



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



**Proceedings of the 28th West Indies
Agricultural Economics Conference
/2009 Barbados National
Agricultural Conference**

In collaboration with

The Ministry of Agriculture, Barbados

The University of the West Indies (UWI)

**“Food Security, Investment Flows and
Agricultural Development in the
Caribbean”**

**Bridgetown, Barbados
6th-10th July, 2009**

Neela Badrie
Editor

Copyrighted @ September 2010 by the Department of Agricultural Economics and Extension. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopy, recording or otherwise, without the prior consent of the publisher.

Pre- and post-accession performance to the WTO: A vulnerability study of Jamaica's beef industry

Govind Seepersad, Nkosi Felix, Omardath Maharaj
Department of Agricultural Economics and Extension
The University of the West Indies, St. Augustine, Trinidad
nkosif@hotmail.com; govind.seepersad@sta.uwi.edu

Abstract

The World Trade Organization (WTO) has completed its twelfth year of existence. It has promoted a rule-based approach for agriculture, principles of transparency in trade, elimination of discrimination, increased liberal trade through negotiation and similar treatment, promotion of competition while encouraging economic and social development and, finally reform amongst its signatories.

After more than a decade of adjustment and adoption, the WTO's impact on Caribbean agriculture has been varied. The issue has been the subject of many debates; however, the empirical evidence to support this has not been fully collated. It is therefore necessary to gauge the impact of the WTO on the position of different economies and especially productive sectors through a series of yardsticks that are based on empirical evidence upon which we can make positive statements.

This paper analyzes the performance of one segment of the Jamaican agricultural economy, (beef) in pre- and post-WTO periods using various indicators and benchmarks those against the performance of another leading economy, the United States of America (USA). The paper suggests different yardsticks and proposes a Vulnerability Index that may be used for such an exercise. This can prove to be useful to policy makers in assessing other sectors in the post-WTO period.

1.0 Introduction

Purpose of the Paper

The Economic Partnership Agreement (EPA) is now on our doorstep, while the full impact of the WTO remains to be analyzed and understood. With this in mind, the paper seeks to assess the Pre- and Post-Accession Performance of the WTO by benchmarking the Jamaican beef markets to that of the USA, specifically the production, imports and exports of beef. The research also attempts to open an area of thought on vulnerability

changes with the advent of Economic Partnership Agreement (EPA). Trading arrangements usually foster a greater level of intra-regional trade and so, if trading partners are located geographically closer to the destination market then food miles are shortened and by extension reducing the associated risks involved, be it through sanitary and phytosanitary measures among others. The opposite is also true. (What's the point of these last 2 sentences?)

1.1 Background

1.1.1 World Production of Beef (1991-2007)

World production of beef fluctuated during the years 1991 – 2007 however production gradually increased over time. These periodical lows of 52 billion (Bn) kilograms (kg) in 1993, 55 Bn Kg (1998), 56 Bn kg (2001) and 59 Bn kg in 2006 did little to hamper the industry that held a production volume of 60 Bn kg in 2007.

1.1.2 Beef Production in Jamaica (1985 - 2007)

Jamaica produced 13.8 Million (Mn) kg of beef on average from 1985-89, which increased by 2.3 Mn kg by 1994 to 16.1 Mn kg, production declined and settled at an annual average of 12.4 Mn kg between 2002-06.

1.1.3 Beef Imports in Jamaica (1985-2006)

Jamaican beef imports were generally slow during 1985-2006, starting with an annual average of 381,200 kg (1985-1999) which decreased to 71,400 kg by the end of 1999. This decrease represented a 80% decline in imported beef alongside prospering domestic production. Notably, the import market regained its strength between 2002 and 2006, which activity rekindled what was lost two decades ago.

1.1.4 Beef Consumption in Jamaica (1985-2006)

Consumption of beef in Jamaica showed an increase from 14,000 kg (1985-89) to 16,000 kg (1990-94), where it peaked. After which, beef consumption in Jamaica slowed to 12,000 kg (2002-06).

1.2 Proposed Goals of the WTO and EPA Agreements

1.2.1 WTO Agreement

The signing of the WTO's Agreement on Agriculture (AoA) on January 1st 1995 was aimed at motivating confidence in the rules of international agricultural trade, by removing trade barriers and creating level playing fields. That agreement had the three concepts or "pillars" that addressed domestic support, market access and export subsidies and was meant to strengthen the process leading to improved predictability and stability for importing and exporting countries. The agreement made provisions that encouraged the use of fewer trade distorting policies, those of which include; the removal of "negative lists" and the tariffication of all imported products. Tariffs were also to be reduced by developing and developed countries at rates of 24% and 36% respectively. These reductions occurred within a 10 year period for developing and a 6 year period for developed countries.

1.2.2 Economic Partnership Agreement (EPA)

After 14 years of the initiation of the AOA it is safe to conclude that the gestation period is over, regional and of late, bilateral arrangements are being formed. The European Union (EU) has recently put into motion a group of partnership agreements which seek to promote bilateral trade in a diverse world economy. It is anticipated that once the ongoing EPA negotiations between the EU and the CARIFORUM are completed, a more dynamic export and import market for Jamaica and the rest of the region will be facilitated.

This uniqueness is achieved with the boasting of policies such as reciprocity and a strong non-discriminatory position. This is achieved through the progressive removal of

trade barriers and preferences which have been established between the EU and the African, Caribbean and Pacific (ACP) countries in prior arrangements. With the aim of achieving the criterion of being a non-discriminatory agreement, the EPAs are open to all developing countries, thereby effectively ceasing the existence of an 'ACP group' in favor of bilateral agreements which helps to foster trading partners instead of development partners. Regional exporters have secured duty- and quota-free access to the markets of the EU for almost all products with the exception of rice and sugar, which are regarded as sensitive products.

This agreement uses the Heckscher-Ohlin theory of international trade¹ and it is believed that over the last few decades regional economic agents have been misled by adopting such theories at face value. Each economy and trade situation is unique to the partners involved and so one must be vigilant so as to construe a more dynamic interpretation. Countries would have produced and exported those commodities of which they possess an abundance of factors of production and sought to import commodities which they could not produce efficiently. However, making decisions solely on the cost of production proved to be ineffective. The ease of access of factors of production is also as important. Within recent time one was able to effectively demand grains; it was in short supply on a global scale and the lavish taste for or the dependence on imports erodes self-sufficiency and food security. Imports also expose the importing nation to a host of non-pecuniary risks such as Bovine Spongiform Encephalopathy (BSE), commonly known as 'mad cow' disease and other infections

¹ First developed by Eli Heckscher (1879-1952) and later modified by fellow Swedish economist Bertil Ohlin (1899-1979) in 1933, which seeks to explain the existence and pattern of international trade based on a comparative cost advantage

related to greater food miles from the globalized trading arena.

2.0 Definitions / Critical Review of Existing Indicators

A number of inter-temporal and spatial indicators are commonly used to assess a country's food security situation. These include: Per Capita Availability, Per Capita Consumption, Self Sufficiency and Import Dependency. While these indicators will be used to assess the pre-and post-accession performance to the WTO, they are considered inadequate by analysis done in this paper. Thus the paper develops a new parameter, the Vulnerability Index, to further assess food security issues in the region.. The paper benchmarks the Jamaican beef situation relative to the signing of the WTO Agreement in 1995.

2.1 Indicators Commonly Used to Assess a Country's Food Security Situation

The concept of food security originated from international development literature in the 1960s and 1970s. Public interest in global and domestic food security grew rapidly following the world oil crisis and related food crisis of 1972-74. With the African famine of 1984-85, the increase in numbers of people looking for food assistance in developed nations, as reported by churches, community centers, soup kitchens, and the growing numbers of food banks in the USA and Canada; the literature on food security grew rapidly. Over time a large number of different definitions have been proposed. There are approximately 200 definitions and 450 indicators of food security (Hoddinott, 1999). Maxwell and Frankenberger's (1992) report lists 194 different studies on the concept and definition of food security and 172 studies on

indicators.²

USAID defines food security as “*when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.*” This definition is focused on the ability to acquire food not only through monetary means but physically. Alternatively, other definitions of food security include:

1. Food security is defined as access by all people at all times to enough food for an active, healthy life and includes at a minimum: a) The ready availability of nutritionally adequate and safe foods, and b) the assured ability to acquire acceptable food in socially acceptable ways (e.g. without having to resort to emergency food supplies, scavenging, stealing, and other coping strategies).
2. Food security means that food is available at all times; that all persons have means of access to it; that it is nutritionally adequate in terms of quantity, quality and variety; and that it is acceptable within the given culture. Only when all these conditions are in place can a population be considered food secure.
3. All people at all times have physical and economic access to sufficient, safe and nutritious foods to meet their dietary needs and food preferences for an active healthy life.

Alternatively, *food insecurity* is often used at the household or individual levels, with a focus on its manifestations within households and individual experiences of hunger and other forms of dietary compromise. Researchers who discuss the potential health

² Definitions of Food Security:

http://www.toronto.ca/health/children/pdf/fsbp_ch_1.pdf

consequences of food insecurity for a given population generally confine their conceptualization of the term to manifestations of quantity (insufficient food) and a narrower view of quality (having to rely on only a few low-cost foods, unbalanced diet).

The USAID definition for food security includes three dimensions:

1. *Food availability* is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, commercial imports, or food assistance.
2. *Food access* is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income amongst households, and on the price of food.
3. *Food utilization* is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends to a large extent on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper child care, and illness management. (Frank Riley n.d.)

Given the complexity of the term *food security*, which has many dimensions and can vary considerably in different contexts, other indicators may be used for the analysis at the country level which includes: Availability, Self Sufficiency and Import Dependency to effectively capture the multiple dimensions to the assessment problem. These are defined as:

1. The concept of *availability* of food looks at access to food in a country and may be further disaggregated on a per capita basis which allows comparison with availability in other countries. The per capita availability is calculated as the quantity of a commodity or product available for use in a country divided by the population.
2. *Self Sufficiency* may be defined as: a) A state in which someone or something can self-sustain oneself without using outside resources, b) The state where a country produces an ample supply of a commodity or product to meet the basic nutrient needs of its population and, c) The ratio of production to consumption. A value closer to 1 indicates a higher level of self sufficiency and a better food security situation.
3. *Import Dependency* is considered as the opposite of self sufficiency, that is, the quantity of a commodity supplied from sources external to the domestic market that is necessary to meet the needs of the population. It is found by the ratio of import volume to consumption and is also used as an indicator of food security. The smaller the value shows that a nation is less dependent on imports and therefore has a higher level of food security. The relationship between self sufficiency and import dependency can be seen as a scale, such that the greater the value of one indicator, the smaller the value of the other. This is further strengthened by the fact that the sum of the indicators' value equates to 1.

2.2 Criticisms of the Indicators

While these indicators can assist in the assessment of a country's food security situation, there are also deficiencies in its

utilization. For example:

1. *Availability*: this parameter does not take into consideration utilization, actual consumer consumption by household consumers as well as trade or export.
2. *Self Sufficiency*: this is considered as a good indicator of a country production to consumption ratio over various time periods. However, where a country imports to satisfy shortfall in domestic production, the indicator does not indicate the constraints that may be involved in accessing the foods.
3. *Import Dependency*: an indicator of a country's level of imports compared to that of consumption, but it fails to consider the risks involved in importing goods.

Thus, these indicators possess a narrow consideration of the quantity of imports and domestic production, while failing to fully incorporate the ability or difficulty encountered or may be experienced in accessing the commodities. If accepted without taking their inherent deficiencies into full consideration, they may result in inaccurate policy decisions. For ease of understanding, Country A is 75% while country B is 25% import dependant, but country A source for imports is a border country which can be accessed via motor vehicle, while country B source is half way around the world making air freight or ocean freight necessary. Using this knowledge, country B has a higher food security level than country A, but this is where the problem exists.

If there is any factor that disturbs trade, for example acts of war or hurricane, country B's imports will be delayed or may be stopped, which will place its population with a 25% deficit in food supply. On the other hand, since country A imports can be transported

via motor vehicle, this will increase its access if airplanes experience difficulty operating; close proximity provides a reduction in time lag from farm to fork. With these variables (time and distance), Country A will now have a higher level of food security since its food supply is less vulnerable to disturbances in trade.

3.0 Towards the Development of a Vulnerability Index

A nation's food security is not solely affected by their inability to purchase food or their levels of importation but by the possible barriers in attaining such food in which there is a great divide that will make them vulnerable. Some of these barriers include adverse weather conditions, natural disasters, political upheaval, war and any other barriers which may slow or stop air and sea shipments. Such as increasing costs of fuel due to its availability and disease outbreaks transferable by humans and animals. Therefore for this study, the increase or decrease in vulnerability needs to be assessed.

In relation to hazards and disasters, vulnerability is a concept that links the relationship that people have with their environment to social forces and institutions and the cultural values that sustain and contest them. "The concept of vulnerability expresses the multidimensionality of disasters by focusing attention on the *totality* of relationships in a given social situation which constitute a condition that, in combination with environmental forces, produces a disaster." (Bankoff *et al.* 2004: 11).

4.0 Methodology

4.1 Model Used in the Analysis

This study used the concept of the composition of a typical plate of food and the

access of the composition therein. This definition is argued to be deficient given the amount of other factors that can impact on a country's food supply. Thus, to develop the concept of vulnerability further, it is proposed that the variable of "distance" (and the possibilities of disturbances in trade therein) of imports and the composition of these imports in a nation's product utilization be considered, the following formula is proposed.

$$C_R = \frac{[(P_D) * D_D] - \sum (I * D_{Cor})}{POP_D}$$

Where:

C_R = Consumption Risk

P_D = Domestic Production

D_D = Domestic Distance

I = Imports

D_{Cor} = Distance from the country of origin

POP_D = Domestic Population

This formula uses distance as a scalar to increase the inability in attaining the products which shows the risk due to food miles that is the distance food travels from farm to the plate (Hill, 2008). The difference of what is produced domestically and utilized for consumption (production less exports) and that which is imported multiplied by their distance scalars is found. It is necessary to sum the imported distance to accommodate for multiple import sources. This value is then divided by a country's population to find the risk in consumption per person.

Notes:

1. C_r denotes the risk food is exposed to due to distance traveled, per person. Negative values denote more food is being sourced internationally hence increasing risk for consumption, while a positive value implies food sourced domestically which provides no food security risk.
2. A negative value for consumption risk

equates to vulnerability, while positive shows invulnerability. A greater value decreases the risks, and vice versa.

3. D_D will be equal to 1, while D_{Cor} will be equated to the distance away from the home country to the foreign countries and was measured in miles using Google Earth 4.0
4. Production, imports and exports are measured in kilograms.

4.2 Data Collection

To assess the effect of the WTO on the vulnerability of beef in Jamaica, data was collected for two periods, 1991-1993 and 1996-2007. This was done to identify any trends pre- and post- WTO timeline given to developing countries to open their markets to foreign competition and make a comparison to a developed country (USA).

The data for the analyses were collected from online databases, which provided Production, Imports, Export data and also Population statistics for Jamaica's Beef industry. The HS Codes 0201 (meat of bovine animals fresh or chilled), 0202 (meat of bovine animals frozen) and 0206 (edible offal of bovine) were used and aggregated which provided the totals for imports and exports. (Table A1)

4.3 Distance of Exporting Countries

Exporting partners were selected from the United Nations commodity trade (UNcomtrade) database and distances were found using the Ruler tool on Google Earth 4.0. Two points were selected that would provide the shortest distance between the countries. For Jamaica, imports from Australia and New Zealand would be considered the most vulnerable, whilst Panama, and the Netherland Antilles would be the least vulnerable to trade disturbances due to distance.

5.0 Results

5.1 Supply Composition of Beef in Jamaica (1991 – 2007)

The Jamaican beef market in 1991 was solely supplied by domestic production showing a market share of 76 % giving less than 24 % to international competition. After 16 years the Jamaican beef market has opened itself to international competition, where domestic production supplies less than 50 % of the demand while the international competitors dominate that market. USA has the greatest market share of 17% which is almost half of domestic production. The next two major exporters to this market are approximately more than 10,000 miles away and control 14 % each. Costa Rica, Panama and Canada control less than 10% each but summed 15% of beef consumed domestically. These results strengthen the need to focus on securing Jamaica's beef supply.

5.2 Food Security Indicators

5.2.1 Jamaica Food Security Indicators

The Pre-WTO agreement (1991-1993) per capita availability experienced a decrease throughout the period starting at 8.1 kg in 1991 and 5.1 kg at the end of the considered time series. During the period, fluctuations where experienced with a high of 10.4 kg/person in 1992 and 7.3 kg/person (2005). Smaller fluctuations where observed in 1995, 2000 and 2002, valued at 9.4, 8.2, and 7.3 kg/per respectively. Increases were noted in per capita availability however, after a gestation period of over a decade the Jamaican consumers are now worse off. (Figure 5.0).

Self sufficiency averaged 72% over the 1991-2004 period but declined thereafter 53% in 2005, 42% in 2006 and 40% in 2007 and commensurately, import dependency averaged 28% until 2005 when it increased to

47% in 2005, 58% in 2006 and 60% in 2007 (Figure 7). We can therefore conclude that Post-WTO Self Sufficiency reduced from almost 80% to 40% in Jamaica's Beef industry.

Jamaica's beef industry weakened and became more vulnerable leading to the WTO agreement, moving from a value of -2678 in 1991 to -5736 in 1993. After this, some improvements were seen up to 2007, but overall the industry's vulnerability increased ending at -11970.

6.0 Conclusion and Recommendations

Jamaica's beef food security analyzed per capita showed to be increasing over time, signifying more beef on each plate, but import dependency to self sufficiency showed that increase was the result of imports and not production. This increase in imports allowed the entrance of risk of unavailability due to possible disturbances in trade.

The *Vulnerability Index* developed an analytical picture of the level of risk that beef consumption is exposed to over time. The results showed greater risk post-WTO, which was a consequence of imports increasing from countries with greater geographical distances, such as, New Zealand (75% of imports, 2005). The *Vulnerability Index* therefore questions the accuracy of Per Capita Availability as a food security index and validates the effect import dependency has on Jamaica, which increases with distance of food source.

In conclusion, the WTO agreement has negatively affected Jamaica's beef industry and therefore its food security. With the EPA, the cost of imports from Europe will decrease therefore providing greater competition to domestic production and, hence increasing import dependency. Vulnerability might decrease if import volume remains constant since Europe's proximity is lower than Australia, but observing world production of beef is very improbable. Therefore imports

will increase, exposing beef to time delays due to adverse weather and disease, such as the Mad Cow disease, which will eventually negatively affect supply.

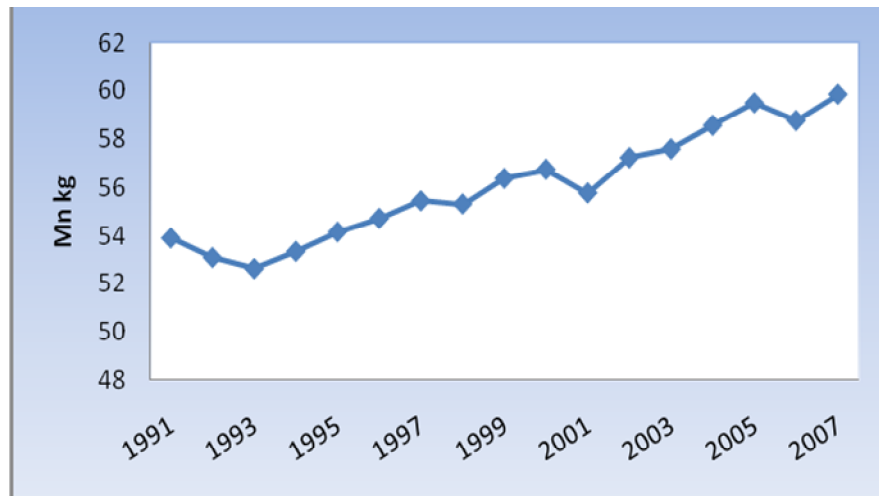
As a result, this segment of research is a work in progress. The completion of the study is necessary to develop a concrete picture for policy makers, which will guide them in securing the present therefore saving the future. *This study can be applied to other sources of protein along with fruits and vegetables, to indentify the composition of suppliers (domestic and international) of a plate of food satisfying the basic nutritional requirement and therefore providing the an efficient measure of the Caribbean's food security*

7.0 References

- Riely, F., Mock, N., Cogill, B., Bailey, L. and Kenefick, E. 1999. *Food Security Indicators and Framework for Use in the Monitoring and Evaluation of Food Aid Programs*. http://www.toronto.ca/health/children/pdf/fs_bp_ch_1.pdf. (accessed June 22, 2009).
- Food and Agriculture Organization, *Food Security*. 1996. Summit, Rome <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>. (accessed June 22, 2009).
- Food and Agriculture Organization Statistics. <http://www.faostat.com> (accessed May 16, 2009)
- United Nation Commodity Trade database. <http://unstats.un.org/unsd/default.htm> (accessed May 16, 2009)
- WDI, Database. <http://go.worldbank.org/6HAYAHG8H0> (accessed May 16, 2009)

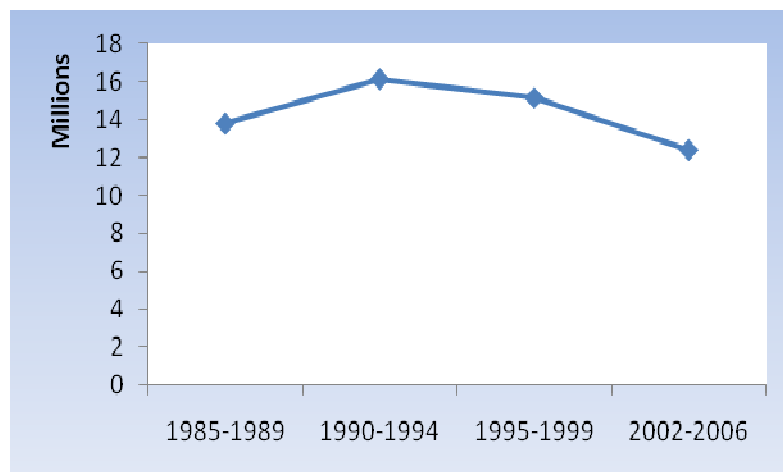
Table 1: Distance of Exporting Countries to Jamaica

Exporters	Km
Australia	14747
Austria	8604
Belgium	7847
Brazil	4469
Canada	2962
Chile	5378
Costa Rica	1098
Czech Rep.	8739
Denmark	8019
Finland	8607
Germany	8214
India	14449
Neth. Antilles	937
Netherlands	7884
New Zealand	12467
Panama	982
Poland	8799
Switzerland	8146
United Kingdom	7203
USA	1096



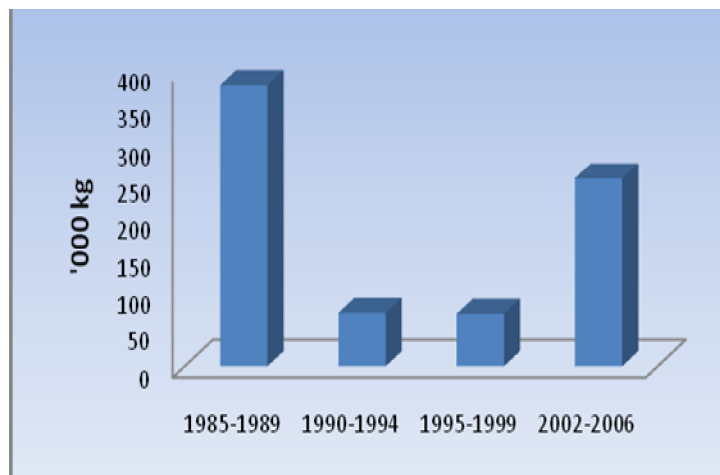
Source: FAOSTAT Database

Figure 1: World Beef Production (1991 – 2007)



Source: FAOSTAT Database

Figure 1.1: Beef Production in Jamaica (1985 – 1999 & 2002 – 2006)



Source: FAOSTAT Database

Figure 1.2: Jamaica Beef Imports

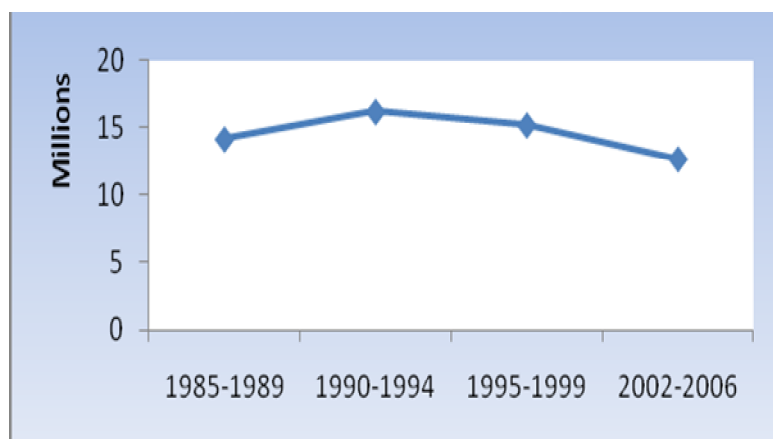


Figure 1.3: Beef Consumption in Jamaica (1985- 1999 & 2002 – 2006)

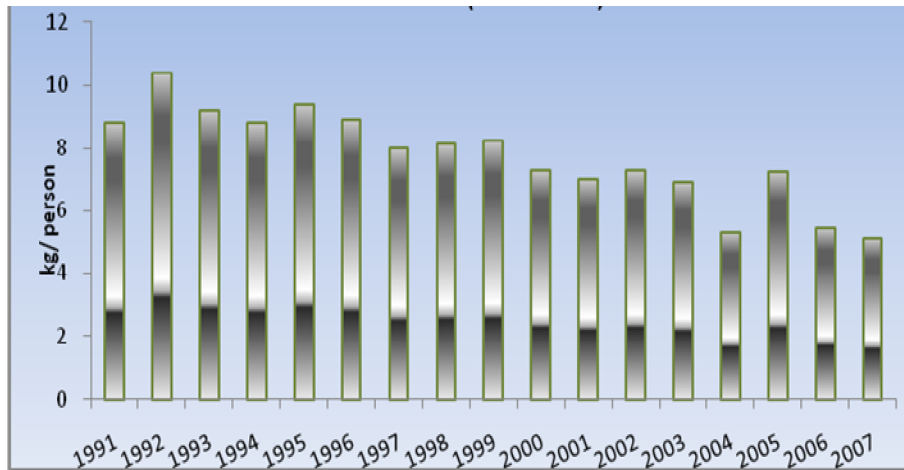


Figure 5.0: Per Capita Availability of Jamaica Beef (1991 – 2007)

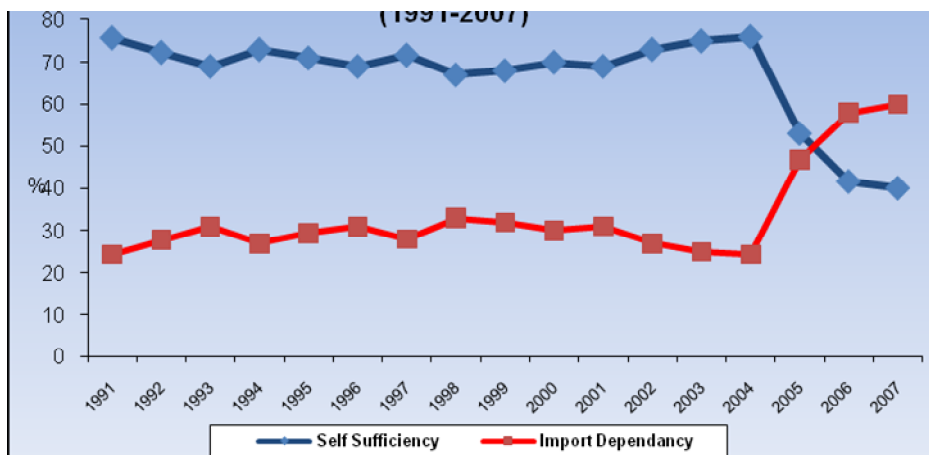


Figure 5.1: Jamaica Beef Self Sufficiency and Import Dependency (1991 – 2007)

Table A1 continued...

Jamaica Beef		Mkt holders									
Vulnerability	Mkt holders and Mkt %										
-5.8											
0											
-4											
-7.8											
-3.289											
-4.822											
-3.369											
-3.356											
-4.632											
-3.644											
-5.194											
-9.992											
-3.5097											
-2.3377											
-2.1325											

Jamaica Beef	Respective Imports times Distance				1991
155328255.6	0	0	0	0	1991
18447552.43	0	0	0	0	1992
26433283.42	0	0	0	0	1993
212087478.4	0	0	0	0	1996
8350080522	0	0	0	340257605.1	1997
1.23E+10	0	0	0	0	1998
8.69E+09	0	0	0	0	1999
8.7E+09	0	0	0	0	2000
1.21E+10	0	0	0	1.67E+08	2001
9.55E+09	0	0	2.34E+08	7.45E+08	2002
1.37E+10	0	0	6.59E+08	6.61E+08	2003
26370101911	0	0	102688674.6	316706497.6	2004
93031641574	0	0	0	520012522.2	2005
6.226E+10	844931892	592872963	825151947	1.711E+10	2006
57067185441	0	563169779.7	574492658.2	1.417270774	2007

Source: FAOSTAT, UNCOMTRADE, WORLD BANK, and compiled by author