A PERSPECTIVE ON THE MARKET POTENTIAL OF THE JAMAICA HOPE

P.G A. Jennings
Jamaica Dairy Development Board

ABSTRACT

The paper examines the medium- to long-term prospects of the Jamaica Hope Breed of Dairy Cattle from the perspective of the virtual 'Livestock Revolution' evidenced in the phenomenal growth in demand for milk and meat among developing countries.

The view is posited that the rapid escalation in the international price of milk solids of the past three to four years will continue into the medium term and will make imported substitutes for locally produced fresh milk increasingly unaffordable. The confluence of the anticipated increase in local demand, continuing growth in demand for dairy products internationally, and the curtailment of live animal exports from North America due to the incidence of BSE, is projected to create a medium-term demand for approximately 600 bred heifers per year, locally, while at the international level it is estimated that Jamaica Hope Breeders could feasibly supply up to 5000 embryos from the existing female population, in a market for tropical dairy cattle genetics estimated at approximately 30,000 embryos. Major target markets are South East Asia and Latin America, the former accounting for 76 percent of estimated demand.

It is suggested that for Jamaica Hope Breeders to exploit these unfolding opportunities will require a realignment of the historical relationship between the Public and Private sectors in respect of Jamaica Hope breeding. Suggestions are proffered with respect to an appropriate framework for Public Policy as well as strategic initiatives by private breeders of Jamaica Hope cattle.

INTRODUCTION

It is conservatively estimated that, at current rates of exchange, Jamaica Hope breeders have, over the past decade, foregone the opportunity to earn approximately J$1.0 billion from the export and local sales of cattle genetics. This has occurred in the midst of a phenomenon aptly dubbed "The Livestock Revolution" (FAO, 2002; Delgado *et al*. 1999 & 2001) and has resulted from the uncertainty and tentativeness regarding the future of the cattle industry in Jamaica.

This *Livestock Revolution*, evident since the early 1970's, has been led by developing countries whose aggregate consumption of meat and milk to 1995, grew respectively, from 36 to 53 and 34 to 44 percent of world consumption; driven primarily by changing consumption patterns in China and South East Asia.

With specific reference to Jamaica, while *per capita* consumption of dairy products since 1992 has remained essentially constant and has increased with respect to beef, there have been significant declines in the local production of milk and beef. The corresponding decimation in the populations of purebred Jamaican cattle breeds is considered by many a threat to the continued viability of these breeds, which historically have provided the platform for industry development.

This paper seeks to assess the future prospects of the Jamaica Hope Breed of Dairy Cattle within a local and global perspective and within a purely business framework. It also attempts to stimulate discussion regarding appropriate Public Policy specific to the sustainable medium- to long-term development of the Jamaican cattle sector.

2.0 THE JAMAICA HOPE – A SITUATIONAL ANALYSIS

The Jamaica Hope Cattle Breeders Society marked its 50th anniversary in 2002. Unlike the three (3) native beef breeds, the initial development of the Jamaica Hope was almost exclusively an initiative of the Jamaican Government. McCorkle (1983) records that in 1952 the registered breed

comprising 136 males and 212 females was owned entirely by the Government of Jamaica (GoJ) and kept mainly at the Bodles Agricultural Research Station. Over the 50 years of the Breed's existence, the Ministry of Agriculture has remained the principal driver of breed development, retaining at *Bodles,* the concept of a Central Test Station for the provision of Herd Sires and accounting over the years, for more than 90 percent of the breed's herd sires. A system of line breeding has been retained, ostensibly as a means of minimizing inbreeding depression.

There remains an urgent need for greater direct farmer participation in the genetic progress of the breed. In one of the few recorded studies on the level of inbreeding within the Jamaica Hope, McCorkle (1983), from 2214 records of animals born between 1948 and 1975, calculated a mean coefficient of inbreeding of 3.20 percent, declining by 0.08 percent per generation over seven generations. Average inbreeding coefficients for females and males were 3.05 and 3.48 respectively. It is worth noting that bulls of farmer-herd backgrounds used in the Bodles herd had a mean coefficient of inbreeding of 2.76 and their daughters, 2.25 percent.

The effectiveness of the operation of Bodles as a Central Test Station or Elite Nucleus Herd has been constrained by the structural adjustment of the Jamaican economy, adopted as macro-economic strategy since 1977. This has seen the retreat of the state from the commanding heights of the economy. While successive administrations have accepted that Agricultural Research in Jamaica remains an inescapable public good, there has been a distinct ambivalence with respect to cattle, and in particular the continued role of the state in the future of the four (4) cattle breeds in whose creation it was the prime mover.

As a consequence, the supporting structures required for sustained breed development and evolution have either been abandoned or rendered ineffective by inadequate - or at best, inconsistent - resource provision. The absence of a **National Progeny Testing Programme** with its associated **Milk**

Recording, Artificial Insemination (AI), Genetic Evaluation and other requisite **Animal Improvement Services** has resulted in the majority of herd sires made available through the AI service being unproven and thus having had a negative influence on the genetic merit of the breed (Schneeberger *et al*., 1980; Douglas 1989).

Given this situation, the Breed and Breed Society members have been unable to capitalize on what would otherwise have been substantial opportunities for export of cattle genetics driven by the *Livestock Revolution*. At the domestic level, the stagnation in the genetic improvement of the breed would have inhibited the attainment of sustained competitive advantage by the local dairy sector in a market-driven economy, and consequently the demand for Jamaica Hope genetics.

Private farmers have been reluctant, therefore, to take ownership of the breed as would normally be dictated by breed evolution, because they have perceived little commercial benefit within a market open to milk solids, highly subsidised at origin. This has contributed in large measure to the downturn of the local dairy industry and has dampened optimism regarding the future of the breed.

2.1 Comparative Attributes of the Jamaica Hope

A recent demographic survey of Jamaican dairy farms indicated that animals of Jamaica Hope breeding accounted for 85 percent of the national dairy herd of 18,511 head (Jennings *et al*., 2004). With respect to breeding females, the population of purebred Jamaica Hope, grades and Jamaica Hope types, approximated 9,700 cows and mature heifers. Information from the breed registry at Bodles suggests that the current population of registered Jamaica Hope females is of the order of 2,800 – 3,200 (J.A. Holness, Pers. Com.). This compares with approximately 6,000 registered females during the decade after breed formation (Mahadevan, 1966). This has posed concern regarding the viability of the breed.

While providing no comfort, the documented current purebred populations of Australian Milking Zebu (AMZ), and Australian Friesian Sahiwal (AFS) cattle in Australia (breeds similarly derived from *Bos indicus* x *Bos taurus* crossing), are 170 and 552 respectively (Chambers, F., 2004) The export penetration of the AFS, notwithstanding its relatively small numbers in Australia, is evidenced in the fact that Mexico, a close neighbour to Jamaica, has the largest sub-population of AFS cattle estimated at 1,000 purebreds and 7,000 grades (Chambers, F. *op cit*.)

This clearly points to ineffectiveness in the traditional reactive marketing of Jamaica Hope genetics.

With respect to milk production and other commercially important traits, a comparison is given in Table 1 of the Jamaica Hope, Australia Milking Zebu (AMZ) and Australian Friesian Sahiwal (AFS) Breeds.

Table 1. Productive Traits of the Jamaica Hope (JH) ; Australian Milking Zebu (AMZ) and Australian Friesian Sahiwal (AFS) Cattle

	JH [1]	**AMZ** [2]	**AFS** [2]
Registered popn. (2004)	2800	<200	1300
Mature 305-day yield (L)	3218	2700	3000
1st Lactation	3088	N/A	N/A
Calving Interval (days)	439	N/A	N/A
Age at 1st calving (mth)	34.2	N/A	N/A
Butterfat %	4.88	3.5-4.0	4.0
Milk Protein (%)	N/A	3.4	3.4

1. Wellington & Mahadevan, 1977
2. Australian Meat & Livestock Corporation, 1989 (3rd Ed.)

It is evident that the Jamaica Hope continues to hold advantages in population of registered animals and milk yield and composition over the other two composite breeds developed contemporaneously in sub-tropical Australia, but which have had much greater impact on the international market for tropical cattle genetics, than the Jamaica Hope. These minor breeds have effectively applied multiplication techniques such as **Multiple**

Ovulation and Embryo Transfer (MOET) a competence which we in Jamaica have been tardy in acquiring, even 30 years after this technique was successfully commercialised.

3.0 PROSPECTS FOR THE DOMESTIC AND INTERNATIONAL MARKETS FOR DAIRY CATTLE GENETICS

3.1 The Domestic Market

The impact of the whole-scale adoption, since 1992, of an open, market-driven economy on the dairy cattle sub-sector, has been extensively assessed (Jennings, 2005, 2006; Jennings *et al.* 2004 & Kirton & Witter, 2006). These analyses clearly identified the adverse effects of trade liberalization on local milk production and industry structure as summarised in Table 2.

Table 2. Impact of trade liberalization on the dairy sub-sector

	1990[1]	**2004**[2]	**% Change**
Milk Production (L. 10^6)	31.25	15.4	-50.7
Dairy Herd Size	22325	18511	-17.1
No. Dairy Farmers	753	254	-66.3
(Small Farmers)	613	185	-69.8
No. Cows	11,780	10063	-14.5
Area in Dairying (ha)	10940[3]	7375	-32.6
Imputed - Breeding Herd size	13748	11440	-16.8
- Litres/cow/yr	2653	1530	-42.3
- Litres/ha/yr	2856	2088	-26.9

1. *Data Bank and Evaluation Div., Min. Agric., 1990*
2. *Jennings et al. (2004)*
3. *Jennings & Wellington (1992)*

The data in Table 2 attest to the significant, adverse socio-economic impact of trade liberalization on the local dairy sector. Significantly, they also point to the substantial decline in productivity and high levels of slack resources as farmers have sought to reduce input costs to stay afloat.

On the basis of the productivity levels of 1990, and assuming no loss of genetic merit, the dairy sector has the potential to produce beyond 25 million litres of milk annually from current animal and land resources.

The escalation in international prices of milk solids over the past four years indicates the increasing unaffordability of these products. At current international prices (FOB), whole-milk powder retails locally at J$38 – $42 per 80g sachet, equivalent to a reconstituted cost to the householder, of approximately $60.00 per litre, compared with a retail price for fresh milk of $78-80 per litre.

The recent trends in milk powder prices (Fig.1), suggest that within the next 3-4 years milk powder will trade at US$3200 per metric ton (FOB), at which price, given current trade margins, the reconstituted price of milk powder would have surpassed the current price of fresh milk.

Fig. 1 Historical International Prices for SMP & Cheese (FOB EU-$US/t)

As a result, locally produced milk, purely as a commodity, is fast approaching international competitiveness. This ignores the vast opportunities which currently exist, to competitively diversify into high-value dairy products.

To capitalise on the likely demand surge, Jamaican farmers will need to significantly increase output of milk, through a combination of increased productivity and increased herd numbers. To sustain a modest annual increase of five percent in the number of lactating cows over the next five years, will annually require approximately 600 heifers above requirement for replacements. At current prices this translates to a potential additional income of J$30 million per year. This, assuming that farmers regain their productivity levels, pre-liberalisation, also translates to an annual output of approximately 38 million litres after five years, a near-trebling of the 2005 level and an additional gross earning, at current prices, of J$587.5 million at farm-gate.

It appears incontrovertible that Jamaica Hope breeders are poised for resurgence in local demand for cattle genetics. Given the negative impact of the sporadic incidence of BSE on the export of US and Canadian cattle genetics (Table 3), there is an urgent need to adopt appropriate business models to ensure the sustained capacity of the breed to capitalise on these opportunities for rebuilding the local dairy industry.

Table 3. Live Cattle Exports from selected countries ('000 head)

	2001	**2002**	**2003**	**2004**	**2005**
Mexico	1142	948	1240	1375	1260
Canada	1310	1690	507	0	562
Australia	822	972	774	638	580
European Union	358	509	475	435	325
Brazil	0	1	3	16	113
New Zealand	11	11	18	69	50
United States	449	244	99	16	21
World	**4681**	**5042**	**3573**	**2940**	**3199**

Source: USDA-FAS (2006)

3.2 Aspects of The International Market For Dairy Cattle Genetics

Black and White cattle have overwhelmingly dominated the international trade in dairy cattle genetics. Moran (2005) reported that during the 20-year period ending 1995; more than 5 million Friesians were exchanged in international trade. Half of the Friesian cattle exported from temperate countries have been to the tropics.

In fact, tropical or tropicalized cattle have accounted for a very minor proportion of world trade in cattle genetics. Australian export of AFS cattle have accounted for a significant share of this trade. Also, New Zealand has been successfully marketing *Taurindicus* (cross-bred cattle) to South East Asia and has reported over 2,000 such animals as having been exported mainly to Indonesia and Thailand (Campbell, 2006).

Export of Jamaica Hope genetics, contrastingly, has virtually ceased over the past decade as breeders have failed to build on the strong interest in the breed shown by regional Latin American and Caribbean (LAC) neighbours during the decades of the 1960's – 1970's.

3.3 Outlook on the International Trade in Dairy Products

World production of milk has been projected to increase to 665 million tonnes by 2010, a 15 percent growth over the period 1998 – 2000 (FAO – Inter Governmental Group on Meat and Dairy Products 2002). The largest increment of growth is expected from developing countries where the output of milk is projected to rise by 71 million tonnes to reach 293 million tonnes. Among the developing countries, Asia and India (+27 million tonnes) and LAC region (+19 million tonnes) are forecast to account for the largest incremental growth.

Contrastingly among the developed countries, milk production is projected to increase sluggishly by 20 million tonnes by 2010.

In terms of consumption, strongest growth in demand is similarly expected from developing countries where a demand growth of 2.5 percent per year to 2010 is projected.

Strongest demand is projected from Asia – 52 percent of world demand - and 18 percent within the LAC region (Brazil and Mexico). In fact, the Asian countries have demonstrated significant restructuring of their dairy industries toward greater self-sufficiency over the past 30 years as shown in Table 4.

Table 4. Growth in dairy populations and milk production for selected countries – 1970 – 2004

Country	Index	Year			
		1970	1985	2004	Change/yr (%)
Indonesia	Popn' 000 (P)	59	208	368	6.2
	Milk (L. 10^6) (M)	29	191	580	9.7
India	P	18575	27700	38800	2.1
	M	8736	17500	37800	4.5
Malaysia	P	32	37	83	3.4
	M	17	19	37	2.4
Thailand	P	3	26	240	15.8
	M	3	57	825	16.8
Vietnam	P	14	42	61	4.5
	M	17	34	78	5.4
China	P	511	1680	6873	8.4
	M	0.7	2589	18850	10.2
Australia	P	2673	1809	2052	-0.6
	M	7756	6225	10377	1.4
N. Zealand	P	2320	2540	3841	1.7
	M	5986	7884	14780	2.6
UK	P	3304	3313	2200	-1.4
	M	12971	16022	14600	0.2
US	P	12000	10981	9084	-0.8
	M	53073	64930	77565	1.2

Source: Moran, J. (2005)

Imports of temperate stock have driven the rapid expansion of the dairy industries of Indonesia, Thailand, Vietnam and Malaysia. Given the high wastage rates and reduced fertility of these cattle in tropical environments, endogenous population growth rates are not expected to exceed five (5) percent per year. Thus, in order to sustain the levels of growth shown in

Table 4, these three (3) countries of South East Asia will cumulatively, need to import approximately 23,000 head per year.
With respect to Latin America and the Caribbean, in order to sustain annual increases in milk output of approximately 2 percent per year, substantial net imports of cattle will be required to achieve the required 1.8% annual growth in the dairy population.

The population of milk producing animals in the tropical LAC was estimated at approximately 35 million (FAO 2002). Assuming that 75 - 80 percent of these are dual-purpose producers, the population of specialized breeding females is calculated at between 3.5 - 4.5 million. On this basis, it is projected that tropical LAC will require 7,000-9,000 imported breeding females per year to sustain the projected growth in output.

Taken together, the estimated import requirements for South East Asia and LAC, (30,000 females) represent an export market, on the basis solely of embryos, of approximately US$6 million. Assuming a potential donor population from current registered females, of 500 dams, Jamaica Hope breeders could earn, potentially, an incremental US$1 million (J$66 million) *per annum* from the sale of embryos, which represents a considerable opportunity for private entrepreneurship for which the Breed Society is best positioned.

McDowell (1994) reported that, during the decade of the 1990's, the USA exported approximately 60,000 pregnant heifers annually as well as being the major supplier of frozen embryos. This author (McDowell, *op cit* & 1995) also estimated that in the tropics, imported Holstein cattle performed at levels of 35 - 50 percent below potential. Assuming a genetic potential of 7,500 litres per lactation from Holsteins and 4500 from other Friesian cattle, it is indicated that realized lactation yields from *Black and White* cattle in the Tropics, are of the order of 2,925 – 3750 litres.

The Jamaica Hope therefore, has a distinct comparative advantage in many areas of the Tropics, particularly in the small-holder dairy systems of the South-East Asian countries.

A query at the beginning of the 1990's, regarding the availability of approximately 2,000 Jamaica Hope heifers for export to Thailand (J. Scoffield, Pers. Comm.) remains unanswered. This number was needed to fill the shortfall in orders of AFS cattle from Australia. Therefore, there seems to be a need for a strategic alliance with AFS breeders to gain an entrée into this market, an alliance first mooted in respect of the AMZ, by Wellington *and Mahadevan.* 1977.

4.0 THE ROLE OF PUBLIC POLICY IN STIMULATING THE SUSTAINABLE REDEVELOPMENT OF THE JAMAICA HOPE

Recent concerns raised regarding the viability and survivability of the Jamaica Hope, have elicited a range of suggestions including the declaration of the breed as "endangered". **From a strictly commercial perspective, the survival of a breed is purely a function of the demand for the specific attributes of the breed compared to others**. The breeder influences this demand by the positive demonstration of the continuous improvement on these attributes through the application of generally acceptable methods of genetic evaluation, selection and multiplication.

The development of the Jamaica Hope over the past half-century has lacked the commercial ethos necessary to drive the sustained investment in cutting edge technology, required to successfully compete with the leading dairy cattle breeds.

The clear opportunities presented by the current unsatisfied demand internationally, as well as the anticipated turnaround of the local trade, requires a reorientation with respect to the historical management of the breed. Given a historical situation in which there can be no guarantees of consistent public resource allocation to breed development, it becomes incumbent on Breed Society members, who stand to gain the most, to take responsibility for managing the development of the breed; the state creating a supportive policy environment as well as providing technical support through R & D and ensuring the availability of technical competence through HRD.

The principal elements of such a supportive policy environment are suggested as:

- A clear, unequivocal and overarching policy framework that seeks to balance international competitiveness with national food security and livelihood protection for Jamaican farmers.
- Recognition of the cattle sector as strategic to the goals of food security a livelihood protection and rural development.
- A clear commitment to improvement of the factor endowments critical to the dairy and wider cattle sector through sustained investment in research and required technological competencies.
- Adoption of supportive fiscal support measures such as venture capital financing, investment in incubator projects and joint venture investments with purebred cattle breeders.
- Commitment to assisting in the reorganization of the cattle sector through support to farmer organizations and other relevant civic groups.
- Commitment to market facilitation through information gathering and market research.
- Commitment to the phased increase in the use of locally produced milk in a rationalized National School Feeding Programme.
- Rationalization of the receipt of gifts of powdered milk to minimise any adverse effects on the local dairy sector.

5. STRATEGIC INITIATIVES REQUIRED BY JAMAICA HOPE BREEDERS

The Beef and Dairy Producers Association of Jamaica **(BADPAJ),** has submitted to the Jamaican Government, a Redevelopment Plan for the cattle sector. This provided the basis for a Cabinet Submission seeking financial assistance for its implementation. The initiatives listed hereunder are drawn from this Plan and are considered critical to the revitalization of the Jamaica Hope Breed.

- A commitment to taking the lead role, in joint venture with GOJ, in guiding the future development of the breed for maximum economic benefit to all stakeholders.
- Adoption of a business model appropriate to the sustainable exploitation of the commercial potential typical of pure-breeding of dairy cattle by farmer-groups.
- Initiate dialogue with the GOJ in respect of the rehabilitation of the animal genetic improvement infrastructure, including the Embryo Collection and Freezing facility at Minard Estate, through a joint venture arrangement that integrates the Breed Society into the direction and management of the national breeding programme.
- Immediately enlist the participation of all breeders of purebred cattle, through contract, in the implementation of a broadly-based National Progeny Testing Programme.
- Investigate the feasibility of outsourcing the management and provision of critical services such as milk recording, artificial insemination, embryo transfer and export marketing.

REFERENCES

Australian Meat and Livestock Corporation 1989 *Handbook of Australian Livestock.* 3rd Edition.

Campbell, Natalie 2006 *Company Finds Niche in Tropical Cattle. Country-Wide Publications Ltd.* www.countrywide.co.nz

Chambers, Fiona 2004 *Status of Rare Breeds of Domestic Farm Livestock in Australia 2004.* Official Publication of Rare Breeds Trust of Australia.

Data Bank and Evaluation Division 1990 *Livestock Census 1990.* Ministry of Agriculture, Jamaica, May 1990.

Delgado, C. L., Rosegrant, M.W. and Meyer, S. 2001 *Livestock to 2020: The Revolution Continues.* Paper presented at the International Trade Research Consortium, Jan. 18 – 19, 2001, Auckland, New Zealand. International Food Policy Research Institute, Washington, D.C. (IFPRI).

Delgado, C., Rosegrant, M.W., Steinfeld, H., Ehui, S. and Courbois, C. 1999 *Livestock to 2020: The Next Food Revolution.* 2020 Vision Initiative, Food Agriculture and the Environment, Discussion Paper 28. IFPRI.

Douglas, F. 1989 *Evaluation of Genetic Parameters of the Jamaica Hope.* MSc Thesis, Univ. Guelph, Canada.

Food and Agriculture Organization of the UN 2002 *The Livestock Revolution.* *www.fao.org/WAIRDOCS/LEAD*

FAO Inter-Governmental Group on Meat and Dairy Products 2002 *Medium Term Projections for Meat and Dairy products to 2010*. www.fao.org

Jennings, P.G. 2005 *Managing Dairy Cattle for International Competitiveness in Unfavourable Economic Environments: A Strategy for Developing Sustainable Competitive Advantage in Milk Production in Jamaica.* Review paper presented to Annual Conference 2005, Jamaican Society for Agricultural Sciences, Kingston, Jamaica, June 15 – 16, 2005. www.moa.gov.jm

Jennings, P.G.A. 2006 *Livestock Production in Unfavourable Economic Environments: Strategies for Attaining Sustained Competitive Advantage.* BookSurge Publishing LLC (Pub). www.amazon.com

Jennings, P.G., Miller, R.C., Ffrench, D.L. and Pryce, M. 2004 *Current Demographics of the Jamaican Dairy Farming Sector. Analysis of a 2004 Survey.* Report presented to JLA/JDDB Dairy Farmers' Seminar, JLA Ltd., Kingston, Jamaica, July 22, 2004. www.moa.gov.jm

Jennings, P.G. and Wellington, K.E. 1992 *Case Studies on the Dairy Situation in the Caribbean: The Jamaican Industry.* Paper presented at CARDI/CTA/IDF Seminar*: Dairy Development in the Caribbean Region*. Ocho Rios, Jamaica, Nov 30 – Dec. 03, 1992.

Kirton, C. and Witter, M. 2006 *Liberalization of the Jamaican Economy and the Impact of Import Surges on Dairy, Poultry and Onion Production.* Draft report of study conducted under the aegis of FAO Project: *The Extent and Impact of Import Surges in Developing Countries.* June 2006.

McCorkle, O.G. 1983 *A Study of Inbreeding in the Jamaica Hope Breed.* In: INVESTIGATIONS, Bull. 68, Min. Agric., Jamaica; 5-15.

McDowell, R.E. 1994 *Dairying with Improved Breeds in Warm Climates.* www.cals.ncsu.edu/an_sci/ann_rep94

McDowell, R.E. 1995 *Strategies for Dairy Cattle Breeding in the Tropics.* JAGRIST **7***: 5 – 13.*

Mahadevan, P. 1966 *Breeding for Milk Production in the Tropics.* CAB Pub.

Moran, J. 2005 *Tropical Dairy Farming. Feeding Management for Small Holder Dairy Farmers in the Humid Tropics.* Landlinks Press, Pub.

Schneeberger, C.P. 1980 *Factors Affecting the Performance of the Jamaica Hope Breed in Jamaica.* MS Thesis, Cornell U., USA.

USDA-FAS 2006 *Livestock and Poultry: World Markets and Trade, March 2006.* *www.usda.gov*

Wellington, K.E. and Mahadevan, P. 1977 *Development of the Jamaica Hope Breed of Dairy Cattle.* FAO Animal Production and Health Paper 1: Selected Articles from *The World Animal Review. www.fao.org*