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USING LOCALLY PRODUCED MILK TO PRODUCE FRESH YOGHURT AND COTTAGE CHEESE: THE POTENTIAL FOR THE LOCAL DAIRY INDUSTRY

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Abstract: Over 3 million liters of fresh cow’s milk and 1 million liters of fresh goat’s milk are produced in Trinidad and Tobago annually. Eighty percent of the cow’s milk is sold to the Swiss food and beverage giant Nestle at a subsidized price of 2.15 TTD/L. The state through the Ministry of Food Production contributes a further 1.50 TTD for every liter produced by registered dairy farmers. Goat’s milk is sold as pasteurized milk at 40 TTD/L from individual small-medium farmers. Acidified dairy products use milk processing techniques to convert fresh milk into healthy products with extended shelf life. Currently, several foreign brands of cottage cheese and yoghurt are found on supermarket shelves, with an average retail price of 80 TTD per 600g and 7 TTD/30 mL respectively. 5 L of fresh milk yields approximately 2.2 kg of cottage cheese or 3 L of yoghurt. Both products can be easily made and are in high demand because of their neutraceutical properties by dieters, immuno-compromised and lactose intolerant persons. The objective of this study is to evaluate the economic feasibility of utilizing fresh milk from dairy farmers to produce fresh yoghurt and cottage cheese for the domestic market. Trinidad and Tobago’s dairy industry has the potential for creating employment and ensuring food security by processing fresh milk into acidified dairy products to meet the local demand for these products.

Keywords: Dairy Industry, Acidified Dairy Products, Cottage Cheese, Yoghurt, Food Security.

Introduction

Food and Drug Regulations of T & T (1969). Milk is the normal lacteal secretion obtained from the mammary gland of the cow, genus Bos, and shall be free from colostrum, and shall contain: (a) not less than 3.0 percent of milk fat; (b) not less than 8.5 percent of milk solids not fat; (c) not more than 20 parts over million dirt (by dirt means all matter insoluble in, and foreign to milk as it leaves the cow’s udder). The milk of animals other than bovine species shall be give a designations appropriate to its source”

Milk is considered a whole food as it contains Water, Proteins, Carbohydrates, Minerals, Vitamins and Fats. However it may also contains Biological and Chemical contaminants. This makes it susceptible to spoilage and causes loss of income for dairy farmers. Within the dairy industry in Trinidad, there has been a rising interest in the area of value-added dairy processing however as the law only recognises milk as coming from cows the price is not regulated for milk from other animals this has its advantages and disadvantages. This report engages to show the opportunities and challenges of value-added processing. Our dairy industry is a regulated industry in the Food and Production Ministry (Livestock Division) as it requires a marketplace with considerable government oversight to guarantee orderly marketing, balancing the supply and demand, and to assure the quality and consistency of the product. This type of value added project will only succeed with a thorough understanding of the consumer, marketing channels, adequate equity
investment, legal foundation and a firm commitment by a team of individuals who are willing to work towards a common goal.

**How we are losing this fight.**

Domestic milk production was once linked to government food procurement programmes e.g. the National School Feeding Programmes (NSFP). 30,000 packets (250ml) of flavoured imported diary products are offered to the students per week however it is outsourced by Universal Food Ltd as subsidiary of Associated Brands Limited as Nestle was no longer awarded the contract. Pine Hill and the MOO line is found on our shelves, however a container of Nestle products was denied entry in to Barbados as it did not meet the country standards, this came about when a consultant was dispatched to TT, found, that some cows were being milked manually and this resulted in Nestle being shut out of Barbados market, a counter action due to issues of being shut out of our market due to its “non-compliant” labelling. Our market needs to be protected even in the face of free trade. In March 2013 The Ministry of Food Production purchased 60 heads of cattle (55 heifers - and 5 bulls) from United States to improve the genetics of the local dairy population. The beef cattle bull was Angus red, while the others were Holstein and Jersey. This was necessary because as of 2013 there were only 2500 dairy producing cattle in Trinidad and Tobago and local milk production fell from 52% of consumption to 27% between 2000 and 2010. Nestle entered into an agreement with the MOFP and established a partnership for long term development of a sustainable and profitable diary industry by 2015. This is in relation with the National Food Production Action Plan 2012-2015 to import 100 pregnant heifers per year. Since then we have imported more of animals and are due to be released from quarantine as of 27th May 2015 to farmers who have met all the requirements. While it was more feasible to import the Jamaican Hope as it is a known, large volume milk producer, issues with the Blue Tongue disease, prevented its importation. It must be noted that we have confirmed cases that have not been reported so unrevised policies prevented the importation of the best suitable animals for our climate.

The shortfall – there is little development in our unexploited “Invention” the buffalypso who’s milk is perfect for mozzarella cheese, as cheese made from this milk is much in demand all over the world and as this milk contains twice as much butterfat as cow’s milk. “Rather than exploit this valuable asset, we have allowed the number to decrease and some herds no longer exist. The importation of cattle from North America has resulted in the introduction into the buffalypso a new disease-Brucellosis.” Quoted by The late John Spence-professor emeritus-UWI. On April 1st 2012. The idea was taken by an Italian photographer who was on assignment to the village of Grande Riviere, he abandoned his former way of life and settled to pursue his dream of cheese making after he noticed the amount of water buffalos whose milk was not being used. His business Dolce Valle was registered as line of dairy products in which the label reads-(milk, salt and love and care) and now I guess with added herbs and spices.

**From Dairy to Dairy Aisle**

**Raw Milk**

Even now as some of our population are involved in organic and commercial agriculture, food security is virtually still out of our reach but we can change it with Value Added Dairy Processing. Dairy processing starts with raw milk, on average milk contains 87% water and 13% solids. The
solids make up of fat solids and non fat solids that carry vitamins A, D, E, and K. The non fat solids include protein and must be transported to the processing center at 4°C. Dairy Processing Centers should have significant raw milk storage as it a best that the milk collected be utilized in one day.

What is Cottage Cheese?

Cottage cheese is a source of protein and calcium, but offers multiple applications, ranging from sweet deserts to savoury snacks. It is a fresh, uncured, moist cheese that is highly perishable. Pasteurization, packaging innovations, use of carbon dioxide and the use of additional antimicrobial agents have minimised the need for artificial preservative. However, some brands of commercial cottage cheese do contain the artificial preservative E3202 Potassium Sorbate, - GRAS in combination with the natural antimicrobial Natamycin. To inhibit mould, yeast, and spoilage bacteria. The Brand that are available in our market local Dolce Valle Dairy and Yumma. International brands Daisy, Odyssey Bel Gioloso, Sargento and Axelrod.

The benefits of eating cottage cheese are:

**Weight Management:** Low fat and no fat cottage cheese have the reputation as a diet food or a weight management food. Low or no fat cottage cheese packs a lot of punch without a lot of fat, carbohydrates and sugar. As previously mentioned, cottage cheese contains a large amount of casein. Casein makes you feel full and unlikely to snack on other less healthy foods. Cottage cheese is popular with dieters because it fills you up, is low in calories and high in protein.

**Muscle Development and Maintenance:** Cottage cheese is popular with athletes and fitness buffs as well, due to the amount of protein and calcium gained without fat. The protein and calcium in cottage cheese play a major role in the development, repair and maintenance of the muscles.

**Bone Development and Maintenance:** The combination of calcium and phosphorus results in greater bone density and cottage cheese is the perfect source of these two minerals.

**Teeth and Gum Health:** Calcium is vital for the health of the teeth and gums. Cottage cheese is full of calcium to assist in bone development and prevent osteoporosis.

**Nerve Functions and Blood Clotting:** The healthy functioning of the nervous system, circulatory system and neurological functions depend on a healthy presence of calcium, which cottage cheese has in abundance.

International producers are DSM, Dairy Land Canada, Tnuva, Terrace Park Dairy, Westby Creamery and Manta –Crowley Foods LLC, The Cottage at Bell Haven, Garelick Farms LLC.

**Yoghurt/Greek Style Yoghurt:** This product results from culturing a mixture of milk and cream product with lactic acid producing bacteria, Lactobacillus bulgaricus and Streptococcus thermophilus. Yoghurt contains not less than 3.25% milk fat and 8.25 milk fat and 8.25 % non fat solids. Low fat yoghurt contains not less than % milk fat. Non Fat Yoghurt less than 5% milk fat. Basic yoghurt can be made with half a gallon Milk, Starter (cheddar cheese, or 3tbs of plain yoghurt. Rendering milk into Yoghurt effectively doubles the price. Production cost plus profit – minus overheads like packaging, facility cost, energy cost, labour cost and shipping-equal a
commercial product when the primary concern is the corporate bottom line. The distribution and cost will involve further energy cost and vehicle management.

To increase their profit margins and offset the cost to produce milk Dairy processors must work to establish a niche in this market and it can be obtained by promoting the product in the following ways.

Better Flavor: More solids create a smoother taste however consumers are looking for reduced fat in their products.

Increase Shelf Life: Can be difficult with distribution cost rise as it may be difficult to deliver to various routes on a daily basis. The use of CO\textsubscript{2} has been known to increase shelf life.

Perceived Quality: Control the quality and create an image of high quality. Consumers are likely to pay a premium price for perceived quality. The foreign brands are full of chemically produced hormones, pesticides, herbicides, artificial colors, artificial flavors, flavor enhancers, and preservatives. Locally produced product don’t require.

Organic: Require substantial premium and is susceptible to dramatic changes in consumer preferences. Organic farming starts with GAP and GMP.

Packaging: Decorative containers.

Direct Delivery (Home Delivery): there is a sector that will pay a premium for direct delivery to home or offices. The cost of distribution is high so consumer must be willing to pay. Delivery to home and offices are ideal for this type of business.

According to CSO results milk has been in the decline since 1999 from 20,482.6 (000 Liters) to 8632.4 (000 Liters) in 2010.

Trinidad Diary sectors and its production:

Approximately 150 farmers in five milking Districts in Trinidad (Turure, Waller Field, Charlieville, Carl sen Field and Woodland -Penal. Nestle purchases 3 million kg of milk on an annual basis from these farmers. The price - TT $2.15 kg with a quality bonus of TT$0.23/kg of TCP Total Plate Count of <250,000 cfu (colony forming units)/ml and addition TT$0.12 for TS Total Solids of >11.5%. Government pays a direct subsidy to the farmers of TT$1.50 only if the milk is sold to Nestle. Under world trade rules, subsidies can be lowered but not raised and that is bad news for farmers as the government hands on subsidies are tied. Medford farms in Carl sen Field is the sole supplier to The Ramsaran Product Line at TT$8.00 p/l and also supplies restaurant in Port of Spain at TT$10.00 per litre. He encourages the farmers to bring in their milk to his farm and in turns acts as a distributor on their behalf to Nestle. The Owner Chris Medford is a 2\textsuperscript{nd} generation farmer and a MBA graduate. Not waiting on the government he takes the reigns an injected life in his farm by importing genetically altered frozen seamen from Canada and the US, the result one of his cow can produce four (4) to six (6) gallons of milk while on average in T&T a cow produces 1.5 gallons a day. Milk not sold, is sold at the farm gate either as raw milk or value added products like yoghurt or Ghee. Farmers claim that Nestle’s policy reduced collection station from 14-2 as they required the milk to be 4 degrees within three hours of leaving the cow. This policy the farmers claimed forced a number of farmers out of business.
To assist the farmers that stayed in business the TT Dairy Association assumed management of
the collection station at Turure and upgraded the collection station in Charlieville and Woodland
in Penal.

Marlissa Farms in Penal has 400 goats that are milked producing 350 kg - 400 litres of goat’s milk
daily (146,000 annually). However the amount of milk can be varied if they decided to adjust the
animal diet as it was required in the past as production ran high and the milk had to be dumped
due to lack of space. Their milking machine can milk 40 goats at a time and is sensor activated to
avoid over milking the animal that can result in damage of the teats.

Results and Discussion

The Farmers Association of Trinidad and Tobago called on the Government to fix important issues
in dairy farming before attempting to importation of cows, such as improving infrastructure on
farms and giving land tenure, training and increasing the amount paid to farmers for their milk
production. The government are not subsidizing farmers they are subsidizing Nestle and as they
were forced to pay one third of the cost of the imported cow while the price of milk remain $3.88
in 2013 to $4.00/kg in 2015. However as quoted by Nestle this will be increased to TT 4.20/kg
from June 1st 2015. The cost for farmers to produce milk has risen by four and six dollars in 2006
by eight dollars as of 2013 while the price paid by Nestle remained stagnant

Marlissa Farms produces 400 liters a day from 400 milking goats and sell 1.8 liter bottle at an
average price of $59.00 while imported goat milk is sold at supermarkets costing $37.49 per lt.
The farm is also supplying milk to a cheese-maker in St. Ann. The 30,000 packets (250ml) of
flavored dairy products are offered in NSDSL cost TT2.85 ea with a monthly consumption of
30,000 liters at a cost of $265,500 TTD (40,079 USD) per annum. This is a potential large niche
market once precautions are taken as it’s a high risk foods served to children. Homemade yoghurt
is healthier as it lacks the artificial thickening agents and sweeteners as in the commercial types
Temp over 130 F will kill the yoghurt bacteria. Further information of imported commodity for
Trinidad and Tobago can be found in the online US Comtrade Database.

Conclusion

Milk according to the world Atlas Milk Production is at the lowest since 1972 which was at
17,703.33 Hg/An to 2,991.43 Hg/An. The shortfall of local production has traditionally been met
through imports of milk powder and up to recently liquid product including fresh UHT and other
milk drinks. These imports are growing at a rapid rate aided by government policies to
enhance access to ‘cheaper foods’. The Government has established that the local dairy industry
is essential to food and national security, employment and rural incomes. However despite all
efforts fresh mil production is in crisis with dwindling profits, shrinking markets, no incentives
and a lack of clear rules for the management of milk powder imports.

Also children of the farmers were not interested in farming and the parents who own the farms do
not want their children to become farmers and this resulted in the farms becoming abandoned.
There were also reports of cattle roaming the street causing danger to residents The Livestock
Product Board requested that all animals be stamped with a number and the name of farm so the
owners could be held responsible, however that was discontinued as that department no longer
exist. While worldwide dairy consumption continues to grow every year, agriculture is faced with
significant challenges on the global level; which is to produce more with less impact on the environment.

We are challenged in “The 2050 Criteria”, from the World Wildlife Fund - “Over the next 40 years, land, energy, water, and weather constraints will place unprecedented pressure on mankind’s ability to access its most basic goods – food, fuel, and fiber. Humanity must now produce more food in the next four decades than we have in the last 8,000 years of agriculture combined. And we must do so sustainably.”

The existing world systems currently support 7 billion humans, or more correctly, adequately support about 6 billion with another 800 million or so suffering from food insecurity, malnutrition or hunger. The FAO projects that the world population will grow to more than 9+ billion by 2050, requiring a 70% increase in food production.

While there has been considerable progress made in the science and practice of agriculture in the world, we have to produce more food and fiber on about the same acreage as a century ago with less labor, energy and water per unit of output and with considerably less soil erosion. The projected population growth however will intensify the challenges in terms of declining quality of water, soil and air, loss of genetic diversity, rising input costs, loss of farmlands.

We need to increase in the imported tariff so that dairy farmers would be encouraged to produce more milk” Farouk Mohammed director of the Livestock and Livestock Product Board (December 13th 2011)

Sustainability efforts can not fall on any one group of stakeholders. A joint responsibility of many parties including but not limited to: consumers, health professionals, retailers, food industry (including producers and manufacturers) and mostly the government. A key solution is to follow PFID Pine Plill Diary and move to an ultra-pasteurised processed, along the use of Tetra Gemina Aseptic packaging away from the Swiss company Nestle control.

**Issues these stakeholders must address are:**

Greenhouse gas emissions (carbon footprint); Water Supply and Usage; Reduction in Biodiversity; Ability of our food supply to sustain us and promote health; Impact of farming on the local economy; Good animal welfare

**Sustainability in the Dairy Industry.**

Our aim should be to produce healthy, nutritious and affordable dairy products in our country with the focus on the relationship between animal welfare, sustainable farming and the milk quality for human consumption. We should set by example, environmental stewardship and innovation by always looking for ways to improve upon our practices and processes in Water Conservation; Waste Management; Air Quality; Farm Management Practices and Diary Farm Expansion.

**Diary Farming in Trinidad and Tobago can be protected through:**

**Environment Control**- Developing a livestock policy: Livestock Database : Developing a forage farm; Developing training manuals.; Promotional campaigns such as fairs and exhibitions; Value added product development and training and assistance in grading and branding and extension services to assist dairy farmer.
Milking Equipment Management, Dry Cow Therapy Training, and Proper Milking Technique.

Improved feeding programs in Trinidad and Tobago

Mulato and Mulato II are improved grasses introduced to TT. A combined effort of CARDI Nestle, UWI and the Sugarcane Feeds Centre, A product of 20 years research of the International Center for Tropical Agriculture in Columbia. It is highly recommended by CARDI to mitigate against the rising price of grain and also the issue that feeding the animal GMO corn was producing an acid resistant strain of E-Coli. Mulato and Mulato II is related to the Tanner grass, which was locally fed to the animals. This product is an improvement in terms of dry matter yield, leaf to stem ratio, nutrient content, pest resistance and persistence. Its rooting system can withstand grazing and trampling with quick regrowth. Adaptable to acid infertile soils and drought conditions this will make it ideal for the unused sugar cane lands. Diary farmers have reported milk yield on this grass in some cases a 23% increase.

This report is not meant to be an all-inclusive template or a business start up venture but a general overview of the marketplace for dairy products and the production and process mechanics for value added venture. Additional Marketing research should be done with the assistance of competent experts in the field. There is an additional levels of risk for value added dairy ventures, as by their nature, are perishable and require solid and consistent quality controls procedures which require investments in time, money research and effort from the business owners.

While from the import figures listed above the market exist for Value added dairy products as shown using the last year for reference.

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