Improving competitiveness of SMMEs through the Private Sector Development Programme Botswana

Dairy value chain analysis and action plan

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"The Private Sector Development Programme is an initiative of the Government of Botswana, represented by the Ministry of Trade and Industry (MTI) and the Ministry of Finance and Development Planning (MFDP), in partnership with the European Union (EU). The Programme is supported by the Centre for the Development of Enterprise and Business Botswana."

Foreword

Dairy value chain analysis and action plan

The dairy value chain study emphasized pragmatic recommendations which could be executed instantly, among them encouraging the development of vertical linkages to encourage the production of more value added products.

The most important outcome of the study is a defined action plan, which could be implemented by key public and private stakeholders. One of the key areas of collaboration proposed is in the establishment of a National Dairy Production and Marketing Institution that would facilitate the provision of effective service of lobbying, product development, training and marketing support.

This study provides comprehensive guidelines that can be used to better structure the dairy value chain around the development of research, technology and vocational training, as well as the development of a national dairy policy.

The implementation of the action plan will impact positively on new investment and employment in the dairy sector while building the capacities of the institutions and human resources that support it.

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Acronyms

BCA	Botswana College of Agriculture
BDC	Botswana Development Corporation
BDF	Botswana Defence Force
BMO	Business Membership Organisation
BNDPAMI	Botswana National Dairy Production and Marketing Institution
BOBS	Botswana Bureau of Standards
BPS	Botswana Prisons Services
BSO	Business Service Operator
CDE	Centre for Enterprise Development
CEDA	Citizens Entrepreneurial Development Agency
DB	Dairy Board
DFA	Dairy Farmers Association
EDD	Economic Diversification Drive
EU	European Union
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FMD	Foot and Mouth Disease
IPP	Independent Power Producer
LEA	Local Enterprise Authority
LME	Liquid Milk Equivalent
LME	Liquid Milk Equivalent
MFDP	Ministry of Finance and Development Planning
MOA	Ministry of Agriculture
MSE	Medium and Small Enterprise
MTI	Ministry of Trade and Industry
NAMPAADD	National Master Plan for Arable Agriculture and Dairy Development
NPL	Non Paying Loan
NPL	Non-Performing Loan
PSDP	Private Sector Development Programme
R&D	Research and Development
RME	Raw Milk Equivalent
SACU	Southern African Customs Union
SACU	Southern African Customs Union
SME	Small and Medium Enterprise
UNIDO	United Nations Industrial Development Organisation
VC	Value Chain

Executive Summary

This report on the Botswana dairy sector is a component of the wider *Value Chain Analysis in Emerging Sectors*, a Government of Botswana initiative, undertaken under the Private Sector Development Programme (PSDP), which is supported by the European Union and the Centre for the Development of Enterprise. The main purpose of the study is to map the sector's value chain, identify key actors, highlight bottlenecks and upgrading opportunities, enabling the development of a national strategy and an action plan. Methodological tools used involved analysis of statistics and relevant documents, targeted interviews of 21 value chain actors, and benchmarking.

Major findings of the intervention are that:

- Botswana's dairy sector is an underdeveloped industry, relying heavily on imports;
- 95% of Botswana's milk demand (65 million l) is supplied by imports, mainly from South Africa;
- of the total 5,000 dairy cattle herd, only 20% were lactating cows in 2011, down from 64% in 2001 due to disease and drought; average production is 3,200l/cow/year (South Africa: 5,100);
- 58% of the total average yearly milk production of 6 million l comes from 3 commercial farms;
- 77 micro, mostly semi-subsistence farms keeping animals grazing on natural pastures for beef production and selling milk, in excess of their home consumption, mostly during the wet season, account for the remaining 42%;
- feed supplies, constrained by import restrictions, are mainly used by commercial farms;
- the South accounts for 71% of the herd (Lobatse: 48%) and 83% of milk production;
- processing of milk (fresh, UHT) and yoghurt is concentrated in Gaborone and Francistown.

A Government Dairy Strategy, adopted in 2012 to develop processing of raw milk, focuses on nine areas and eight actors to upgrade the sector but does not envisage increases in value added products. The Dairy Board is to be the main implementing agency, with links to the Dairy Farmers Association. The Botswana Dairy Association is not able to provide adequate services to its members.

The key features of the Dairy Value Chain are:

- disorganised chain without proper linkages between actors;
- uncompetitive production compared to imports (P6/l for local milk versus P5/l for imported milk);
- most breeding stock and feed imports sourced in South Africa;
- many production constraints: cost of feed (65% of total input costs), 70/30 import restriction, difficult climatic conditions, micro producers, limited access to finance;
- Botswana's total market is valued at P550 million/year, of which only 30% from local production;
- 3 firms produce 95% of processed milk and account for about 650 of the 850 jobs in the sector;
- the processing stage is the highest economic contributor in the dairy sector;
- opportunities lie in up-scaling production and value-addition.

Namibia has been selected as the most appropriate benchmark for the Botswana dairy sector, because of a successful and long-standing commercial dairy industry, and comparable environmental conditions. Lessons can be learnt from Namibia on integration (Namibia Dairies), upgrading production, mitigating constraints, product diversification, technology, partnering, certification and policy (school feeding campaign).

With a view to focusing on the competitiveness of primary raw milk production and value addition, recommended activities, summarised in an outline Action Plan, include:

- establishing of a National Dairy Production and Marketing Organisation;
- encouraging increased domestic consumption of processed dairy products;
- encouraging processing and adding value to raw milk production;
- creating a commercial and professional dairy farming community.

Introduction

Objective

This report presents the findings of the dairy sector component of the study "*Value chain analysis in emerging sectors*" undertaken under the Private Sector Development Programme (PSDP).PSDP is a Government of Botswana initiative supported by the European Union (EU) and the Centre for the Development of Enterprise (CDE). It aims to stimulate and sustain growth through diversification of the economy while building the capacities of institutions and human resources that supports the private sector.

The objective of this initiative is to identify ways in which the dairy sector can be helped to improve its performance. Value chain analysis is a useful tool for understanding the potential of industries, and through the application of this approach, new insights have been gained and valuable new strategies developed, both at the micro-economic (company) level and at the macro-economic level.

The methodology adopted to carry out this study was as follows: the analysis was based on a literature review of the sector, analysis of statistics, value chain mapping, survey of 21 actors throughout the value chain and benchmarking with other countries. Based on this, a national strategy and Action Plan have been outlined for discussion by stakeholders.

The study describes and analyses the overall dairy value chain, apportions costs to the different elements within each segment and details the relationships and mechanisms between them. The analysis allows comparison through a benchmarking exercise with Namibia whose physical and economic environments are similar to that of Botswana. In addition, comparisons are made with other countries, especially Kenya whose dairy sector, although much larger, is comparable to that of Botswana. This comparison, in turn, allows the identification of whether Botswana's dairy sector performance is better or worse and therefore where action can be taken to improve individual areas of activity.

The overall aim of this assignment is to identify potential markets, upgrading opportunities and constraints throughout the dairy value chain and elaborate a national strategy and action plan to develop the sector.

Overview of the Dairy Sector in Botswana

Production

Milk production in Botswana is from two subsectors, the commercial and the semi-subsistence sectors. In the semi-subsistence sector, animals are kept mainly for beef production, but are milked for home consumption. There is normally excess milk during the wet season, when pasture is good, as farmers rely on natural pastures for their feed requirements. Due to the distances involved and lack of cooling equipment, this excess milk is normally processed into sour milk and sold in urban centres.

In the commercial sector, animals are kept primarily for milk production and sale to formal markets. There are three production systems:

1. Intensive- where animals are zero grazed;
2. Semi-intensive - where animals depend in part on natural grazing and purchased feeds; and
3. Extensive - where the animals depend on natural grazing for most of their feed requirements.

The dairy industry in Botswana is still relatively underdeveloped and the country relies heavily on imports to meet local demand for fresh milk and other dairy products. The number of dairy cattle[1] increased from about 2,600 in 2000 to about 4, 600 in 2011. The number has fluctuated between 5,000 and 6,000 for most of the period from 2002-2010 and then fell below 5,000 in 2011. The number of lactating cows remained constant at just below 2,000 but then fell to almost 1,000 in 2011.

However, the number of lactating cows as a proportion of total dairy herd has drastically decreased from 64 % in 2001 to 28 % in 2011. This is well below the expected level of 80%. This means that the Botswana national dairy herd is made up of cattle that are unproductive in terms of milk production. This factor impacts negatively on milk production and, thereby, on the profitability of the dairy enterprises.

As a result, Botswana depends on imports to meet domestic requirements of both raw milk and other processed dairy products. Data from the Ministry of Agriculture (Department of Animal and Production) indicates that in 2011, local milk production was 3.1 million litres, a fall of 61% from the previous year. According to the Ministry, this drastic fall was due to the outbreak of foot and mouth disease (FMD) and the drought. Imports for fresh raw milk were 62 million litres, representing over 95% of domestic requirements. Data from the Dairy Unit indicates that annual milk production has on average been 6 million litres between 2000 and 2011, ranging from 3 million litres in 2000 to a high of 8.3 million in 2009. This production falls short of local demand for fresh milk and the country has to depend on importation of liquid fresh milk and other dairy products, especially from South Africa.

[1]Source: Dairy Unit, Annual Reports (different)

Geographical distribution of value chain actors

Table 1 shows the total number of dairy cattle, number of farms and milk production by location. The majority of farms are found in the southern part of the country representing 71% of the national dairy herd (3,255 dairy cattle), 69% of farms (60 farms) and producing 83% of the total milk production for 2012. The Southern region of Lobatse alone has 48% of the national herd (2,061 dairy cattle).

Table 1: Geographical Distribution of Dairy Farms and Total Milk Production 2012

District	Village/Town	Total herd	No. of farms	Total production (litres per annum)
Southern	Good Hope	329	n.a.	n.a.
	Kanye	105	n.a.	n.a.
	Jwaneng	194	n.a.	n.a.
	Total	*628*	*20*	*668,049*
South East	Lobatse	2,061	n.a.	n.a.
	Gaborone	159	n.a.	n.a.
	Total	*2,220*	*18*	*1,771,828*
Kweneng	Molepolole	*215*	*9*	*156,643*
Kgatleng	Mochudi	*192*	*13*	*110,000*
Central	Palapye	200	n.a.	n.a.
	Serowe	268	n.a.	n.a.
	Mahalapye	184	n.a.	n.a.
	Tutume	176	n.a.	n.a.
	Total	*828*	*16*	*392,273*
Ngami	Maun	*157*	*3*	*42,541*
North	Francistown	154	n.a.	n.a.
	Selibe-Phikwe	197	n.a.	n.a.
	Total	*351*	*8*	*122,160*
Total		4,591	87	3,263,494

Source: Dairy Annual Report, 2013.

There are a number of dairy processors concentrated in Gaborone, and Francistown, the largest population centres. These processors use local raw milk as their input to process it into fresh milk, UHT milk, and yoghurt for the local market. As a result of low quantities produced locally, the processors also import raw milk from South Africa.

Government Policy

The Government has a Dairy Strategy (2012). The focus of Government policy in the dairy sector is on low level processing of raw milk into UHT and pasteurised products. There is no emphasis or

consideration of higher value production such as yogurt, cream, cheese and other dairy products; in fact the Ministry of Agriculture refers to such high value processing as by-products.

The Dairy Strategy, finalised in December 2012, aims to meet the increasing demand for milk and milk products; and as a potential contributor to economic diversification, employment creation and poverty eradication. While the local demand stands at 65 million litres per annum, the local farmers can only supply 3.1 million, representing 5% of a growing market.

The Strategy notes several challenges in the sector which include high input costs and shortage of feed, low skills levels, poor performing animals, lack of appropriate funding and a "disorganised dairy value chain with linkages not understood or developed".

The Dairy Strategy outlines nine (9) strategic focus areas intended to transform the Sector, which will be addressed through the fulfilment of the following objectives:

- To provide appropriate support to infrastructure such as electricity and roads
- To create an enabling environment through a special support programme
- To increase the dairy herd (numbers and breeds)
- To identify strategic fodder production zones as part of the implementation of the NAMPAADD production area zoning recommendations
- To identify dairy farm areas of the right type and size for investors
- To develop a well-functioning dairy value chain that encompasses components of production, processing, distribution and marketing
- To map dairy clusters along the whole dairy value chain
- To facilitate market access through off-take agreements and adherence to product specifications
- To promote local production of veterinary requisites to address the short supply, and high cost, of veterinary drugs, equipment and services
- To promote effective Research & Development to provide information on e.g. fodder production, dairy breeds and new technologies

To facilitate implementation, the strategy identifies eight (8) key players/programmes in the sector as outlined below:

1. Dairy Board - to provide strategic direction and ensure successful implementation of the strategy
2. Department of Animal Production (MOA) – to provide extension and training, to facilitate policy formulation and provide technical and professional advice
3. Dairy Farmers Association - to represent farmers in the districts at all forums including the dairy board.
4. Botswana Bureau of Standards (BOBS) and other Institutions with quality mandate – to develop and maintain standards that will promote the industry
5. The National Veterinary Laboratory – to perform tests on all milk and dairy products according to set BOBS standards
6. Financial Institutions – to finance investment in the sector
7. Research Institutions - to identify research areas necessary to inform the development of the sector e.g. breeds to be kept, feeds to be produced
8. Training Institutions (e.g. Botswana College of Agriculture) - to identify critical areas of training in the industry.

The Dairy Value Chain

Overview

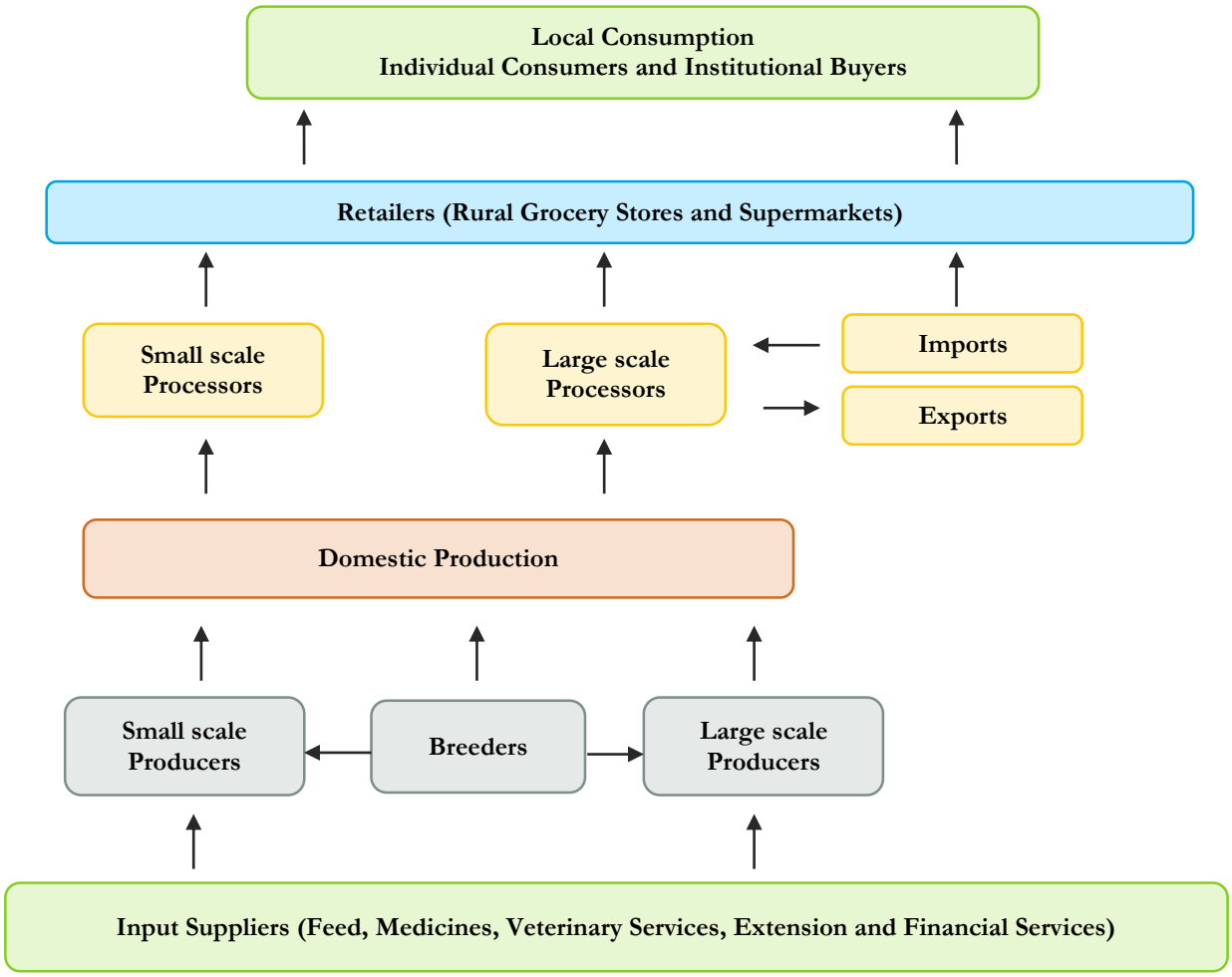
In order to plan and survey the value chain in any sector, and then develop upgrading and expansion strategies, it is first necessary to understand the value chain itself. The "theoretical" value chain for the dairy sector can be divided into three core sub-sectors as shown in Figure 1.

1. Inputs
2. Primary production and Processing
3. Distribution

Inputs and their suppliers

The major inputs to dairy production are dairy cattle and their feed. The feed comes from feed manufacturers and distributors that source their raw materials mainly from fodder producers with supplements from other sources. The dairy stock is sourced from breeders. The other inputs are the dairy equipment which are sourced from different equipment manufacturers and distributors.

Figure 1: Theoretical Dairy Value Chain



Production and Processing

- Breeders: produce the dairy stock and undertake research on the best genetics. They sell these improved animals to the dairy farmers.
- Farmers: manage the dairy stock. The cows are used to produce raw milk for sale to processors and wholesalers for further processing and distribution.
- Processors and wholesalers: process fresh raw milk from farmers into different products such as fresh milk, yoghurt, cheese and other products, and pass them to distributors.

Distribution

- Retailers/supermarkets distribute the processed dairy products to the final consumers.
- Restaurants use the processed products as ingredients in the food they prepare to sell to their customers.
- Institutional buyers include schools and hospitals, both public and private. They normally buy fresh pasteurised milk and other dairy products in bulk.

Support services

For the value chain to work effectively there is need for support services. In the dairy industry these include research in animal breeding, transport services, extension services which help farmers to use the best production and management techniques. Other services include artificial insemination and veterinary support services in the form of drugs, vaccines and treatment of sick animals. The other important support service to the dairy value chain is financing, especially at primary producer level and processing where equipment and dairy cows are very expensive.

Domestic Control Regimes

In Botswana, there is a restrictive feed policy which requires dairy farmers to buy 70% of their feed on the domestic market regardless of whether the feed is competitive or not. Similarly, there are import controls on raw, fresh and UHT milk imports so that imports are largely banned and only allowed when Ministry of Agriculture's Committee sees a shortfall in local production compared with consumer demand. In addition, for UHT milk products there is a levy of 40% on imports.

Business Support Services

Botswana has no single organisation promoting the dairy industry in a holistic manner, but there are several organisations each supporting single components of the industry. Appendix 3 details the organisations which impact the sector from Government and private sector.

Management and Technical Skills development

The dairy sector is challenged by a lack of management and technical skills. Some of the key organisations interviewed, while pointing at environmental challenges, confirmed that this weakness accounted for the failure of many dairy operations. Similarly several dairy cooperatives are said to have wound up due to management problems.

Financing

Although finance has been allocated in the past through Government programmes, the low success rate of dairies makes this sector, in particular among commercial banks, unattractive. CEDA offers long-term loans to citizens for bankable projects at a much lower interest rate than commercial banks, currently at 5% per annum. The basic requirements for CEDA support to the dairy sector include:

- a minimum of 100 cows;
- 20ha for fodder production per 100 cows;
- should be within 100km on tarred road and 70km on gravel road from the market;
- electricity must be available;
- access to 60litres of water per cow per day, (therefore at least a borehole is required);
- water output of $5m^3$ per hour is required.

While appreciating the basis for these requirements, when combined with other environmental factors (e.g. water availability) and the challenges of accessing land, these requirements can be prohibitive and, in addition, they are not aligned with the Government minimum recommended herd of 50 cows.

Business Services and Business Membership Organisations (BMOs)

BMOs, such as the Botswana Dairy Association (BDA), are essential not only in advocating a conducive environment but also in providing market information, business support, training and in mobilising the needed support to be offered at lower/negotiated rates directly by themselves or through other service providers. Where BMOs are strong they can also facilitate a reduction in the cost of services and other business inputs through the use of economies of scale. However, the current structure and services provided by the BDA is reportedly inadequate.

The dairy industry lacks any R&D or training programmes and has no cooperatives. It has poor access to extension services and financial institutions. Although informal collaborations are in place in other sectors (e.g. between BCA and LEA in the horticultural sector) there is no evidence of any linkages between the support institutions in the dairy sector.

Dairy Value Chain Analysis

Survey Approach

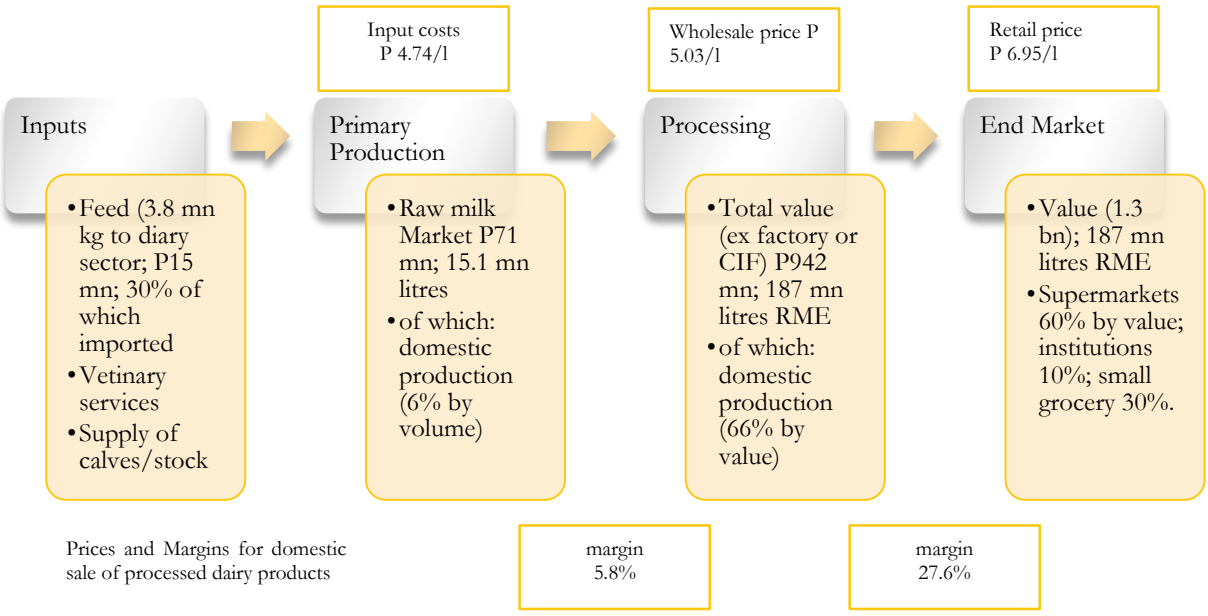
The survey of the dairy value chain actors comprised 3 input suppliers and manufacturers (with 5 branches), 10 producers, 4 processors (3 large and 1 small) and 4 retailers (all large supermarkets). Data was collected from the dairy value chain actors through structured interviews, and this ensured that the researcher was able to explain the questions to the interviewees and more data was collected through the discussions.

Data collected from the interviews was supplemented by secondary data collected from reports and verbal communication with the Ministry of Agriculture officials in the Dairy Section, Department of Animal Production and other actors.

The Botswana Dairy Value Chain

The dairy value chain for Botswana has been mapped and is detailed in Appendix 1. A summary value chain is presented below:

Figure 1: Summary Dairy Value Chain



The dairy value chain in Botswana totals 187 million litres raw milk equivalent (RME), that is, the total amount of raw milk required in Botswana to process all dairy products consumed within the country. To calculate raw milk equivalent, production coefficients have been used that determine the volume of raw milk inputs required to manufacture 1 litre (equivalent) of final processed product as follows:

Table 2: Total Consumption (Raw Milk Equivalent)

Product	Production in Botswana plus imports (mnl)	Production Coefficients[2]	Raw Milk Equivalent (mnl)
Fresh Milk (Pasteurised)	10.8	1.03	11.1
UHT	34.2	1.10	37.6
Yogurt	9.3	1.04	9.7
Sour Milk	1.3	1.10	1.4
Cheese	2.9	9.30	27.0
Juice Blend	3.9	0.54	2.1
Other (including butter, cream, milk powder, ice cream and buttermilk)	21.1	4.50	97.0
Total			185.9

It should be noted that RME differs from the usual measure presented in many statistics of dairy markets, liquid milk equivalent (LME). This is based on the solid mass methodology of presenting the milk equivalent based on scientific extrapolation based on solids (including fat content). Whilst this is useful in analysis of pricing and other factors such as nutrition, it does not accurately reflect the processing inputs (for example, it is reported that in the EU 8 litres of raw milk are a required input in cheese production whereas LME rates agreed by industry, and FAO use 3.84 as the factor – LME method would therefore underestimate the volume of raw milk required to process cheese in Botswana). RME produces a higher volume than LME estimates of the Botswana dairy value chain; 186mn l RME compared with 174mn l LME.[6]

The dairy sector (excluding retail and distribution segment) employs 1,490 persons, the majority (43%) in the processing stage, 16% at the primary production stage and only 24% at the input (feed and veterinary) stage.

However, earnings per employee are highest in the processing sector at P20, 094per employee per annum compared with the raw milk production sector of P15,144 and P11,194 in the feed distribution sector.

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[2] F. O'Mahony and K.J. Peters (2013) "Options for smallholder milk processing in Sub-Saharan Africa" International Livestock Centre for Africa (ILCA)

[3]Production coefficients for cheese vary according to type of cheese and range from 8-14; average production coefficient in the EU is 8.

[4]Based on reports from Dairyreporter.com, milk juice blends are generally 50% milk

[5]An average figure is used here as butter has a productivity coefficient of 8, cream 10, buttermilk 1.1 and ice cream <1.

[6]LME for Botswana has been calculated from the FAO estimates of per capita dairy consumption LME of 88.9 kg. Figures of 1l milk = 1.033kg milk and population 2.021 million were used to estimate 174 mn l LME.

Key Observations:

- The domestic dairy sector is underdeveloped and only contributes 6% of raw milk equivalent to dairy consumption in Botswana; therefore, there appears to be considerable scope for development of this sector, if competitive.
- The processing stage is by far the most important economically with high employment and turnover value and there is scope for development.
- Earnings per employee are relatively low in the feed distribution sector, suggesting low added value production and potential to move up the value chain.

Inputs

There are currently three large manufacturers of dairy feeds, while other manufacturers concentrate on poultry feeds only. These employ on average about 250 employees, with 13 (5%) directly involved in dairy feed. Thus, the total number employed by the feed manufacturers is estimated at 39.

Table 3:Feed Production in Botswana

	Feed Producers (proportion of business dairy related)
No	3
Average production of feed for dairy sector	0.5mn kg pa
Average t/o (dairy business)	P 1.7mn pa
Average number of employees	1 (pro rata)
Average ex-factory price	P 3.2 per kg

Feed is distributed to farms directly by manufacturers as well as feed suppliers/distributors. There are currently about six medium to large suppliers and twenty five small suppliers scattered all over the country.

The main inputs sold to the dairy industry are dairy meal and lucerne, which is also sold to other livestock farmers. On average, each smaller supplier sells 15 tonnes per annum; medium suppliers sell about 22 tonnes, while large suppliers on average sell 313 tonnes. In terms of gross turnover, feed retailers indicated that, on average, the sales to dairy farms account for 5% of their turnover. This is not surprising because of the size of the dairy herd, less than 5,000 compared to 2.5 million beef cattle and other livestock species such as small stock and poultry. The main customers for the input suppliers are individual farmers and institutional buyers such as the Botswana Defence Force (BDF), Botswana College of Agriculture (BCA) and Botswana Prison Services (BPS), who also keep dairy animals.

Table 4: Feed Suppliers/Distributors

	Small Feed Distributors	Medium Feed Distributors	Large Feed Distributors (including manufacturers)
No	30	10	5
Average sales of feed for dairy sector	15 tonnes pa	22 tones pa	313tonnes pa
Average t/o (dairy business)	P60,000	P 90,000	P 1.3mn pa
Average number of employees	2	3	12
Earnings per employee	P30,000	P30,000	P104,000
Average selling price	P4 per kg	P4 per kg	P4 per kg

Average retail price of dairy meal is P233.00 for a 50 kg bag, while that of lucerne is P93 for a 35kg bag, while the average wholesale prices are P177.50 and P55 respectively for the same quantities of dairy meal and lucerne. This translates to average annual gross turnover of about P60,000 for small suppliers, P90, 000 for medium suppliers and about P1.3mn for large suppliers. The input suppliers indicated that the price of imported feed was lower than the locally produced feed, for example a 35kg bag of lucerne cost P93 locally, while the same bag costs P55 in South Africa. However, the suppliers are prevented from sourcing all their supplies from South Africa or elsewhere by the law that requires them to source 70% of all animal feed from local and a maximum of 30% from abroad (Control of Goods, Prices and Other Goods Act). The intention of this law is to promote feed manufacturing in the country and is enacted under the SACU agreement for infant industry protection (IIP).

According to the World Dairy Report (2014) of the IFCN Dairy Research Centre, world feed price for dairy feed averaged US$36/100kg in 2013. In Botswana average price is P400/100kg[7] which equates to US$ 42/100 kg. Quality and protein mix is also an issue as international standards are based on protein content which is17% higher than in Botswana. This adversely affects competitiveness and yield.

Milk yield is directly related to the quality and quantity of feed. The quantity of feed required depends on: fat content, stage of lactation, body weight, body condition, quantity and quality of forage eaten: the better the quality of roughage, the less grain is required.

Table 5: The Effects of Increasing Feed Intake (on a dry matter basis) on Daily Milk Production[8]

Feed Intake (lbs dry matter)	Amount of Energy Supplied (Mcal/day)	Amount of 3.5% Milk Supported by this Energy Intake (lbs/day)
30	22.5	42
35	26.2	54
40	30.0	66
45	33.8	78
50	37.5	90
55	41.2	102
60	45.0	114

Source: Donna M. Amaral-Phillips, Roger W. Hemken, and William L. Crist "More Feed = More Milk" University of Kentucky http://www2.ca.uky.edu/agc/pubs/asc/asc135/asc135.pdf

[7]Feed suppliers 3.8 mn kg valued at P 15.2 mn

[8]In this example, a 1300 lb mature cow eating a diet containing 0.75 Mcal NEL/lb dry matter was used. No weight gain or loss was assumed.

In Botswana, feed given to dairy cows averages 5 kg per head (11 lb) for productive animals. This equates to 1,825 kg per annum. However, yields in Botswana are low at only 9 litres per day (equivalent to 20 lbs per day; 1 litre of milk = 2.272 lb) which does not even feature in the above analysis linking feed to productivity.

Key Observations:

- High cost of feed in Botswana impacts negatively on costs of production.
- Given the fact that farmers mainly practice the extensive dairy production system where the animals graze on natural pasture and the fact that most farmers give dairy concentrates to milking cows only, it is safe to conclude that the size of the dairy feed industry is very small. This is compounded by the fact that some farmers use cheap feed such as bran to feed their animals in order to reduce costs.
- The amount of feed given is comparatively low at only 1,825 kg per head per annum compared with, for example UK9,839 kg feed plus 3,463 kg forage; but in Botswana there is little to no forage so there is greater reliance on feed. Therefore, increasing the levels of feed drastically may have the potential to increase yields and profitability.
- In addition, feed quality has been reported as being low in Botswana which will affect yield – improving quality of feed will improve yields and make production more competitive.

Primary Production (Raw Milk)

Primary production of raw milk is derived 40% from one large farm, 42% from 77 micro farms (averaging less than 20,000 litres per annum) and the balance produced by 2 small firms.

Table 6: Milk Production

	Micro Dairy Farms	Small Dairy Farms	Large Dairy Farm
No	77	2	1
Average production of raw milk	15,978 l pa	250,133 l pa	1.2 mn l pa
Average t/o	P95,867	P1.5 mn	P7mn
Average number of employees	6	8	10
Earnings per employee	P15,978	P187,600	P701,605
Average selling price	P5.9/litre	P6.0 /litre	P5.95 /litre

From the survey of dairy farms, the highest number of dairy animals owned by one farmer is 188, while the lowest is 16, with an average of 63 dairy animals per farm. Each farm has on average 20 milking cows, making the average proportion of milking cows to the total dairy herd at 31%. The breeds are dominated by Brown Swiss, with half of the farms keeping this kind of breed; this is followed by Friesian which are kept by three farms and Simmental which are kept by two farms. It was evident from the survey that some farmers managed the dairy animals as if they were managing beef animals, which partly explains the low milk production. For instance, farmers will let their cattle graze in the veld and milk them in their kraals with no proper milking utensils and milking parlour leading to unhygienic milk being produced.

[9] http://www.milkbenchplus.org.uk/Documents/Milkbench/FarmerPack/Youngstock%20Enterprise%20Report.pdf

Dairy producers raise their dairy animals just like beef cattle, hence the predominance of the dual breeds such as the Simmental and Brown Swiss. This is supported by the fact that one farmer interviewed said that he was not milking his dairy animals as they were pregnant and expected to milk them after giving birth during the wet season. It can therefore be deduced from this that milk production fluctuates depending on the season, with the wet season recording high milk production, while the dry season records low milk because both the quality and quantity of forage are very poor.

As expected, farms who practise zero grazing produce higher average milk yields per cow per year (6,000 litres) compared to extensive system (2,000 litres). These yields are lower than the individual breed potential yield by a range of 20–90%, with the zero grazed herds performing better.

The predominant breeding method used is bull service, which is used by 6 farmers, followed by 3 farmers using both artificial insemination and bull service and only one farm practising artificial insemination alone. The majority of farmers (7) reported they sourced their initial breeding stock through imports from South Africa, while the remainder bought them locally. In addition most farmers (8) indicated that they obtain replacement stock from their own herds, while the other two got their replacements from other local farmers.

The biggest input cost in dairy production is feed, which on average comprises about 65% of the total input costs. The proportion of costs allocated to milk production varies with each farm and production process being practised with zero grazing farms having feed costs over 80% of the operational costs. The majority of farmers indicated that they do not give their animals proper dairy concentrate feed because it is very expensive. In fact most farmers only let their animals graze in the veld.

In terms of selling price of raw milk, there is very little difference between the prices of each size of enterprise with average prices of P5.9 per litre.

The large commercial farm employs only 10 people whereas, combined, micro enterprises employ over 40 times more at 462. Although this results in higher levels of employment in the sector, earnings per employee (and efficiency, costing and competitiveness) are 6.3 times lower for micro and 2.5 times lower for small scale farms compared to the large scale farm. Earnings per employee measures contribution to the economy which is especially important in low population countries where targeting, and maximising earnings per employee has to be an economic policy to stimulate growth.

Key Observations:

- Botswana has low milk yields with 3.2 million litres produced from an active dairy herd of 1,000 head. This means yields are only 3,205 litres of raw milk per head per annum which compares with South Africa (in 2012) of 5,110 l pa and UK (2013) of 7,327 l pa. This suggests that there is significant scope for improvement in productivity.
- Botswana has a dairy herd of around 5,000 head but currently only 1,000 are actively producing. This means that there is potential to improve capacity utilisation of the existing dairy herd (currently only 20% of production capacity). If 100% of capacity was utilised, production of raw milk in Botswana would amount to 16 million litres per annum, which is greater than current consumption of raw milk of 15.1 million litres (from domestic production and imports).
- However, the price of domestically produced raw milk is significantly higher than imports at P6.00 compared with only P4.89 per litre. This is largely due to the protected nature of the market and suggests that there is significant opportunity for efficiency gains in the domestic sector (through economies of scale, feed quality, breeding, animal husbandry, veterinary care, etc.).
- There are a large number of micro dairy farms and excess herd capacity in the country. These micro farms have the same number of employees as small farms which produce and earn much more revenue. If micro farms could be grown into small farms, production of raw milk and earnings per

employee would rise dramatically. Growing 30 micro farms into small farms would increase production of raw milk by 7.7 million litres per annum (which is over two thirds of imports). If the number of micro enterprises growing into small farms was to rise to 46, imports of raw milk could be eliminated. Factors such as access to land, management, access to credit, extension services and stock would have to be addressed.

Dairy Processing

There are 3 large processing plants in Botswana accounting for 95% of domestic production of processed dairy products. In addition there are 4 small farms and 1 farm owned by processing plants. Each processing plant employs significant numbers of staff totalling 611 across the 3 large companies, while small processors employ a total of thirty three (33) employees. The small producers process only sour milk and yogurt whereas larger firms produce all products, except cheese.

Table 7: Dairy Processing

	Small Dairy Processors	Large Dairy Processors
No	4	3
Average production	144,900 l	48.5mn l
Average t/o	P0.5 mn	P79mn
Average number of employees	8	204
Earnings per employee	P13,200	P26,987

By comparison Namibia, with a comparable GDP to that of Botswana has only one processing plant, Namibia Dairy Industries, which produces 500,000 litres of UHT milk per month.[10]

Processors source 21.2% of raw milk inputs domestically whilst importing 78.8%. Import price of raw milk is 30% lower than domestic prices (P4.2/l compared with P6/l).

Table 8: Main Products Produced in Botswana

Product	Domestic Production Value *P million*	Domestic Production l	Relative Value (based on retail price, P/l)
Fresh Milk (Pasteurised)	103.2	11mn	11.67
UHT	350.0	34mn	12.50
Yogurt	111.0	4,800	17.26
Sour Milk	14.9	1.3mn	13.17
Juice Blend	38.2	3mn	9.45

More than 50% (by value and volume) of processing is into UHT; with juice blend just over 25% and fresh pasteurised milk 17%. The average weighted retail prices of this production is relatively low at P11.6/l, especially compared with imported products such as cheese which attracts a retail price of P31.9/litre. Locally produced yogurt, which is the highest valued local dairy product, only meets 0.1% of domestic demand.

[10] (Competitiveness of the dairy sector of Namibia 2012 study)

Comparing average wholesale prices of domestic production and imports shows an average price of domestically produced UHT at P10.45/litre compared with average import prices of P13/litre; this difference could be attributed to high import tariffs or quality/perceived quality of imports, consumer preference for foreign goods (but unlikely as UHT is largely a generic product). The only other import competing product is yogurt where domestically produced products average P32.24/l compared with imports at only P11.84. Differences are hard to understand given the extremely small quantities produced domestically: speciality yogurts or just high cost production that limits demand.

Over 90% of dairy imports are sold to the retail sector by wholesale and distribution companies. The remaining imports are purchased by retailers directly and some manufacturers import and sell final products to retailers.

Sub-sector value chains

Figure 2: Value Chain – Fresh/Pasteurised milk

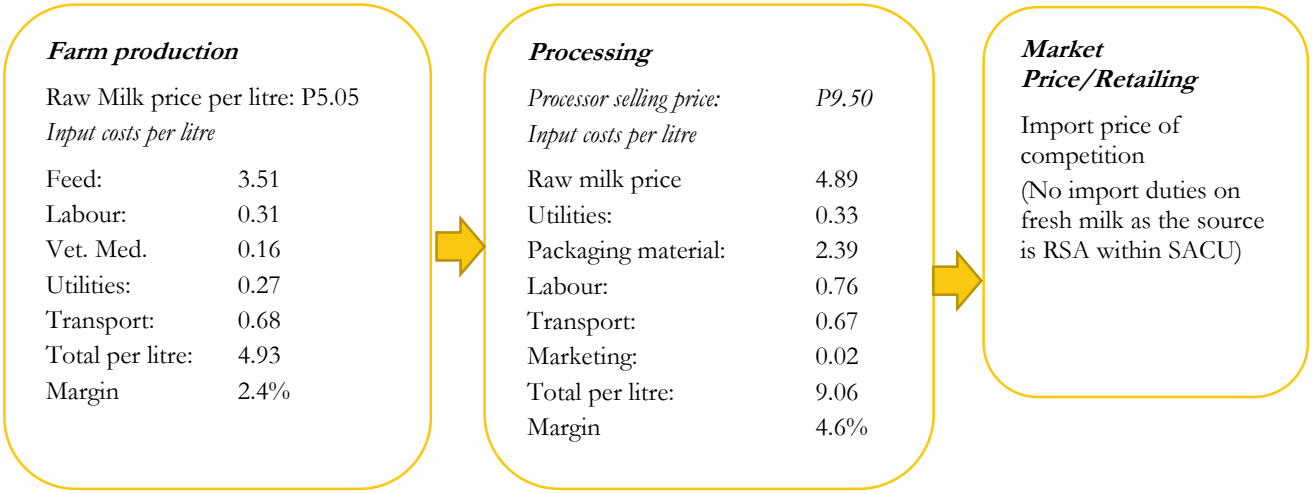


Figure 3: Value Chain – UHT Milk

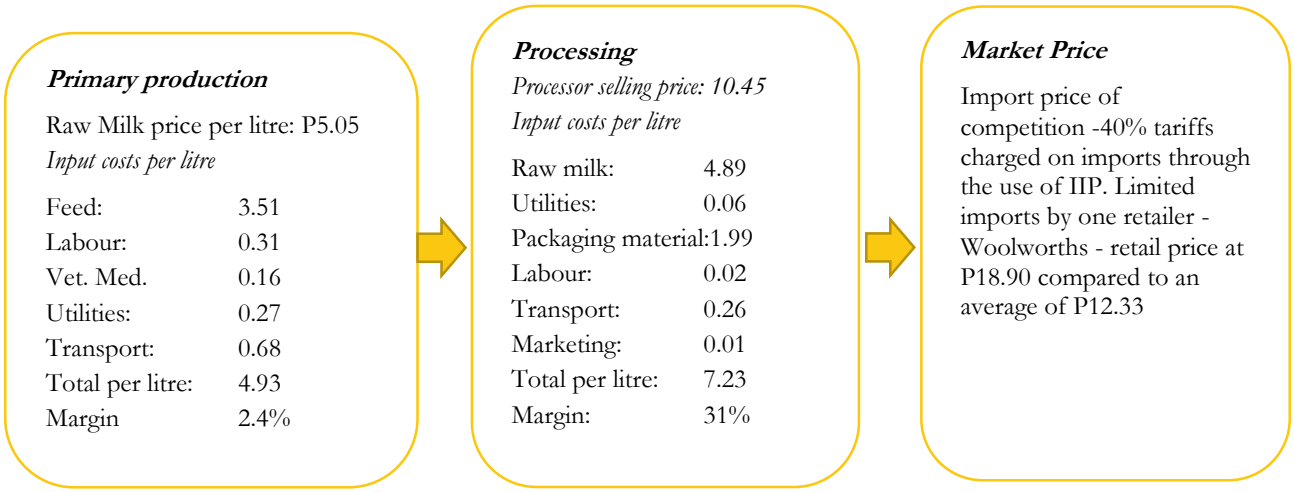


Figure 4: Value Chain – Sour milk

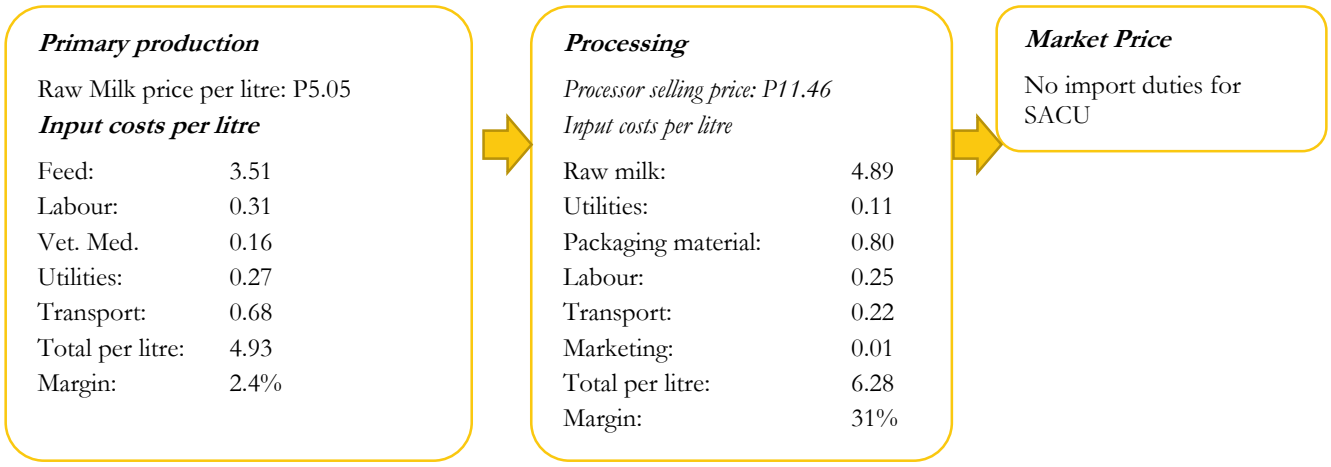
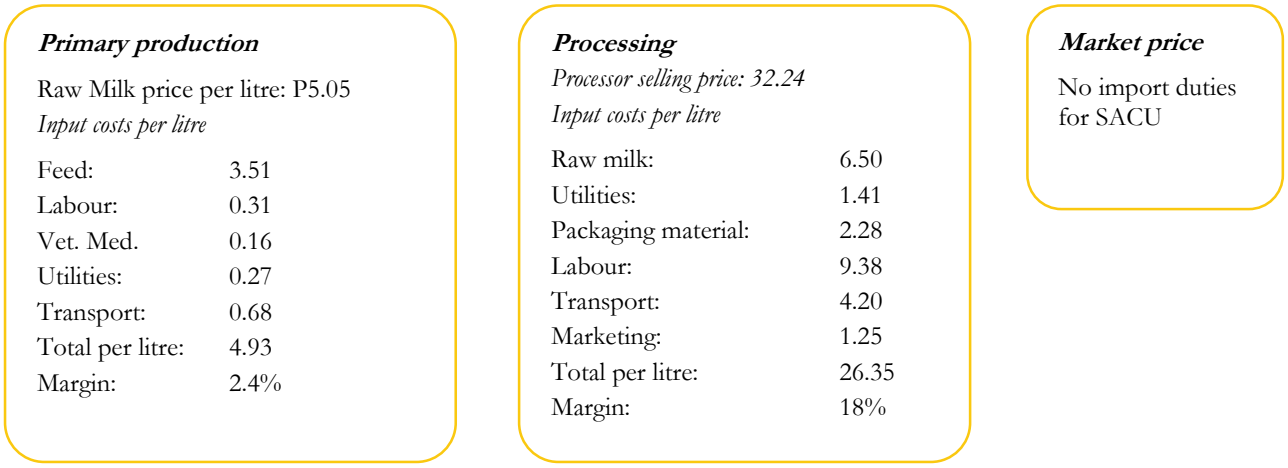


Figure 5: Value chain – yoghurt



Constraints

- High feed prices
- Lack of government support
- Limited land for fodder production
- Lack of business management skills
- Dairy equipment very expensive
- Poor extension services
- Limited infrastructure, leading to high connection fees for services such as electricity

Constraints

- Limited bargaining power
- High local raw milk prices
- High per unit transportation costs
- High capital costs of setting up processing plant
- Unskilled and inexperienced labour force
- Difficulties in getting work permits for skilled labour

Key Observations:

- Due to restrictions on imports, local producers have a monopoly on fresh pasteurised and UHT milk which creates an incentive not to add value as Value Added products are not protected. As a result, there is an investment bias away from competitive production and resource allocation towards these low value protected segments which is economically inefficient and suggests that a review of this policy is needed to encourage downstream processing to more value added products.
- Such a policy also encourages resources and production in low value added products, with relatively low earnings per employee and concentration on domestic markets. Addressing these distortions could result in encouraging more value added production and sales in domestic and international markets.
- There is potential in the market for producing high value added products like cheese but these would need competitive pricing of raw material inputs. At the moment these locally produced inputs are expensive so they would face competition from processed dairy imports. Either raw milk imports must be used or efficiency increased thus lowering the cost of domestic production.

Market

The market for dairy products in Botswana is estimated at P548.6 million and is dominated by imports, with domestic production of P163.7 million representing only 30% of consumption.

Table 9: Market for Dairy

Product	Domestic Production P million	Imports	Total Wholesale P million	Gross Margin %	Assumed Retail Value of domestic production[11] P million	Apparent Consumption in Botswana[12] P million
Fresh Milk (Pasteurised)	103	0	25.2	25	25.20	31.5
UHT	350	0.7	86.3	21.8	93.80	105.0
Yogurt	111	68	68.8	130	0.16	145.0
Sour Milk	14.9	0	6.40	25	6.40	8.0
Cheese	0	29.9	29.90	16	0	34.7
Juice Blend	38.2	0	38.20	na	38.20	42.1
Other (including butter, cream, concentrated milk, milk powder, ice cream and buttermilk)	0	217	21	20.0	0	198.7
Total					**163.76**	**565.0**

Supermarkets dominate retail sales of dairy products in Botswana, accounting for 60% of sales (by value), with 30% sales in small grocery stores and 10% to institutions.

Moreover, the overall size of the dairy market in Botswana is relatively small with average per capita consumption of dairy products at 88.9 l LME per capita per annum. This compares favourably within the region: South Africa 57.9 l; Namibia 77.2 l; Zimbabwe 28.6 l; Zambia 7.4 l, and Mozambique 4.1 l.

[11] Assuming equal margin across imports and domestic production

[12] Apparent consumption is calculated as follows: domestic production plus imports less exports; since there are no exports of dairy products

The FAO observes that the consumption of dairy products is directly proportional to GDP per capita (UK: 241.5 l). Therefore, when per capita consumption of dairy products in Botswana is compared with those countries immediately above and below Botswana in World Bank GDP per capita rankings, consumption would normally be expected to be 75% higher than current levels of demand.

Key Observations:

- If consumption in Botswana averaged that of other countries with similar levels of development, then expected total consumption of dairy products in Botswana would be 306 million litres LME compared with current level of 174 million litres (146.8 kg * population 2.021 *1.033 is litres =306 mn l LME). If demand levels of dairy products could be addressed, there could be a more sustainable market for domestic production. This could be achieved through national campaigns to increase awareness, status, benefits of dairy consumption, as a stimulus to the market and domestic production.

Lessons from Other Countries

Dairy Value Chain Upgrading Lessons Learnt from other Countries. Case study: the Namibia Dairy Industry

The Namibia Dairy industry has been selected for benchmarking the Botswana dairy industry because of its long successful commercial dairy sector. In addition Namibia has similar physical and economic environments to that of Botswana. The commercial Namibian dairy industry is a highly integrated industry comprised of a single large dairy product manufacturer called Namibia Dairies. Since 1997, Namibian Dairies has been involved in the total value chain performing almost all activities including fodder production, milk production (own production and other commercial dairy producers), manufacturing, as well as distribution to retailers.

The Namibia dairy industry achieved both firm level upgrading and industry level upgrading as follows:

- Industry level of upgrading was achieved through focusing of the dairy industry on increasing the competitiveness of all dairy activities involved in the production, processing, and/or marketing of a product or service and mitigating the constraints that influence value chain performance. The Namibian dairy industry became highly integrated offering total value chain services in a competitive manner.
- Firm level upgrading occurred at different levels as follows:

Functional upgrading

Namibia Dairies is the major supplier of a variety of dairy products on the local market. The products include fresh, long-life dairy based products, value-added dairy products, and other beverages including those that are tailor-made to meet the needs of the consumers. The company provides innovative products; it also provides value-added production processes. This has however not been without problems due to cheap milk and dairy products imports flooding the local market. Cheese is one of the dairy products which is no longer being produced since 2007 because it became uncompetitive against South African cheese.

Process upgrading

Since July 2009 Namibia Dairies uses one of the most modern dairy farms in the world. The farm is located in Mariental in the South of Namibia and is called Aimab Superfarm. The farm was built and equipped with tested state-of-the-art technology from New Zealand, Israel and the United States. The total mixed ration and deep-litter system is based on the controlled feeding of cows in large barns, providing Namibia Dairies with a semi-intensive milk production process[13].

[13]http://www.ohlthaverlist.com/o-l-companies/namibia-dairies.php#.VWvZw8-qqko

Production upgrading

This involved improving quality of milk through own fodder production, own dairy farms and strategic milk producing partners, sourcing only hormone-free milk from approved Namibian milk producers, and enforcing stringent control measures. Namibia Dairies is ISO 9001:2008 certified, making the company compliant with internationally recognized quality management systems. The company also forms an integrated network of milk supply, processing, value-adding production and the largest national cold-chain distribution network in Namibia.

Institutional upgrading

This was achieved through the establishment of Namibia Dairies (Pty) Ltd in 1997 following the merger between Rietfontein Dairies and Bonmilk. The Namibia Dairies has become a leader in the Namibian dairy industry with a main production plant in Windhoek, the Aimab Superfarm in Mariental and different depot locations across Namibia. This has made manufacturing of dairy products in Namibia to be highly concentrated, with one big milk processor, and many small milk distributors in rural areas of Namibia.

Policy upgrading

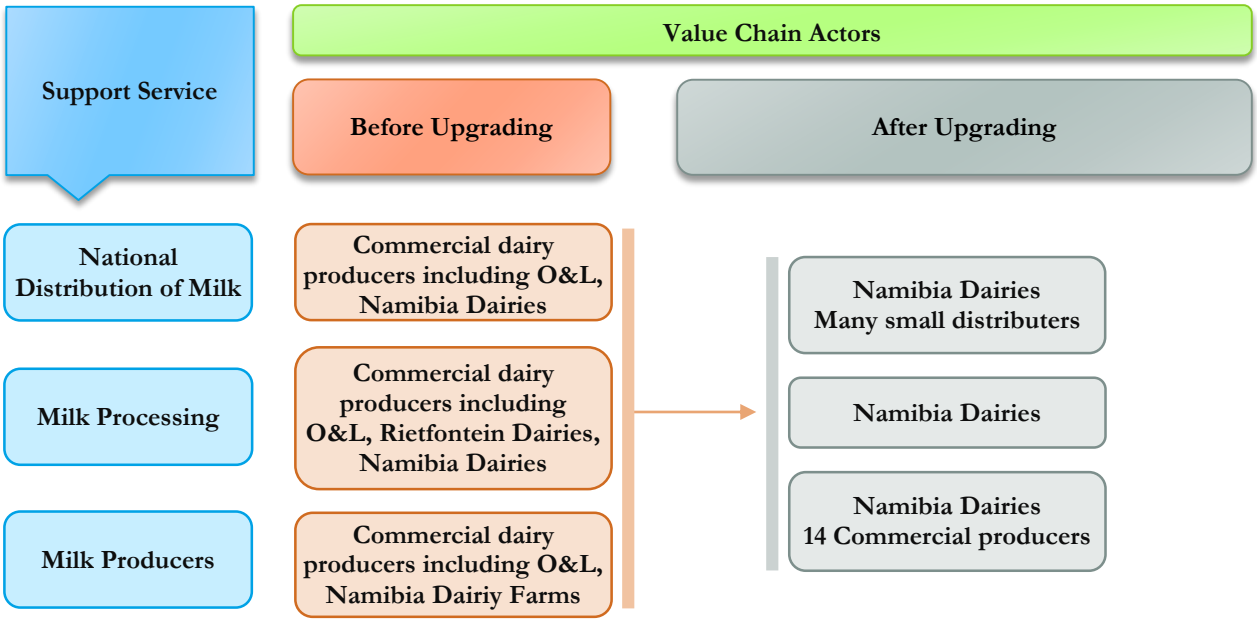
Governments cannot create competitive industries but can play the proper supportive role for creating national competitiveness by encouraging change, promoting domestic rivalry, and stimulating innovation. In the case of Namibia, Government supported the dairy industry by creating and funding a school milk feeding programme for malnourished children which positively impacted on the creation of local demand for dairy products.

The 40% import duty on UHT milk imports which the Namibia Government has imposed also created a supportive role. The action was backed by the Control of the Importation and Exportation of Dairy Products and Dairy Product Substitutes Act (Act 5 of 1986)

Upgrading Outcomes:

- Improved milk quality
- Doubling of the local milk production
- Increased dairy products market share
- Diversification of milk products into manufacturing of traditional milk products

Figure: 8 Upgraded Namibia Dairy Value Chain



Key Lessons of success:

- Vertically integrated value chains reduce costs and improve efficiency of the Industry. This is demonstrated by achievements of the Namibia Dairies which was integrated with other firms.
- Industry protection using tax policy as was done with UHT milk in Namibia by imposing an import duty of 40% on UHT milk was successful in controlling, rather than completely banning imports of UHT. The policy was beneficial to both producers and consumers of milk since the duty made imports of UHT milk expensive compared to the locally produced UHT milk, and at the same time gave the consumers a choice of the brand of UHT milk to buy.

Dairy Value Chain Benchmarking

Dairy Value Chain Benchmarking Parameters

Namibia has been selected for benchmarking Botswana Dairy Value Chain because Namibia has successfully vertically integrated its dairy industry and has improved its milk processing including using the most modern processing technology in Southern Africa through the activities of Namibia Dairies. Because of non availability of data, few relevant benchmarking parameters have been used and are presented below.

Benchmarking Herd Size, farm size

Botswana has about 5 thousand dairy animals, with only 1,000 being milked. These are scattered in several micro farms, with an average herd size of 20. On the other hand, one farm in Namibia has 4,500 dairy cows.

Benchmarking farming System

Similarly to Botswana, dairy production in Namibia is done using two systems and these are communal and commercial systems of production. Commercial dairy farming is done using the intensive system of dairy farming which accounts for 87% of the milk production in Namibia. Similarly, 87% of the fresh raw milk produced in Botswana is produced using the intensive milk production farming system.

Unlike in Botswana, Namibian commercial dairy farmers do not graze their animals in range, while in Botswana the majority of the dairy farms use the extensive system (free range system of production) with most of the animals used for both milk and beef production.

Institutional Benchmarking

The Dairy Industry of Namibia is well organised, with Namibia Dairies providing all total value chain services making the industry vertically integrated. The company now focuses on driving brands and research and development activities to a level where it can venture into new markets on brand and product sides. Apart from the Namibia Dairies, Namibia also has the Dairy Producers' Association. The Association is affiliated to the Namibia Agricultural Union and acts as mouthpiece for the commercial dairy farmers in Namibia. Botswana does not have a large company such as Namibia Dairies, but has a producer association, Botswana Dairy Producers Association. The processing sector is composed of four small processors and two micro processors.

Benchmarking Milk Production, and Productivity

The average daily milk production per cow for the commercial sector in Namibia ranges between 15 to 40 litres per cow per day, while average production in Botswana is less than 20 litres. In 2011 commercial milk production in Namibia was 23 million l, while in Botswana the highest milk output was in 8.3 million l annually, with an average of 6 million. In recent years annual milk production has fallen to 3.1 million litres.

Benchmarking milk imports and exports

Botswana imports about 77 million litres and does not export any milk. This is in contrast with Namibia which imports UHT milk from South Africa, but also exports milk to some countries in the Southern Africa.

Benchmarking milk marketing

Namibia Dairies provides the main market of fresh raw milk to most of the commercial milk producers and communal milk producers in Namibia, while in Botswana the market for milk is confined to the four small-scale and micro-processors.

Recommendations

Summary of Findings

At the primary production level, Botswana is not competitive in the production of raw milk as the price of imported milk is lower than that of locally produced raw milk. A number of factors contribute to this, chief amongst them being expensive feeds. As a result some farmers have resorted to the use of cheaper low quality feeds, while others have resorted to grazing their animals extensively, leading to low milk production.

The climatic conditions in the country also make it difficult for farmers to rely on pasture to feed their animals, which means they need to zero graze for maximum yield. In addition, it is difficult to depend on irrigated pastures because of the shortage of water. Resulting from this water shortage there is little incentive for dairy farms to invest in their own land for fodder production. The result is that farmers have to rely on expensive feeds leading to low production and hence low margins.

Another problem faced by dairy farmers is inadequate capital to finance business expansion and required inputs. For instance most farms do not have proper housing for their animals, yet the climatic conditions in the country require this as temperatures are very high, especially during the summer months. This stresses the dairy cows and leads to low milk production. The National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) has recommended a minimum herd size of 50 cows as ideal for a profitable dairy farm, but most farms operate below this ideal minimum due to lack of capital for expansion. In addition, the survey results indicate that the margins at primary production level are very low, suggesting that only farmers with large herds will be profitable as they will be able to reap economies of scale.

One of the constraints faced by producers is the scattered nature of farms, which makes sharing of large pieces of equipment, such as milking sheds and cooling tanks, impossible. Given the poor infrastructure in the rural areas, farmers face high transaction costs in both the output and input markets. Government established two milk collection centres, one in the study area (Pitsane) and another in Serowe (Central District) with the aim of helping farmers. These centres were supposed to be run by farmers themselves in the form of cooperatives or other form of association. Unfortunately these have not been run well and currently the one in Pitsane has actually closed down while the Serowe one is operating below capacity.

At the processing level, the main problem is low and variable local milk supply. The low milk supply in the country exposes processors to increased risk, such as an outbreak of foot and mouth disease disrupting imports. This means that the processors cannot have access to their most important raw material, raw milk. Small processors face shortage of raw milk and this problem is further exacerbated by the fact that they cannot import as the minimum quantities of 10,000 litres for one tanker is beyond their reach. The small processors end up facing stiff competition as they buy local milk at higher prices than the larger ones.

Suggested Strategy

There are a number of options for the development of the dairy sector:

1. Increased focus on dairy processing to higher value added products
2. Increase the competitiveness of primary production of raw milk

There is potential for Botswana to be competitive in both milk production and dairy processing sectors but this requires a more commercial and larger scale approach to the sector. Therefore, if the Government believes in, and wants to develop the sector, it should be prepared to invest in time and resource for a systematic and comprehensive restructuring and implementation strategy.

Strategic target for dairy sector value chain upgrading in Botswana:

The strategic target for upgrading the dairy value chain in Botswana is to increase the yield of dairy cows, the percentage of the herd producing milk and total production of value added processed products.

Based on international norms, the quantitative targets for this strategy should be to increase the raw milk equivalent production in Botswana to 125 million litres (processed from domestic and imported raw milk), of which 16 million litres from domestically produced raw milk. These are based on the following sub-targets:

- Increase Yield per cow from 2,000 l/milking cow pa to 5000 (equivalent to that of South Africa)
- Increase the share of existing herd lactating to 65%, this would increase the number of milkers from 1,000 now to 3,250
- The above would equate to production of raw milk in Botswana of 16 mn litres pa
- Increase in market for dairy products from 167 mn litres to 250 mn litres RME (less than per capita consumption of equivalent income countries)
- Increase in processing of raw milk from 50 mn litres to 125 mn l (from 30 to 50% of domestic and imported raw milk)

In order to achieve this target, a number of strategic goals are proposed:

➔ *Organisation of the sector to drive development*

➔ *Promote and develop dairy consumption in Botswana*

➔ *Encourage processing of milk into added value products*

➔ *Support the commercialisation of dairy farming in Botswana to a modern competitive industry*

Strategic Goal 1: Organisation of the Sector

The specific objective of this strategic goal is:

To Establish a National Production and Marketing Organisation to act as a catalyst to drive development of the dairy sector

Activities to achieve this goal will include:

1. *Establish A National Dairy Production and Marketing Institution:* In Botswana, there is no institution dedicated to the development of the dairy sector.
2. *Re-establish collection points:* Having a central point for the collection and temperature controlled storage of milk is essential for development of the market. The previous attempts, with farmer ownership of collection centres, have failed. Therefore, an important facilitation role for the new organisation could be the management of these facilities.
3. *Provide loans for milk churns:* Allied to the management of collection centres, the provision to farmers of adequate containers for storage and transport of raw milk is essential for quality control and maximising potential for preparation of value added products. The alternative being the necessity to process into sour milk locally which is a low value end product.
4. *Promote vertical linkages and support mechanisms:* Based on experience in both Greece and France of vertical support along the value chain, a programme of contracts for collection of milk by processors in exchange for supply of collection containers, extension services and transport could be offered. Processors would provide supplies and services with no "cash cost" on a contract basis and deduct these costs from the final sale price of raw milk. This would both provide supplies/services and provide an assured market for the farmer. The processor would also gain more sustainable supplies of a better quality.
5. *Develop a research, technology and vocational training programme:* Such a programme would address not only dairy farmers and processors, but also business support organisations including extension services.

Strategic Goal 2: Promote and develop dairy consumption in Botswana

The specific objective of strategic goal2 is:

To encourage the increase in national consumption of processed dairy products in Botswana

Activities to achieve this goal will include:

1. *Develop a national strategy for the promotion of dairy product consumption:* survey to understand why there is low consumption in Botswana and research into behavioural change, as well as review of science on benefits (nutrition, calcium, protein). This should be a well developed, consistent and well financed campaign over the long term that promotes dairy consumption to levels closer to that of similar income countries around the world (dairy consumption is linked directly to wealth and health).
2. *National advertising campaign:* The aim of this campaign will be to raise general awareness through television, newspapers, health clinic brochures and posters, church networks, radio, bill boards and similar all designed by an appropriate marketing team.

3. *Schools campaign:* Over the long term, promoting dairy consumption amongst children will greatly influence the sustainable rate of dairy consumption in Botswana. The specifics of such a campaign will be determined in a separate strategy, but could include awareness, posters, integration of dairy into education curricula (daily school milk for children, home economics, nutrition, assembly topics etc)
4. *Product campaigns:* increase the information on processed dairy products and how they can be used, including increasing the cachet of dairy products amongst middle classes (cheese and wine parties) through a designed campaign which could include recipes, books, national competitions, cheese festivals, amongst other things.

Strategic Goal 3: Encourage Processing of Dairy Products

The specific objective of strategic goal 3 is:

To encourage the processing and higher value added of raw milk in Botswana

Activities to achieve this Goal will include:

1. *Development of a dairy policy:* There is an attitude in the Government of Botswana that resonates through the sector namely that dairy products consist only of raw milk and value added is fresh (pasteurisation) and UHT milk. The concept of further value added is alien and summed up in the constant reference (including in policy documents) to by-products (cheese and yoghurt) for what actually are higher value and potentially more economically beneficial parts of the value chain. Therefore, a serious change in approach across Government and the wider industry is needed to clearly identify high value added dairy products. This must start in the policy that guides the sector.
2. *Remove restrictions on import of UHT milk:* To encourage the higher value processing of raw milk, the removal of import restrictions of UHT will remove the *de facto* national oligopoly of production of this low value added product and provide a better economic incentive and investment opportunity cost of value addition further up the value chain.
3. *Improve access to investment finance for dairy processing:* A major constraint to processing (especially to scale) is capital and access to finance for funding. The institutional survey highlighted a lack of access to investment finance and the risk adverse behaviours of commercial banks and CEDA (based on previous high NPL). Therefore, financial programmes for investment in production of high value added dairy products should be developed including guarantee schemes (to address collateral), subsidised lending and FDI, joint ventures and vertical integration of processors and producers.
4. *Technological development, training and support to dairy processing plants (small scale):* Linked to capital is know how. The undeveloped nature of the high value dairy segment necessarily means that there is a lack of management and technological skills for this business segment. Therefore programmes that address this gap are needed to encourage these producers by creating demonstration projects for small-scale cottage industries and vertical integration.

Strategic Goal 4:Support the commercialisation of dairy farming in Botswana to create a modern competitive industry

The specific Objective of strategic goal 4 is:

To create a commercial and professional dairy farming community

Activities to achieve this goal will include:

1. *Promotion of bigger farms:* Government recommends a minimum herd of 50 for competitive primary production of milk, which is in line with international standards, but the major financier recommends a minimum of 100 and yet the average farm has only 20 head. Therefore, a Government backed programme to actively turn this recommendation into reality is required. This could be achieved through the development of cooperatives and up-scaling of farms. The establishment of cooperatives could be encouraged through subsidised or free infrastructure such as shared sheds, milking facilities, land for grazing, storage and transport. In parallel, a programme of selling milking cows to farmers at subsidised rates or loans with interest rebates on guaranteed output targets could be used to increase the size of average farms.
2. *Increase access to quality affordable dairy feed:* Quality affordable feed is a key area of competitiveness of raw milk production. Therefore, complete liberalisation of purchase of what is higher priced; lower quality, national feed is needed so that there is full and open competition through a complete liberalisation of imports and abolition of the 70% national feed requirement.
3. *Encourage use of high yield breeds:* There is a predominance of breeds in the Botswana dairy herd which are not the most productive. Therefore, the Government should embark on a herd quality improvement programme that seeks to encourage the use and introduction of Friesian cows away from the predominance of Brown Swiss (often selected for dual dairy/beef use). A national swap programme where the Government exchanges Brown Swiss (for example it could slaughter these and sell beef in the public sector) for Friesian. In addition strengthening the breeding sector with incentives for breeding only high yield breeds, as well as use of high yield breeds amongst bull service providers. Friesians crossed with a beef breed provide perfectly good beef animals. This development will require assistance to farmers through a good Artificial Insemination service. This function could be provided through the National Dairy Production and Marketing Institution proposed above.
4. *Training and education in dairy husbandry and management:* The survey noted that management of dairy farms, both commercial and technical is poor, with the management of dairy stock similar to treatment of beef stock. Therefore, there is a real need to have a dairy farm management programme for both existing and future dairy farmers. This could include training, guidebooks/manuals and college education programmes in animal husbandry (feed, shelter, AI, lactation periods, drying).

Action Plan

Supervision, Monitoring and Evaluation

This strategy will require cooperation and actions by a broad range of stakeholders within the public and private sectors. Therefore, there is a real need for a strong supervisory and facilitation role for an apex organisation that can coordinate and oversee implementation. This lead organisation will not only act as the driver of the strategy, but take responsibility for monitoring and evaluation. This will first require undertaking baseline studies of key indicators and publishing progress of the strategy (with appropriate media coverage to support the sector).This is a crucial role and will need to be given appropriate resources to monitor and facilitate implementation in the national interest, and will also need to develop appropriate skills for the task.

Stakeholders need to discuss, agree and appoint by consensus a lead organisation to drive through this strategy. Options for this role would include:

Ministry of Agriculture

LEA

BNDPAMI

Institutional Arrangements

Implementation of this strategy will be undertaken by a broad range of stakeholders in both the public and private sectors. There are a number of options for implementation and lead agencies/organisations depending upon willingness, commitment and resources. During the initial discussion of this strategy amongst stakeholders, the exact modalities will be discussed and agreed, as well as completion of the Outline Action Plan (below).

Outline Action Plan

The following Action Plan provides an indicative schedule of activities to implement the strategy. However, the institutions involved in implementation should review and revise the Action Plan on an on-going basis to ensure its accuracy, relevance and reflect the changing dynamics of Botswana as well as the global market.

The Action Plan is purposely incomplete to ensure national understanding, acceptance and ownership of the action plan by stakeholders who will first need to discuss and complete the Outline, assigning Lead Agencies, resources and budgets.

Once these have been agreed, each component of the Action Plan must be elaborated into an individual Work programme. The Action Plan and individual Work programmes will need to be revised

periodically to take into account the available resources, changing politics, commitment of the sector, international market dynamics and lessons from previous activities.

Outline Action Plan

Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
Overall objective	**increaser ME production to 125 mn l, (16 mn l from local raw milk)**	**Increase Yield per cow from 3,205 l/milking cow pa to 5,000 Increase the share of existing herd lactating to 65% (to 3,250) Increase production of raw milk in Botswana to 16 mn litres pa Increase domestic market for to 250 mn litres RME Increase in processing of raw milk to 125 mn l**				
Strategic Goal 1: Organisation of the Sector						
Specific Target	To Establish a National Production and Marketing Organisation to act as a catalyst to drive development of the dairy sector					
Activity 1.1 Establish A National Dairy Production and Marketing Institution (BNDPAMI)						
Task 1.1.1 Feasibility study and corporate plan	Articles of association Budget in place Fully staffed and functioning organisation	Provision of effective services to the industry: lobbying, product development, training and marketing support				
Task 1.1.2 Funding Identified						
Task 1.1.3 Membership recruitment						
Task 1.1.4 Staffing						
Task 1.1.5 Twinning with international organisation						
Activity 1.2 Re-establish collection points:						
Task 1.2.1 Feasibility study on legal/functional way for the new dairy board to take over facilities	Existing milk collection points in operation New collection points established	Increased collection of quality milk available for processing				
Task 1.2.2 Strategic review and feasibility of the construction of new collection points						
Task 1.2.3 Recruitment and training of appropriately qualified management and technical staff for collection centres						
Task 1.2.4						

Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
Plan for integration into cold chain and transport/distribution						
Activity 1.3 Improve use of milk churns:						
Task 1.3.1 Design of programme to source, supply and finance milk churns to farmers (through collection centres)	Increased use of appropriate milk vessels	Increase in quality of milk and reduction in % of sour milk				
Task 1.3.2 Implement programme						
Activity 1.4 Promote vertical linkages and support mechanisms						
Task 1.4.1 Design of a Programme to encourage backward vertical support mechanisms	Increase use of extension services amongst farmers Increased use of appropriate milk vessels Increased yields	Increased quality and quantity of milk produced				
Task 1.4.2 Develop model contracts for supply of milk in exchange for services						
Task 1.4.3 Dairy Board could initially subsidise such programmes (e.g. supply of churns and veterinary medicines)						
Task 1.4.4 Promote and trial contracting in exchange for services in pilot processing and						
Task 1.4.5 Train, promote and disseminate model to other processors and farmers (describing benefits to each)						
Activity 1.5 Develop research, technology and vocational training programme						
Task 1.5.1 Develop vocational programmes for extension and support services for dairy	Increased number of private support service providers Increased yields Accredited BSOs	Increased quality and quantity of milk produced				
Task 1.5.2						

Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
Develop and undertake research programmes that provide information to farmers and BSOs						
Task 1.5.3 Develop certification and accreditation programme of BSOs for dairy						
Strategic Goal 2: Promote and develop dairy consumption in Botswana						
Specific Target	To encourage the increase in national consumption of processed dairy products in Botswana					
Activity 2.1Develop a national strategy for the promotion of dairy consumption						
Task 2.1.1 Identification of institution to take ownership of dairy consumption campaign	Consumer Survey Key consumer messages defined	National awareness strategy adopted and in implementation				
Task 2.1.2 Secure adequate financing for campaigns						
Task 2.1.3 Tender and procure marketing services for survey, research on benefits and design of strategy						
Activity 2.2 National advertising campaign						
Task 2.2.1 Agencies recruited for implementation of this component of strategy	Awareness activities as defined in strategy (could include television, newspapers, health clinic brochures and posters, church networks, radio, bill boards)	Increase in awareness of the benefits of dairy amongst population				
Task 2.2.2 Management of implementation by marketing team						
Activity 2.3 Schools campaign						
Task 2.3.1 Review of schools education curricula	Dairy taught in classes as part of curricula Posters, leaflets and other promotion in schools Assemblies and events in schools surrounding dairy	Children and teachers aware of dairy products, their uses and benefits				
Task 2.3.2 Revision of curricula to include dairy in teaching of home economics, science, nutrition						
Task 2.3.3						

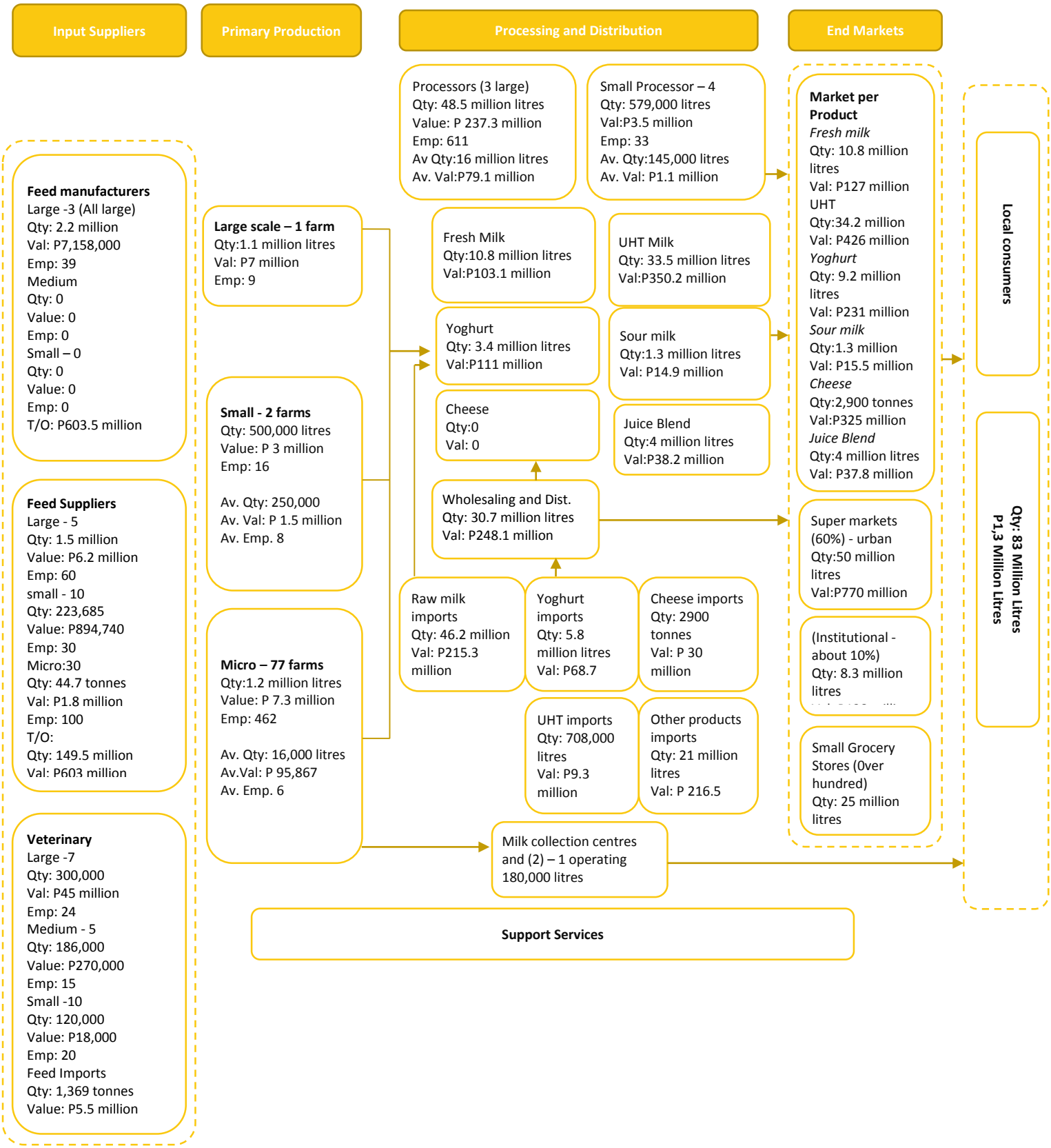
Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
Development of materials and guidelines for promotion of dairy in schools						
Activity 2.4. Product campaigns						
Task 2.4.1 Recruit appropriate agencies for implementation	Product focused national and regional events including recipes, books, national competitions, cheese festivals, supermarket promotions	Better informed public of high value dairy products				
Task 2.4.2 Management of implementation by marketing team						
Strategic Goal 3: Encourage Processing of Dairy						
Specific Target	To encourage the processing and higher value added of raw milk in Botswana					
Activity 3.1 Development of a dairy policy						
Task 3.1.1 Development of the dairy policy	Dairy policy developed. Government and industry understand high value dairy High value dairy no longer referred to as by-products	High value dairy products are accorded priority and focus for development and promotion				
Task 3.1.2 Training of government staff (across MDAs) on high value addition						
Activity 3.2Remove restrictions on import of UHT milk						
Task 3.2.1 Draft revisions in legislation and regulation of dairy import regime	Complete liberalisation of dairy imports	Increased investment in higher value dairy production				
Task 3.2.2 Press announcement on complete liberalisation of import regime for dairy						
Task 3.2.3 Enactment of revised legislation						
Activity 3.3Improve access to investment finance for dairy processing						
Task 3.3.1 Establishment of financial instruments for investment lending	Government provide loan guarantees and subsidised loans for high value dairy processing FDI promotion undertaken	Increased investment in high value processing.				
Task 3.3.2 Development of projects in the dairy						

Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
sector for JV and FDI promotion						
Activity 3.4 Technological development, training and support to dairy processing plants (small scale):						
Task 3.4.1 Identification of existing national institutions	Institutions (research, training and academic) commit to establish programmes for the dairy sector. Demonstration projects for dairy processing (possibly located at collection centres)	Research is undertaken on dairy technologies, improvements and development of vocational training and skills upgrading				
Task 3.4.2 Development of programmes supporting the dairy sector						
Task 3.4.3 Development of demonstration projects for cottage industries (as training and technology centres)						
Strategic Goal 4: Support the commercialisation of dairy farming in Botswana to a modern competitive industry						
Specific Target	To create a commercial and professional dairy farming community					
Activity 4.1 Promotion of scale farming						
Task 4.1.1 Design of Cooperative model including incentives	Creation of dairy farm cooperatives. Supply of stock to small/micro farmers	Larger average farm and dairy herd size				
Task 4.1.2 Promotion and assistance in generation of cooperatives						
Task 4.1.3 Development of shared infrastructure for cooperatives						
Task 4.1.4 Design and implementation of farm up-scaling programme						
Activity 4.2 Increase access to quality affordable dairy feed						
Task 4.2.1 Draft revisions in legislation and regulation of feed use	Complete liberalisation of dairy feed markets. Reduction in price of feed. Increase in per animal consumption of feed.	Increase in the use of feed (intensive systems) of dairy herd management				
Task 4.2.2 Press announcement on complete liberalisation of						

Activities	Outputs	Result Indicators	Lead Agency	Duration (start-finish months)	Internal Resources	Other resources (Donor and National Budget)
import regime for dairy						
Task 3.2.3 Enactment of revised legislation						
Activity 4.3 Encourage use of high yield breeds						
Task 4.3.1 Design and implementation of a national dairy breed swap programme	Increase in percentage of herd that are high yielding breeds (Frisians)	Increase milk yield of cows				
Task 4.3.2 Design and implementation of a Frisian breeding programme						
Task 4.3.3 Design and implementation of improvements in high yielding breeds amongst "bull service"						
Activity 4.4 Training and education in dairy husbandry and management						
Task 3.4.1 Identification of existing national institutions	Training programmes for dairy farmers Education programmes in colleges and vocational training courses Technical guidebooks/manuals in animal husbandry (feed, shelter, AI, lactation periods, drying).	Improvements to management on dairy farms				
Task 3.4.2 Development of programmes for dairy farm management						

Appendices

Appendix 1: Detailed value chain Map



Appendix 2: Directory of Firms and Organisations by VC Stage

Input Stage

Feed Suppliers

Feed centre
The Agri shop
Plot GICP
Private Bag BO 125
Gaborone

Agrichem
Tlokweng
P.M. Box 428
Gaborone

Livestock advisory centre
Ministry of agriculture
Private bag
Gaborone

Feed manufacturers

Nutri feeds Botswana
Plot 55 pilane
P/bag 17
Mochudi

Tholo holdings
Gabane

Maya enterprises t/a
Egg head poultry
P.O. Box 3311
Gaborone

Optifeeds Botswana
Plot 1227, Haile Selassie road
Old industrial ext. 6
Private Bag BO 005
Gaborone
Techno feeds
P.O. Box 403134
Gaborone

Woodsmoke industries
P/Bag BO 10
Maun

Botswana Agricultural Marketing Board
Plot 130 Units3 & 4
Gaborone International Commerce Park
Private bag 0053
Gaborone

Primary Production

Large Scale

WJ Herbst, Lobatse
R Schutte, Lobatse

Medium Scale

Agric Research, Gaborone
Botswana Defence Force, Pitsane
C S Herbst
F. Viljoen
BDF
Ntshe Farms

Small and Micro Scale

SOUTH EAST DISTRICT
BVTC
S Diphoko
Letsema
C Koekmoer
WJ Maree
JL Kerekang
Willie Herbst
J. Ackerman
LA Herbst

KWENENG DISTRICT
Kenosi C. Mmoloke
Joseph Mmoloke
TumoMowaneng
Elliot Phindela
GofamodimoRasesia
MoffatBabini
Peter Gabarongwe
NchomaneRegoeng
Molepolole Prisons

KGATLENG
J. Mosweu
H.Tsiako
Adam's Apple
P.P.Maribe
K .Rammidi
S. Machailo
J. Gaetsaloe
M. Dikgale
S. Boikanyo
S. Moleele
Mrs Coyne

MAHALAPYE SUB DISTRICT
State Prison
MontheMonthe

PALAPYE SUB DISTRICT
Mookodi
GothamangMotswagole
Matshambani
Palapye Dev. Trust
NonofoMakwapa
B. SEEMA

SEROWE SUB DISTRICT
J. Molwalefhe
O. Tobane
F. Molelwane
O. Lefhoko
S.F. Brigade
Mr Mogwera

TUTUME SUB DISTRICT
Mr Salani

NORTH WEST DISTRICT
Nonny Wright
Dikobe

GABORONE DISTRICT
DAR
B.C.A
Katse
Mokefane

GOOD HOPE SUB DISTRICT
S.Ditlhabi
R.Kgengwenyane
K.C Mathule

JWANENG
Gare
Farm Fresh-Dingalo
Tiro
Nthomang
BM Dairy

KANYE SUB DISTRICT
MphoRadipitse
Mogatwane
WalebatlaRadipitse
SentatlhengKooneeng
Ramatea V. School
BatshwariDintwa

Dairy Processing Facilities

Large Processors

CLOVER BOTSWANA
Plot 22042 Mahuditlhane Rd
P/Bag 00339
Gaborone

DELTA DAIRIES
Plot 54233 Broadhurst industrial block 3
P.O. Box 4425

Gaborone

PARMALAT BOTSWANA
Plot 22026/27 Takatokwane Rd
Gaborone WestIndustrial
P/Bag 00246
Gaborone

SALLY DAIRY PRODUCTS
Plot 48/49 Zeerust Road
Tlokweng
P/Bag 00329
Gaborone

Small Processors

WHITE ANGLES (PTY) LTD
P.O. Box 452
Metsemotlhabe

YARONA DAIRY
Molepolole
Waga waga
Maun

Milk Collection Centres

SEROWE MILK MARKETING ASSOCIATION
Pitsane dairy
P.O. Box 342
Pitsane

Appendix 3: Existing Business Support Institutions

INSTITUTION	PURPOSE/ MANDATE	SERVICES/EFFECT ON DAIRY VALUE CHAIN
Government Ministries		
MOA	Agric policy, promotion and programmes	Agricultural policy; Extension services; Hides & skins improvement programme; Department of Veterinary Services; Livestock Management &infrastructure development programme (LIMID); Department of Agri-Business promotion; Export, movement, import permits
MTI	Trade & industry policy, promotion & programmes	Private Sector Development Strategy & Programme; Strategy for Development of Textile & Clothing Sector; Trade Policy, Strategy, Negotiations & Implementation; Economic Diversification Drive; Industrial Upgrading & Modernisation Programme (IUMP); Textile and Clothing Strategy; Business licensing;
Public Institutions /Government Agencies		
Artificial Insemination (AI) Centre, Department of Animal Health, MOA	Farmer training in AI	Enhanced breeds
BNVL	Laboratory animal disease diagnostics & certification of products of animal origin	A specialised division of the Department of Veterinary Services performing animal disease diagnostics to allow for proper management of animals and disease prevention. Also certifies products of animal origin such as milk and dairy products, meat and meat products fitness for human consumption.
Training and Research Institutes		
Agricultural Hub, MOA	Transformation of agriculture	Commercialise and diversify agricultural sector (as part of Vision 2016)
BCA	Education, training and research in Agriculture	Education & Training; R&D; Linkages with University of Botswana for additional R&D
BOBS	Development of national standards	Standards
BVI	Animal vaccines development & sales	Provision of animal vaccines

The PSDP is an inititative of the Government of Botswana, represented by the Ministry of Trade and Industry and Ministry of Finance and Development Planning, in partnership with the Euorpean Union

Government of Botswana

European Union

BOTSWANA INVESTMENT & TRADE CENTRE

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