The CARICOM

Regional Transformation Programme

for Agriculture

EXECUTIVE SUMMARY

The Small Ruminant Meat Industry in CARICOM

Competitiveness & Industry

Development Strategies

Core Team of Consultants

Singh, R.H. (Ph.D)

Seepersad, G. (Ph.D)

Rankine, L.B. (Ph.D)

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The core team takes the opportunity to express its appreciation to all those who provided logistical and technical support for the completion of this exercise. We firstly like to thank the RTP Coordinator / Agricultural Advisor, Mr. Sam Lawrence as well as the country officers for their logistical and other support in the completion of this exercise. Field visits allowed us to verify and update the information base on small ruminants. Small ruminant investors particularly in the case of Jamaica, Trinidad and Tobago and Guyana provided valuable information in shaping the review of the Regional Sheep and Goat industry. The database on small ruminants worldwide, as well as in the Caribbean, contains significant gaps and took considerable time in their verification and validation.

Our discussion with officials in the Ministries of Agriculture in the Region proved helpful in reconciling some of the deficiencies we encountered in the review. Technical support was provided through the assistance of Brent Theophile, Rebecca Gookool, Jai Rampersad and David Hanson, to which the Core Team also expresses support. To Ms. Martha Jiminez-Spence and Ms. Indira Buchoon-Ousman, we express our sincere thanks for their logistical organizational and communication support.

Although we tried to ensure accuracy of the database used for the review, nonetheless we accept responsibility for any errors that may be discovered. This may be the result of the multiple databases from which we had to access the data. The small ruminants sector in the Caribbean is just emerging unlike countries such as Australia and systems of data recording for this commodity have not yet entered the mainstream databases. This gap we recommend should be addressed with urgency.

The Core Team

Dedication

We dedicate this work to the Memory of our Colleague and member of the study team, Dr Lloyd B. Rankine. Dr Rankine passed away on October 25, 2006. He was a colleague with whom we shared many long hours in dialogue, in the field and in the class room. His life long endeavours and dedication reflect his passion for agriculture in the Caribbean.

Dr. Rankine was an integral part of the University of the West Indies having served the University (both Mona and St. Augustine campuses) from 2nd December 1968 to June 3, 2006 when he suffered a debilitating stroke. He served as Head of the Department of Agricultural Economics and Extension from 1977 to 1990 and taught in the capacity of Senior Lecturer up until 2003, when he retired. From 2003 to June 3, 2006, he lectured part-time in the Department

Dr. Rankine also served as Director and Chairman on many Boards in Trinidad and Tobago. .

Ranjit H. Singh & Govind Seepersad

The Small Ruminant Meat Industry in CARICOM

COMPETITIVENESS & INDUSTRY DEVELOPMENT STRATEGIES

Executive Summary

1.0 INTRODUCTION

The Study on the Small Ruminant Industry in CARICOM is part of a larger study commissioned by the CARICOM Regional Transformation Programme for Agriculture to evaluate the international competitiveness of selected agricultural commodities. This Report constitutes the final component of the overall study on the competitiveness of the Small Ruminant Meat Industry. It was preceded by a Review of the Policies in the CARICOM countries included in the study, and a Market Intelligence Report on the global Small Ruminant meat industry. The countries included in the Study were: Barbados, Belize, Jamaica, Trinidad and Tobago, St Lucia and St. Vincent.

2.0 MARKET ASSESSMENT

2.1 The Global Market for Small Ruminant Meats

Global exports of small ruminant meat are dominated by Oceania (New Zealand and Australia) at 64%, and by Europe (mostly France) at 31%. With respect to sheep meat, Australia and New Zealand account for 70% of the global exports, valued at USD 1.96 billion. Of this amount, New Zealand has a 56% share and Australia, 44%. In the case of chevron, the combined exports from both countries are 14,680 tonnes valued at USD 34.7 mn (2003). Australia accounts for most (89 %) of the chevron exports. Sheep flocks in both Australia and New Zealand are produced for meat (including sheep for live export) and wool[1]. The joint product nature of the industry in both countries allows for cost sharing of production expenses between wool and meat, giving the respective producers tremendous leverage in pricing their products and maintaining a competitive

[1] (Source: **Statistics – Tasmania Agriculture. Agricultural production., Livestock., Sheep and lambs** http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/7FE4D2922DD91969CA256C3200241770)

position in global trade. Countries attempting to develop a sheep industry solely for meat production would find it difficult to compete on the basis of price, making quality factors the necessary basis for developing a mutton industry.

2. 2 The CARICOM Market for Small Ruminant Meats

Consumption Patterns and Preferences: Fresh goat and sheep meat are consumed in the Region throughout the year with peaks associated with various celebrations and religious events such as Christmas, *Eid Ul Adha* and *Eid Ul Fitr*; and recently, in increasing amounts for tourists and in local cuisine. Ethnic, cultural and religious factors are observed as the main factors influencing consumption patterns for goat and sheep meat in the Region. The Regional market for sheep and goat meat, however, remains underdeveloped, with the supply and availability of quality meat being a main concern.

CARICOM consumption of Sheep and Goat meat in 2003/04 was about 2 kg/capita (Table 2.1). Overall the per capita consumption of sheep meat was approximately twice that of goat; 0.6 kg versus 1.4 kg / capita. Significant variation exists in the level of consumption and the type of meat preferred among countries as shown in Table 2.2.

Table 2.1 CARICOM Consumption of Goat and Sheep Meat (2003 & 2004)

Commodity	Year	Production (kg)	Imports (kg)	Total Consumption (kg)	Per Capita Consumption (kg)
Goat & Sheep					
	2003	3,661,000	11,123,889	14,784,889	2.086
	2004	3,668,000	11,287,856	14,955,856	2.111
Goat Meat					
	2003	2,579,535	1,948,338	4,527,873	0.639
	2004	2,591,800	1,769,812	4,361,612	0.615
Sheep Meat					
	2003	1,081,465	9,175,551	10,257,016	1.447
	2004	1,076,200	9,518,044	10,594,244	1.495

NB: 2003 excludes Antigua & Barbuda, Bahamas and Montserrat
2004 excludes Antigua & Barbuda and Bahamas

Table 2.2: Per Capita Consumption of Sheep & Goat Meat : CARICOM countries- 2004

COUNTRY	Per capita Consumption (kg)		
	Goat & Sheep	Goat Meat	Sheep Meat
Antigua & Barbuda	0.504	0.220	0.284
Bahamas	6.046	0.716	5.330
Barbados	5.666	0.136	5.530
Belize	0.073	0.024	0.048
Dominica	1.789	0.875	0.915
Grenada	1.520	0.316	1.205
Guyana	1.029	0.339	0.691
Jamaica	2.222	0.821	1.401
Montserrat	2.714	0.350	2.364
St. Kitts & Nevis	4.548	0.190	4.358
St. Lucia	5.484	0.413	5.072
St. Vincent	0.809	0.191	0.618
Suriname	0.149	0.068	0.081
Trinidad and Tobago	2.595	1.127	1.468
NB: Antigua and Barbuda based on 2005 data available. Bahamas based on 2001 data available.			

Production and Supply: The Structure of the CARICOM Small Ruminant meat market reflects a highly segmented market between imports and domestic fresh meat supply. The key features are as follows:

(1) Market Size & Imports:

- Consumption of sheep and goat meat in CARICOM is highly dependent on imports from New Zealand and Australia.
- Overall, the Region imports approximately 75% of its consumption requirements of both meats.
- In 2004, imports were valued at USD 23.3 mn with over 88% being sheep meat.

- Our estimate is that the total value of the industry with respect to ONLY meat is approximately USD 30 – 40 mn.
- Estimated CARICOM consumption is approximately 15,000 tonnes. However, the actual levels of consumption and self sufficiency vary among countries, as well as between mutton and chevron meats.
- The main import product into the region was sheep cuts, bone in frozen (HS 020442) representing 72% of imports in value terms.
- Jamaica is the largest importer in the Region, followed by Trinidad and Tobago. Large importers mostly consume meats of sheep, while Trinidad and Tobago's imports are mixed - about 65% sheep meat and 35% goat.

(2) **Production:**

- Small Ruminant meat production has been dominated by Jamaica, which produces an average of 1,500 tonnes annually.
- Other significant producers include Guyana, Antigua, St Lucia, St Kitts and Nevis, Barbados, The Bahamas and Grenada.

3.0 INDUSTRY PROFILE

The Caribbean Region has been a traditional producer of small ruminant meats and products. Data on domestic production of Sheep and Goat meat in CARICOM countries are not readily available, largely on account of the fact that a significant number of animals are slaughtered at informal facilities. The only complete database is the FAOStat, which based on own observations in Trinidad and Tobago, may be underestimated. In the Region, Jamaica has the largest stock of sheep and goat at 142,000 head, followed by Guyana with 78,000 head, Antigua, 15,000 head, and the rest of CARICOM having animals stocks at less than 10,000 head (FAOStat).

In terms of goat meat production, the FAO data show Jamaica as CARICOM's largest producer with 1,559 tonnes, followed by Guyana with 260 tonnes, Antigua 111 tonnes; and St Kitts and Nevis, 70 tonnes. Production levels for the other identified countries fall below 68 tonnes. However, in the case of sheep meat, Guyana was the largest CARICOM producer with a production of 520 tonnes in 2004, followed by Barbados (92 tonnes) and St Lucia (90 tonnes).

4.0 PRODUCTION COSTS FOR SMALL RUMINANT

Production costs were computed for the sample of fifteen sheep and nine goat farms distributed across the various countries. Cost was estimated with respect to both live animals and meat.

4.1 SHEEP: Cost of Production - All Models & Breeds

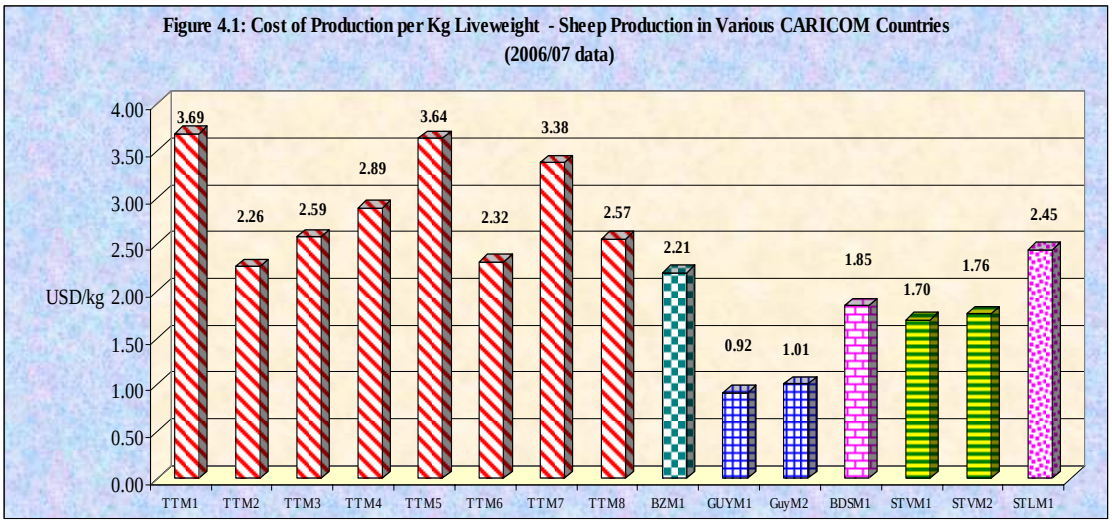
Live Animals: The following are the general findings of the study on cost of sheep fattening operations (Figure 4.1):

i. The highest cost of production (USD 3.69/kg live weight) was observed for Trinidad and Tobago, and the lowest cost (USD 0.81/kg live weight) was observed for Guyana.

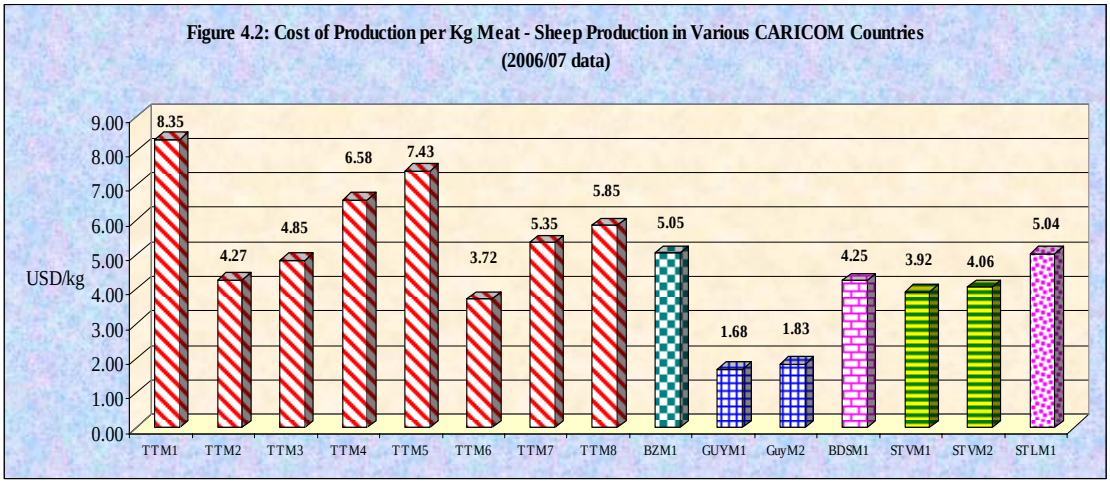
ii. Guyana's cost of production was significantly below that of other countries. Relative to Trinidad and Tobago's highest cost producer, cost of production in Guyana was as low as 40 % of the former.

iii. St Vincent, Barbados, Belize and St Lucia showed intermediate costs.

iv. Feed cost represented a major cost item, almost 50 % of total operational cost in all farm models except St. Lucia.



Cost of Locally Produced Mutton: The estimated cost of local mutton (at the wholesale level, ex butcher) ranged from a low of USD 1.68/kg for Guyana to a high of USD 8.35/kg for Trinidad & Tobago (Figure 4.2).



4.1 GOAT: Cost of Production - All Models & Breeds

Live Animals: Summary results of the cost of production study on goats (Table 4.3 and Figure 4.3) indicate as follows:

i. The range of cost for goat production in Jamaica was quite wide, having both the highest and lowest cost of production among the three countries analyzed. The highest cost of production was USD 3.83/kg live weight basis (Ministry of Agriculture Intensive Model Data) and the lowest was USD 2.47/kg live weight (a semi intensive farm visited).

ii. As was noted for sheep, feeds constitute a major cost item, accounting for up to 25% of production cost in the intensive farm models.

Cost of Locally Produced Goat Meat: The estimated cost of locally produced goat meat at the wholesale level follows the same pattern amongst the three countries as was the case with live animals. Costs range from a low of USD 4.27/kg of meat to a high of USD 8.66/kg, both in the case of production models in Jamaica (Figure 4.4). Other production models in Jamaica had costs of USD 5.26 and 7.51/kg. The estimated cost of goat meat derived from the two production models in Trinidad & Tobago was USD 7.54 and 6.75/kg. Cost of meat out of the St Lucia farm models were USD 5.52 and 6.66/kg.

5.0 TRADE COMPETITIVENESS: CARICOM SMALL RUMINANTS

5.1 Methodology

Given that local Small Ruminant meats are differentiated in the marketplace from the imported products, the methodology for the conduct of the competitiveness analysis envisages two stages. In the first stage we attempt to determine whether our farmers could supply a product that could compete with the imports from these countries on the basis of price. Our analytical model therefore builds up cost (simulation) along the value chain from the farm gate to the output from the slaughter house or butchers: that is, we derive the cost of carcasses at the wholesale level. Later in the report we shall introduce the other dimension of competitiveness, in particular the Quality Factor, as was presented in our Model of International Competitiveness.

The calculation of price competitiveness referred to as **IMPORT PRICE COMPETITIVENESS COEFFICIENT (MCC)** is measured by comparing the **local carcass cost at the wholesale level (LCC)** with the **Final Landed Cost (FLC)** of the imported equivalent product at the wholesale level. This is shown in Equation (1) below:

MCC = LCC / FLC …….. Eq'n (1)

Where: MCC = Import price competitiveness coefficient

FLC = the final landed cost of imported meat at the wholesale level

LCC = cost of local animal carcass at the local wholesale market level

Domestic production is considered price competitive when the MCC < 1. **The degree of competitiveness or uncompetitiveness is measured by the Competitiveness Gap (CG)** which is the difference between the imported cost and the local cost.

CG ($) = LCC –FLC ……..…. Eq'n (2)

or **CG (%) = [(LCC - FLC) / FLC] *100**

Where CG (USD) = degree of uncompetitiveness measured in US dollars

CG (%) = degree of uncompetitiveness measured in US dollars

5.2 Price Competitiveness of the Regional Small Ruminant Producers

Sheep: Generally, Figure 5.3 and 5.4 indicate that among CARICOM producers of sheep / mutton may be placed in three categories based on competitiveness:

(i) Producers that are Competitive: only producers in Guyana are price competitive, and only marginally so, as reflected by CG values ranging between 12% and 19 % equivalent to a dollar value of USD 0.32 – 0.52 /kg of meat.

(ii) Most Uncompetitive Producers: Trinidad and Tobago is the most uncompetitive producer of mutton / lamb meat with a CG value ranging from 80 % - 360 %. This suggests that production cost of mutton in Trinidad and Tobago is significantly (80 – 360 %) above the landed cost of the equivalent product.

(iii) Other Uncompetitive Producers: Sheep production in Belize, Barbados, St Vincent and the Grenadines and St Lucia was also uncompetitive. The CG for these countries ranged from 91% for St Vincent and the Grenadines to 146% in the case of Belize and St Lucia. In value terms, the CG revealed local cost exceeding the landed meat cost by USD 2.57 /kg to USD 4.12/kg.

Goat: In the case of goats, the results are as follows:

(i) **Producers that are Competitive**: only one semi-intensive production model in Jamaica shows some potential of being marginally competitive as reflected by local cost exceeding imported by 21 % (CG = 21%). This is equivalent to a dollar value of USD 1.03 /kg of meat (Figures 5.5 and 5.6 respectively).

(ii) **Uncompetitive Producers**: CG values ranged from a 92 % - 114 % for Trinidad and Tobago; 57% - 89% in the case of St Lucia; and 49% to 147 for Jamaica. Costs were also significantly above the landed cost of the equivalent product ranging from USD 2.39 /kg of meat up to USD 7.39 / kg for this group of producers/models.

5.3 The Influence of Technology and Breeds on Competitiveness

Theoretically, one expects that both the technology employed in the production of Small Ruminants, as well as the breeds of animal, would influence productivity performance and costs. However, no significant or systematic differences in performance were noted among the various production technologies or the breeds of Small Ruminant. This occurrence may be due to the overwhelming influence of management on productivity.

5.4 Competitiveness Based on Quality Factors

The price spreads suggest that while local meats are not price competitive with imports, they are highly competitive on the basis of quality. **In this instance, quality factors constitute the freshness and flavour of locally produced mutton and chevron.** Table 5.4 presents the spread between the estimated cost of local mutton and chevron at the wholesale level, and the cost of imported equivalent, also at the wholesale level. For both mutton and chevron, Trinidad and Tobago has the largest spread relative to other CARICOM countries..

Table 5.4: Spread in the Cost of Small Ruminant Meat at the Wholesale Level: Local vs. Imported Meat

Country	Average Cost of Local Mutton / Chevron at the W/Sale Level (USD / kg)	**Price Spread**: *(Local Fresh Mutton Cost up to W/Sale Level **less** Cost of Imported Meat at the W/Sale Level)**	
		Mutton USD /kg)	Chevron (USD /kg)
Trinidad & Tobago	11.17	7.91	5.61
Jamaica	8.88	5.62	3.32
Belize	5.87	2.61	-
Guyana	6.61	3.35	-
Barbados	8.80	5.59	-
St Vincent & the Grenadines	5.17	1.91	-
St Lucia	7.68	4.42	2.12
Note: * The cost of imported meat at the wholesale level (includes a 15 % CET and 20 % importers' margin) Imported wholesale costs are as follows: Mutton = USD 3.26 /kg ; Chevron = USD 5.56 /kg.			

6.0 PROFITABILITY OF SMALL RUMINANT FARMING

6.1 Introduction

We now consider whether Small Ruminant farming, and in particular, the fattening enterprise, provides adequate financial incentive as an investment to entrepreneurs. Specifically, we consider two indicators: firstly, the financial returns on operating expenses; and secondly, the Net Income from animal sales, assuming a given breeding herd of 50 animals.

6.2 Financial Attractiveness of Small Ruminant Production

Returns on Operational Expenses per Animal: Financial returns on operational expenses were calculated on an animal basis for each of the farms sampled. Operational expenses included a charge

for Management of the Enterprise equivalent to 10 % of Operational expenses. Revenue from animal sales was calculated on a live weight basis and using average market prices for live animals..

Total Income from Farming: We now ask the question: **Is the level of income from sheep / goat rearing sufficiently remunerative to the entrepreneur to allow him/her to financially support a farm family?** In order to answer this question, we make the following simplifying assumptions:

(i) A typical fattening unit based on weaners from a 50 ewe breeding operation

(ii) Production per year = 114.75 live animals assuming a lambing rate of 1.7 lambs / lambing; the number of lambings per year is 1.5; and total mortality of 5 %.

(iii) All offspring (both male and female) are raised to the market weight and sold as live animals.

(iv) The 50 ewe breeding/fattening unit is the only source of income to the farm family.

(v) Gross Enterprise Income is based on the Gross Margins from current fattening operations

Based on the cost of living throughout the Region, we estimate that USD 10,000 per year would provide adequate support to a farm family of four for the year. At income below USD 5,000 farm families would experience food insecurity.

Findings: The general conclusions from these analyses are as follows:

(i) Sheep farming was certainly more profitable than goat.

(ii) While returns on operational expenditure was fairly attractive on an animal basis, total farm income based on the model of 50 breeding ewes gave income levels that were below what was considered adequate to support a farm family of four, assuming that this was the only economic activity.

(iii) Assuming a target return on investment per animal of 30 %, one half of the fifteen sheep farms in the study achieved this, with some as high as 60 % – 90 %. Only one of the goat farms gave returns that exceeded 30 %.

(iv) The analysis showed that over two thirds of the sheep farms and all the goat farms examined in this study would realize an income below USD 5,000 per year if they operated a 50 female breeding and fattening enterprise. Clearly this is inadequate to support a typical farm family.

(v) Given that the typical goat or sheep farmer in the Region carries a breeding stock of less than 50 female animals, the above results suggest that such enterprises would

not be capable of generating the level of income required to support the farm family, assuming this was the only source of income.

Refer to Annex Tables 1 and 2 for summary of the Farms visited for Sheep and Goat.

Table 6.1: Projected Annual Sheep Enterprise Income Distribution amongst Farms Surveyed (USD /farm / year): (Assumes a 50 Ewe Breeding / Fattening Operation)

Estimated Annual Income Level (USD/ Farm / Yr)	No of Farms	Farm ID
> 10,000	2	TT2, TT6
5,000 – 10,000	3	TT3, TT4, BDS1
< 5000	9	TT1, TT5, TT7, TT8, G1, G2, SV1, SV2, SL1
< 0	1	BZ1

Table 6.2: Projected Annual Goat Enterprise Income Distribution amongst Farms Surveyed (USD /farm / year): (Assumes a 50 Ewe Breeding / Fattening Operation)

Estimated Annual Income Level (USD/ Farm / Yr)	No of Farms	Farm ID
> 10,000	0	-
5,000 – 10,000	0	-
3000 - 5000	1	J1
1000 - 3000	2	J2, J4
0 - 1000	3	T1, T2, J3
< 0	3	J5, SL1, SL2

The analyses suggest that while the return on operational investment on an individual animal basis is generally attractive, the scale of operation is critical to overall profitability in order to realize a level of income that would be adequate to support a typical farm family; assuming it was the only economic activity in which they were engaged. **FOUR** major constraints in realizing economies of scale are as follows:

a. The unavailability of breeding stock

b. The lack of financial capital in the case of the typical Small Ruminant farmer

c. Difficulty accessing adequate land for pastures

d. The high cost of supplement feeds

6.3 Optimal Farm Size

The above analyses suggest that while many Small Ruminant fattening operations realize fairly attractive returns on their investment with respect to Operational Expenses, their scale of Operation is generally too small to realize a level of income that would provide adequate support for the typical farm family.

The development of the Small Ruminant industry in CARICOM would certainly call for more specialized breeding / fattening farms where entrepreneurs would focus exclusively on sheep and / or goat. In such a case we estimate that the region would need to aim for establishing much larger units, having at least 200 breeding ewes.

7. INDUSTRY DEVELOPMENT STRATEGY: THE WAY FORWARD

7.1 Opportunities

From the foregoing discussions it is obvious that Small Ruminants offer significant opportunities to the CARICOM region in terms of investment, food security, employment and improved rural livelihoods. Some of the key factors which suggest the potential for this industry include:

(i) The revealed strong preference for locally produced fresh mutton and goat meat over the imported equivalents.

(ii) The strong demand for Small Ruminant meats (and live animals) generally throughout the year on account of cultural factors such as festivals and celebrations, and with peak demands associated with various religious occasions.

(iii) The Market Potential for Locally Produced Meats.

a. Significant opportunities exist for market and product development.

7.2 The Strengths / Advantages of Developing the Small Ruminant Industry

(i) Small Ruminant production is better suited than cattle as a source of meat & milk given the limited land resource in many CARICOM countries.

(ii) Small Ruminant is also capable of more rapid development than cattle.

(iii) Small Ruminant production is more appropriate for the small resource poor farmers given their limited resources.

(iv) The valuable genetic resource base existing in the Region – The Barbados Black Belly Sheep.

7.3 Constraints / Challenges to the Development of a Small Ruminant Industry

Some key constraints that characterize the small ruminant industry in some CARICOM countries include:

(i) Lack of good quality breeding stock (both quality and numbers basis).
(ii) Praedial larceny as a major risk factor.
(iii) High cost of supplemental feeds.
(iv) Little or no health certification of slaughtered animals / small ruminant meats presented for sale.
(v) R&D deficiency – innovations taking place at a faster rate at the farm level that and the research institutions.

7.4 Industry Development: Challenges and Binding Constraints

Throughout the CARICOM region, the binding constraint to the expansion and development of the Small Ruminant industry is the unavailability of breeding stock, in particular female breeding stock.

The incremental actions of Government and private efforts of farmers/organizations remain somewhat miniscule relative to the critical mass that is required to have an appreciable impact. When one considers that the Small Ruminant industry is dominated by small farmers having limited resources, then one cannot expect this group to effectively address the key constraint of the industry. A bold new initiative is required to achieve the advances desired.

7.5 The Way Forward: A Strategy for the Industrialization of Small Ruminant Production

On the basis of the above analysis we propose the following broad approach for the development of the Small Ruminant Industry. Given the gestation involved in livestock development we propose a **FIFTEEN YEAR (15) DEVELOPMENT PROGRAMME** (Figure 7.1), which envisages the following:

i. Phase 1: The Establishment of a Centralized Nucleus breeding and multiplication herd
ii. Phase 2: The Stocking of Private Farms at the Country level with pregnant ewes from the Nucleus herd

iii. Phase 3: The Stocking of a Second Round of Private Farms with Pregnant ewes from the Initial set private farms

7.5.1 Phase 1: The Establishment of a Centralized Nucleus breeding and multiplication herd

The first phase is seen as a CARICOM level investment activity whereby countries with an interest in developing their Small Ruminant industry would take equity in a Company established to develop and operate these farms.

The core business of the proposed Company is to build up a Nucleus herd of quality animals for breeding and multiplication so as to provide a **SUSTAINABLE SOURCE of QUALITY BREEDING STOCK TO CARICOM** member states. Pregnant ewes from the Nucleus herd would then be sold to the member states for distribution and stocking their private farms. It is also envisaged that the Nucleus herd may comprise 2 – 3 large farms, both sheep and goat, located in countries with the best environmental conditions for Small Ruminant production. In addition, the unit should possess highly competent technical and managerial staff, and should serve as centres for high quality R&D in Small Ruminants.

7.5.2 Phase 2: The Stocking of Private Farms at the Country Level

The second phase of the Strategy is seen to commence in year 6 when the Nucleus herd would have expanded to the size where it was able to distribute animals to the countries. It is suggested that Governments purchase the three month pregnant ewes from the Nucleus Herd Company, giving these to farmers on condition that they replace these animals after three years with the same number of three month pregnant ewe offspring. These pregnant ewes could then be used to stock a second round of private farms.

We are also suggesting the adoption of what we call the **St Lucia Model** where a team is assigned to work with Small Ruminant farmers in each agricultural district. The Team comprises a vetinerary officer, an extension officer, and possibly a farm management specialist. The Team first screens the farmer to ascertain an interest in Small Ruminant production. Also, this team will assist the farmer in preparing a development plan and project document. Clear targets and performance standards are set. The government provides other support in the form of medication, breeding and farmer training. The Team visits the farm on a regular basis to monitor activities and provide advice.

Figure 7.1: Proposed Small Ruminant Industry Development Model/Strategy

Phase 1: A Centralized CARICOM Level Programme	Phase 2 Country Development Programme	Phase 3 Supplying Countries with Quality Breeding Stock from the Nucleus Herds
Years 1- 5	**Years 3 - 6**	**Years 4 and ongoing**
The Establishment of the Centralized Nucleus Breeding Herds **Features:** ✓ **two farms -** One for Sheep & the Other for Goats; ✓ Operated under a Company Structure with private and public Equity **Role:** **1.** Development of Nucleus Herds of quality breeding animals (herd size of approximately 5000 breeding animals each for sheep and goat) **2.** Production / Supply of quality breeding stock to CARICOM Countries **3.** Serve as a Specialized R & D centre and a source of technology for the Regional Industry	**Capacity Building at the Country Level** **1.** Design of a Small Ruminant Development Programme at the National level **2.** Establishment of the enabling policy and regulatory environment **3.** Establishment and appointment of Production Support Teams to implement the programme with the private farming sector.	**Stocking the National Herds** **1.** Commence stocking of Private Farms at the Country level with pregnant ewes from the CARICOM Nucleus herds – an ongoing activity to build up the national herds **2.** Transfer of technology know how generated from R & D work at the Nucleus farms.

With regards to our proposal we suggest that the teams should be established by Government prior to the start of Phase 2 so that farmers may be assessed and farms selected to receive animals when they are available from the Nucleus Herd.

7.5.3 Phase 3: The Stocking of a Second Round of Private Farms with Pregnant Ewes from the First Set of Farms

In this Phase we envisage that farmers who were recipient of breeding stock from the Nucleus herd, would be allowed adequate time to build up their own herd. At the end of three years we would expect farms to now return to Government the number of pregnant ewes that were given to them. These animals could then be used to establish or expand a second set of farms, supported in the same way as described above using the St Lucia Model.

7.5.4 Critical Success Factor

The critical success factors for the Development Model proposed include the following:

- The Nucleus Herd Company should operate on a strict business model.
- High quality R&D is critical to the overall development of the industry in CARICOM and should be centered at the Nucleus herd Farms.
- Government support of the plan by agreeing to purchase high quality breeding stock from the Nucleus herd at economic cost.
- Equity participation in the Nucleus herd Company by Governments and the Private sector.
- Long-term government commitment (policy, funding, veterinary health etc).
- A committed and trained cadre of producers (horizontal) with strategic alliances between breeders, finishers and feed-lot operations.

7.6 PROJECT PROFILE: DEVELOPMENT OF THE NUCLEUS HERD

7.6.1 Herd Build Up

Each of the Nucleus farms being proposed, one for sheep and the other for goat, comprises a breeding herd of approximately 5,000 females at maturity. The Assumption is that the farms will be stocked initially with approximately 1,000 young females. The breeds of animal to comprise the herd will depend on the cross breeding programme planned. It is recommended that only high quality breeding stock should be acquired. Given the limited supply of such animals in the Caribbean, it is envisaged that the majority of the acquisition would need to be imported from extra-regional sources.

The herd build-up model is presented in Table 8.1. The model assumes that the nucleus herd stabilizes at about year 5 with a population of approximately 5,000 breeding animals. Through a well monitored programme of rigorous culling we expect that the quality of breeding stock will be continuously upgraded. Young pregnant females will be available for sale to the region commencing in about year 4 of the project. When the herd stabilizes from year 5 onwards the model projects a total of approximately 3,000 pregnant ewes will be available for sale.

Table 8.1: Nucleus Herd Projection: Annual Production and Sale of Pregnant Ewes

Year	Total Breeding Herd (Female)	Total Offspring's Yield	Males lambs (Assume 2% mortality)	Selected Females Lambs (assume 2% mortality and 5% culled)	Culled Females Lambs (to be fattened) (5%)	Sale of Pregnant ewe
Year 1	1000	1910	917	821	96	0
Year 2	1821	3479	1670	1496	174	0
Year 3	3317	6336	3041	2724	317	0
Year 4	5006	9562	4590	4112	478	1035
Year 5	5028	9603	4610	4129	480	3084
Year 6	5032	9612	4614	4133	481	3097
Year 7	5033	9614	4615	4134	481	3100
Year 8	5033	9614	4615	4134	481	3100
Year 9	5033	9614	4615	4134	481	3100
Year 10 -20	5034	9614	4615	4134	481	3101

Assumptions: No of lambing /yr =1.5; No of lambs /lambing = 1.5; Conception rate = 0.85; Annual production =1.5 *1.5 * 0.85 = 1.91offsprings /yr; Mortality =2% male and 2% female lambs and 5% of female lambs are culled from those selected for introduction into the genetic multiplier programme. The culled female lambs are to be fattened for the meat market.

Key Principles of Seed Stock Operation

1. *Project assumes 1,000 ewes to start nucleus herd at Year 1, which is the year rearing of animals for the production of seed stock will commence.*
2. *All females' offspring will be retained until the end of Year 4 when 68% is retained for breeding and 32% sold to farmers/entrepreneurs.*
3. *Sale of offspring will thus commence in Year 4.*
4. *The project will therefore reach an ewe population of about 5,000 ewes during year 4 and this nuclear herd will be maintained from that year.*
5. *Ewe replacement at a rate of 20% will begin from Year 5.*
6. *The project will release about 1,035 pregnant females during year 4 and about 3,000 annually thereafter.*
7. *All males / rams will be sold after 6 – 8 months for breeding (excess sold for slaughter).*

7.6.2 Capital Investment

The estimate of the approximate projected cost and returns for each of the Centralized Nucleus herd is presented here. The initial capital investment for each Nucleus Farm is estimated at approximately USD 5 million comprising the cost of breeding stock, buildings, equipment and infrastructure (such as pasture, roads and utilities) for the establishment of the farm (Table 8.2). The total for the two farms (sheep and goat) being proposed is thus USD 10 million.

7.6.3 Annual Farm Recurrent Cost

The annual operating cost for each farm is shown in Table 8.3. At year 5, when the herd stabilizes the total recurrent cost is estimated at approximately USD 1.7 million. Recurrent cost comprises staff cost, feed and other production input costs and administrative overheads. With respect to professional staff, we propose farm management personnel, as well as a compliment of scientists in

the relevant specialization, to ensure high quality research emanating from the Farm. We estimate an annual staff cost of approximately USD 0.4 mn.

Production cost for animals was estimated at the rate of USD 3.50 /kg live weight per annum, based on cost of production studies reported earlier. Total cost is therefore approximated on the basis of the total mass of animals on the farm in a given year.

Table 8.2: Nucleus Farms: Approximate Initial Capital Investment

Item	Amount in USD Million
Animal Housing & Buildings	0.6
Pasture Establishment	0.5
Equipment	1.5
Labs	0.4
Road & Utilities	1.0
Purchase of Breeding Stock	1.0
Total	**5.0**

Table 8.3: Nucleus Herd Annual Operating Cost –Each Farm (USD 1000)

Year	Total Farm Population 1/	Feed & Med Cost for Breeding Herd 2/	Fattening Cost (Male & culled females) 3/	Total Animal Prodn Cost (Feed, Med & Labour)	Staff + Admin Cost 4/	Annual farm Recurrent Cost
Year 1	2834	191	76	267	400	667
Year 2	5161	348	138	487	400	887
Year 3	9399	634	252	886	400	1,286
Year 4	14186	957	380	1337	400	1,737
Year 5	14247	962	382	1343	400	1,743
Year 6	14260	962	382	1344	400	1,744
Year 7	14262	963	382	1345	400	1,745
Year 8	14263	963	382	1345	400	1,745
Year 9	14263	963	382	1345	400	1,745
Year 10 -20	14263	963	382	1345	400	1,745

Key Assumptions:
1/ Rams kept for 6 months while ewes are fed for 12 months
2/ USD 105 / animal / year feed etc 35kg ewe
3/ USD 75.00 / animal to 7.5 months market weight
4/ Technical Staff and Technical Assistants estimated at $252,000 plus admin = $400,000

Cost items

1. *Cost per ewe for breeding USD 1,000 each.*
2. *Professional, technical and support will cost USD 400,000/annum*
3. *Males sold at 40 kg bodyweight and culled female fatteners and spent ewes at 25kg.*
4. *Rams budgeted to be sold at USD 3.75/kg and culled females at USD 1.50/kg.*
5. *Pregnant females are sold at a price of USD 700 / head.*

7.6.4 Revenue

At year 5 when the animal population stabilizes annual revenue from animal sales is estimated at approximately USD 2.9 million.

Revenue is based on returns from the sale of the various classes of animals as follows:

(i) Male offspring and culled female offspring that have been fattened for market up to an average age of 7 – 8 months reaching an approximate weight of 40 kg. These animals would be destined for the mutton market attracting and average price of USD 3.50 /kg liveweight

(ii) Culled spent female animals from the breeding herd. The price assumed here is USD 1.50 /kg liveweight

(iii) Select pregnant lamb offspring to be sold as high quality breeding stock. The assumed price is USD 700 / animal.

7.6.5 Cash Flow and Profitability

The Cash Flow projections for each farm are presented in Table 8.4. Operating deficits are expected for the first four years, respectively USD 0.5, 0.6, 0.8 and 0.3 million. The cumulative deficit at the end of year 4 is therefore approximately USD 2.2 million. From year five onwards a positive cash flow of USD 1.1 million is estimated.

The economic viability of this project primarily depends on the price of breeding stock. While we have suggested a price of USD 700 /animal, a policy decision could be taken with respect this price.

The profitability of investment in the Nucleus herd was estimated using two scenarios: Scenario one assumes 50% of the initial investment is provided by grant funding; and Scenario two assumes that 100% of the initial investment is provided by grant funding. The internal rate of return of the investments and the net present value based on these assumptions are as follows:

(i.) Scenario 1 - IRR = 14.5% and NPV = USD 1.946 mn

(ii.) Scenario 2 – IRR = 31.5% and NPV = USD 4.45 mn

7.6.6 Financing

On the basis of the parameters employed in the analysis and the assumptions of the model, the revenue base of the project is inadequate to support the initial investment proposed. We suggest an investment strategy aimed at mobilizing approximately 50 % of the total investment form donor funding. For the two farms this amounts to USD 5 million. The remaining 50 % of investment and the required working capital we suggest should be mobilized through equity participation of governments and private sector in region in the project.

Table 8.4: Cash Flow: Nucleus Breeding Herd (USD 1000)

Year	CASH OUTFLOW				CASH INFLOW	CASH FLOW
	Establishment Cost	Annual Staff & Admin Cost	Annual Farm Prodn Cost	Total Cash Outflow	Total Revenue*	
Year 0	5000					
Year 1		400	267	667	141	($526)
Year 2		400	487	887	257	($630)
Year 3		400	886	1,286	468	($818)
Year 4		400	1337	1,737	1,431	($306)
Year 5		400	1343	1,743	2,907	$1,163
Year 6		400	1344	1,744	2,917	$1,172
Year 7		400	1345	1,745	2,919	$1,174
Year 8		400	1345	1,745	2,919	$1,175
Year 9		400	1345	1,745	2,919	$1,175
Year 10 -20		400	1345	1,745	2,919	$1,175

** Assume: (i) Males sold at 40 kg bodyweight and culled female fatteners and spent ewes at 25kg.*
(ii) Rams budgeted to be sold at USD 3.75/kg and culled females at USD 1.50/kg.
(iii)Pregnant females are sold at a price of USD 700 / head.

7.6.7 Strategic Partnerships

Given the developmental role of this project, we strongly urge the participation of a wide cross section of private investors as a measure to ensure that the project remains focused on maintaining commercial viability. In this regard we are of the view that among the various stakeholder groups, the current processors/ integrators in the broiler industry in CARICOM should be considered strategic investors and potential business partners since the CARICOM mutton industry could benefit from the meat handling and distribution know how and infrastructure of these entrepreneurs.

ANNEX

Annex Table 1: Key – Farm Location, Production Technology and Breed for Sheep Farms Visited

Country Model Number	Farm Location	Production Technology	Breed
TTM1	Trinidad Farm 1	Semi Intensive	BBB & WA
TTM2	Trinidad Farm 2	Semi Intensive	DP&BBB DP&WA
TTM3	Trinidad Farm 3	Extensive	BBB & WA
TTM4	Trinidad Farm 4	Intensive	DP&BBB DP&WA
TTM5	Trinidad Farm 5	Intensive	DP&BBB DP&WA
TTM6	Trinidad Farm 6	Extensive	BBB*BBB or BBB*WA
STLM1	St Lucia Farm 1	Semi Intensive	BBB
STVM1	St Vincent Farm 1	Semi Intensive	BBB
STVM2	St Vincent Farm 2	Semi Extensive	BBB
BDSM1	Barbados Farm 2	Intensive	BBB
MDSM2	Barbados Farm 3	Intensive	BBB
GUYM1	Guyana Farm 1	Extensive	Common
GUYM2	Guyana Farm 2	Extensive	BBB & WA
BELM1	Belize Farm 1	Semi Intensive	BBB&DP

Annex Table 2: Key – Farm Location, Production Technology and Breed for Goat Farms Visited

Country Model Number	Farm Location and Number	Production Technology	Breed
TTM1	Trinidad Farm 1	Extensive	Local
TTM2	Trinidad Farm 2	Intensive	Saanen, Alpine, Toggenburg, Nubians
JAM1	Jamaica Farm 1	Semi Intensive	Boer* Nubian*Common
JAM2	Jamaica Farm 2	Intensive	Saanen, Alpine, Boer
JAM3	Jamaica Farm 3	Semi Intensive	Boer * Local
JAM4	Jamaica Farm 4	Extensive	Boer * Local
JAM5	Jamaica Farm 5	Intensive	Boer * Local
StL1	St Lucia Farm 1	Semi Intensive (Tethering)	Saanen* Local
StL2	St Lucia Farm 2	Semi Intensive Adjusted for pasture	Saanen* Local