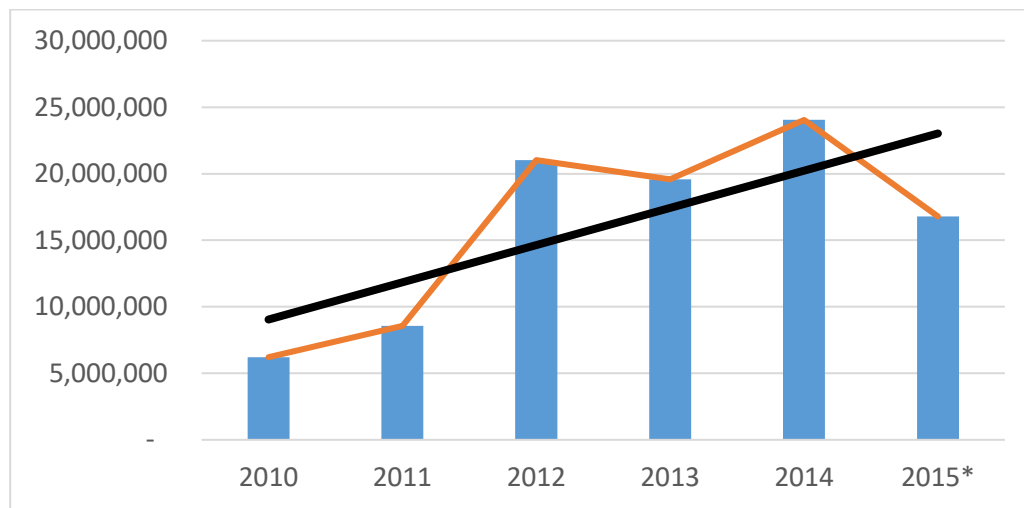


Figure 15: Value of “Cheese Processed, not Grated or Powdered” Imported (2010-2015) TT\$



### 5.2.1. Competition from Alternative Milk Products

The emergence and rapid growth of the alternative milk products market is posing a direct threat to the growth and development of the dairy goat industry worldwide. This market now includes milk substitutes made from almond, soy, rice, and coconut.

The market for dairy alternatives is projected to reach about USD 19.5 Billion by 2020. The market is driven by the increasing consumer awareness, growing incidences of lactose intolerance and milk allergy, and growing preference towards vegan diet. Consumers are becoming more health conscious due to the growing incidences of gastrointestinal diseases. Increasing incidences of gastrointestinal diseases in the population, consumers avoid dairy products, which in-turn drives the market for dairy alternatives. <http://www.marketsandmarkets.com/PressReleases/dairy-alternative-plant-milk-beverages.asp>

The threat directly affects the dairy goat industry since these products are promoted as alternatives to cow's and the problems associated with digestibility and allergic reactions. Goat's milk has long been marketed as the alternative to cow's milk for these same reasons. Hence, these new products pose a serious threat to the future of the dairy goat industry worldwide.

No import data was obtained for these alternative milk products, however, the prevalence and rapidly expanding range of these products on local supermarket shelves suggest that there is also a growing demand for these products among local consumers.

### 5.3. Review of Demand Analysis in the EUROCHAMTT presentation (2014)

Analysis of Figure 16 shows that sale of goat milk at stores of a selected supermarket chain ranged from a low of approximately 40 litres in four months to a high of approximately 120 litres in March and July in 2010, but an overall declining demand trend from January to December. However, Figure 16 shows an increasing demand trend in 2011 from a low of less than 20 litres per month in January 2011 to a high of approximately 120 litres in July and December 2011. This sales trend points to an increasing demand for goat's milk over the 2 year period. This increasing demand trend is partly supported by the increase value of imports of goat's milk from 2010-2015 in Table 8 and Figures 13.

It is also noteworthy that the supermarket outlets in south Trinidad showed the highest demand in 2010 as well as 2011, while the lowest demand figures were recorded at outlets in west Trinidad (Figures 16 and 17).

Figure 16: Estimate of Goat Sales at a Supermarket Franchise in Trinidad in 2010

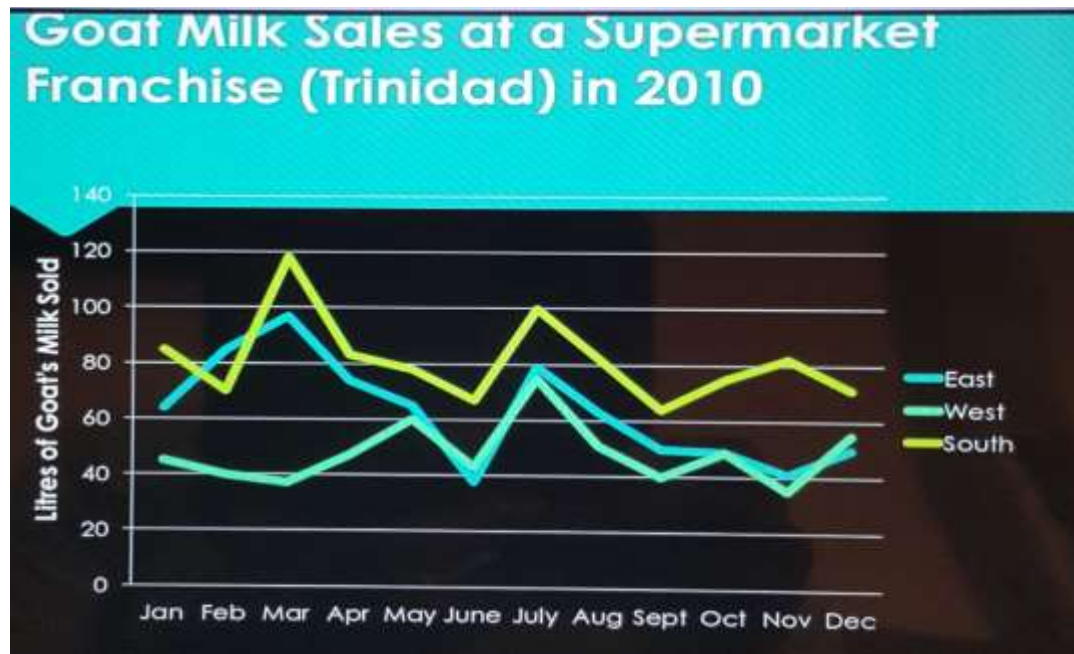
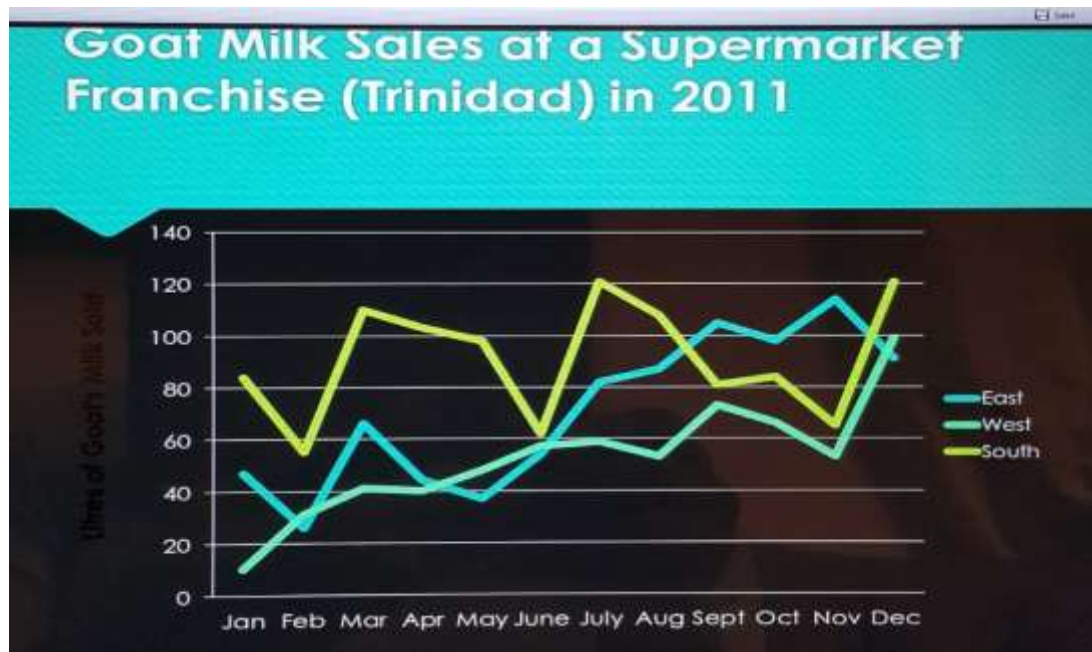


Figure 17: Estimate of Goat Sales at a Supermarket Franchise in Trinidad in 2011.



#### 5.4. Review of Demand for Local Goat Milk Value Added Products

Newspaper reports over the past five years indicates an increasing demand for goat's milk in Trinidad and Tobago. The Trinidad Express newspaper (May 13, 2014) and Trinidad Newsday newspaper (March 10, 2016) in interviews with Mr. Lincoln Thackorie owner of Marilissa Farms reported a pioneering local business venture where he operates a dairy goat business with over 1000 milking animals and now sells pasteurized milk at leading supermarket chains in Trinidad. (See Appendix 4 and Appendix 5).

According to the Express Newspaper report Marilissa Farms produces over 400 litres of milk per day which is marketed in 1.8 litre bottles at two major supermarket chains. According to Mr. Thackorie, "“We have a demand for goat milk, but we don't have a supply of goat milk. We are trying to fill that void. The quantity of milk that we will be able to produce at our peak, we believe that we may be able to help meet that demand.” (Trinidad Express, May 13, 2014). Currently, Marilissa Farm produces over 500 litres milk per day.

In addition, two other farms with over 50 milking animals are also producing and marketing pasteurized goat's milk at major supermarket chains in Trinidad and Tobago (See Appendix 3).

A budding goat cheese industry is simultaneously emerging among a number of small-scale producers in Trinidad and Tobago. In Tobago, Orange Hill Farms produces a range of goat cheese which are marketed in local supermarkets (See Appendix 6). La Blanchiseuse is a small dairy company specializing in goat milk products – fresh goat cheese, cream cheese, and a cream cheese dip.

According to Cheryl Roach-Benn, Director of Animal Production and Health in the Ministry of Agriculture, in an article in the Trinidad Guardian in 2013, “...what the data also shows is there is a potential market and opportunity to increase the local production levels of not only meat, but milk production from both goat and sheep...Recently goat milk and cheese have become staples on our grocery shelves and the demand for small ruminant products continues to increase whilst production lags behind consumption.” (Trinidad Guardian, March 1, 2013).

## 6. SUPPLY ANALYSIS

### 6.1. Local Production

#### 6.1.1. EUROCHAMTT Analysis

An analysis of milk production among the core group of goat milk producers in Trinidad shown in the EUROCHAMTT presentation by John Borely in 2014, revealed that in 2008 seven (7) small farmers with less than 10 does produced between 0.83 to 1.2 litres of milk per doe per day (an average of 1.12 litres), while producers with 10 – 25 does produced between 0.83 to 1.5 litres milk per doe per day (an average of 1.21 litres). Overall, in 2008 a total of 14 does produced approximately 178 litres of milk per day (Table 9). In 2008, these farmers would have collectively produced approximately 53,400 litres milk over a 300-lactation day period for the year.

Interestingly in 2012, the small farmers' productivity levels showed improvement by producing between 1 to 1.67 litres per doe per day (an average of 1.21 litres), but the productivity level of the farmers with 10 to 25 does remained the same as in 2008 – between 1 to 1.5 litres per doe per day. Overall, in 2012 a total of 15 small and medium-sized farmers produced about 222 litres of milk per day (Table 9). The group of small and medium-sized farms in 2012 would have collectively produced approximately 66,600 litres of milk over the 300-lactation day period for the year; an increase of 13,200 litres over 2008.

Table 9: Local Milk Production of Different farm Sizes in 2008 and 2012

Farm Size	Number of Does	Range of Milk Production per Doe/Day (litres)	Average Milk Production per Doe/Day (litres)
<b>2008</b>			
< 10 does	7	0.83 - 1.2	1.12
10-25 does	7	0.83 - 1.5	1.21
Number of Does	14		
Total Milk Production/Day (2008) = 178 litres			
<b>2012</b>			
< 10 does	3	1 - 1.67	1.21
10-25 does	12	0.83 - 1.5	1.21
Total Does	15		
Total Milk Production/Day = 222 litres			
> 100 does	1	2.67	2.67
Total Milk Production = 400 litres			
Total Milk Production/ Day (2012)	622 litres		

Noteworthy, in 2012 one large farm (Marilissa Farm) with 150 does demonstrated the ability to significantly improve productivity level by producing a total of 400 litres of milk per day at an average of 2.67 litres/doe/day. This production approximates to over 120,000 litres for the year. In total, the dairy goat farmers in Trinidad produced over 186,600 litres in 2012.

Interestingly, Marilissa Farm has significantly expanded and upgraded production since 2012 and now has the capability to produce over 2000 litres per day with over 1000 does. The Marilissa brand of pasteurized goat milk is now on man local supermarket shelves (See Appendix 3).

### 6.1.2. TTGSS Survey Data (2016)

#### (a) Monthly milk production

The TTGSS survey (2016) showed that among the 17 farmers interviewed the majority of them (8) produced less than 150 litres per month, while 6 produced between 150 to 300 litres per month (Table 10). The annual production figures of the respondents in Table 11 shows that 7 of the 16 farmers produced less than 1200 litres per year, while 2 farmers produced more than 4800 litres per year.

Table 10: Monthly Milk Production by Respondents

Monthly Milk Production (litres)	Number of Farmers
>150	8
150-300	6
301-500	1
>500	2
Total	17
Total Milk Production/month = 4370 Litres	

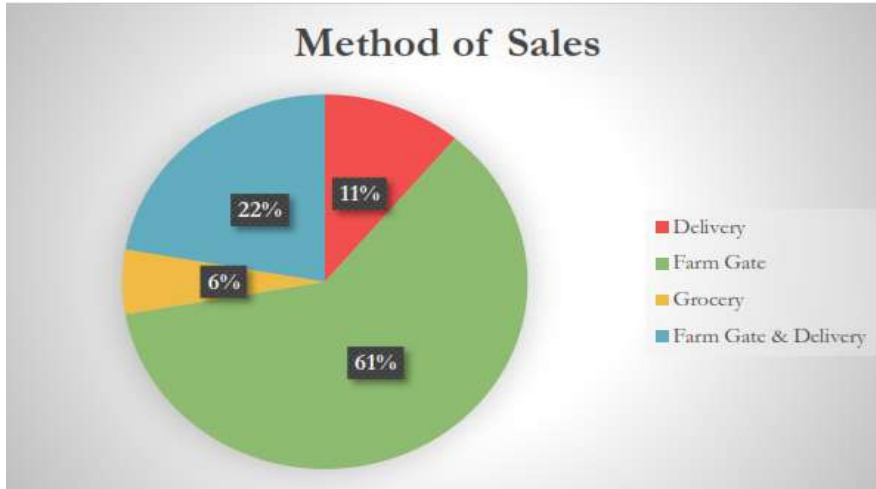
Table 11: Annual Milk Production by Respondents

Annual Milk Production (litres)	Number of Farmers
<1200	7
1200-2400	4
2401-4800	3
>4800	2
Total	16
Total Mil Production/year = 50,720 litres	

(b) Method of Sale

The TTGSS survey 2016 shows that the majority of farmers sold their milk at farm-gate and delivery to consumers (94%), but only 6% sold milk in the mainstream supermarkets. (Figure 18).

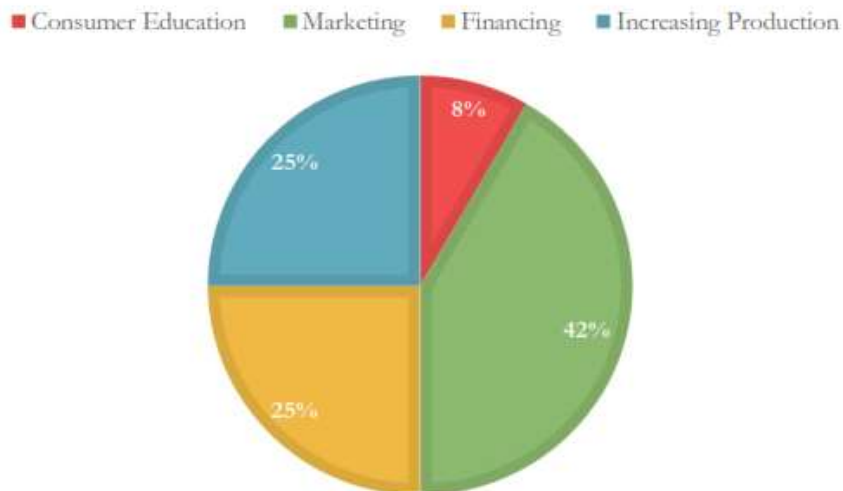
Figure 18: Method of Sale by Respondents of the TTGSS Survey (2016)



(c) Major Constraints

According to Figure 19, approximately 42% of the respondents in the TTGSS survey (2016) revealed that marketing their milk was their most significant constraint they face, however, only 8% felt that a lack of consumer education was a major constraint to marketing their milk. Inability to secure financing and increasing production were the other major challenges faced by the farmers (25% each).

Figure 19: The Major Constraints faced by Respondents in the TTGSS Survey (2016)





(d) Disposal of Milk

About 75% of the farmer's surveyed use about 17% of milk produced on their farms to feed kids on the farm. Therefore only 83% of the milk produced is sold. The other 25% of the farmers use milk replacer to feed their kids. However, about 70% of the farmers practice early weaning of the kids. Almost all farmers surveyed (96%) sell fresh goat's milk without adding value to the product.

(e) Milking Practice

Almost all (18) the farms surveyed (20) milk their goats once per day. Only one farmer used milking machines.

### **6.1.3. Additional Market Information**

**(a) Emergence of a category of large farmers with more than 50 does**

Interviews with key TTGSS personnel provided additional insight into the latest development of the dairy goat industry in Trinidad and Tobago. One of the more interesting development is the emergence of a small group of large farmers operating with over 50 milking animals and producing an average of 2 to 2.5 litres of milk per doe per day. There are currently three (3) farmers in this category.

These producers use improved technologies such as forage choppers and milking machines and are engaged in a structured breeding programme using imported breeds to upgrade their stock and improve efficiency and productivity. In addition, they pasteurize and market their milk to local supermarket chains under their own brands.

**(b) Emergence of Salad bars serving goat cheese**

There is an emerging local demand and consumption of a range of goat cheese incorporated into various salads which are becoming quite popular in salad bars in several popular high-end restaurants. These restaurants include, Texas de Brazil, Friday's, Rituals, Starbucks', in addition to a large number of gyro outlets across the country.

**(c) Some of the key challenges facing the small producers include:**

- Low level of milk production
- Lack of milking machines
- Lack of food safety standards which prevents them from penetrating the mainstream local supermarkets and restaurants.
- Marketing of unpasteurized milk
- Marketing restricted to the direct-marketing of fresh milk in the community

#### **6.1.4. Summary of Local Supply Capacity**

A review of the AMCHAMTT and TTGSS data suggest that there was a significant improvement in productivity and production among the small farmers from 2008 to 2012, while there was no marked improvement among the medium-sized farmers. In addition, 4 years later in 2016 the TTGSS survey showed that the estimated milk production among the same core group of small and medium-sized farmers showed a decline in total production from approximately 66,600 litres in 2012 to 50,720 litres in 2016. The TTGSS survey data (2016) did not identify the productivity levels among the small and medium-sized farmers.

A deliberate effort is therefore urgently needed to improve the productivity levels among both the small and medium-sized farms. The bulk of the local production is currently spearheaded by Marilissa Farm, with an approximate annual production of over 800,000 litres. The annual production from the small, medium and large farms ranges from 18,000 – 24,000 litres.

## 7. SWOT ANALYSIS

### 7.1. Production SWOT

Table 12: SWOT Analysis of Dairy Goat Production System

Strengths	Weaknesses	Opportunities	Threats
Productivity level average of 2kg/doe/day.	Low level of technology among the small and medium producers. Most farmers do not have milking machines.	Embracing the value chain and cluster approach to production	Illegal importation of small ruminants from Venezuela
Technical assistance support available from IICA, CARDI, MALF	Limited availability of high quality forage	Technical assistance to upgrade technology	Entry of pests and diseases
On-going stock improvement programme	Limited availability of land for pastures	Adoption of good agricultural practices and other food safety and quality practices	Increasing cost of imported concentrate feed ingredients
Increasing number of animals	High dependence on “cut-and –carry” low quality forage		Unavailability of labour
Average of 2 kids per litter	High level of dependence on imported concentrate feed ingredients	Production of value added products	
Early weaning (2months)	Inadequate economies of scale, due to the relative small size of dairy goat farms		
Increasing number of imported milk breeds	Lack of a food safety and quality standards system.		
	High labour costs		
	Absence of adequate record keeping		

## 7.2. Marketing SWOT

Table 13: SWOT Analysis of Dairy Goat Marketing System

Strengths	Weaknesses	Opportunities	Threats
Increasing demand for goat's milk and its products	Persistence of negative consumer behaviour toward goat's milk	A dynamic farmers' organization in the TTGSS	Increasing importation of dairy goat products
Penetration of the local mainstream supermarkets by Marilissa Farm and other large farms with fresh pasteurized milk.	Lack of awareness of the benefits of goat's milk. Absence of promotion and advertising effort	Penetrating the mainstream local markets	Increasing importation of non-dairy milk alternatives
Existing niche markets of consumers – health and allergy sensitive consumers and specialty consumers	Negative image about goat's milk linked to the smell and different taste of goat's milk	Development of a dairy goat cluster and value chain	Increase in demand for non-dairy milk alternatives
Emergence of a local value added dairy goat milk processing industry for cheese, yogurt etc		Potential for expanding market share with fresh, pasteurized milk	Increasing array of dairy goat products on local supermarket shelves
Technical support and assistance from MALF, IICA, CARDI etc		Introducing flavoured milk products and other value added products such as yogurt to increase local consumption	
Technical support available		Increasing demand for dairy goat products	

## **8. THE MARKETING STRATEGY**

In accordance with the objective of the business plan, the market strategy builds on a structured framework to position the dairy goat industry to achieve its goals of increased production; productivity and market access for its products.

A cluster and value chain approach provides the basis for the development of the marketing strategy and the business plan for the dairy goat industry led by the TTGSS. The market analysis conducted dictates that the TTGSS marketing strategy adopt a multiple approach to penetrate the market and capture a significant market share currently enjoyed by imported dairy goat products. A 3-year marketing strategy and marketing plan is developed for the TTGSS cluster for the small and medium-sized farmers combined and the large farmers separately.

The cluster approach focuses on joint action by members such as collaborative production and marketing. A cluster marketing initiative is earmarked for small and medium-sized farmers as a strategy to strengthen their economies of scale and accumulate production to meet market demand and capture some market share in the mainstream supermarkets. The cluster strategy for the large farmers will be focused on joint market development for TTGSS products.

The cluster marketing techniques for the multiple strategy includes:

- (1) Cluster marketing for the small and medium farmers
- (2) Promotion and branding – promoting and educating on the virtues of goat’s milk – nutrition, health etc
- (3) Market segmentation (niche marketing)
- (4) Market penetration
- (5) Pricing Strategy
- (6) New product development into value added products such as flavoured goat milk, goat cheese and yogurt.

### **8.1. Cluster Marketing**

The project was unable to estimate the quantity of goat’s milk demanded by local consumers over the past 5-6 years. It is however clear that demand is steadily increasing, as shown by the increasing values of imported goat’s milk and cheese between 2010 to 2015, as well as the market penetration achieved in recent years by Marilissa Farm and the large farmers of the TTGSS into the local mainstream supermarkets. It is estimated that 30,000 to 40,000 litres of local goat’s milk is currently sold at local supermarkets each month.

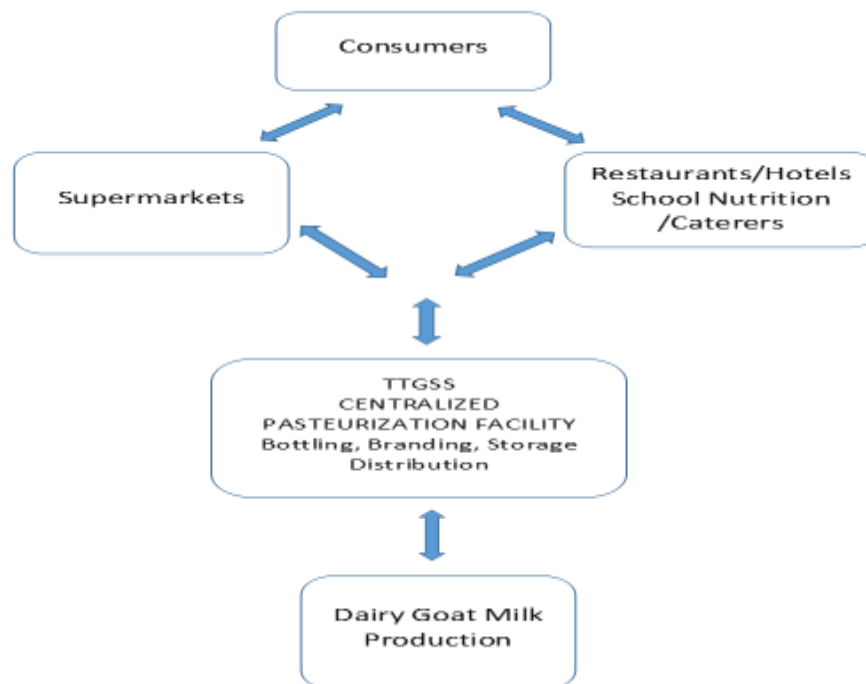
The objective of the cluster strategy is to capture a significant portion of the market for goat’s milk which is currently enjoyed by imported products; initially targeting 25% of the market.

Using the 2014 value of importation of goat milk of TT\$20,171,476 and an estimate of US\$6.26/kg international price, it is estimated that 480,273 litres of milk was imported in 2014. Therefore the cluster marketing strategy of the small and medium producers is to collectively target 25% of 40,000 litres of milk or 10,000 litres per month for the mainstream markets in year 1 and increase incrementally each year. The strategy also allows producers to maintain meeting their demand among the local community with direct sale of unpasteurized milk and gradually encouraging a shift to pasteurized milk over time.

### 8.1.1. Marketing Plan - Cluster Marketing for Small and Medium Farmers

In order to create a sustainable market for the TTGSS farmers, a cluster marketing strategy would be initiated for the small and medium farmers to strategically market a production target of initially over 300 litres of milk produced by these farms per day over the next 3 years. A pasteurization facility will be established to facilitate joint pasteurization and expanding marketing of fresh goat’s milk into the main stream markets and at the same time maintain a traditional community and local market for un-pasteurized milk. Figure 20 illustrates the marketing structure and channel for the distribution of small and medium farmers’ milk in particular.

Figure 20: Marketing Channel for Small and Medium TTGSS Dairy Goat Farmers



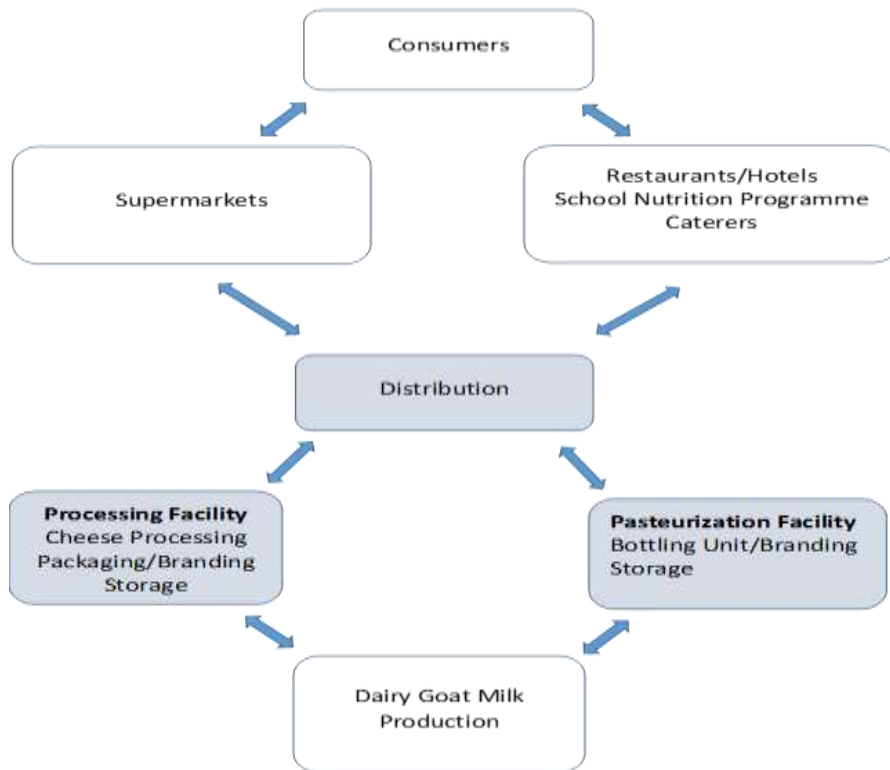
It is expected that the progressive small and medium producers will ultimately graduate to branching off on their own with their individual pasteurization and processing facilities, similar to the operations of the large farm category.

As an interim measure, the TTGSS is already in discussion with the Aripo Livestock Station and the Sugar Cane Feed Centre to work out an arrangement to pasteurize farmers' milk at the pasteurization facilities of these agencies. It is expected that an agreement will be reached and that the activity of pasteurizing TTGSS goat's milk will commence shortly.

### 8.1.2. Marketing Plan - Cluster Marketing for Large Farmers

A 3-year cluster marketing strategy is developed for the individual large farms, each producing 300-500 litres milk per day. The strategy proposes TTGSS cluster support for research and development for the farmers' independent operations to process and market value added products such as pasteurized fresh and flavoured milk, cheese and yogurt and other products. Technical assistance would be sought from development agencies to facilitate research and development in new and innovative products and to upgrade the processing capabilities of these farmers.

Figure 21: Marketing Channel for Large TTGSS Dairy Goat Farmers



The initial strategy involves penetrating and cementing a presence in the local mainstream supermarkets for fresh pasteurized milk and the restaurant's salad bars for goat cheese products. This will be followed by research and development work and introduction of value added goat's milk products such as flavoured milk, flavoured goat cheese, yogurt and ice creams, all targeting local niche markets.

## **8.2. Promotion and Branding**

The market analysis of the IICA Market Study reveals that only 12 and 13 of the 47 supermarkets surveyed carried goat milk and cheese products respectively, mainly because of low demand by consumers. Similarly, the vast majority of institutions surveyed which included restaurants, hotels and caterers did not use significant amounts of these products in their menus because of low demands. Only 2 institutions used goat milk while 10 used cheese, yogurt and ice creams made with goat's milk. Almost 50% of the consumers who responded to the reasons for not purchasing the products pointed to a lack of awareness of the products, were not interested or never bought the products.

A priority goal in the marketing strategy must therefore be a comprehensive promotional strategy to educate consumers about the advantages of goat's milk over cow's milk and other milk substitutes. In addition, the imported liquid milks are all UHT milk, which means that they have been pasteurized at an ultra-high temperature (UHT) of 138°C for 3 seconds to preserve taste and nutrition and extend shelf life for up to 9 months without refrigeration. It is argued that while the process kills all the pathogens, it also destroys some of the useful enzymes necessary for protein digestion. The milk sold locally is all pasteurized, using the traditional methods of heating at 74°C for 10-20 seconds and then cooling. Pasteurized milk lasts for about 15 days under refrigerated conditions.

### **8.2.1. Marketing Plan - Promotion**

Promotion, branding and positioning a positive image of local goat's milk in the minds of consumers constitute a key marketing strategy for the TTGSS cluster. The strategy will develop and execute a project to promote awareness of the virtues of goat's milk with two (2) specific objectives:

- (i) Promote advantages of goat's milk over cow's milk and other non-dairy milk substitutes
- (ii) Promote advantages of pasteurized milk over UHT milk.

The promotional campaign will highlight the distinct benefits and advantages of goat's milk over competing products.



## The Benefits of goat's milk over cow's milk include:

- **It's easier to digest**

The fat content of cow and goat milk is similar, however, the fat globules in goat milk are smaller, making it easier for the body to digest. The protein in goat milk forms a softer curd than cow milk (only about 2 percent of goat milk is curd, compared to about 10 percent in cow milk) helping the body digest it with less irritation than cow milk.

Goat milk is also lower in lactose, or milk sugars, than cow milk. Many people are not as lactose intolerant as they believe but may simply have trouble digesting cow milk and aren't actually allergic to lactose. This makes goat milk a viable option to cow's milk.

<https://draxe.com/wp-content/uploads/2015/05/GoatsmilkArticleMemev21.jpg>

- **It has fewer allergenic proteins and causes less inflammation.**

It has been shown that most people who are intolerant of cow milk are actually sensitive to one of the proteins found in it, A1 casein, and lack the ability to digest it. This protein is highly inflammatory for some people, and can contribute to gastrointestinal issues like irritable bowel syndrome.

Additionally, cow milk causes allergies among some children and can persist throughout adulthood, because it contains more than 20 different allergens (including A1 casein) that can cause allergic reactions. On the contrary, milk that contains mostly or exclusively A2 casein produces none of these inflammatory effects. Goat milk contains only A2 casein, which do not produce these inflammatory effects and is said to be the closest milk to human breast milk.

<https://draxe.com/wp-content/uploads/2015/05/GoatsmilkArticleMemev21.jpg>

- **It's high in calcium and fatty acids but low in cholesterol.**

Goat's milk is actually richer in calcium than cow's milk, even though cow's milk is often touted as one of the main calcium-rich foods. Goat's milk is actually richer in calcium with about 33 percent of the daily recommended value versus 28 percent in cow milk.

Goat milk also has high levels medium-chain fatty acids (30–35%) as opposed to 15–20% in cow milk. These fatty acids provide an energy boost that isn't stored as body fat, help lower cholesterol, and can even help treat conditions like coronary diseases and intestinal disorders.

Goat milk also helps increase “good” cholesterol levels while reducing the bad ones. It is also claimed that it’s got healing properties similar to olive oil and is recommended for keeping high cholesterol in check.

<https://draxe.com/wp-content/uploads/2015/05/GoatsmilkArticleMemev21.jpg>

- **It absorbs nutrients and minerals better than cows’ milk.**

Early studies have found that nutrients like iron, calcium, magnesium and phosphorous were more easily digested and used by the body in goat milk than cow milk. This can help in treatment of nutritional deficiencies like anemia and bone demineralization, iron and magnesium deficiency. In fact, researchers suggest that goat milk should be consumed regularly by individuals with mal-absorption issues, anemia, osteoporosis or prolonged treatments with iron supplements.

Regularly consuming goat milk enhances the body’s ability to use iron and boosts regeneration of hemoglobin, making it a safe and natural way to treat osteoporosis and combat anemia. Its high levels of zinc and selenium also help prevent neuro-degenerative diseases.

<https://draxe.com/wp-content/uploads/2015/05/GoatsmilkArticleMemev21.jpg>

- **It keeps skin looking good.**

The fatty acids and triglycerides found in goat moisturizing qualities help keep skin soft. Goat milk also has high levels of vitamin A which can improve complexion, fight acne and improve overall skin health. In fact, it can be considered one of the home remedies for acne. In addition, the lactic acid found in goat milk helps rid your body of dead skin cells and brighten skin tone. Finally, goat milk has a pH level similar to humans and is absorbed by the skin with less irritation and helps keep bacteria which causes pimples away.

<https://draxe.com/wp-content/uploads/2015/05/GoatsmilkArticleMemev21.jpg>

### **The Benefits of pasteurized milk over UHT milk include:**

- **Lower protein loss or destruction by heating**

Pasteurization is a process of heating raw milk to a certain temperature to kill microbial, fungal and other agents that contribute to spoilage. Exposure to heat may degrade the nutritional quality of the milk slightly. The regular pasteurization methods are perfectly fine, and they are used by people for centuries to make milk safer to drink.

However, the ultra-pasteurization in UHT milk is known to change milk drastically. The proteins in milk change dramatically when heated at very high temperatures. Many of the benefits of goat’s milk may therefore be reduced or lost by ultra-pasteurization. The extreme heat used in ultra-pasteurization allows the milk to remain safe for consumption for up to six months if it remains unopened and stored properly.

Whereas, pasteurized milk has a shelf life of 5-15 days, making it a fresher milk than UHT.

<http://www.livestrong.com/article/507949-loss-of-nutritional-value-in-ultra-pasteurized-vs-pasteurized-milk/>

- **Less Nutrient Loss**

Adding heat to raw milk causes mild nutrient loss in pasteurized milk. Research has shown that pasteurized milk loses 3 to 4 % thiamin, less than 5% vitamin E and less than 10% biotin during the heating process. In addition, it has been demonstrated that the denaturation of milk's whey proteins through pasteurization can decrease how well your body absorbs the milk's vitamin B12. Ultra-pasteurization may further degrade these nutrients.

<http://www.livestrong.com/article/507949-loss-of-nutritional-value-in-ultra-pasteurized-vs-pasteurized-milk/>

- **Flavour of milk retained after pasteurization**

Raw milk can carry dangerous bacteria like Salmonella, E. coli and Listeria, all of which may pose a significant risk to health. Pasteurization kills these harmful bacteria, though it may leave other non-pathogenic bacteria that can still cause milk spoilage after shelf life expiration. Ultra-pasteurization effectively kills all bacteria in the milk which alters the flavour of the milk.

<http://www.livestrong.com/article/507949-loss-of-nutritional-value-in-ultra-pasteurized-vs-pasteurized-milk/>

### **Benefits of goat's milk vs non-dairy milk alternatives:**

The following claims have been reported about several milk alternatives:

- **Soy milk** can cause bloating for non-dairy consumers with gastritis or irritable bowel syndrome.
- **Rice milk** is very low in nutrient value unless vitamins and calcium are added and contains very little protein. It is good for lactose intolerance but has twice as many carbohydrates as cow's milk and therefore not a healthy alternative.
- **Coconut milk** is higher in saturated fats and calories than cow's milk, but is lactose free.
- **Almond milk** has very little protein and must be supplemented by other sources of protein.

<http://www.care2.com/causes/5-alternatives-to-dairy-milk-and-their-health-benefits-compared.html>

### **8.2.2. Marketing Plan – Branding**

A deliberate promotional strategy will focus on branding and positioning the “made in Trinidad and Tobago” image to exploit the nationalistic pride in a locally manufactured product. Popular and well-respected local celebrities will be used to promote the local brand and help develop a unique image and position in the mind of local consumers.

The cluster marketing strategy for the small and medium producers which includes a centralized pasteurizing facility will also include distribution and branding of the pasteurized milk. A TTGSS brand will be developed to identify the local product produced by the small and medium producers and also promote and identify the individual producer for loyalty and traceability purposes, similar to the brands developed by the independent larger producers.

The TTGSS will select the brand name, image, logo, etc. An aggressive advertisement campaign is also an integral part of the branding strategy to communicate the image and features of the product and create a position in the mind of the consumer.

### **8.2.3. Marketing Plan – Communication**

The promotion, communication and branding strategies need an effective combination of media channels to get the messages to the consumers and cluster members. The channels proposed include:

- (i) The development of a corporate and marketing website and associated online features are essential and cost-effective tools to promote the TTGSS and its marketing efforts. The website will feature the corporate profile of TTGSS, blogs, chat-rooms, market intelligence, industry updates and features, as well as a platform for online marketing of products and links to large producers’ websites etc.
- (ii) A mass media advertising programme for television, radio and newspaper utilizing local celebrities to promote and develop a desired image of local goat’s milk and value added products.
- (iii) A group communication mechanism for communication among cluster members and the wider consumer segments such as group email network, applications (apps), etc.

### **8.3. Market Segmentation Strategy**

The IICA Market Study in 2013 shows that only a small percentage of consumers who shop at supermarkets are interested in the purchase and consumption of dairy goat products. Nevertheless, import data (2010-2015) supports the visibility of a proliferation of goat's milk products on local supermarket shelves, which points to a steady increase in demand. It stands to reason that the market for the products seems to be a select group of consumers and not the general consumers. In addition, it must be noted that the benefits put forward for consumption of goat's milk narrowly focus on consumers with allergies and digestibility problems and other health-related issues.

Therefore a niche market strategy would be pursued to target these consumers and penetrate this market segment and expand the market share for local dairy goat products. A market penetration strategy will simultaneously be pursued to encourage consumers to accept goat's milk as a healthy, nutritious and non-allergenic food. In addition, the strategy will focus on capturing some of the market share enjoyed by imported dairy goat products.

In addition, the 22% of the institutions (restaurants and hotels) in the IICA Market study who use dairy goat products serve mainly specialty dairy goat products such as cheese in salads, yogurt and ice creams. This suggests that only a small high-end segment of the local market is interested in the products and also that a niche marketing strategy be pursued to expand the consumption of these specialty products, including using goat's milk in menus at these outlets.

The market will therefore be segmented into 2 niche market categories:

- (1) Health and allergic solutions consumers
- (2) Specialty foods consumers.

#### **8.3.1. Marketing Plan – Market Segmentation (Health and allergy)**

The marketing strategy for this niche market is built on the knowledge that these consumers base their purchasing decision on the benefits they expect to derive from consuming goat's milk and other value added products. An initial step in executing the marketing plan for this niche market is the identification and profiling of the segment. The project was unable to quantify the proportion of the population who experience health and digestive-related problems associated with cow's milk consumption. This is necessary to be able to develop targeted market strategies for the segment.

A communication strategy among these users would be developed including the formalization of an online “blog” or chat-group to strategically link and maintain a relationship among this captive group of consumers.

### **8.3.2. Marketing Plan – Specialty dairy goat foods**

The marketing strategy for this niche market is based on their lifestyle which includes dining at high-end restaurants where specialty goat cheeses are served in salads, yogurt and ice creams. The major restaurants which serve specialty dairy goat cheese salads include Texas de Brazil, Fridays’, and several restaurants in Ariapita Avenue, Port of Spain and several shopping malls across the country.

A number of small-scale goat cheese producers are already involved in cheese production and marketing at local supermarkets and restaurants. These operators will be encouraged to become part of the cluster and source or supplement their raw material from the large producers. In addition, the large producers will conduct research and development projects to produce their brand of cheese and other products as part of their five (5) year development programme.

A survey of the value added processors and high-end restaurants will also be conducted to quantify and profile these actors and formalize their participation in the cluster.

A communication strategy, similar to the one for the health and allergy group, would be developed including the formalization of an online “blog” or chat-group to strategically link and maintain a relationship among this captive group of consumers.

## **8.4. Pricing Strategy**

It is often advised that a pricing strategy should take the following factors into account:

- Fixed and variable costs,
- Competition
- Company objectives
- Proposed positioning strategies
- Target group and willingness to pay

As discussed earlier, a niche marketing strategy is proposed for the TTGSS cluster to target the select group of consumers who either have health issues like lactose intolerance which makes goats’ milk a natural option over other milks, as well as the specialty market for healthy meals such as salads, yogurt and ice creams made with goat’s milk.

In this regard, the pricing strategy of value based pricing is the most logical option for the TTGSS cluster. A value based pricing strategy considers the value of the product to consumers rather than how much it cost to produce it. Value is based on the benefits it provides to the consumer such as health nutrition, convenience, well-being, reputation or joy.

As such, the pricing strategy adopted by the TTGSS involves a premium price for a superior product using a value-based pricing strategy, which along with the branding and positioning strategy sets apart the local product from imported and alternative products.

#### **8.4.1. Marketing Plan – Pricing Strategy**

In addition to the well accepted benefits of goat’s milk over cow’s milk and the non-dairy milk products, the TTGSS pasteurized milk would be promoted, positioned and adequately branded as a fresh, healthier, local product occupying a stellar position in the mind of consumers to command a premium price.

The TTGSS products will therefore not be in direct competition with imported products which cannot be branded and promoted as being fresh or local because the integrity of the imported products relies on UHT treatment or powdered form for extended shelf life for a long period without refrigeration.

The TTGSS pasteurized milk can be pitched at an introductory retail supermarket price of \$48/litre, similar to the imported UHT milk currently on the market. The cluster market promotion and education programme will subsequently differentiate the local product and be able to command a premium value-based price by the second year.

### **8.5. Product Development of Value Added Products**

The TTGSS cluster will spearhead research and development in new and innovative value added products. This is important since a significant number of respondents in the IICA Market Study do not like the taste of goat’s milk, never bought the products and are not attracted to consume the existing products. In addition to using promotion to change the perception of goat’s milk for consumer acceptance, TTGSS must also engage in research and development efforts to make the milk and other products more palatable and attractive to local consumers.

### **8.5.1. Marketing Plan – Product Development (Value Added)**

The research and development efforts will seek to differentiate the TTGSS products by considering the following initiatives:

- Flavoured milk
- Original and flavoured yogurt
- Whey and crumbled cheese for salads
- Flavoured cheese using local ingredients

Technical assistance will be required for this initiative. Support institutions will therefore be approached to contribute to the development of new and innovative products and processes using local goat's milk as the base. The IICA has already embarked on a series of capacity-building workshops in various areas of dairy goat production, including cheese-making. Efforts will be expanded to incorporate other institutions in these initiatives.

The existing cheese manufacturers will for an integral part of this initiative and can serve as the launching pad for further value added development.

This marketing plan will include the sourcing of grants and soft loans to establish and/or enhance cheese processing facilities and equipment.

Appendix 7 shows examples of several types of value added products for consideration by TTGSS, farmers and dairy goat processors.



## 9. THE PRODUCTION PLAN

In accordance with the marketing strategy and marketing plan, the production plan is developed to provide a consistent, reliable and sustainable supply of dairy goat commodities to the targeted markets identified. The production strategy encompasses two categories of producers – the small and medium farm category and the large farm category.

The small and medium category consist of 15 small farmers with less than 10 does and 17 medium farmers with 10-30 does. There are 4 large farmers with more than 30 and up approximately 60 does.

The objective of the production plan is three-fold:

- (i) Coordinating production to collectively provide the throughput for the central pasteurization facility and meet the market demand
- (ii) Improve the productivity of milk yield per doe
- (iii) Improve the quality of milk to international food safety standards from farm to table.

### 9.1. Coordinating Production in the Cluster

In order to fulfil the mandate of the marketing strategy and the marketing plan, the small and medium farmers will produce and supply the central pasteurization facility operated by TTGSS for the mainstream markets as well as the direct market of community consumers. According to the marketing plan, the required collective daily production of raw milk is presented in Table 14.

Table 14: Daily Production Requirements for the Different Categories of Producers

Producers	Daily Production (litres)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Small farmers	91	158	240	270	300
Medium farmers	510	748	1,020	1,190	1,500
Total supply to TTGSS Pasteurization Facility	601	906	1,260	1,460	1,800
Large Farmers (each)	100	125	125	150	150

#### 9.1.1. The Production Schedule

The small and medium farmers will coordinate production to collectively provide a consistent supply of raw milk to the central pasteurizing facility to process an average of 90kg and 500kg per day respectively in the first year and increasing incrementally according to Table 14. In order to maintain a consistent and continuous supply of milk to the pasteurization facility and to the



## **9.2. Improving Productivity per doe**

The TTGSS breeding programme will continue and expanded to upgrade the stock on each farm with the introduction of off-springs of the imported breeds of dairy goats. The distribution of kids from these animals should be accelerated and expanded with the importation of more improved breeds of dairy goats. Simultaneously, additional support should be sought to complement the contribution of CARDI with the establishment and operation of the model farm to be used to demonstrate the use of improved technologies such as an improved nutrition programme.

A TTGSS technician/extension officer is required to provide advisory services and technical support to the members of the TTGSS. This officer will be tasked with the responsibility to provide training and technical support in all areas of husbandry and the productivity improvement programme in particular.

## **9.3. Improving Milk Quality**

The major drawbacks to small and medium dairy goat farmers entering the mainstream local supermarkets relates to the absence of a food safety system which follows international standards, the practice of hand-milking and the selling raw, unpasteurized milk. The central pasteurizing facility will immediately alleviate most of these constraints, however, a food safety and quality system must be urgently developed and adopted by all farmers supplying raw milk to the facility. A set of required standards of good agricultural practices (GAP) must be established, implemented and monitored as a matter of urgency.

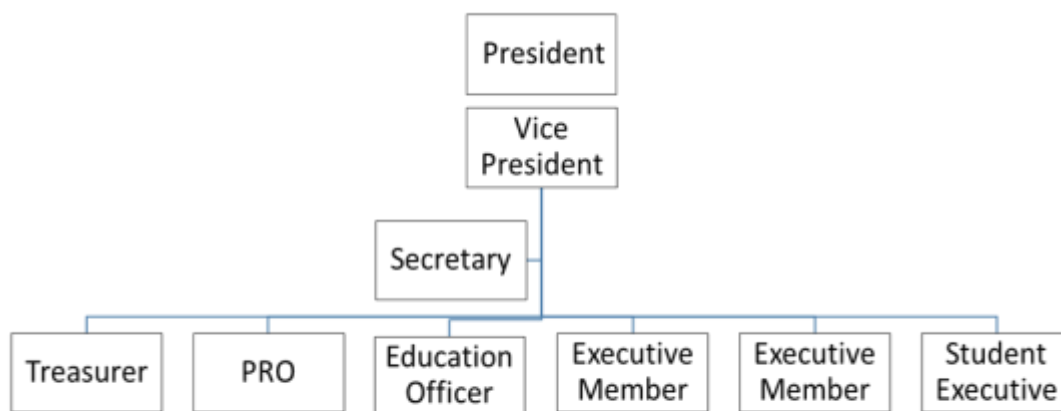
Institutions, such as IICA, with the technical assistance capability in food safety standards could be approached to provide assistance in this area. Consumers around the world are now demanding that international food safety standards be implemented along the entire value chain in the production of food for human consumption. The food safety quality assurance system for local pasteurized goat's milk could also be used as a product advantage or product differentiation strategy in branding and differentiating from other products.

The TTGSS technician/extension officer will also be required to provide advisory services and technical support to members of TTGSS in food safety and quality as well as fulfilling the quality assurance monitoring requirement of the TTGSS.

## 10. THE HUMAN RESOURCE PLAN

The TTGSS is positioned to provide the lead role in advancing the development of the dairy goat industry in Trinidad and Tobago. Currently, the executive of the organization performs all administrative duties voluntarily, at the expense of time on their individual farm operations. It has already taken several initiatives to develop the sector, but is hamstrung by limited administrative and managerial endowment. The current organizational structure of the TTGSS is presented in Figure 23.

Figure 23: Current Organizational Structure of TTGSS



The Board of Directors nominates the executive of the TTGSS, headed by the president, and includes the vice-president, secretary and treasurer. All the functions of the TTGSS are carried out by these four persons.

The human resource strategy is to re-position the TTGSS to execute its existing and new roles and functions more effectively. The human resource plan is divided into two (2) categories:

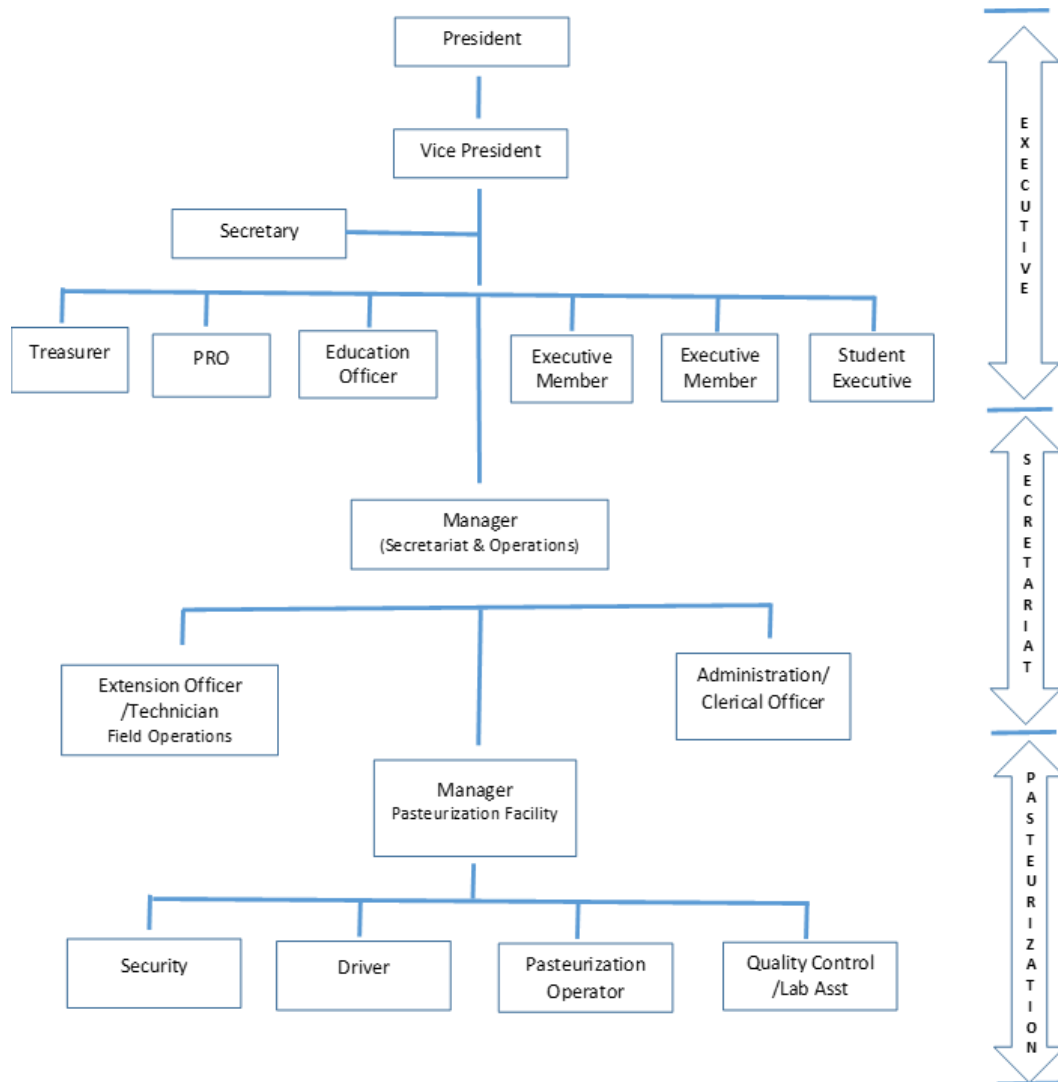
- (1) TTGSS Secretariat and Technical Support human resource plan
- (2) TTGSS Central Pasteurization and Marketing Facility human resource plan.

### 10.1. The TTGSS Secretariat Human Resource Plan

The human resource plan calls for manpower to operate the secretariat to manage the administration of the TTGSS. The secretariat human resource requirement is headed by a manager (secretariat and operations) and include an extension officer/technician and a clerical personnel. The manager (secretariat and operations) is responsible for all TTGSS matters and is accountable and reports to the president and the Board.

One of the major roles already charted by the TTGSS include a programme to upgrade the level of technology practiced on the farms including breeding stock, nutrition, general husbandry, value added processing and farm management and marketing. There is need for full-time technical personnel to provide advisory support and training. The extension officer/technician is responsible for all field activities including advisory services, training and quality assurance. The clerical officer is responsible for all office-related duties of TTGSS, including the pasteurization facility matters (See Figure 24).

Figure 24: The Proposed Organizational Structure of TTGSS



## **10.2. The Central Pasteurization/Marketing Facility Human Resource Plan**

The main pillar of the marketing strategy rests on the establishment of a central pasteurization facility to process and market milk produced by the small and medium farmers of TTGSS. This unit represents the main revenue earner of the TTGSS to finance the operation of the secretariat and the pasteurization facility and other programmes and projects of the organization. Two pasteurization facilities are proposed to facilitate farmers in the north and north-east and south and central regions respectively.

Each facility will be managed by a trained person with experience in operating a pasteurisation facility and will be responsible for all activities involved in milk collection, pasteurization, quality assurance, packaging, storage and distribution. The operator is responsible for the day-to-day activities involved with pasteurization. The quality assurance/laboratory assistant is responsible for all quality control and testing following international food safety standards in milk processing. A driver and security officer will be recruited to provide delivery/merchandising services and security of the facility respectively.

## **10.3. Human Resource Budget**

Table 15 shows the estimated budget for the TTGSS human resource requirement to execute the business plan and marketing strategy.

Table 15: The Estimated Human Resource Budget

<b>Human Resource Requirements</b>	<b>Number</b>	<b>Monthly Salary</b>	<b>Annual salary</b>
Facility Manager	1	10,000	120,000
Laboratory technician	2	7,000	168,000
Pasteurisation operator	2	7,000	168,000
Office Clerk	2	4,000	96,000
Driver	1	5,000	60,000
Security	3	4,000	144,000
Manager (Secretariat & Operations)	1	15,000	180,000
Extension Officer/Field Technician	1	8,000	96,000
Clerk	1	5,000	60,000
<b>Total</b>	<b>14</b>	<b>65000</b>	<b>1092000</b>

## 11. THE FINANCIAL PLAN

### 11.1. Financial Plan - The TTGSS Pasteurization Facility

The TTGSS central pasteurization and marketing facility will be the flagship initiative to generate revenue to run the programmes, projects, and the secretariat of the organization. The small and medium farmers will collaborate and coordinate their production to supply the facility with raw milk on a consistent basis. The projected production and sales revenue in Table 16 and the projected income statement in Table 17 shows a 5-year projection of the estimated revenues which can be generated.

#### 11.1.1. Payment scheme to farmers

The tables show that the farmers will deliver milk to the facility at a price of \$28.82/litre, which is the current average price farmers currently receive for their milk. In addition, the TTGSS will pasteurize and sell the milk to the local mainstream supermarkets at an estimated price of \$40/litre.

It is expected that a another payment will be made to farmers from the value added to the product by the pasteurization and marketing effort as part of a two-phase payment scheme or as a dividend, which will be based on the quantity of milk delivered to the facility. The second payment and frequency of payment will be determined by the membership and board of directors. In total, farmers will receive a significantly higher price for their milk than the price they currently receive. The second part payment at a later date will also assist in managing a healthy cash flow to supplement the expenses incurred in operating their individual farms. This initiative illustrates the benefits that could be derived from cooperation and operating in a cluster.

Table 16: Projected Production and Sales Revenue (TTGSS Pasteurization Facility)

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Production (projected)</b>					
Small Farm Production (litres)	33,124	57,488	87,600	98,550	109,500
Medium Farm Production (litres)	186,150	273,020	372,300	434,350	547,500
Total production (litres)	219,274	330,508	459,900	532,900	657,000
Marketed Yield (litres) (15% fed to kids)	181,997	274,321	381,717	442,307	545,310
Milk for pasteurization (litres) (75%)	136,498	205,741	286,288	331,730	408,983
<b>Projected Sales</b>					
Supermarket consumers	4,094,937	6,172,228	8,588,633	9,951,908	12,269,475
Total projected revenue	4,094,937	6,172,228	8,588,633	9,951,908	12,269,475

**Assumptions for Table 16**

- (1) Small farm:
  - Year 1: Fifteen (15) farmers with an average of 5 does in milk, producing an average of 1.21 litres of milk per doe per day.
  - Year 2: Fifteen (15) farmers with an average of 5 does in milk, producing an average of 1.5 litres of milk per doe per day.
  - Year 3: Fifteen (15) farmers with an average of 5 does in milk, producing an average of 2.0 litres of milk per doe per day.
- (2) Medium farms:
  - Year 1: Seventeen (17) farmers with an average of 20 does in milk, producing an average of 1.5 litres of milk per doe per day.
  - Year 2: Seventeen (17) farmers with an average of 20 does in milk, producing an average of 2.0 litres of milk per doe per day.
  - Year 3: Seventeen (17) farmers with an average of 20 does in milk, producing an average of 2.5 litres of milk per doe per day.
- (3) Approximately 17% milk produced daily are fed to kids.
- (4) 75% of the milk produced is delivered at \$28.82/litre to the TTGSS pasteurization pasteurized and sold to the mainstream supermarkets at approximately \$40/litre.
- (5) 25% of the milk produced is sold directly to local community consumers as unpasteurized milk at an average of \$28.82/litre in year 1 and increased incrementally by \$2.00 each year subsequently.

Table 17: Projected Income Statement of the TTGSS Central Pasteurization Facility

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Revenue</b>	4,094,937	6,172,228	8,588,633	9,951,908	12,269,475
Cost of goods sold:					
<i>Pasteurised milk</i>	363,994	548,642	763,434	884,614	1,090,620
<i>Bottles/Caps/Labels</i>	109,198	164,593	229,030	265,384	327,186
Total Cost of goods sold	473,193	713,235	992,464	1,149,998	1,417,806
Gross Profits	3,621,745	5,458,992	7,596,168	8,801,909	10,851,669
<b>General Administration and selling expenses</b>					
<i>Administration</i>	1,092,000	1,092,000	1,092,000	1,092,000	1,092,000
<i>Utilities</i>	36,000	43,200	50,400	57,600	64,800
<i>Communication expenses</i>	21,600	24,000	26,400	28,800	31,200
<i>Office expenses</i>	12,000	16,800	21,600	26,400	31,200
<i>Promotional expenses</i>	100,000	100,000	100,000	100,000	100,000
<i>Insurance</i>	100,000	100,000	100,000	100,000	100,000
<i>Depreciation</i>	57,500	57,500	57,500	57,500	57,500
<i>Miscellaneous</i>	100,000	120,000	140,000	160,000	180,000
<b>Sub-Total</b>	1,519,100	1,553,500	1,587,900	1,622,300	1,656,700
<b>Operating Income</b>	2,102,645	3,905,492	6,008,268	7,179,609	9,194,969
Interest expense	33,114	26,572	19,624	12,249	7,656
<b>Net Profit/Loss (before tax)</b>	2,069,531	3,878,920	5,988,644	7,167,360	9,187,313
<b>Net Profit/Loss (after tax)</b>	1,533,522	2,874,280	4,437,585	5,311,014	6,807,799



**Assumptions to Table 17:**

- Estimated cost of 1 litre milk cartons - US 0.08 each = approximately TT\$0.60 each.
- Estimated cost of pasteurizing milk = TT\$2.00/litre.
- Cost of water - \$500/month x 2 locations
- Cost of electricity - \$1000/mth x 2 locations
- Cost of telephone, wi-fi access etc - \$800/month x 2 locations
- Cost of office stationery and supplies - \$1000/month x 2 locations
- Cost of pasteurization equipment - US\$50,000 = TT\$337,500. Salvage value \$50,000. Useful life - 5 years.
- Other capital expenses – Vehicle \$300,000, Refrigeration \$100, 00, Office building \$200,000.

Analysis of the financial statements in Tables 16 and 17 shows that an annual net income after taxes can range from \$1.5 million in year 1 to over \$6 million by year 5. The second payment will be made after current debts and administrative expenses have been met.

### 11.1.2. Margin Analysis

Table 18 shows the estimated profit margin which can be attributed to all the actors along the value chain relating to the central pasteurization facility. The analysis shows that the small farmers can receive \$8.37/litre net return from selling raw milk either to the pasteurization facility for pasteurization or to the local community as raw milk. However, these farmers will receive additional payments from sale of value added pasteurized milk to supermarkets. Similarly, medium farmers can receive an estimated \$10.30/litre, as the first payment from TTGSS.

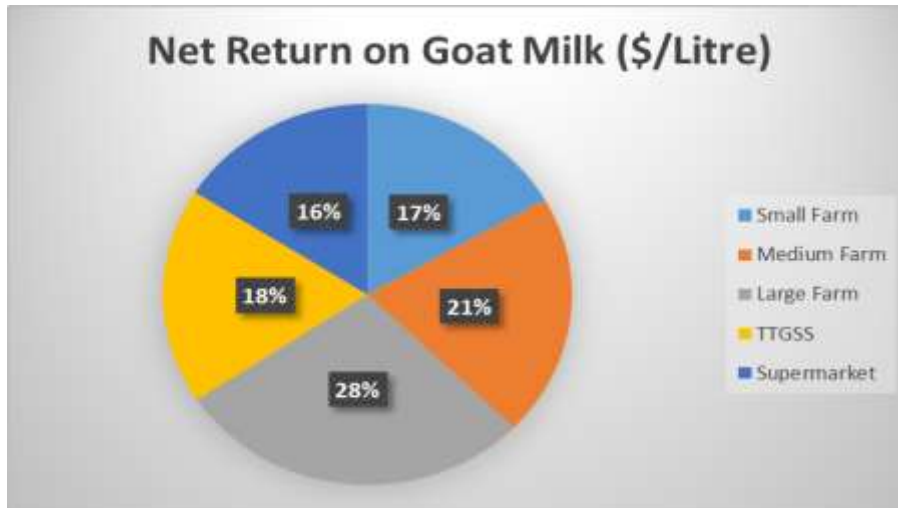
Large farmers can receive an estimated \$14.21/litre at farm gate or if sold to the pasteurization facility and as much as \$23.40/litre if they pasteurize and market their milk independently to supermarkets.

Table 18: Estimated Profit Margins along the Value Chain for Pasteurized Milk

Cost/Price	\$/litre				
	Small farm	Medium Farm	Large farm	TTGSS Facility	Supermarket
Cost of production	20.45	18.51	14.61		
Price at pasteurization facility	28.82	28.82	28.82		
Cost of raw milk				28.82	
Cost of pasteurization			2.00	2.00	
Cost of goods sold				30.82	40.00
Price to supermarket			40.00	40.00	48.00
Net Return	8.37	10.31	14.21	9.18	8.00
			23.39		

Figure 25 shows the percentage share of the returns to value added pasteurized milk by all the actors along the value chain. The small farmers receive approximately 17% of the returns, while the medium and large farmers receive about 21% and 28% respectively.

Figure 25: Percentage Share of the Returns along the Value Chain for Pasteurized Milk



## 11.2. Financial Plan – Small Farms

The financial plan presented for a small farm operation with less than 10 does is shown in Table 19 and Table 20. A small farm with an average of 5 milking does producing about 1.21 litres of milk per doe per day can produce 2208 litres in year 1. They can realize annual sales of \$52,823 after reserving about 17% of milk produced to be fed to kids on the farm.

The income statement in Table 17 shows that a net profit of only \$1,430 may be obtained at current productivity levels in year 1. With adoption of improved technology including nutrition, the farm can increase productivity to 1.5 litres/doe/day in year 2, and to 2 litres/doe/day from year 3 onwards. With improved technology, the net profit could increase to \$18,163 by year 2 and up to over \$76,000 by year 5.

Table 19: Projected Production and Sales Revenue (Small Farm)

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Production (projected)</b>					
Small Farm Production (litres)	2,208	3,833	5,840	6,570	7,300
Marketed Yield (litres)	1,833	3,181	4,847	5,453	6,059
<b>Projected Sales</b>					
TTGSS	39,617	68,757	104,772	117,869	130,965
Direct Marketing consumers	13,206	23,857	38,778	46,351	54,531
Total projected revenue	52,823	92,614	143,550	164,220	185,496

Table 20: Projected Income Statement (Small Farm)

<b>Projected Income Statement</b>					
	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Revenue</b>	52,823	92,614	143,550	164,220	185,496
Cost of goods sold:					
<i>Raw milk</i>	37,482	58,880	70,818	79,670	88,522
<i>Transport</i>	5,431	5,431	5,431	5,431	5,431
Total Cost of goods sold	42,913	64,311	76,249	85,101	93,953
Gross Profits	9,910	28,303	67,301	79,119	91,543
<b>General Administration and selling expenses</b>					
<i>Administration</i>					
<i>Utilities</i>	2,880	2,880	2,880	2,880	2,880
<i>Communication expenses</i>	3,600	3,600	3,600	3,600	3,600
<i>Insurance</i>					
<i>Depreciation</i>		1,660	6,560	6,560	6,560
<i>Miscellaneous</i>	2,000	2,000	2,000	2,000	2,000
<b>Sub-Total</b>	8,480	10,140	15,040	15,040	15,040
<b>Operating Income</b>	1,430	18,163	52,261	64,079	76,503
<b>Other Income (Dividends from TTGSS)</b>					
Interest expense					
<b>Net Profit/Loss (before tax)</b>	1,430	18,163	52,261	64,079	76,503

### 11.3. Financial Plan – Medium Farm

The medium-sized farms with 10-30 does may have an average of 20 milking does consistently producing an average of 1.5 litres of milk/doe/day in year 1, accumulating an annual production of about 10,950 litres of milk. (Table 21). These farms can realize an estimated \$261,931 in annual sales in year 1.

With improved technologies, the medium farms can increase productivity to 2 litres/doe/day in year 2 and to 2.5 litres/doe/day from year 3 onwards. Two (2) additional young does are added to the milking stock each year, to a total of 30 does by year 5.

An average of 17% of milk produced are reserved to be fed to kids on the farm each day.

Table 21: Projected Production and Sales Revenue (Medium)

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Production (projected)</b>					
Medium Farm Production (litres)	10,950	16,060	21,900	25,550	27,375
Marketed Yield (litres)	9,089	13,330	18,177	21,207	22,721
<b>Projected Sales</b>					
TTGSS Pasteurization Facility	196,448	288,124	392,896	458,378	491,120
Direct Marketing consumers	65,483	99,974	145,416	180,255	204,491
Total projected revenue	261,931	388,097	538,312	638,634	695,611

The income statement for a medium farm in Table 22 shows that a net income of \$34,731 can be achieved in year 1, and increasing steadily to over \$378,000 in year 5 with improved technology.

Table 22: Projected Income Statement (Medium Farm)

<b>Projected Income Statement</b>					
	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Revenue</b>	261,931	388,097	538,312	638,634	695,611
Cost of goods sold:					
<i>Raw milk</i>	168,137	194,748	265,566	258,083	276,518
<i>Transport</i>	5,431	5,431	5,431	5,431	5,431
<b>Total Cost of goods sold</b>	173,568	200,180	270,997	263,514	281,949
Gross Profits	88,362	187,918	267,315	375,119	413,662
<b>General Administration and selling expenses</b>					
<i>Administration</i>					
<i>Utilities</i>	6,000	6,000	6,000	6,000	6,000
<i>Communication expenses</i>	6,000	6,000	6,000	6,000	6,000
<i>Insurance</i>					
<i>Depreciation</i>	13,450	13,450	13,450	14,665	14,665
<i>Miscellaneous</i>	5,000	5,000	5,000	5,000	5,000
<b>Sub-Total</b>	30,450	30,450	30,450	31,665	31,665
<b>Operating Income</b>	57,912	157,468	236,865	343,454	381,997
Interest expense	23,181	18,601	13,738	8,575	3,094
<b>Net Profit/Loss (before tax)</b>	34,731	138,867	223,127	334,879	378,903

## 11.4. Financial Plan – Large Farm

The large farms are estimated to carry a stock of an average of 50 milking does annually, producing an average of 2 litres of milk/doe/day in year 1 (100 litre/day) and increasing to 3 litres/doe/day (150 litre/day) by year 5. (Table 23). The corresponding annual sales could range from \$1.4 million in year 1 to \$2.1 million in year 5.

Table 24 shows the estimated income statement with net returns ranging from \$632,713 in year 1 to \$1.2 million by year 5. It is assumed that the large farms will independently add value to their milk by pasteurizing, branding and marketing their milk in the local mainstream supermarkets. Local brands of pasteurized milk of at least two (2) large farmers have joined Marilissa Farms in marketing their products in the local mainstream supermarkets. These farms enjoy a larger profit margin with their value added products.

Table 23: Projected Production and Sales Revenue (Large Farm)

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Production (projected)</b>					
Large Farm Production (litres)	36,500	45,625	45,625	54,750	54,750
<b>Projected Sales</b>					
Supermarkets etc	1,460,000	1,825,000	1,825,000	2,190,000	2,190,000

Table 24: Projected Income Statement (Large Farm)

<b>Projected Income Statement</b>	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Revenue</b>	1,460,000	1,825,000	1,825,000	2,190,000	2,190,000
Cost of goods sold:					
<i>Raw milk</i>	533,265	555,256	555,256	666,308	666,308
<i>Bottles/Caps/Labels</i>	21,900	27,375	27,375	32,850	32,850
<b>Total Cost of goods sold</b>	555,165	582,631	582,631	699,158	699,158
Gross Profits	904,835	1,242,369	1,242,369	1,490,843	1,490,843
<b>General Administration and selling expenses</b>					
<i>Administration</i>	41,000	41,000	41,000	41,000	41,000
<i>Utilities</i>	12,000	12,000	12,000	12,000	12,000
<i>Communication expenses</i>	8,400	8,400	8,400	8,400	8,400
<i>Office expenses</i>	7,200	9,600	12,000	14,400	16,800
<i>Promotional expenses</i>	40,000	40,000	40,000	40,000	40,000
<i>Insurance</i>	10,000	10,000	10,000	10,000	10,000
<i>Depreciation</i>	25,928	25,928	25,928	25,928	25,928
<i>Miscellaneous</i>	100,000	120,000	130,000	140,000	150,000
<b>Sub-Total</b>	244,528	266,928	279,328	291,728	304,128
<b>Operating Income</b>	660,308	975,441	963,041	1,199,115	1,186,715
Interest expense	27,595	22,144	16,355	10,210	3,684
<b>Net Profit/Loss (before tax)</b>	632,713	953,297	946,686	1,188,905	1,183,031

## 11.5. The Business Plan Budget

Table 25 shows the estimated business plan for the TTGSS business plan and marketing strategy. It shows an estimated annual expenditure of over \$4 million annually. It is expected that revenue generated from sale of pasteurized milk by the pasteurization facility will cover the expenses incurred by TTGSS. As such, year 1 will incur an estimated expenditure of \$4, 366,693, a net revenue of \$4,745,800, realizing a net balance of \$379,107. Thereafter, with improved production and net revenue, a net balance of \$4,157,145 could be realized in year 2, with a progressive improvement to a net balance of \$14,967,152 by year 5.

Table 25: Estimated Annual Budget for the Business Plan

Item/Activity	Budget				
	Year 1	Year 2	Year 3	Year 4	Year 5
Human Resource requirement	612,000	1,092,000	1,092,000	1,092,000	1,092,000
Market promotion	100,000	100,000	100,000	100,000	100,000
Pasteurization facility			2,580,364	2,772,298	3,074,506
Capital items	400,000				
Utilities (Secretariat)	9,600	9,600	9,600	9,600	9,600
Production Plan (Technology and stock improvement)		300,000	300,000	300,000	300,000
Cluster/Value Chain development workshops		250,000	250,000	250,000	250,000
Information and Communications expenses	10,800	12,000	13,200	14,400	15,600
Office supplies	6,000	6,000	6,000	6,000	6,000
Miscellaneous expenses	6,000	6,000	6,000	6,000	6,000
Total Expenditure	1,144,400	1,775,600	4,357,164	4,550,298	4,853,706
Net Revenue (Pasteurisation Facility)	1,533,522	2,874,280	4,437,585	5,311,014	6,807,799
Net Budget Balance	389,122	1,098,680	80,421	760,716	1,954,093

## **12. THE CLUSTER AND VALUE CHAIN DEVELOPMENT PLAN**

Numerous examples of the success of working in clusters have been demonstrated in both developed and developing countries around the world. Small and medium enterprises have established themselves as important and dynamic players in local and international markets, responding to global competition challenges by capitalizing on local opportunities and collective competitive advantages.

The value chain approach forms the perfect fit with clusters since it deals with adding value along the interconnected, coordinated set of links and linkages that take place as products move along the chain between primary production and the consumer.

The success of the business plan and marketing strategy outlined for the development of the dairy goat industry is totally dependent on the development of the cluster and value chain of dairy goat farmers and the associated institutions as depicted in the cluster map in Figure 1. A cluster and value chain development plan is therefore included in the business plan since it is critical for the success of all the initiatives outlined in the plan.

### **12.1. Building Trust**

It is important that members of a cluster develop and build trust among themselves. Trust is a level of understanding among stakeholders that facilitate a joint activity, ensuring that all relevant information for that joint activity are shared and that the best of efforts are made for achieving the objective of that joint activity. The success of such relationships are based on shared values and a culture of belonging, enshrined in long-standing accepted practices and ways of behaviour among the group.

Trust is a key element in the creation of widely accepted business practices by way of shared values and without it, people cannot be expected to trust each other. A programme of a set of activities are therefore proposed as part of a capacity-building project to help trust-building to pick up momentum among the group. The success of the production and marketing programmes outlined in the business plan will ultimately demonstrate the advantages of working in clusters.

The TTGSS has already started the process of building a cluster and enhancing the relationship among members with a number of development initiatives in progress. This business plan strategy serves to re-enforce this initiative. The Small Ruminant Stakeholders Committee facilitated by IICA is also an initiative already in place, which can be tapped to form a specialized dairy goat cluster and value chain.

Technical assistance would be sought from agencies with the expertise in cluster development such as IICA, FAO, and CARDI UNIDO (United Nations Industrial Development Organisation), using a series of training workshops. Consideration should be given to inclusion of these training workshops in the current IICA training programme conducted for the TTGSS members.

## **12.2. Capacity-Building Training Workshops**

The proposed capacity-building training programme is outlined as follows:

### **Module 1: Value Chain Development**

The topics may include - understanding the concepts, processes and importance of:

- (a) Overview of value chain approach
- (b) Value Chain analysis
- (c) Value chain mapping
- (d) Performance analysis along the chain
- (e) Value chain committees
- (f) Governance arrangements and mechanisms
- (g) Value chain upgrading strategies

### **Module 2: Cluster Development**

The topics may include – understanding the concepts, processes and importance of:

- (a) Overview of the cluster approach
- (b) Approaches to cluster development
- (c) Techniques for fostering linkages
- (d) Role of public sector in cluster development and management
- (e) Institutional networks in cluster management
- (f) Legal considerations in cluster development and management
- (g) Governance arrangements and mechanisms
- (h) Consensus building – relationships, trust, respect, cooperation etc
- (i) Joint actions and collective efficiencies
- (j) Economic performance of clusters
- (k) Critical success factors in the respective value chains and clusters
- (l) Cluster Creation/Upgrading strategies



### 13. THE ACTION PLAN

Strategy	Objectives	Activity	Responsibility	Timeframe	Outcome
Review of the Business Plan and marketing Strategy	To present and sensitize the Business Plan and Marketing Strategy to the membership of the TTGSS	A Special Meeting/Retreat to review, discuss and agree/approve the Business Plan and marketing Strategy	TTGSS IICA	Month 1 – Year 1	An informed membership of the Business Plan and Marketing Strategy of the TTGSS
Cluster/Value Chain Development	Building trust and cooperation	Training workshops on value chain and cluster development.	TTGSS IICA SRSC	Month 1 - Year 1 and continuing	A good understanding of the value chain and cluster approach by TTGSS members; and the strengthening of trust among members. Furtherance of IICA/TTGSS Capacity Building programme.
Central Pasteurization	To facilitate the collective pasteurization of milk produced by small and medium farmers	Meetings with Aripo Livestock Station and SFC to come to an interim agreement to pasteurize goat's milk on behalf of TTGSS	TTGSS MALF (Aripo Livestock Station and SFC)	Month 2 – Year 1 and continuing	A memorandum of Understanding between TTGSS and MALF to pasteurize TTGS goat's milk – as an interim cluster marketing arrangement.
Promotion and Brand development	To promote the use of local goat's milk produced by all TTGSS farmers and develop a brand and brand image for TTGSS pasteurized milk	Engaging a marketing/advertising firm to promote goat's milk and to develop a brand, brand image and strategy to promote the TTGSS pasteurized milk	TTGSS Marketing/ Advertising firm	Month 2 – Year 1 and continuing	Consumers aware of local pasteurized goat's milk and the presence of the local brands (large farms brands and the TTGSS brand produced by the pasteurization facility).
Pricing strategy	To develop a value-based premium pricing strategy to market local fresh pasteurized milk	A market analysis to determine an appropriate value-based price	TTGSS Marketing/ Advertising firm	Month 2 to 6 - Year 1	A value-based price for local pasteurized goat milk which consumers are willing to pay to experience the benefits of the product
Re-structuring the TTGSS	To upgrade the administrative capacity and positioning the TTGSS to establish the Central Pasteurization Facility	Special Meeting/Retreat to discuss the establishment and staffing of the central pasteurization facility	TTGSS	Month 2 – Year 1 and continuing	Agreement/approval of the new TTGSS organizational structure and the establishment of the central pasteurization facility.
Cluster/Value Chain Development	Formalizing the TTGSS Dairy Goat Cluster and Value Chain	Meetings with the Small Ruminant Stakeholders Committee	TTGSS IICA SRSC	Month 3 – Year 1 and continuing	A formal cluster/value chain arrangement among the key players of the cluster including the formation of a Value Chain Committee
Coordinating Production	Developing a coordinated production schedule	Meeting and negotiating an agreement with TTGSS members on a production schedule	TTGSS Small farmers Medium farmers	Month 3 – Year 1 and continuing	Farmers participating in the coordination of production including a breeding/lactation schedule

<b>Strategy</b>	<b>Objectives</b>	<b>Activity</b>	<b>Responsibility</b>	<b>Timeframe</b>	<b>Outcome</b>
Cluster/value Chain Development	Building trust and cooperation	Training workshop on value chain and cluster development – Joint Action - Coordinating production, pasteurization and marketing.	TTGSS IICA	Month 3 – Year 1 and continuing	A commitment by farmers to commit to participate in the cluster production and marketing effort
Cluster Marketing	Penetrating the local mainstream supermarkets	Meetings with major supermarkets to discuss marketing of local pasteurized goat's milk	TTGSS SRSC Supermarkets	Month 4-Year 1 and continuing	A commitment by supermarkets to carry local goat's milk and by TTGSS to coordinate production, supply and merchandising
Cluster Marketing	Coordinating production and marketing among small and medium farmers	Meetings with small and medium farmers to discuss and agree on operation of the pasteurization facility and delivery of raw milk to the facility.	TTGSS	Month 4 – Year 1 and continuing	A unanimous agreement by farmers to commit to participation in the cluster marketing and production pasteurization.
Improving farm productivity	To increase the milk yield per doe	Expansion of the genetic stock of dairy goats among the TTGSS farmers by distribution of kids produced by imported goats.	TTGSS CARDI UWI MALF	On-going	An increase in milk yield per doe and overall milk production among farmers.
Cluster/Value Chain Development	Building trust and cooperation	Training workshop on value chain and cluster development – Joint Action - Coordinating production, pasteurization and marketing.	TTGSS IICA	Month 6 - Year 1 and continuing	Cluster members informed about value chains and clusters; and committed to continue the development of the cluster and joint actions
Consumer awareness	Sensitizing consumers about the benefits of goat's milk and stimulating increase on consumption	A mass communication and promotion campaign about the virtues of goat's milk.	TTGSS MALF	Month 6 – Year 1 and continuing	Increase in awareness and demand for local pasteurized goat milk.
Marketing strategy	Segmenting the market into niche markets and positioning local goat milk	Developing and implementing marketing strategy to target niche market for local goat milk	TTGSS	Month 6 – Year 1 and continuing	Development of a marketing strategy and plan to target the niche markets for local goat milk
Central Pasteurization	To facilitate the collective pasteurization of milk produced by small and medium farmers	Establishment of TTGSS Pasteurization Facility	TTGSS MALF	Month 1 – Year 2	Operation of pasteurization facility by TTGSS
Processing of value added products	To increase market share for value added products and farmers' margin	Meeting with large farmers, local processing enterprises, supermarkets, restaurants to stimulate value added production and consumption of cheese, yogurt etc	TTGSS Large farmers Processors	Month 1 – Year 2 and continuing	An increase in local production of value added products such as cheese, yogurt etc

<b>Strategy</b>	<b>Objectives</b>	<b>Activity</b>	<b>Responsibility</b>	<b>Timeframe</b>	<b>Outcome</b>
Improving farm productivity	To increase milk yield per doe	Importation of additional dairy goats of superior genetic capability for milk production. Breeding and distribution of kids to farmers	TTGSS MALF CARDI	Month 5 – Year 2	An increase in milk yield per doe and overall milk production among farmers.
Establishing food safety and quality system in accordance with international standard	To institute food safety and quality assurance and control systems to gain acceptance into mainstream markets	Developing food safety and quality good agricultural and processing standard practices along the value chain.	TTGSS IICA MALF FAO	Month 6 – Year 2 and continuing	Established food safety and quality standards and protocols. Effective food safety and quality assurance and monitoring system along the value chain.
Cluster/Value Chain Development	Building trust and cooperation	Training workshop on value chain and cluster development – Joint Action - Coordinating production, pasteurization and marketing.	TTGSS IICA	Month1 – Year 3	Cluster members informed about value chains and clusters; and committed to continue the development of the cluster and joint actions
Cluster/Value Chain Development	Building trust and cooperation	Training workshop on value chain and cluster development – Joint Action - Coordinating production, pasteurization and marketing.	TTGSS IICA	Month 6 – Year 3 and continuing	Cluster members informed about value chains and clusters; and committed to continue the development of the cluster and joint actions

## APPENDIX 1:

### Estimated Cost of Production Model – Small Dairy Goat Operation (<10 Does)

ACTIVITY	Unit	Quantity	\$/Unit	Total (\$)	Total Value (\$)
		per month		per month	
<b>FORAGE COLLECTION:</b>					1,703.33
Transport	km	249.55	3.72	928.33	
Labour	mandays	8	100.00	775.00	
<b>CONCENTRATE/SUPPLEMENTAL FEED</b>					3,565.00
<i>Feed (does and buck)</i>	bags	7.58	300.00	2,273.33	
<i>Feed (Kids)</i>	bags	1.72	300.00	516.67	
<i>Feeding</i>	mandays	8	100.00	775.00	
<b>MINERALS</b>					150.00
<i>Mineral block</i>	each	1.00	150.00	150.00	
<b>VETERINARY SERVICES</b>					100.00
<i>De-worming</i>	visits	0.50	200.00	100.00	
<b>LABOUR</b>					1,550.00
<i>Milking</i>	mandays	11.63	100.00	1,162.50	
<i>Sanitation</i>	mandays	3.875	100.00	387.50	
<b>REPAIRS AND MAINTENANCE</b>					410.18
Fence material				166.67	
Labour for fencing	mandays	0.02	100.00	2.08	
Machinery and Equipment parts				233.10	
<i>Labour for repair of machinery&amp;equipment</i>	mandays	0.08	100.00	8.33	
<b>Packaging</b>					248.00
<i>Bottles</i>	each	496.00	0.50	248.00	
<b>Sub-Total/month</b>					7,478.51
<b>INTEREST ON OPERATING CAPITAL/MONTH</b>					448.71
<b>TOTAL VARIABLE EXPENSES/MONTH</b>					7,927.22
<b>TOTAL VARIABLE EXPENSES/Year</b>					95,126.64
<b>COST OF PRODUCTION/LITRE</b>					<b>20.46</b>

#### Assumptions:

- Transport to collect forage: Estimated cost/mile=\$6.00 to approximately 5 miles to cut forage, 31 days/month
- Labour to cut forage: 2 hours per day, 31 days/month
- Concentrate Feeding: 1kg/day for 10 does, 1 buck
- Supplemental Feeding for Kids: 0.25kg/day, 10 kids
- Labour for milking: 3 hours per day
- Fence repair; Twice per year, at approximately \$1000 each
- Machinery and equipment parts: Once every 3 months, \$700 each
- Labour for machinery and equipment repair: 2 hours, once every 3 months.
- Interest on operating capital: 6%

## APPENDIX 2:

### Estimated Cost of Production Model – Medium Dairy Goat Operation (30 Does)

ACTIVITY	Unit	Quantity	\$/Unit	Total (\$)	Total Value (\$)
		per month		per month	per month
<b>PASTURE MANAGEMENT</b>					1,375.00
<b>FORAGE COLLECTION:</b>					5,109.98
Transport	km	249.55	3.72	2,784.98	
Labour	mandays	23	100.00	2,325.00	
<b>CONCENTRATE/SUPPLEMENTAL FEED</b>					13,795.00
<i>Feed (does and buck)</i>	bags	33.07	300.00	9,920.00	
<i>Feed (Kids)</i>	bags	5.17	300.00	1,550.00	
<i>Feeding</i>	mandays	23	100.00	2,325.00	
<b>MINERALS</b>					450.00
<i>Mineral block</i>	each	3.00	150.00	450.00	
<b>VETERINARY SERVICES</b>					500.00
<i>De-worming</i>	visits	1.00	500.00	500.00	
<b>LABOUR</b>					4,650.00
<i>Milking</i>	mandays	34.88	100.00	3,487.50	
<i>Sanitation</i>	mandays	11.625	100.00	1,162.50	
<b>REPAIRS AND MAINTENANCE</b>					431.02
Fence material				166.67	
Labour for fencing	mandays	0.06	100.00	6.25	
Machinery and Equipment parts				233.10	
<i>Labour</i>	mandays	0.25	100.00	25.00	
<b>Packaging</b>					744.00
<i>Bottles</i>	each	1,488.00	0.50	744.00	
<b>Sub-Total</b>					27,054.99
<b>INTEREST ON OPERATING CAPITAL/MONTH</b>					1,623.30
<b>TOTAL VARIABLE EXPENSES/MONTH</b>					28,678.29
<b>TOTAL VARIABLE EXPENSES/YEAR</b>					344,139.53
<b>COST OF PRODUCTION/LITRE</b>					<b>18.50</b>

#### Assumptions:

- Transport to collect forage: Estimated cost/mile=\$6.00 to approximately 5 miles to cut forage, 31 days/month, X 3 for 30 animals
- Labour to cut forage: 2 hours per day, 31 days/month
- Concentrate Feeding: 1.5kg/day for 30 does, 2 bucks
- Supplemental Feeding for Kids: 0.25kg/day, 30 kids
- Labour for milking: 3 hours per day
- Fence repair; Twice per year, at approximately \$1000 each
- Machinery and equipment parts: Once every 3 months, \$700 each
- Labour for machinery and equipment repair: 2 hours, once every 3 months.
- Interest on operating capital: 6%

**APPENDIX 3:**

**Estimated Cost of Production Model – Large Dairy Goat Operation (50 Does)**

ACTIVITY	Unit	Quantity	\$/Unit	Total (\$)	Total Value (\$)
		per month		per month	per month
<b>PASTURE MANAGEMENT</b>					1,375.00
<b>FORAGE COLLECTION:</b>					8,516.63
Transport	km	250	3.72	4,641.63	
Labour	mandays	39	100.00	3,875.00	
<b>CONCENTRATE/SUPPLEMENTAL FEED</b>					23,198.33
<i>Feed (does and buck)</i>	bags	55.80	300.00	16,740.00	
<i>Feed (Kids)</i>	bags	8.61	300.00	2,583.33	
<i>Feeding</i>	mandays	39	100.00	3,875.00	
<b>MINERALS</b>					900.00
<i>Mineral block</i>	each	6.00	150.00	900.00	
<b>VETERINARY SERVICES</b>					1,000.00
<i>De-worming</i>	visits	1.00	1,000.00	1,000.00	
<b>LABOUR</b>					7,750.00
<i>Milking</i>	mandays	58	100.00	5,812.50	
<i>Sanitation</i>	mandays	19	100.00	1,937.50	
<b>REPAIRS AND MAINTENANCE</b>					524.77
Fence material				166.67	
Labour for fencing	mandays	1.00	100.00	100.00	
Machinery and Equipment parts				233.10	
<i>Labour</i>	mandays	0.25	100.00	25.00	
<b>Packaging</b>					1,240.00
<i>Bottles</i>	each	2,480	0.50	1,240.00	
<b>Sub-Total</b>					44,504.73
<b>INTEREST ON OPERATING CAPITAL/MONTH</b>					2,670.28
<b>TOTAL VARIABLE EXPENSES/MONTH</b>					47,175.01
<b>TOTAL VARIABLE EXPENSES/YEAR</b>					566,100.17
<b>COST OF PRODUCTION/LITRE</b>					<b>14.61</b>

Assumptions:

- Transport to collect forage: Estimated cost/mile=\$6.00 to approximately 5 miles to cut forage, 31 days/month, X 5 for 50 animals
- Labour to cut forage: 2 hours per day, 31 days/month
- Concentrate Feeding: 1.5kg/day for 50 does, 4 bucks
- Supplemental Feeding for Kids: 0.25kg/day, 50 kids
- Labour for milking: 3 hours per day
- Fence repair; Twice per year, at approximately \$1000 each
- Machinery and equipment parts: Once every 3 months, \$700 each
- Labour for machinery and equipment repair: 2 hours, once every 3 months.
- Interest on operating capital: 6%

## APPENDIX 4:

### Trinidad Express Article on Marilissa Farms

#### Fresh Goat milk on Grocery shelves

- Published on **May 13, 2014, 9:46 pm AST**
- Updated on **May 14, 2014, 8:34 am AST**

Forget Farmville.

Let's head down to a real farm in Penal. A farm producing goat milk that is hitting grocery shelves. For the first time, supermarkets will be selling goat milk locally produced.

Marlissa Farms is heading that new business venture.

Owned by Lincoln Thackorie, it has a herd of 5,700 sheep and goats, and a milking unit **producing up to 400 litres of goat's milk daily**. It is the largest small ruminant farm in the country. The farm was originally established 18 years ago to produce meat but four years ago, Thackorie decided to try something new. Having almost \$13 million in infrastructure, equipment and goats, he invested in the milking aspect of farming. Marlissa Farms now has about 1,000 milking goats and a "milking parlour" capable of handling 40 animals at a time.

Since, machines do most of the hard work, Thackorie only has five persons working in that department.

He said he saw a market for goat milk. Thackorie said: "We have a demand for goat milk, but we don't have a supply of goat milk. We are trying to fill that void. The quantity of milk that we will be able to produce at our peak, we believe that we may be able to help meet that demand."

He did some calculations. **"The country has about 1.3 million people. If you take ten per cent of 1.3 million people, you will get about 130,000 people. Let's say 130,000 people drink one glass of milk per day, that is 130,000 glasses of milk per day. No way, we could ever produce that quantity of milk."** From the purchase of the dairy goats to recently, almost \$2 million worth in milk was dumped because it could not be sold, he said. Some was used to feed other animals.

What lacked was certification from the Chemistry, Food and Drug Division of the Ministry of Health. This, Thackorie received only a few weeks ago.

Two large supermarkets with several branches will be receiving milk from Marlissa Farms on a daily basis, Thackorie said. **The farm will be selling milk in 1.8 litre bottles. The retail price should be an average of \$59, he said.** Already the farm is selling milk to a cheese-maker in St Ann's.

If all goes well, Thackorie hopes to make his return on investment in four years. **A popular foreign brand of goat milk is sold at a grocery costing \$37.49 per litre.** Thackorie said: "Our prices are better than the import leader and you are getting a better product because it is a fresh product. The milk has a standard. We are looking to put fresh, pasteurised milk on the shelf to the consumer."

John Borely, president of the Trinidad and Tobago Goat and Sheep Society (TTGSS) agreed with Thackorie. He said: "The goat milk that is available in the supermarkets is twice the price of the milk that people can buy from the farmers here locally. So the singular defining thing about the goat milk market unlike any other cultural product in the country is that the foreign competition is twice the price of the local product" he said.

Goat milk has been traditionally bought at the farm's gate. With much emphasis being placed on health, diet and exercise, consumers were preferring goat's milk to cows' said Borely. He said: "There is a global trend towards goat milk. People are awakening to the fact that goat milk on the whole is better nutritionally, for digestion and better ecologically than cows' milk. The protein profile is different. It is heart healthy milk."

## APPENDIX 5:

### Newsday Newspaper Article on Marilissa Farm

#### **The business of goat milk**

Thursday, March 10 2016

**Launching any business locally, and in particular, a food business is no easy feat. One based on goat milk however, some may say is a huge risk, especially when faced with large scale competitors such as Nestle and Moo Milk, whose share of the market is substantial and well established.**

Entrepreneurs face many challenging steps: development of product formulations, packaging and label designs, gaining Chemistry, Food and Drugs approvals, set up of equipment and facility, processing, staffing, marketing, sales and distribution are but a few. Yet, Mr Lincoln Thackorie, owner of Marilissa Farms Limited, an impressive goat farm located in Penal, has thus far succeeded in traveling this meandering road.

In addition to his plain pasteurized milk available in JTA Supermarkets and Massy Stores, Mr Thackorie partnered with The Caribbean Industrial Research Institute (CARIRI), utilising the expertise of their food technologists, technicians, engineers and graphics designer, as well as their processing pilot plant facilities to expedite the development and launch of a new chocolate flavoured goat milk product.

But why goat milk when there are so many options out there like cow's milk, soy milk and almond milk just to name a few? The easiest answer to that would be the many health benefits associated with consuming goat's milk and here are just a few of them:

1. If you are lactose-intolerant, then you know the pain of never being able to enjoy dairy products, however that is not the case with goat's milk. Goat milk can be more completely and easily absorbed, leaving less undigested excess behind in the colon to ferment and cause the uncomfortable symptoms of lactose intolerance.
2. Goats' milk is naturally slightly lower in cholesterol than cows' milk as there are nearly twice as many beneficial fatty acids, which means that our cholesterol balance can be aided by consumption of goat's milk.
3. Another health benefit to goats' milk and other types of products like yogurt are they are rich in calcium, a mineral indicated as important in lowering our blood pressure.
4. Goat milk is far more nutrient-dense than cow milk, meaning that you don't need as much of it to receive the same (or even better) nutrient intake.
5. Goat milk is a very rich source of protein, which is an essential part of growth and development, as proteins are the building blocks of our tissue, muscle, and bone.

Here is an interesting view from Mr Lincoln Thackorie on venturing into the goat milk business.

Q: Why did you goat farm and goat milk processing?

LT: It is actually more versatile than any other type of milk, even cow's milk. There are many people who are lactose intolerant and therefore cannot drink cow's milk. Goat milk is the perfect alternative because it contains much less lactose. It can even be used for many other products such as cheese, ice cream and even soap.

Q: What is your perception of the market for goat milk in Trinidad and Tobago?

LT: I believe that there is a niche market for goat milk in Trinidad and Tobago although there is taboo surrounding goat milk. Once people actually have a taste of the milk they overcome their phobia and realize how delicious it is. The important part is really to cultivate an understanding of the benefits of goat milk so that there are not any misconceptions. When that is done, the market will expand



significantly.

Q: What is the greatest difficulty you face in running a goat milk business?

LT: The labour supply is definitely the greatest difficulty.

Not many people want to venture into the agriculture sector, especially when it comes to animal husbandry. Labourers need to have a complete understanding of the animal and usually you'll find that they don't. It's not a glamorous job but it is extremely rewarding work.

Q: What would be the best advice you can give to others entering this business?

LT: It's important to start slowly and be very hands on so that you can learn the business and therefore grow with it.

Passion for what you do cannot be understated. The more passionate you are about what you do, the more zeal and energy you will find. You will work harder and you will be better able to deal with any difficulties that may arise.

Q: What new products or ideas do you envision for the future that you would like to share?

LT: Goat milk is so versatile that in the future I see the product line expanding to include cheese, yogurt, ice cream and even beauty products. It is extremely important to keep introducing quality products on the market that not only taste good but are also beneficial to your health.

For more information on product development, please contact CARIRI's Biotechnology Unit at 299-

0210 ext 5053 or email us at [biotech@cariri.com](mailto:biotech@cariri.com) decide to invest in a I enjoy working with the goats.

From a very young age I found myself interested in farming. I realised that there was a demand for goat meat and instead of rearing solely a meat animal; I selected a dual purpose animal so you can have both meat and milk. In terms of economics, it's obvious that you would get better value for your money with a dual purpose animal.

That being said, goat's milk.

## Appendix 6

### Business Newsday Article on Orange Hill Dairy Goat Farm

Thursday, December 14, 2006

by Marissa Williams  
*Tobago Bureau*

Healthy, Happy goats producing good milk equals great cheese. That's the equation according to Josefa Patience, producer of Orange Hill Nature Ranch Feta Cheese, another one of Tobago's well kept secrets.

Patience, a German citizen, is the island's sole producer of cheese, having started her business almost eight years ago, after moving to the Orange Hill Plantations owned by her husband's family in 1999. She specialises in making feta cheese — a Greek goat cheese normally used in salads. It is a fresh cheese which is placed in salted water for four to six weeks before sale.



Aware that she would need a sustainable income when she moved to Tobago, Patience and her husband felt that it was safer to continue in agriculture and decided to make a living out of cheese production, having learnt the basics in Germany where she managed a major catering company. Armed with a few parting gifts from her friends in Germany, more knowledge about rearing sheep than goats and her determination to succeed, Patience began the business with just six goats.

She later attended a seminar on cheese making at the Kendall Farm School in Tobago, sponsored by the Food and Agricultural Organisation (FAO) and the Tobago House of Assembly (THA), to assist local farmers in utilising their milk.

Her husband, Trevor Patience, left the cheese business in 2001, and she now single-handedly runs the farm. With a stock that has grown to 70 cross-breed goats such as British Alpine, Saanen, Toggenburg and Anglo-Nubian, Patience is taking her business in stride.

She initially dabbled in yogurts but settled upon making cheese. Through trial and error, the business has matured and she now distributes to several of the island's major supermarkets and restaurants, along with the Greek salads.

Always striving for perfection, Patience is on a constant drive to improve her cheeses and recently came up with the recipe for the "Tobago Chèvre" which is a fresh goat cheese with a creamy garlic and dill heart.

"I needed to survive and I had to make money and now I am successful with the small amount that I have been doing", she says with a strong accent. "Because I am the only person making cheese, I would say it is a very good business. If I had more milk and enough labour and all those sorts of things on stream, I could even deliver to Trinidad, where I would have business right through the year instead of it being seasonal, like in Tobago."

Patience explained that her product becomes more popular during the peak tourist season as foreigners tend to appreciate its value. She said cheese making was a lot of work and lamented the lack of labour on the island.

"Good local help is so hard to find," she said, noting she had to work alone several months from early in the morning straight into the night. "I ran this farm with these two hands cutting feed for the animals, milking them, making the cheese, packaging the cheese and then delivering them myself, sometimes at night," Patience said.

She now has two assistants; a gentleman from Guyana and a German veterinary student. In the past, she has had participants from Switzerland and Austria.

Apart from finding valuable help, she also faces rising animal feed prices, hassle from supermarket owners about the prices of the products and improper handling by their staff. The cheese culture she brings in also meets close scrutiny from Customs. Patience said that she prefers not to distribute to smaller supermarkets which do not have suitable facilities to preserve the quality of the cheese.



Her love for her animals has prevented her from selling the animals for meat. "I wouldn't even touch goat meat because, for me, that will be like eating my dog or my cat." Neither will she sell them to take part in the annual Buccoo Goat Race Festival. However, she sells goats to other farmers for breeding purposes.

"Even then it is so hard to part with them because I know that they will not be getting the same treatment that they get here. People have known me over the years to sell quality animals, healthy goats," she said, adding, "It is very bad that the goats have to be boxed in whole day, they need exercise."

Patience's herd is allowed to roam free on the 70-acre farm and eat whatever they want as "this is very important for the taste of the cheese." She is currently preparing to do her annual Christmas baking which, she said, is highly anticipated by customers who often pre-order the cheese. She also has plans to extend the business to include a bakery and café and to refurbish the sugar mill on the over 300-year-old plantation for tourism purposes.

## Appendix 7

### Some Examples of Value added Products from Dairy Goat Milk



**Tobago Chèvre**



