Pro-Poor
Livestock
Policy
Initiative

Developing Countries and the Global Dairy Sector Part II: Country Case Studies

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PPLPI Working Paper No. 31

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PREFACE

This is the 31st of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Livestock is vital to the economies of many developing countries. Animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. For low income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock and livestock products in developing countries, though starting from a low base, is growing rapidly.

This paper is the second of a study on the impacts of global dairy trade on developing countries and aims to address the question of whether and to what extent dairy sectors in developing countries have been harmed by the practice of some OECD countries to dispose of surplus milk powder by 'dumping' it on the world market. The paper adopts a case-study approach and six countries, Thailand, Bangladesh, Tanzania, Senegal, Peru and Jamaica were selected for a detailed analysis of their dairy sector. The individual country studies review national dairy production, consumption and trade; marketing and processing; dairy policies and finally provide a qualitative assessment of the likely impact of milk powder imports on the dairy sector. The study concludes by summing up the findings on the likely effects of milk powder imports in each of the six countries.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author, PPLPI and the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization (FAO).

Disclaimer

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Keywords

Global dairy sector, dairy production, dairy consumption, dairy trade, dairy industry, dairy development

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EXECUTIVE SUMMARY

Introduction

This is the second part of a study on the global dairy sector and developing countries. The first part provided an overview of the global dairy sector, its development trends over the past twenty years and the main international dairy trade flows as background information and overall context. This part aims to address the question of whether and to what extent dairy sectors in developing countries have been harmed by the practice of some OECD countries to dispose of surplus milk powder by 'dumping' it on the world market. The paper adopts a case-study approach and six countries (Thailand, Bangladesh, Tanzania, Senegal, Peru and Jamaica) have been selected for a detailed analysis of their dairy sector. These six case study countries were chosen because either (a) concerns about damage to the domestic dairy sector through milk powder imports from OECD countries had been raised (Jamaica and Tanzania), (b) they have a high import dependency for dairy products while with at the same time having a reasonable domestic capacity or potential for milk production (Bangladesh and Peru) or (c) to provide a wider geographic representation (Thailand and Senegal).

The Country Studies

In the first section of each country study a general background of the country is presented including climatic, geographic and economic information as well as some information on the importance of the dairy sector within agriculture and the national economy.

The second section portrays dairy production trends and consumption patterns for each country together with the development of dairy product imports and exports and the level of self-sufficiency in dairy production.

The third section on dairy marketing and processing gives an overview of the various dairy marketing channels operating in the single countries, the importance of formal versus informal markets, market power and concentration of processors, and the degree of price setting power as well as profitability of milk processing.

The fourth section provides an overview of dairy policies in place in the different countries, dividing policies into measures affecting production and marketing, consumption and trade.

In the final section an attempt is made to gauge the likely impacts of milk powder imports on the domestic dairy sector based on the analysis of the preceding sections.

Conclusion

Arguments that speak against a significant negative effect of cheap milk powder imports are the fact that there often is no countrywide distribution of imported milk powder, the latter being primarily sold in the major cities so that rural dairy producers selling in rural areas are in fact not experiencing competition. Furthermore, of the countries studied, those with the highest proportion of dairy imports, Jamaica, Senegal and Thailand offer the highest producer prices, suggesting that imports are a result of supply shortages rather than their cause. In the case of

Senegal, milk powder imports even sustain a vibrant small-scale repacking industry and lead to employment creation.

Thailand and Peru are effectively protecting their dairy market through tariff barriers from lower price milk powder imports. However, this strategy has an uncertain future as increasing trade liberalisation and bilateral trade agreements make it more and more difficult for developing countries to keep up high levels of tariff protection.

While subsidised milk powder imports in some cases are likely to have contributed to difficulties of dairy sector development in the case study countries, in none of them do they appear to have been the major constraint. As in developing countries climatic conditions for dairy production are often unfavourable for high-yielding breeds, production volumes are low and long-distance distribution costs high while demand for dairy products, particularly from urban centres substantially exceeds domestic production, dairy product imports mainly serve to bridge the gap between domestic demand and production, particularly in the lean season.

It seems that often the claim of dumping is used as an opportune explanation for slow development and lack in competitiveness of domestic dairy sectors that frees policy makers from the necessity to address home made obstacles for development. A forward looking strategy for national dairy production would therefore focus on improving competitiveness of production and processing as well as limit concentration of a few large companies that control the whole sector.

1. INTRODUCTION

This is the second part of a study on the global dairy sector and developing countries. The first part provided an overview of the global dairy sector, its development trends over the past twenty years and the main international dairy trade flows as background information and overall context. This part aims to address the question of whether and to what extent dairy sectors in developing countries have been harmed by the practice of some OECD countries to dispose of surplus milk powder by 'dumping' it on the world market.

A very influential feature for the development of dairy sectors in developing countries is the nature of traditional domestic dairy consumption habits. The types of dairy products that consumers demand varies widely across countries, but generally remains tied to traditional consumption habits despite 'westernization' of diets, especially in the higher-end consumer segments.

In most of South Asia and East Africa, milk and dairy products are traditionally consumed and demand for liquid milk, including raw milk is relatively strong. In South-East Asia and coastal West Africa, dairy consumption tradition is weak or absent, and market demand is mostly for processed products such as yoghurt, fermented milk or milk powder, consumption habits that have only recently been acquired. These underlying consumption 'traditions' and their relationship to domestic production are reflected in Figure 1. As can be seen, South East Asian and West African countries exhibit high import dependencies at low per capita supply of dairy products while South Asian and East African countries are much less import dependent at comparatively higher supply of dairy products. Near East countries show import dependencies similar to those of South East Asia, however at a significantly higher level of supply while South American countries show the highest levels of supply at relatively low levels of importation.

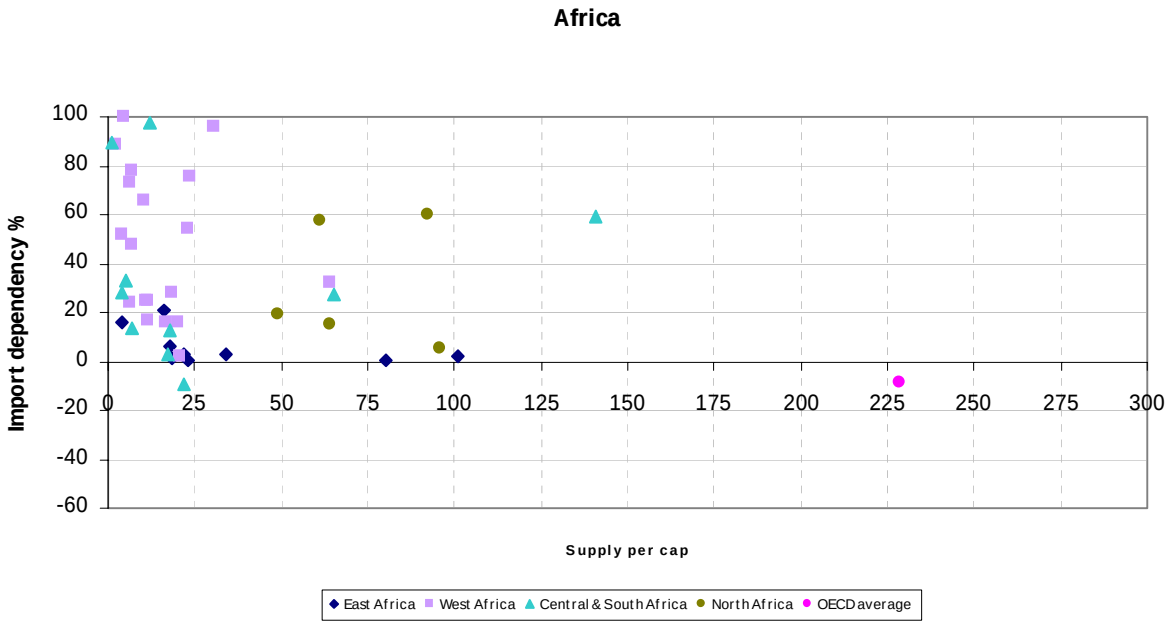
In the first case (South Asia and East Africa), where liquid milk markets dominate, once milk is bulked there may be constraints to formal distribution and retailing, unless strong links exist with established processors. Further, in the flush season market outlet opportunities may be constrained while competition from the informal market can be strong. In the second case (South East Asia and West Africa), where consumers prefer processed products, producers are often offered low prices for raw milk by processors to offset the high processing costs, and to remain competitive vis-a-vis imports of similar products (Staal, 2000).

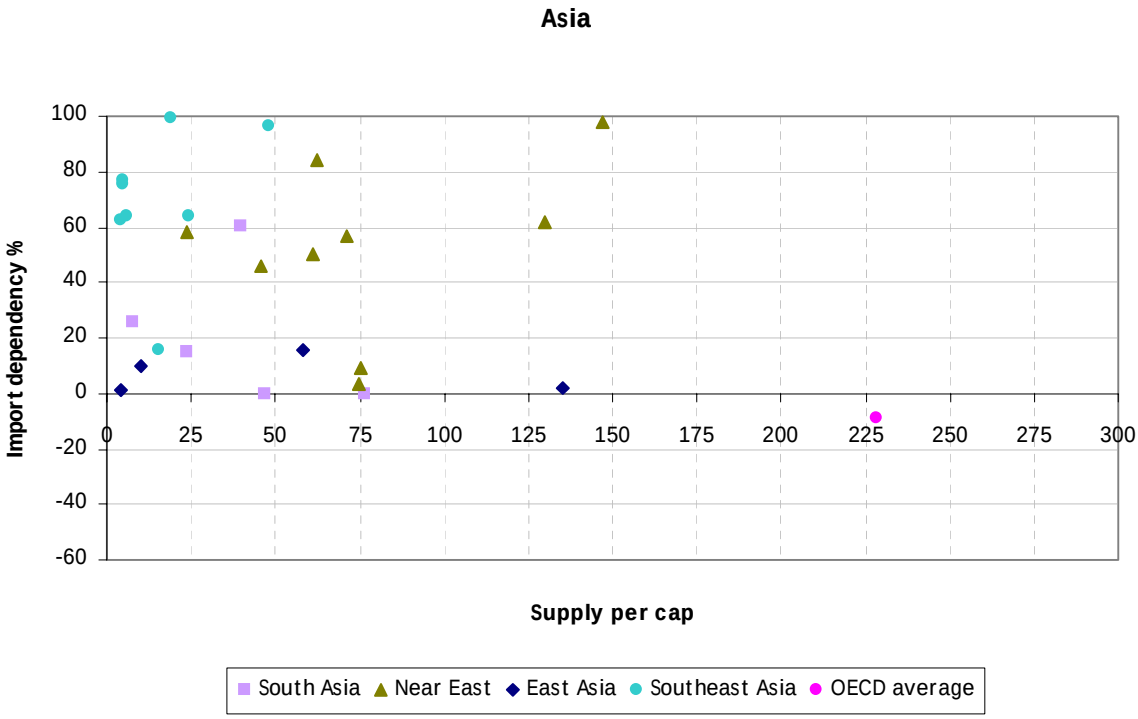
A general problem for dairy production in the tropics are elevated temperatures which do not favour the use of high-yielding temperate dairy breeds such as Holstein Friesian or Brown Swiss but require farmers to resort to adapted, but lower-yielding native dairy breeds (eg. Sahiwal, Gyr) and their crosses. Production volumes per cow and herd sizes are usually relatively small, which in turn leads to high collection costs and makes it difficult to set up profitable processing plants. A further problem in tropical countries is the pronounced seasonality of production with relatively abundant milk supply in the rainy season and, in the absence of supplementary feeding, extremely low production volumes in the dry season. This often leads to bottlenecks in the processing and marketing chains and supply shortfalls during the dry season, which have to be covered through imported dairy products.

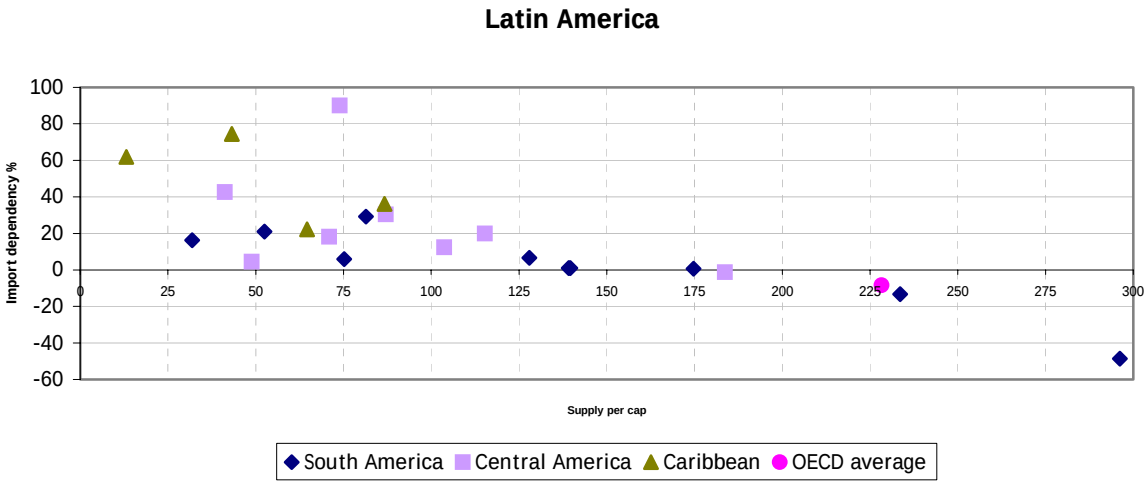
Milk powder and other imported dairy products usually flow though formal market channels while in many developing countries the formal sector captures only a very small share of the domestic milk market as the consumers, particularly those in rural areas, mostly are not willing to pay the extra costs of formal processing and packaging, and process the milk themselves or buy it from small informal processors, which have lower margins than their formal counterparts. These informal processors are better adapted to local circumstances and, given the relatively low production

volumes, often more profitable than larger-scale enterprises. They normally offer higher prices to farmers and lower retail prices to consumers, however, adulteration of milk and problems of product safety are common problems in the informal dairy chain.

Figure 1: *Regional differences in dairy product supply per capita vs. import dependency.*







Given the difference between countries in their 'initial' dairy tradition, agro-ecological endowment, climate and infrastructure and the complexity of formal and informal dairy sector development, quantification of the relative impact of the availability of subsidised milk powder on the world market may have on the development of the dairy industry of specific countries or groups of countries vis-à-vis other factors is notoriously difficult.

This paper therefore adopts a case-study approach and six countries (Thailand, Bangladesh, Tanzania, Senegal, Peru and Jamaica) have been selected for a detailed analysis of their dairy sector. These six case study countries were chosen because either (a) concerns about damage to the domestic dairy sector through milk powder imports from OECD countries had been raised (Jamaica and Tanzania), (b) they have a high import dependency for dairy products while with at the same time having a reasonable domestic capacity or potential for milk production (Bangladesh and Peru) or (c) to provide 'typical' examples of countries, which do not have a tradition of dairy consumption and production (Thailand and Senegal). (Tanzania and Bangladesh represent examples of countries with a tradition in dairy consumption and production).

The individual country studies are structured as follows: first a country background is given, followed by sections on dairy production, consumption and trade; marketing and processing; dairy policies and finally as qualitative assessment of the likely impact of milk powder imports on the countries' dairy sector. The study ends with a conclusion summing up the findings on the likely effects of milk powder imports of the six countries.

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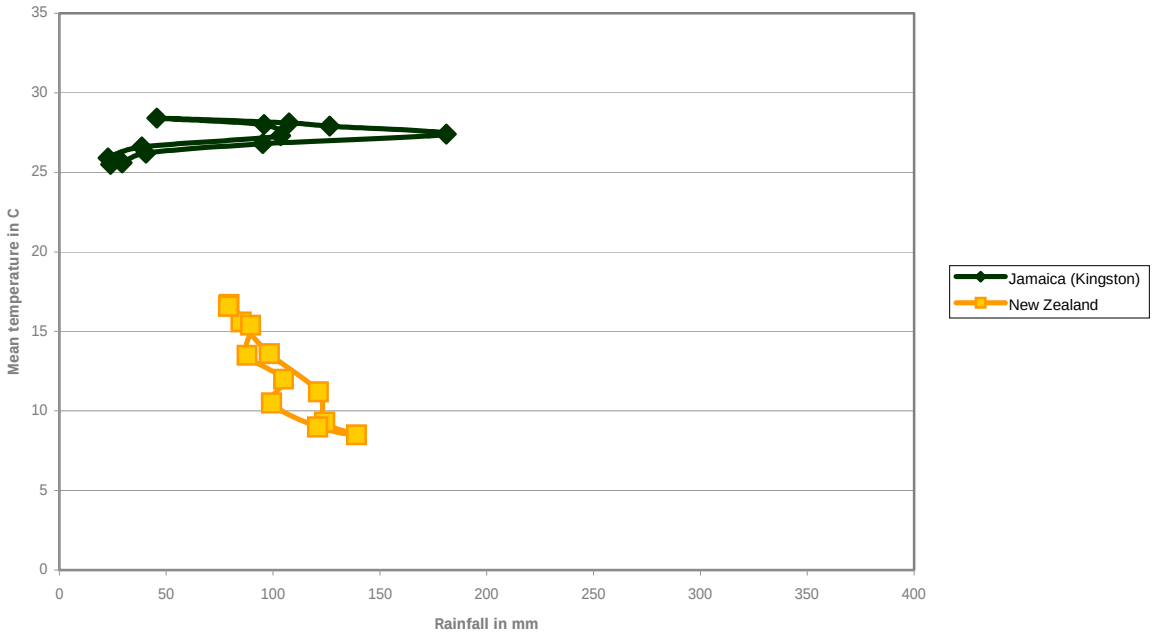
2. JAMAICA

2.1 Background

The island of Jamaica is located in the Caribbean Sea, south of Cuba and has a tropical hot and humid climate (see Figure 2) with a temperate interior. The island is mostly mountainous, with a narrow, discontinuous coastal plain. Jamaica has a land area of 11,000 square kilometres of which 47.4 percent is classified as agricultural land, 44.6 percent of the agricultural area is permanent pasture. Conditions for milk production from grass are conducive in many parts of the island (Dugdill, 1998) while the tropical climate favours the use of tropical milk breeds. However, the seasonality of fodder availability leads to seasonal milk peaks and troughs.

Figure 2: *Climograph of Jamaica*[1]*.*



In 2003, Jamaica had a population of 2.6 million people, of which 20.6 percent were employed in the agricultural sector. However, the agricultural sector only contributed 5.2 percent to GDP and rural poverty reached a level of slightly over 25 percent. Within agriculture, dairy production contributed a mere 1.8 percent of GDP, the main agricultural products being chicken meat, sugar cane, pimento, yams and cattle meat.

[1] Climatic conditions of New Zealand, one of the world's most efficient milk producers using high yielding dairy breeds and intensive pasture management, are included for comparison.

Table 1: *Jamaica country statistics.*

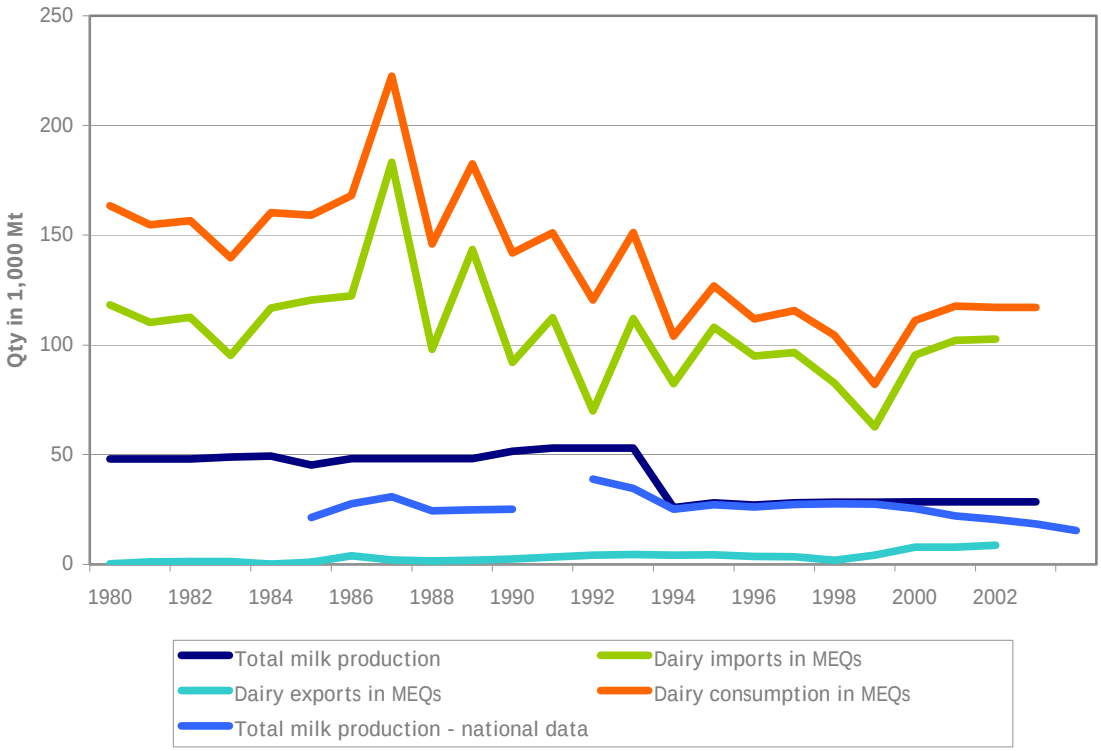
Demographics		Year	Source
Human population (million)	2.6	2003	WDI
Rural population density (people per sq km)	646.6	2003	WDI
Population in agriculture (%)	20.6	2000	FAOSTAT, 2005
Urbanization (%)	57.6	2003	WDI
Rural poverty (% of rural population)	25.1	2000	WDI
Land			
Land area ('000 sqkm)	11.0	2002	FAOSTAT, 2005
Agricultural area (%)	47.4	2002	FAOSTAT, 2005
Share of permanent pasture (% of agr area)	44.6	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	8,341	2003	WDI
GDP annual growth rate 1993-2003 (%)	0.8		WDI
GDP per cap (constant 2000 USD)	3,156	2003	WDI
GDP per cap PPP (constant 2000 USD)	3,877	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	5.2	2003	WDI
Livestock GDP as share of agriculture GDP (%)	38.6	2003	FAOSTAT, 2005
Livestock GDP as share of total GDP (%)	2.0	2003	FAOSTAT, 2005
Dairy GDP as share of livestock GDP (%)	5.1	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	1.8	2003	FAOSTAT, 2005
Trade			
Dairy export value (1,000 USD)	9,277	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	33,829	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	24,552	2002	FAOSTAT, 2005
Value of net dairy imports as share of total agricultural imports (%) (Average 1999 – 2003)	9.9	2002	FAOSTAT, 2005
Dairy Production			
Cattle (1,000 head)	84.0	2005	Duffus and Jennings, 2005
Grade 'Dairy' cows (1,000 head)	17.3	2005	Duffus and Jennings, 2005
Dairy cattle as share of all cattle (%)	21.0	2005	Duffus and Jennings, 2005
National cow milk production (tonnes)	15,400	2004	Jamaica Ministry of Agriculture
Milk yields (kg/cow/year)	1,065-5,475	1996	Jamaica 1996 census of Agriculture
Proportion of milk marketed (%)	n/a		
Ag HH with dairy cows/Dairy farms	245	2005	Duffus and Jennings, 2005
Average dairy herd size (cows)	71	2005	Duffus and Jennings, 2005
Number of cooperatives	na		
Cooperative members	na		

na = not available

2.2 Production, Consumption, Trade

Jamaica has a tradition of dairying and production was particularly enhanced in the 1950's when Nestlé came to Jamaica and, in collaboration with the government, set up a program to encourage milk production for local consumption through churn milk collection routes and condensed milk production. In the 1960s, 4,000 small dairy farmers were holding cows on 200,000 acres of improved pasture. But even then, domestic milk production only accounted for around 30 percent of total milk supply (CAFOD, 2003; FAOSTAT, 2005).

Figure 3: *Production, consumption, imports and exports in milk equivalents, 1980-2002.*



Source: FAOSTAT, 2005, JDDB 2003, Jamaica Ministry of Agriculture

The 1990 Livestock Census conducted by the Ministry of Agriculture found that approximately 2,250 farmers were engaged in milk production keeping 23,385 cows in dual purpose (milk and meat) or specialized milking systems. Eighty percent of the farmers operated herds of below 30 head (average herd size 1.6 head) and together owned 12 percent of dairy cattle while the large farmers (4 percent) owned 77 percent of the cattle population (average herd size 200 head) managed specifically for milk production (JDDB, 2003).

Since the 1990s the dairy sector in Jamaica has shrunk considerably. In 2005, 245 dairy farmers managed 17,300 dairy cattle with 7,225 ha of pasture. Among these, 179 were small farms with less than 10 cows, 37 were medium-scale farms with 11 to 100 cows, while 29 were large-scale operations with more than 100 cows (Duffus and Jennings, 2005). The average herd size was 71 cows with large scale farms holding over 70 percent of the national dairy herd.

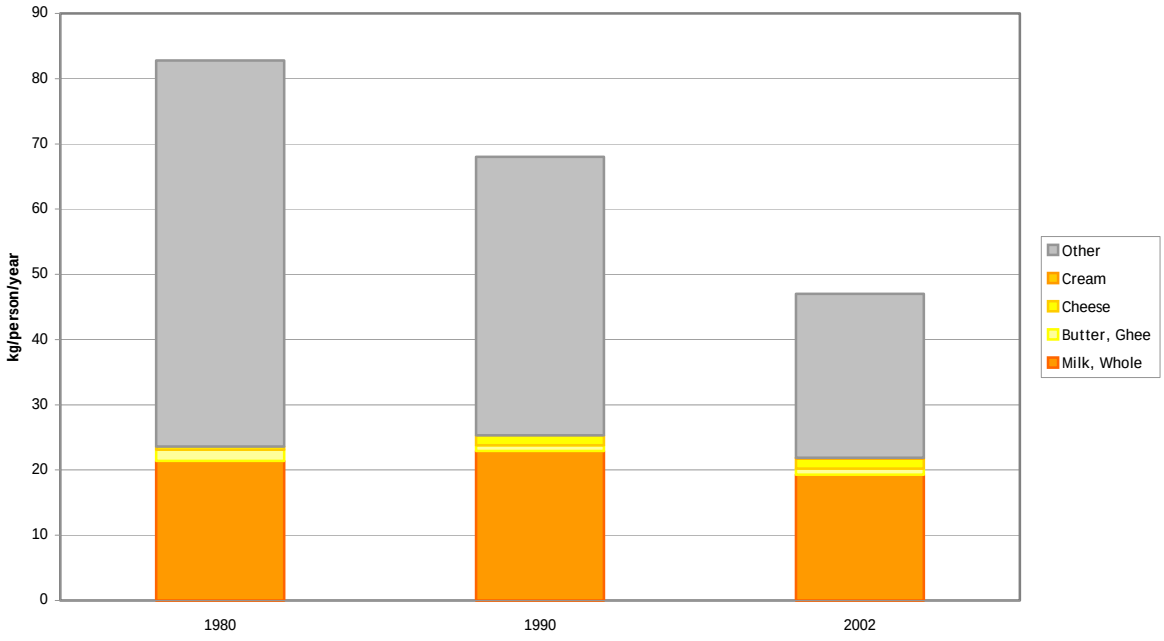
The majority of the dairy cows are kept in the five southern parishes of St. Elizabeth, Manchester, Clarendon, St. Catherine and St. Thomas, which accounted for over 77 percent of the national dairy herd in 2000 (Ffrench et al., 2000). Fifty percent of Jamaica's fresh milk is produced by two corporate farms, 40 percent is produced by medium-sized farms and co-operatives and less than 10 percent is produced by small farmers (CAFOD, 2003).

Ffrench et al. 2002 find that irrigated dairy farms had a cost of production per litre of milk of 19.78 JMD (0.39 USD) compared to 16.88 JMD (0.33 USD) for non-irrigated farms. Small non-irrigated farms showed the lowest direct costs of milk production with variable costs of 12.21 JMD (0.24 USD) per litre. These costs are high compared with cost levels in other Latin American countries (Hemme and Deeken, 2005).

Technology adjustment at farm level has, historically, contributed only minimally to the development of the local dairy farm sector as dairy farmers have shown little willingness to apply the results of the growing body of research on feeding and management of dairy cattle produced locally as well as in similar tropical countries. The fact that interest rates on agricultural loans, after peaking at 38 to 40 percent during 1992-1994, have fallen steadily since, without any perceptible impact on the uptake of credit by the dairy farm sector, according to Jennings (2005) speaks clearly for a resistance to technological change. However, an alternative explanation could be that investments in dairy technology are perceived as risky and farmers do not expect sufficient returns.

Per capita dairy consumption has continuously fallen in Jamaica over the last twenty years. Whereas, in 1980 the average Jamaican consumed over 80 kg of dairy products per year, per capita consumption had fallen to less than 50 kg in 2002. Despite this development, in 2002, dairy products still represented a significant component of the Jamaican food basket accounting for 8.7 percent of food expenditure (JDDB, 2003). Reasons for the low consumption are the relative unaffordability of dairy products – in 2005, a litre of fresh milk cost USD 1.25 to 1.30 in a Kingston supermarket - together with changing consumer preferences for selected modern dairy products that are not produced by local processors.

Figure 4: *Per capita dairy consumption in Jamaica, 1980, 1990 and 2002.*



Source: FAOSTAT, 2005

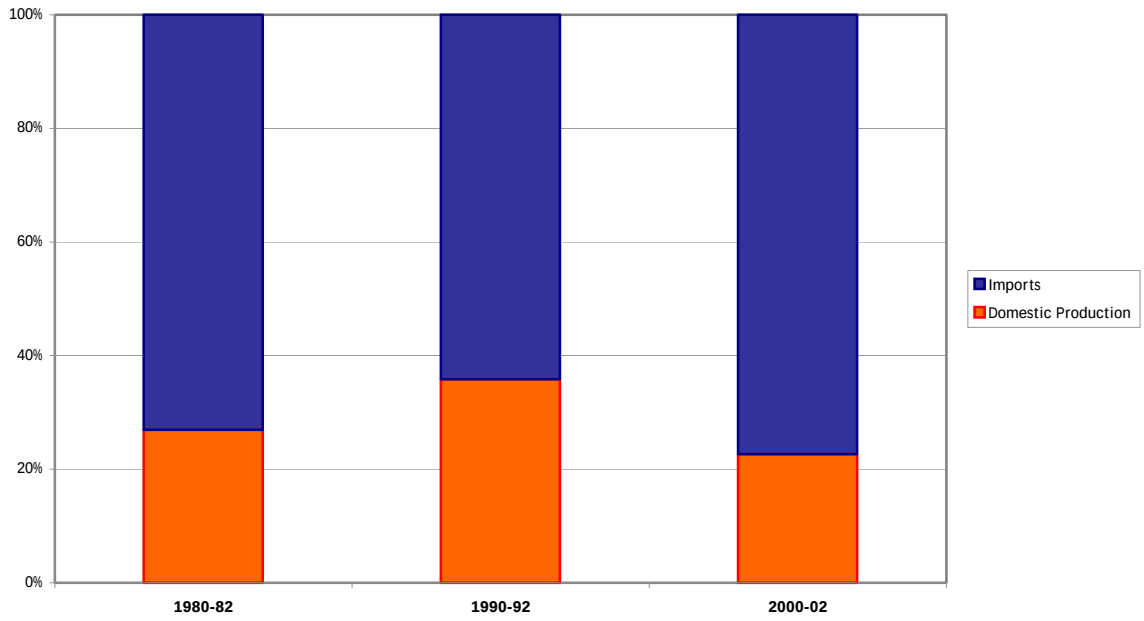
Jamaica is historically a net importer of dairy products and self-sufficiency in milk has always been relatively low (Zhang et al. 2003). In 1987, the Jamaican government established the Jamaican Commodity Trading Company (JCTC) as the sole importer of skim milk powder. Simultaneously, tariffs for dairy products were raised, and as a result, domestic prices for fresh milk increased. The situation of parity between the price of imported skim milk powder and the price of locally produced fresh milk for processors stimulated domestic milk production in the late 1980s and early 1990s. However, in 1992, both the import monopoly was removed and tariffs were cut as part of a structural adjustment loan negotiated with the World Bank (Zhang et al. 2003).

While the protective measures led to an increase of domestically produced milk as a share of total dairy product supply from 27 percent in 1981 to 36 percent in 1991, this share dropped again after liberalisation and was only 23 percent in 2001.

Especially in the period after 1986 milk imports were very volatile with the quantities of liquid milk equivalent imported varying by as much as 60,000 tonnes between two consecutive years. After a sharp rise in imports of liquid milk equivalent from 122,000 to 183,000 tonnes between 1986 and 1987, imports have declined and only amounted to 63,000 tonnes in 1999 while by 2002 they had again risen to 103,000 tonnes (see Figure 3) roughly the same level as at the end of the 1960s.

Between 1980 and 2003 the share of milk powder imports in total dairy imports dropped from 71 to 43 percent in volume and from 52 to 30 percent in value terms. Over the same period, cheese imports increased from 6 percent to 29 percent of total dairy imports in volume and from 12 to 38 percent in value. Ice cream accounted for 10 percent of the volume and 7 percent of the value of total dairy imports in 2003. Butter imports rose slightly from 22 to 29 percent in volume terms and from 35 to 38 percent in value terms between 1980 and 2003. Total import volumes for dairy have been moving around 15 million tonnes between 1980 and 2003 with import value having increased from 18.7 to 30.5 million USD reflecting the above mentioned shift in imports away from bulk commodities such as dry milk to value added products like cheese and ice cream (FAOSTAT, 2005).

Figure 5: *Origin of the dairy supply in Jamaica.*



Source: FAOSTAT, 2005

2.3 Marketing and Processing

Largely as a result the dominant market position of a few large processors, consumers pay a high price for liquid milk with the lion's share of the retail price going to processors and retailers. The high trade margins have been driven by the introduction of the 'exclusive distributor' into the dairy chain as well as on-going capacity utilisation reductions at processing plants (Jennings, 2005). As the vast majority of dairy farmers is not integrated in the up-stream markets their ability to find alternative outlets for their milk if it is rejected by the processors is very limited. For example, this limited market integration led to the throwing away of significant amounts of milk by Jamaican farmers that was reported in the media worldwide when Nestlé reduced its purchases of local fresh milk in 2002.

Due to, by international standards, relatively high farm gate prices of JMD 24 or USD 0.40 per litre of fresh milk in 2004, consumer prices are relatively high with JMD 67.7 to 69.7 or USD 1.13 to 1.16 per litre of processed milk (these prices refer to 2004). Ratios of farm gate to retail price have increased from 2.1:1 in 1992 to 2.8:1 in 2004 (over this period farm gate prices have increased 2.5-fold while retail prices have increased 3.5-fold). Major contributors to this widening gap have been the introduction of the 'exclusive distributor' and the low capacity utilization of the local milk processing plants leading to high processing costs. Of the estimated processing capacity of Jamaican dairy plants of 80 million litres a year only 19 percent were utilized in 2004 (Jennings, 2005; Duffus and Jennings, 2005).

The high consumer prices resulting from high producer prices plus high margins that prevail in the dairy chain, have led to a decline in the demand for dairy products. With respect to dairy and milk powder imports, the high margins captured by processors and retailers have denied the intended benefits to the consumer which originally provided the justification for the retention of a low tariff regime for dairy imports (JDDB, 2005). Furthermore, the persistence of an exclusively single-product industry (packaged liquid milk) as outlet for locally produced milk has contributed significantly to the decline in demand for local milk, whereas products for which demand is growing such as ice cream, cheeses and butter have to be imported (JDDB, 2005). In 1998, there were around ten milk processors with capacities ranging from 1,000 to 100,000 litres a day operating in Jamaica. Especially the larger of these only bought limited amounts of local fresh milk and preferred using imported milk powder for product manufacture (FAO, 1998).

According to Eurostep, of the three largest dairy processors in Jamaica, two are Nestlé subsidiaries. Nestlé has been operating in Jamaica since the mid-forties, and until 2000, collected 70 percent of all domestically produced milk. Nestlé was seen as the 'engine of Jamaican dairy industry' and has been granted special privileges. Until 1997, it had the exclusive right to import milk powder at a 5 percent import tariff, while the other processors had to pay a 30 percent tariff. In 1997, however, the 5 percent tariff was extended to all manufacturers, adding to the squeeze on domestic milk producers (Eurostep, 1999).

Since 2000, Nestlé has steadily reduced it purchases of fresh milk from farmers. As recently as 2001, Nestlé purchased 10 million of the 25 million litres milk produced by Jamaican Dairy farmers. This was reduced to 6 million litres in 2002. Between 2000 and 2002 all 300 farmers who had supplied milk in churns and had it picked up by truck were trying to accommodate the mandate by Nestlé that farmers bring their milk to one of four cooling stations. By January 2002 all churn collection routes had been abandoned and the milk processors' expenditure on collection had passed to the farmers while at the same time raw milk prices were lowered (CAFOD, 2003).

Apart from reducing collection volumes from local farmers, Nestlé also consolidated manufacturing operations. In 2000, Nestlé's pasteurised milk lines were sold to the

Jamaican processor Island Dairies while at the same time UHT milk processing was centralised and ice cream manufacturing ceased altogether (Black, 2001).

2.4 Dairy Policies

Production and Marketing

With support from the Commonwealth Secretariat the Jamaican government started to implement a national dairy development strategy by the end of 1997. Direct outcomes were the establishment of the Jamaican Dairy Farmers Federation (JDFF) in 1998 followed by the establishment of the Jamaican Dairy Development Board (JDDB), which was set up within the Ministry of Agriculture as a statutory body to guide government policy in 1999.

The JDFF was formed to organise and rationalise production and collection of milk and to enable farmers to process and market their milk directly without having to sell to processing companies and to also guarantee constant demand. To this end the JDFF took over a formerly privately owned milk processing plant in 2000.

While farmers expected the JDFF plant to be able to absorb all the milk they could not sell elsewhere it soon turned out that the acquired plant was not equipped to handle all the milk the farmers had to sell. Furthermore, JDFF had difficulties entering the retail market and competing with established brands. As a consequence, and because their feed supply scheme had problems to collect payment from farmers who had been delivered feed, the JDFF started having cash flow problems and finally found it hard to pay the salaries of its professionals (CAFOD, 2003).

Consumption

An expanded school milk program in Jamaica aims at ensuring nutritional levels among the more vulnerable segments of the population where (powdered) milk consumption is lowest.

Trade

As a reaction to rising skim milk powder imports, in 1987, the Jamaican government established the Jamaican Commodity Trading Company (JCTC) as the sole importer of skim milk powder. By increasing the tariff on skim milk powder and passing part of the revenue on to local dairy producers as a subsidy, the JCTC created a situation of parity between the price of skim milk powder to processors and the price of fresh milk (Eurostep, 1999). Although domestic milk production dropped from 31,000 to around 25,000 tonnes right after the raising of the tariff (between 1987 and 1990) it reached an all time peak of nearly 39,000 tonnes in 1992.

In 1992, JCTC's import monopoly was removed in compliance with terms attached to a structural adjustment loan negotiated with the World Bank in 1990. At the same time import tariffs were reduced and the parallel subsidy for local dairy farming was abolished. This made imported powder milk considerably cheaper than domestic milk (Eurostep, 1999). The liberalisation process was supported by domestic social and economic pressures and was perceived as part of a 'deliberate policy to keep imports cheap' to avoid inflationary developments associated with rising food costs. It was also felt that the government's preoccupation was more with the needs of poor consumers and overriding the concern for small farmers (Weiss, 2004).

In 1994 Jamaican dairy farmers commissioned a study by an international accountants firm which they presented to the Jamaican Anti-Dumping Advisory Board. Investigations took very long but finally the accountants made a recommendation of a 137 percent countervailing duty (against dumping) to the Parliamentary Committee on Production. Though this recommendation was never taken on board, in 1996 the parliament decided that the import duty on whole milk powder was to be increased from 30 percent to 50 percent. However, at the same time the concessionary import duty of 5 percent that Nestlé enjoyed was extended to all manufacturers (CAFOD, 2003).

Tariff protection for dairy products in Jamaica is 75 percent for liquid milk, 30 percent for skim milk powder, 50 percent for whole milk powder, 30 percent for condensed milk, 20 percent for yogurt, 10 percent for butter and 5 percent for cheese (AMAD 2001).

2.5 Likely Impacts of Milk Powder Imports

It is undeniable that the Jamaican dairy sector, which since the 1960s was always far from self-sufficient, has begun to decline in the early 1990s. However, it seems over simplistic, and also somewhat misleading, to put the entire blame for this decay on rising milk powder imports (In fact there is no clear trend in milk powder imports). As nearly the entire literature on the Jamaican dairy sector departs from the assumption that milk powder imports were the sole cause for its decline, while in-depth analyses are lacking, it is very difficult to find unbiased information and get an untainted picture.

Since the 1970s milk powder imports have been very volatile and reached their peak in 1987 but have since then declined, however, with intermitted temporary peaks. Though the artificially low world market price for milk powder made it difficult for fresh local milk to compete with imported milk powder after the import liberalisation and subsidy cut for dairy farmers in 1992, it did not lead to an increasing trend in dairy import volume. Other factors that played a role in the decline of Jamaica's domestic dairy sector were the, by international standards, relatively high production costs and producer prices for fresh milk as well as the uneven competition between small farmers and a few big farms. Some of these large farms, that produce the bulk of the domestic milk, are owned by industrial conglomerates and have a distinct competitive advantage through easy access to capital and technology.

The unfavourable position of small farmers in Jamaica is exacerbated by the dominant market position of a few large processors. The largely unorganised small farmers seem to have only very limited price negotiation power and cases where farmers threw away their milk because they did not want to accept the prices offered by processors drew international attention. The fact that Jamaican processors only use low levels of capacity and equipment is underutilised leads to relatively high processing costs and high margins between producer and consumer prices (or in the case of imported milk powder between import price and consumer price). In turn milk is unaffordable for many poor consumers irrespective of its origin. Studies did not report any instances of farmers selling milk through the informal milk market or directly to consumers and efforts by JDFF to establish an alternative marketing channel that would make farmers less dependent on the processing sector have failed.

Overall, the dairy sector in Jamaica was never one of the driving agricultural sectors and the number of the poor in the need of cheap food by far outnumbers the few remaining dairy farmers and those employed in the dairy sector. It would therefore be a more pro-poor approach to supply the population with affordable milk than to raise protection for an internationally uncompetitive dairy sector. This does not mean that the dairy sector should be completely abandoned, especially in the anticipation

of rising world market prices, but that strong emphasis should be put on improving international competitiveness both in primary milk production as well as in the processing industry.

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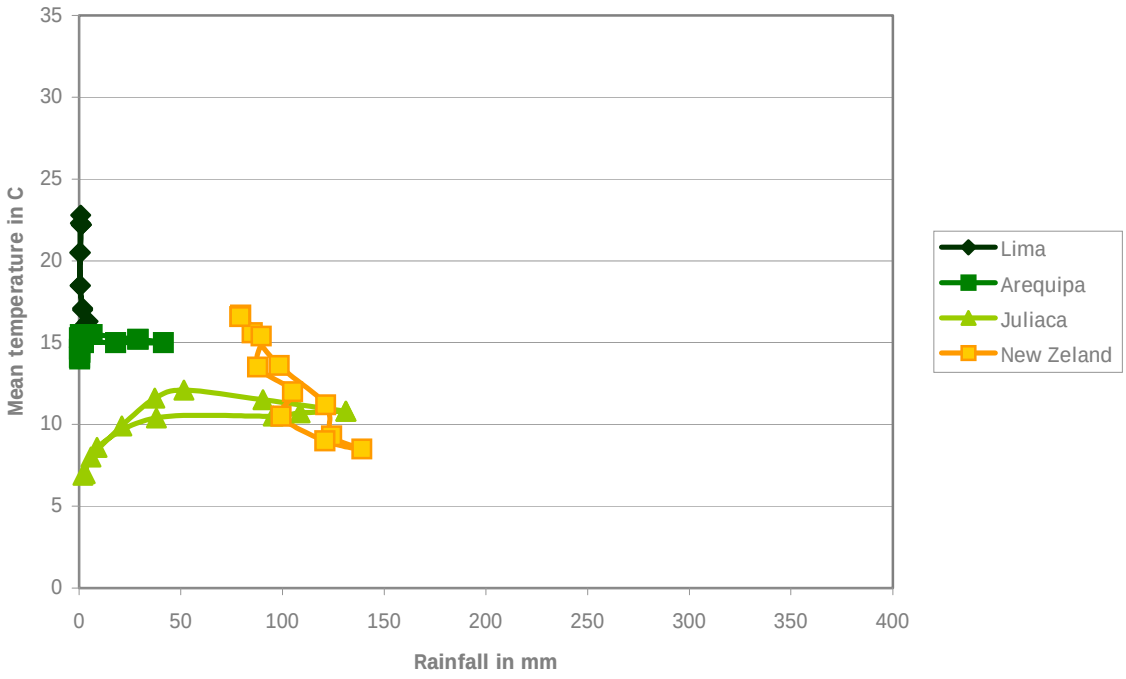
3. PERU

3.1 Background

The climate in Peru varies from tropical in the eastern part of the country to dry desert in the western part and from temperate to frigid in the Andes. The terrain is characterised by a western coastal plain (costa), the high and rugged Andes in the centre (sierra) and the eastern lowland jungle of the Amazon Basin (selva).

Peru has a land area of 1,280,000 square kilometres of which 24.5 percent is classified as agricultural land. Of the agricultural area 86.3 percent constitutes permanent pasture.

Figure 6: *Climograph of Peru.*



In 2003, Peru had a population of 27.1 million people of which 30 percent were in the agricultural sector. Rural poverty reached a level of 64.7 percent.

The agricultural sector contributed 10.3 percent to GDP in 2003 and within agriculture dairy production contributed 6.2 percent in value terms.

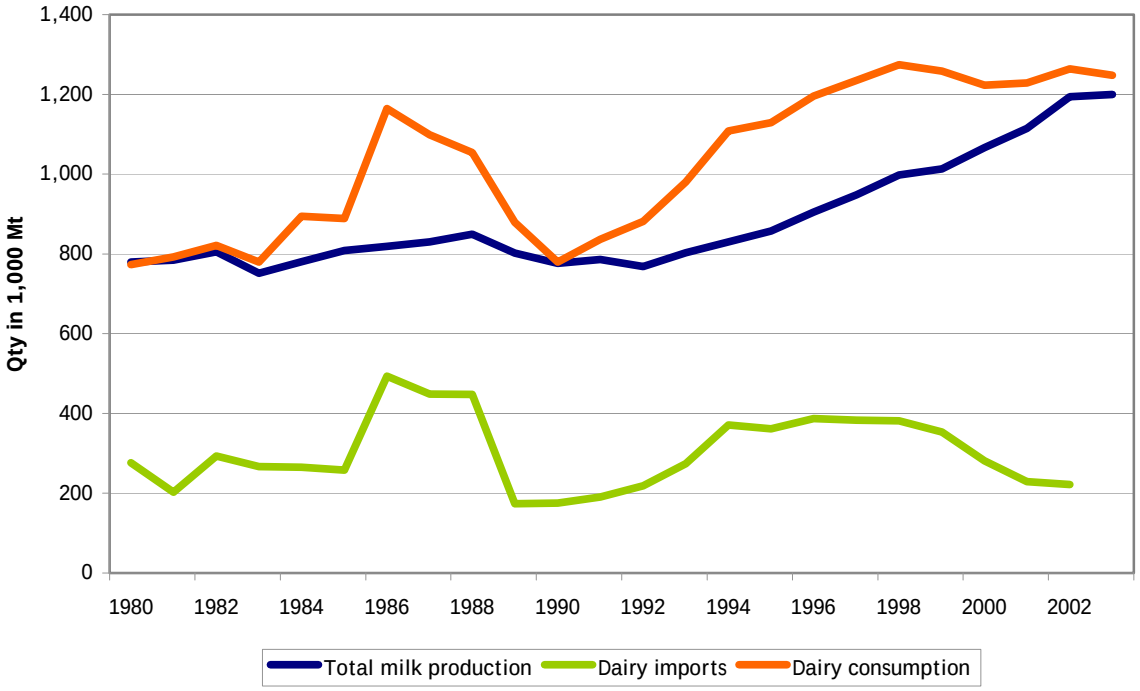
Table 2: *Peru country statistics.*

Demographics		Year	Source
Human population (million)	27.1	2003	WDI
Rural population density (people per sq km)	191.6	2002	WDI
Population in agriculture (%)	30.0	2000	FAOSTAT, 2005
Urbanization (%)	73.9	2003	WDI
Rural poverty (% of rural population)	64.7	1997	WDI
Land			
Land area ('000 sq km)	1,280	2002	FAOSTAT, 2005
Agricultural area (%)	24.5	2002	FAOSTAT, 2005
Share of permanent pasture of agricultural area (%)	86.3	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	57,843	2003	WDI
GDP annual growth rate 1993-2003 (%)	4.1		WDI
GDP per cap (constant 2000 USD)	2,131	2003	WDI
GDP per cap PPP (constant 2000 USD)	4,969	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	10.3	2003	WDI
Livestock GDP as share of agriculture GDP (%)	34.0	2003	FAOSTAT, 2005
Livestock GDP as share of total GDP (%)	3.5	2003	FAOSTAT, 2005
Dairy GDP as share of livestock GDP (%)	18.5	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	6.2	2003	FAOSTAT, 2005
Trade (2002)			
Dairy export value (1,000 USD)	10,990	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	54,672	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	43,682	2002	FAOSTAT, 2005
Value of dairy net imports as share of total agricultural imports (%) (Average 1999 – 2003)	6.2	2002	FAOSTAT, 2005
Dairy Production			
Cattle (1,000 head)	4,900	?	FAOSTAT, 2005
Grade 'Dairy' cows (1,000 head)	512	2003	Ministerio de Agricultura
Dairy cattle as share of all cattle (%)	10	2003	Ministerio de Agricultura
National cow milk production (tonnes)	1,226,130	2003	FAOSTAT, 2005
Average milk yields (kg/cow/year)	2,080	2000/01	Ministerio de Agricultura
Proportion of milk marketed (%)	74	2003	Calculation based on Peru LSMS 2003
Ag HH with dairy cows/Dairy farms	105,000	2003	Garcia and Gomez (2006)
Average dairy herd size (cows)	6.7	2003	Calculation based on Peru LSMS 2003
Number of cooperatives	na		
Cooperative members	na		

3.2 Production, Consumption, Trade

Milk production in Peru stayed more or less constant at a level of around 800,000 tonnes milk equivalent between 1980 and the early 1990s. However, since the beginning of the 1990s production started to grow (with an average annual growth rate of over 4 percent) and amounted to 1.3 million tonnes in 2004. This growth was fostered by improved access of processors to the highland producers, increases in productivity and growing numbers of dairy farms (Garcia and Gomez, 2006).

Figure 7: *Production, consumption and imports in milk equivalents, 1980-2002.*



Source: FAOSTAT, 2005

In 2003, 635,000 dairy cows were kept in the country on 105,000 dairy farms the average herd size being 6.1 cows and the average yield per cow per year being around 2,000 kg. Overall, 95 percent of the dairy farms held 80 percent of the cows (Garcia and Gomez, 2006, Minag 2003).

Although milk is produced throughout the entire country, the bulk of the milk (95 percent) is produced on the coast and in the highlands. The three dominating milk sheds are Arequipa (including Tacna and Moquegua) in the south, Cajamarca in the north, and Lima in the centre. Small-scale farming dominates milk production in these milk sheds; in all three regions, at least 95 percent of all milk producing farms have herds with less than 20 animals (Bernet *et al.*, 2001).

About 23 percent of the domestic milk is produced in **Arequipa** which is located on the coast 1,000 kilometres south of Lima. The major part of this milk is produced in the irrigation zones along the coast, where farmers combine milk production and agricultural crops (e.g., onions, garlic, potatoes). Because of the high price risk for agricultural crops, milk production - despite its lower profitability vis-a-vis agricultural crops – plays an important role in providing farmers with the necessary

security and capital for crop production. The feeding of dairy cattle is based on alfalfa, which is pastured and corn which is used fresh or ensiled (Bernet *et al.*, 2001). In Arequipa, larger farms have a competitive advantage as they are in a position to negotiate higher milk prices with processors (Bernet *et al.*, 2001).

Cajamarca, which is located in the northern highlands, accounts for 17 percent of Peru's milk production. The share of income derived from milk production varies strongly among farms, depending on environmental conditions and socio-economic context. Milk production is generally a complement of agricultural crop production. Under the highland conditions which prevail in the area, available resources (e.g., water, land, labour, manure, crop residues) are better used in mixed farming systems than in specialised dairy or crop farming. In contrast with sales from crop production, which are very seasonal because of the pronounced rainy season, sales of milk, cheese and meat provide an important income source for small-scale farmers throughout the year (Bernet *et al.,* 2001).

A limiting factor for farmers in shifting towards milk production is access to irrigation water as there is a pronounced dry season from May to October when fodder availability is inadequate. In areas where access to irrigation is limited, annual fodder crops (mainly field beans and oats) and crop residues gain importance as a means to partially overcome fodder scarcity in the dry season. Most milk is produced on farms that have access to irrigation and are thus in the position to cultivate artificial pastures. On those farms, Holstein and Brown Swiss cattle prevail, and the use of moderate levels of feed concentrates is fairly common, in contrast to hay or silage production (Bernet, 2000). Average milk production costs in Cajamarca however are lowest on larger farms relying on natural pastures (Bernet *et al.,* 2001).

The region around **Lima** is an important milk production area due to good marketing conditions owing to its proximity to the eight million consumers in Lima City. The region accounts for 16 percent of domestic milk production. The climate is hot and dry and milk production is generally based on stable feeding with fresh corn and concentrates as the main feeds. Often, milk production is a complementary economic activity to improve livelihood security and is, in fact, a particularly important income source for elderly people who have limited options to find other work (Bernet, 2000). However, these small farms have mostly deficient fodder and herd management, primarily because they lack capital and know-how. In contrast, large farms (with up to 800 head) are run efficiently and professionally with contracted labour (Bernet *et al.*, 2001).

Milk production around Lima has grown much faster in recent years than in Cajamarca and Arequipa. This fast growth has occurred mainly on large farms along the coast, where herd sizes and milk production have increased. Stall-feeding has favoured this intensification in milk production, causing a corresponding expansion of Lima's fodder production. Economies of size are especially pronounced in large agro-business farms near Lima. Contracted specialists and stall feeding allow high milk yields and costs of inputs, especially feed, fall due to the increased negotiation power (Bernet *et al.,* 2001). In the specialised milk sheds equipment and husbandry practices have improved with advanced post milking practices and the introduction of storage and cooling tanks that allow higher milk quality. However, the quantity of milk cooled on farm remains very low, not more than 10 percent of production and mechanic milking is also still very rarely used with 95 percent of production still milked by hand (Minag, 2003).

In the hot and humid climate of the **rainforest (selva)** dual purpose production predominates. The production system is characterised by predominantly Zebu cattle, mostly Brahman types, frequently crossbred with European breeds. Despite the inherently low milk yields of these animals, dams are milked regularly if markets for fresh milk or processed products, mostly cheese, are available. In most documented cases in the South American rainforest areas, daily milk production per cow does not

exceed 4 kg, typically a once-a-day milking with the calf at foot. When road or market conditions do not allow for the sale of fresh milk or its by-products, cows are not milked and calves are allowed continuous access to their dams (Vera *et al.*, 1996).

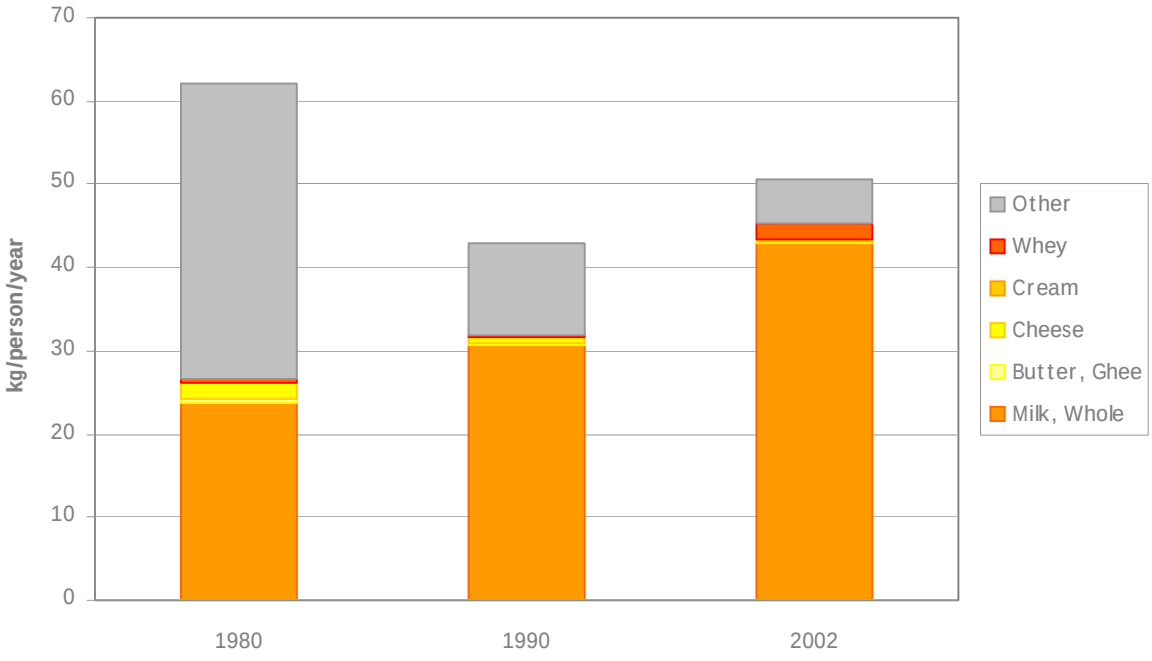
Milk production costs range from PNS 0.40 to PNS 0.90 (USD 0.12 to USD 0.26) per litre of fresh milk depending on the location and production system of the dairy farms. While in Arequipa the major cost factor (60 percent) is green fodder in Lima 57 percent of the costs are due to feed concentrates. Competitiveness of milk production varies strongly between and within milk sheds. Varying profits between the different farm sizes within the same milk shed are determined by the relative magnitude of economies of size, both on the income side (i.e., better negotiation power for milk prices, improved management) and the cost side (lower expenditure per cow) (Bernet *et al.*, 2001).

While total dairy consumption in Peru increased from around 800,000 tonnes milk equivalent in 1980 to over 1.2 million tonnes milk equivalent in 2003, per capita dairy consumption declined over this period. A particularly sharp decline in per capita consumption occurred between 1980 and 1990, when consumption fell from over 60 kg per person per year to slightly above 40 kg per person per year. Even though per capita consumption started to rise again after 1990 it still had only reached 50 kg per person per year in 2002, which is the second lowest level of per capita milk consumption in South America after Bolivia.

Fresh raw milk accounts for 40 percent of dairy product consumption, 53 percent is consumed as processed milk (which is produced to 35 percent from imported milk powder) and 6 percent are imported value-added dairy products (Garcia and Gomez, 2006).

Due to difficulties in maintaining the cold chain, evaporated milk is the most common processed dairy product and accounts for 75 percent of the formal market. UHT milk is also becoming popular but, due to its higher price, it is only affordable to better off consumers (USDA FAS, 2004).

Figure 8: *Dairy consumption per capita per year in Peru.*



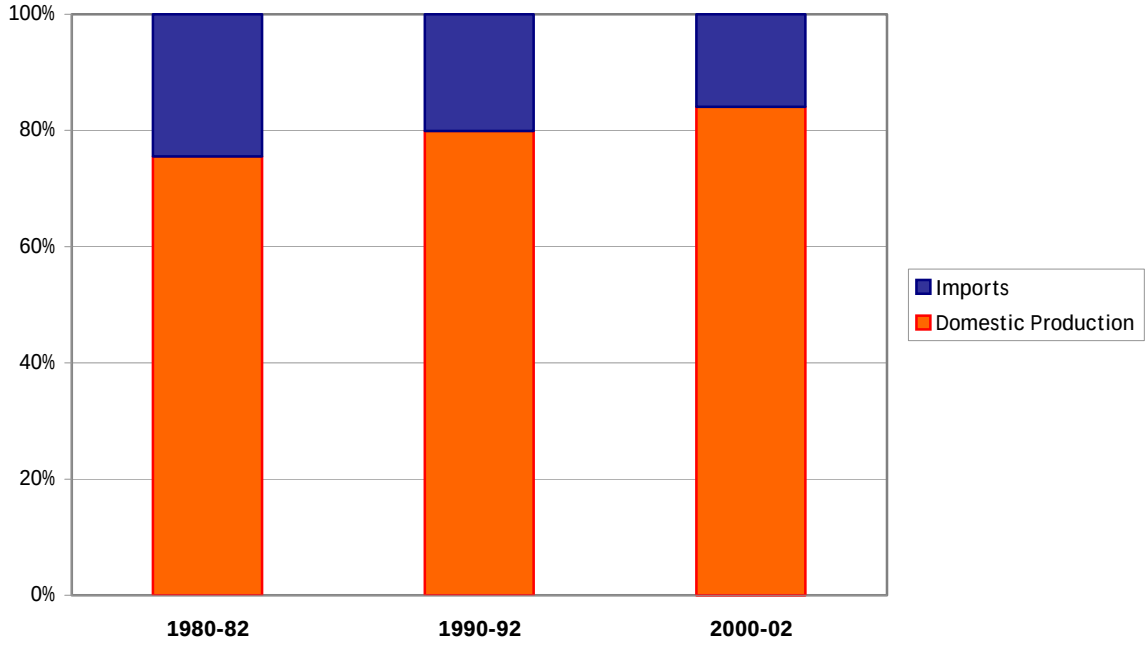
Source: FAOSTAT, 2005

As supply requirements of milk processors cannot be met by domestic production alone, milk powder is imported to bridge this demand gap. The major part of milk powder imports enters the processing industry while 20 percent of dairy imports are consumed directly (Minag, 2003). In total, imported dairy products account for 16 percent of the milk supply on the Peruvian market (see Figure 8).

Overall, milk powder imports have fallen from levels around 40,000 tonnes in the mid-1990s to 11,000 tonnes in 2003 which is the lowest annual import quantity since the beginning of the 1980s. Skim milk powder is mainly imported from New Zealand whereas whole milk powder is imported mainly from Bolivia.

Recently, Peru has started to export evaporated milk with the main foreign markets being Haiti, Bolivia and Chile (USDA, 2004).

Figure 9: *Origin of the dairy supply in Peru.*



Source: FAOSTAT, 2005

3.3 Marketing and Processing

Due to market access problems in large parts of the country, more than 43 percent of Peru's milk is marketed informally or consumed on farm, while 42 percent are used in industrial processing, 13 percent is fed to calves and 2 percent are losses (Minag, 2003). However, there exist large variations in these shares depending on the market access of farms.

The dairy industry collects milk primarily in the three major production regions: Arequipa (including Moquegua and Tacna), Cajamarca and Lima (Bernet, 2000). While in these milk sheds more than 80 percent of the milk produced goes into industrial processing, in areas that are not specialised in dairy production 90 percent of the milk is consumed directly or is being processed in small units and only 10 percent enters the formal market. Overall, the share of domestic liquid milk used in industrial processing has increased from 23 percent in the 1980s to 42 percent in 2003 (Minag, 2003).

Milk producers on the coast tend to have easier market access than those in the rest of the country. Along the coast milk collection is particularly well organised around Lima, Arequipa, Moquegua and Tacna where it is mainly in the hands of the dairy processors. Their milk collection routes involve all coastal irrigation zones of the region. Small farmers use enterprise owned milk cans, which are collected by ordinary trucks along the roads. Milk from larger farms is collected by milk-cooling trucks and milk is stored on-farm in a cooling tank until discharge. In Majes, five (subsidized) milk collection centres allow the gathering of 80,000 litres a day from small farmers (45 percent of the irrigation zones' total milk supply). An increased number of milk buyers and the fact that the dairy industry has managed to increase sales of their products during the last few years, particularly in Lima city has created a favourable situation for milk producers. The increased demand for milk has forced industrial processors not only to pay higher milk prices to producers but also to guarantee regular milk payments and improved access to production factors (Bernet *et al.,* 2000a).

The poor condition of the road system that links the highlands to the coast, and its vulnerability to bad weather, makes milk collection from the highlands difficult for the dairy industry. The exception is Cajamarca, where due to high production levels achieved by a sufficient number of farms it is profitable for milk processors to collect milk from farmers. Hence, collection in Cajamarca is well organised with 85 percent of the milk produced in the region going into industrial processing (Minag, 2003).

Farmers that cannot sell their milk to processors because they produce less than the minimum quantity requirement of 15 kg milk per day, are located off collection routes or in areas where industrial processors do not source their milk, tend to sell the raw milk directly to consumers or to small cheese-making factories. These small cheese makers produce predominantly traditional fresh cheese, but also other dairy products such as yogurt and butter, which are then transported and sold on the Lima market (Bernet *et al.*, 2000a; Minag, 2004, Garcia and Gomez, 2006). The informal dairy sector in Peru is mostly made up of these traditional cheese makers (queseros) who usually pay high prices for milk and return the whey to the farmers. Although they are very small individually, they have helped to maintain dairy production in remote and poor areas (USDA, 2004). However, the expansion of the small-scale cheese processing sector is hampered by low quality and sanitary standards, small production volumes and lack of distribution networks (Nolte, 2003).

The formal dairy sector in Peru is dominated by three large companies: Gloria (collecting 56 percent of the formally marketed milk), Nestlé and Laive which together have a market share of 91 percent of the dairy consumer product market (Minag, 2003). In 2003, together they processed 520,000 tonnes of fresh milk from small and medium producers in Lima, Arequipa and Cajamarca. Nestlé and Gloria both operate primarily in Cajamarca and Arequipa; however, Nestlé with greater presence in Cajamarca and Gloria in Arequipa (Fairfield, 2005). Furthermore, there are a few smaller companies in the market that act as intermediaries or help to negotiate prices with the larger companies (USDA, 2004).

Gloria, a Peruvian owned company, is the biggest of the three processors. It operates one of the largest evaporated milk plants in the world and exports this product to emerging markets in the Caribbean, Central America and Africa. Gloria also imports milk powder from Bolivia, where it has a significant presence. Gloria does not have the same focus on quality as Nestlé, partly due to its lower technical capacity nor does it provide technical services to its producers. Prices paid for raw milk are slightly higher than Nestlé's. Gloria's producer prices have remained constant over the past six years, despite the fact that consumer prices have been rising. In contrast to Nestlé, Gloria has shown a potential interest in expanding collection in other regions (Fairfield, 2005).

Nestlé pays producers based on the temperature, fat, protein and solid content of their milk upon collection and has somewhat more rigid quality requirements than Gloria. It also provides some technical assistance to its producers although the producers must pay for these services. Nestlé has continually expanded its collection routes within Cajamarca and Arequipa but is apparently not interested in moving into other regions. The company has also participated in a wide range of development projects with the state and NGOs (Fairfield, 2005).

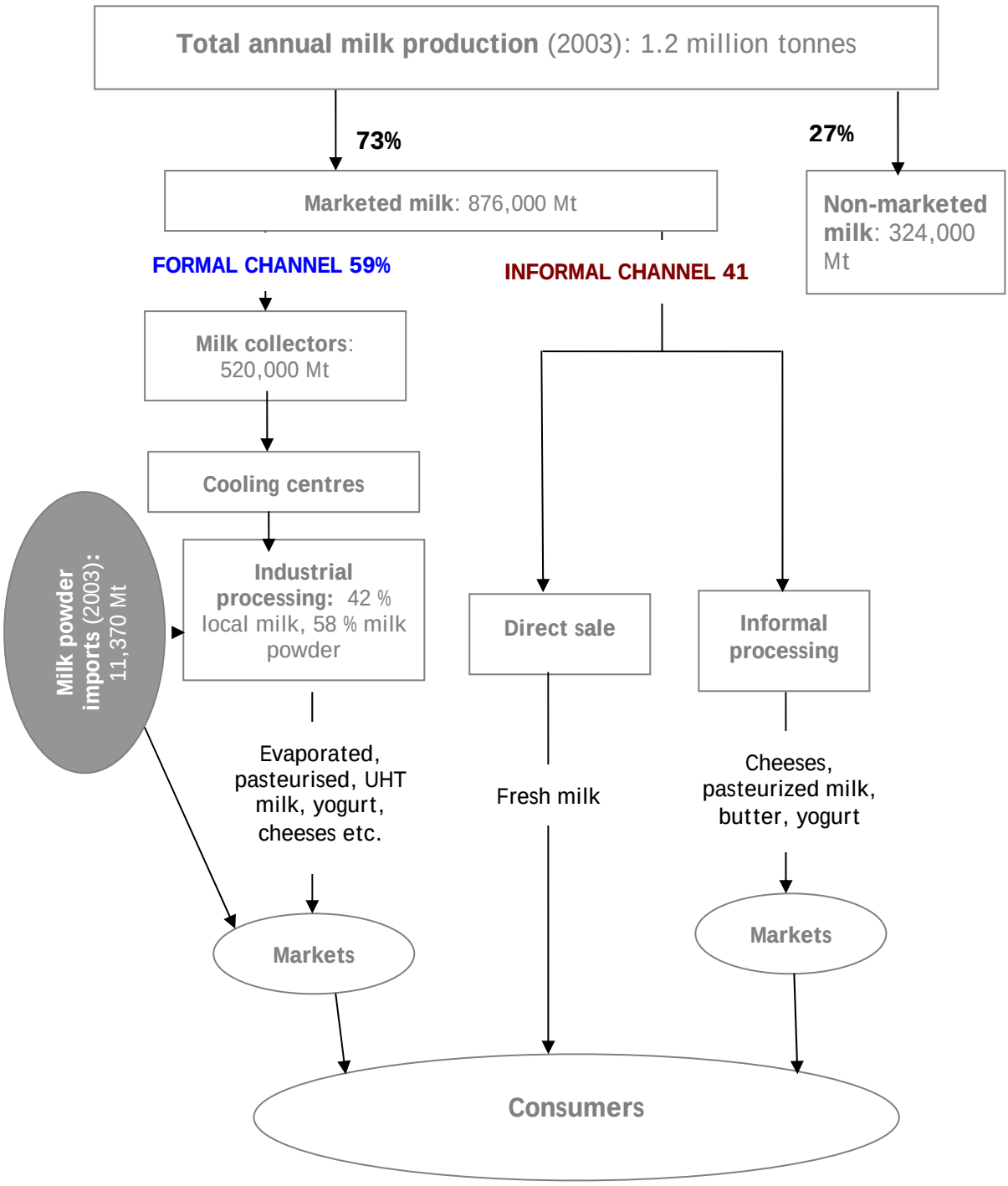
The price processors pay farmers for their milk is determined by its quality, depending on the milk's acidity, fat content and milk solids as well as delivery quantities and distance from the processing plant. Prices paid by processors range from PNS 0.48 (USD 0.14) in remote areas in Arequipa to PNS 0.95 (USD 0.27) in locations near Lima. The highest prices tend to be paid by the national feeding program 'Vaso de Leche', which pays as much as PNS 1.00 (USD 0.29) per litre. Informal cheese processors also tend to offer higher prices to producers than the industrial processors, however, demand is not constant and prices are not guaranteed (Nolte, 2003). Milk prices paid by industrial processors are a matter of controversy between farmers' organisations and the processors as farmers claim that producer prices have not risen sufficiently in the last years to cover the increases in input prices whereas processors argue that higher prices would render locally produced milk uncompetitive as compared to imports from other Latin American countries, such as Argentina (Minag, 2003).

The different processing companies that operate in Peru have specialised in different product portfolios. Gloria is the market leader for evaporated milk and yogurt, Laive for fresh and ripe cheeses, Nestlé has specialised in the production of condensed milk and a local company, Negociación Ganadera Bazo Verde, is specialized in manjar blanco (a sweet made from milk) (Minag, 2003).

Peru's main milk producing regions compete for the same coastal urban markets, mostly Lima City (Bernet, 2000). The city of Lima is also by far the most important market for the national dairy industry with Lima's inhabitants accounting for more than 80 percent of national consumption of industrially processed dairy products (Bernet *et al.*, 2000b). Also for informally processed products, notably fresh cheese, Lima is an important outlet and about half of it is sold on the Lima market.

Industrially processed milk products are either sold through agents to individual retailers or directly from the processing plant to supermarket chains (Minag, 2003). The market for processed dairy products is divided between evaporated milk (76 percent), milk powder (20 percent) and pasteurized and UHT milk (4 percent).

Figure 10: *Peru milk marketing channels.*



3.4 Dairy Policies

Consumption

The Peruvian government promotes the dairy sector through social feeding programs. The two government funded social assistance programs, '*Vaso de Leche'* (glass of milk) and '*Desayuno Escolar'* (school breakfast), purchase milk from the processing industries, and in some cases directly from small producers for distribution to poor children. Totalling USD 97 million in 2001, '*Vaso de Leche*' is the largest social transfer program in Peru and the second largest component of transfers from the central government to municipalities. Introduced as a pilot in Lima in 1984, the program expanded to national coverage during the economic crises in the late 1980s and early 1990s (Stifel and Alderman, 2003). '*Desayuno Escolar*' is managed by the *Programa Nacional de Asistencia Alimentaria (PRONAA)*, a subsidized food program for the poor for which the *Ministerio de la Mujer* is responsible (but which has been decentralised to the regions). '*Desayuno Escolar*' provides milk as a nutritional supplement to children up to fourteen years of age (Nolte, 2003). These programs are an important additional source of demand for nationally produced milk (Fairfield, 2005).

In the past, these social programs did not focus on the purchasing and distribution of locally produced fresh milk, but rather on milk substitutes produced from imported goods: milk powder, soy and other grains which were supplied by milk substitute businesses that started up in the mid-1990s with a view to sourcing the state social programs. The government responded favourably to this supply because these substitutes were cheaper than fresh milk (Fairfield, 2005). This practice has long been criticised by dairy farmers but only recently did the milk industries and producer organisations join in their opposition to the use of milk substitutes by the social programs, and their lobbying efforts have secured some concrete achievements. Gloria and Fongal-Lima, the Lima branch of the national milk producer organisation, together demanded that the state purchase only domestically produced fresh milk. They reportedly pressured public officials to move from substitutes to fresh milk, based on nutritional considerations. In 2002, these efforts were rewarded with the passing of a law, which requires the social programs to purchase nationally produced milk. As a result of these efforts Gloria has increased its supply of milk to the social programs (Fairfield, 2005). The passing of the law has not entirely resolved the problems though. The social programs are still purchasing substitutes, and Fongal-Lima is currently pushing for better law enforcement. However, the milk substitute producers are powerful importers with significant political and economic influence who have established special facilities to process their products and are likely to energetically fight the milk sector's threat to their market (Fairfield, 2005).

Trade

From the 1960s to the 1990s, the government policy emphasized the provision of low-cost foods to consumers which led to large quantities of milk powder imports, that were both directly and indirectly subsidized by the Peruvian government and exporting countries. This preferential treatment of imports made it difficult for domestic milk producers to compete with imported milk powder, particularly in the area around Lima, and the expansion of milk production was hampered. These market distortions remained in place until President Alberto Fujimori implemented structural reforms in the 1990s and a shift in government policy towards import substitution and the encouragement of local agricultural production took place. As a consequence of these reforms, milk production in Lima district has grown rapidly since 1992 (Bernet *et al.*, 2000).

Even though no resources are allocated to the import substitution program, the government encourages local milk production in two ways: through high import tariffs (surcharges and a variable levy) and by granting tax benefits to producers. The import taxation scheme for dairy products which protects domestic producers effectively from low international milk powder prices was introduced in 1993. The application of a variable import tax (which rises with falling world market prices) evens out the import price per litre of milk to around USD 0.35. As a result, the minimum import price for milk powder is higher than the price processors have to pay for nationally collected milk (Bernet, 2000).

This protection of the domestic dairy industry will be endangered by the Peruvian government's signing of a free trade agreement with MERCOSUR, which has been recently negotiated, and met with strong opposition with Peruvian dairy producers and processors who fear that Argentine and Uruguayan dairy products may flood the market (USDA, 2004).

3.5 Likely Impacts of Milk Powder Imports

Due to an efficiently working tariff protection, with a variable levy that keeps the price of imported milk powder constant and evens out fluctuations in the world market price level, the Peruvian dairy sector has, since the early 1990s not been exposed to cheap milk powder imports. Since the introduction of this tariff regime, national milk production has grown by over 4 percent a year while simultaneously the share of local fresh milk used in industrial processing has increased.

Problems for small dairy farmers in Peru arise from limited competition between the three large milk processors that operate in Peru and together buy around 42 percent of the domestic milk. As each of these companies has concentrated its collection in a different milk shed, i.e. Nestlé mainly collects in Cajamarca and Gloria in Arequipa, they avoid competing with each other and are in a position to set prices while simultaneously keeping collection costs low due to the regional concentration. The region of Lima is the exception, as all processors operate processing plants in the area, and compete for the local milk. Consequently, producer prices in Lima are considerably higher than in the rest of the country. For farmers who are located off processors' collection routes it can be difficult to find outlets for their milk if they do not manage to sell directly to consumers or informal cheese processors.

A potential problem of milk production in Peru could arise from the fact, that production costs are much higher than in other Latin American countries. Therefore Peru's plans to join MERCOSUR, the South American Free Trade Union, would put local milk producers under severe competitive pressure from cheaper dairy products originating in Uruguay and Argentina.

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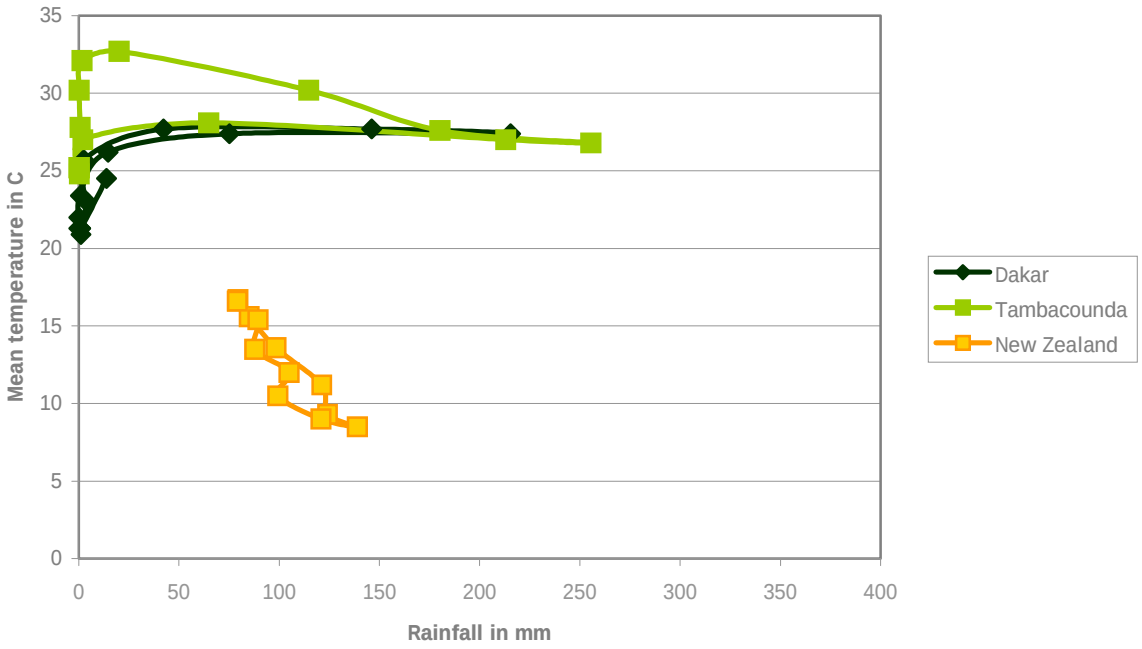
4. SENEGAL

4.1 Background

Senegal has a tropical, hot, humid climate with a rainy season from May to November and a dry season from December to April that is accompanied by hot, dry, harmattan winds. The terrain is generally low, with rolling plains rising to foothills in the southeast, and the lowlands being seasonally flooded. Periodically occurring droughts pose a risk to agricultural production.

Senegal has a land area of 193,000 square kilometres of which 42.3 percent is classified as agricultural land. Of the agricultural area, 69.3 percent is constituted by permanent pasture.

Figure 11: *Climograph of Senegal.*



In 2003, Senegal had a population of 10.2 million people, of which the overwhelming majority of 73.8 percent were engaged in the agricultural sector. Rural poverty reached a level of 40.4 percent.

The agricultural sector contributed 16.8 percent to GDP in 2003 and within agriculture dairy production contributed 2.3 percent in value terms.

Table 3: *Senegal country statistics.*

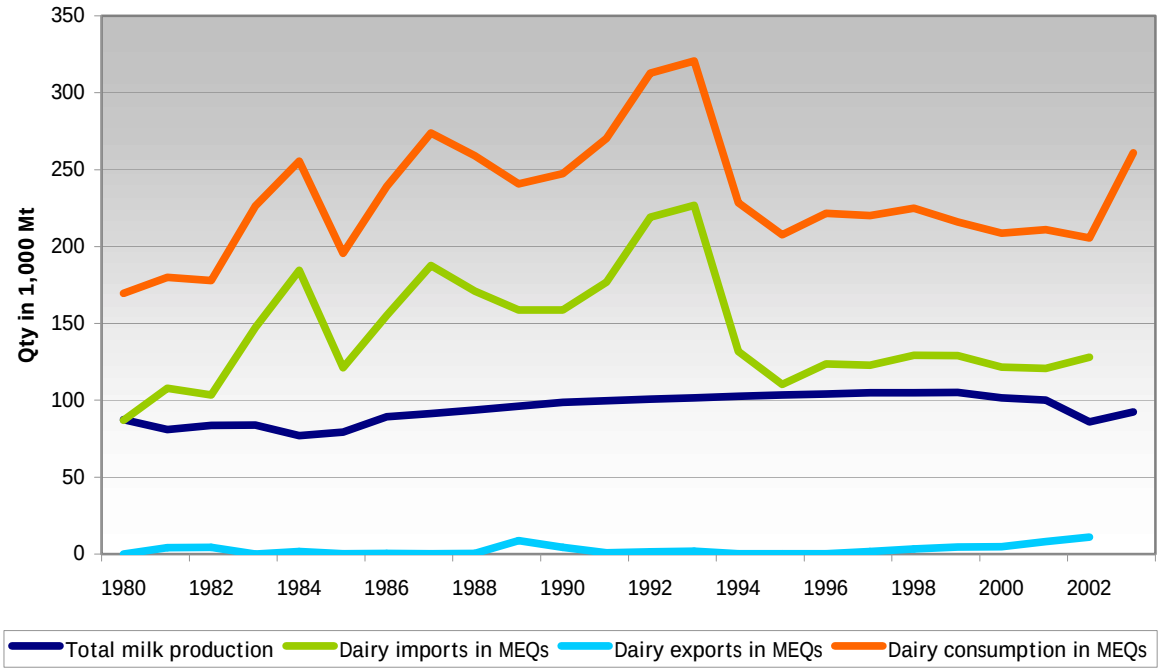
Demographics		Year	Source
Human population (million)	10.2	2003	WDI
Rural population density (people per sq km)	208.0	2002	WDI
Population in agriculture (%)	73.8	2000	FAOSTAT, 2005
Urbanization (%)	49.6	2003	WDI
Rural poverty (% of rural population)	40.4	1992	WDI
Land			
Land area ('000 sqkm)	193	2002	FAOSTAT, 2005
Agricultural area (%)	42.3	2002	FAOSTAT, 2005
Share of permanent pasture of agricultural area (%)	69.3	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	4,970	2003	WDI
GDP annual growth rate 1993-2003 (%)	4.7		WDI
GDP per cap (constant 2000 USD)	485	2003	WDI
GDP per cap PPP (constant 2000 USD)	1,557	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	16.8	2003	WDI
Livestock GDP as share of agriculture GDP (%)	32.2	2003	FAOSTAT, 2005
Livestock GDP as share of total GDP (%)	5.4	2003	FAOSTAT, 2005
Dairy GDP as share of livestock GDP (%)	8.4	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	2.3	2003	FAOSTAT, 2005
Trade			
Dairy export value (1,000 USD)	3,440	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	32,658	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	29,218	2002	FAOSTAT, 2005
Value of dairy net imports as share of total agricultural imports (%) (Average 1999 – 2003)	7.1	2002	FAOSTAT, 2005
Dairy Production			
Cattle (1,000 head)	3,000	2003	FAOSTAT, 2005
Grade 'Dairy' cows (1,000 head)	<30	2001	Author's calculation
Dairy cattle as share of all cattle (%)	<1	2001	Dieye *et al.* (2005)
National cow milk production (tonnes)	92,312	2003	FAOSTAT, 2005
Milk yields (kg/year)	340, (450*)	2003	Diao, 2003
Proportion of milk marketed (%)	na		
Ag HH with dairy cows/Dairy farms	na		
Average dairy herd size (cows)	na		
Number of cooperatives	na		
Cooperative members	na		

*per lactation

4.2 Production, Consumption, Trade

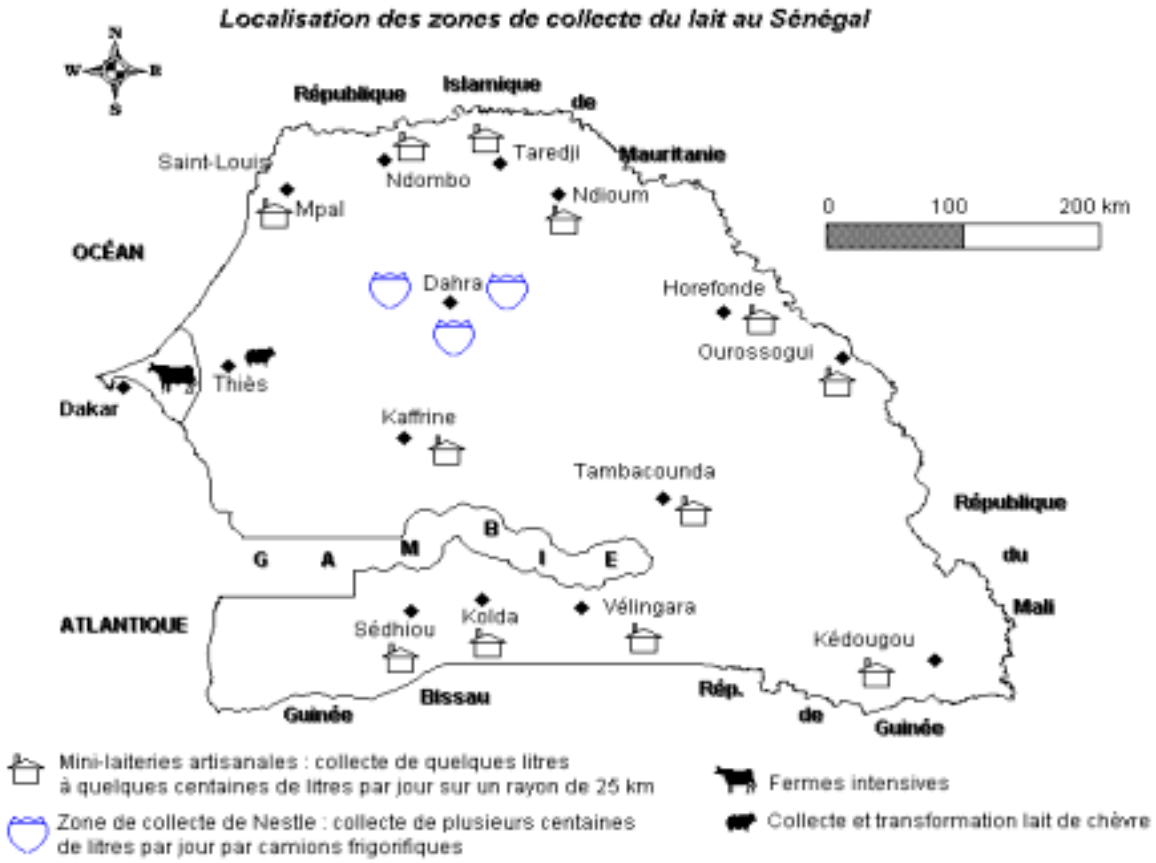
Milk production in Senegal has been stable over the last decade and reached 92,000 tonnes in 2003 (Figure 12). Production is dominated by the traditional extensive system which accounts for the largest part of production, the biggest number of animals and also the largest amount of farmers/herders involved in production. Extensive milk production is practised in pastoral and agro-pastoral systems, which operate only during the rainy season. Intensive dairy production systems are concentrated in the peri-urban areas of Dakar and Thiès (see Map 1) (Dieye *et al.*, 2005).

Figure 12: *Production, consumption and imports in milk equivalents, 1980-2002.*



Source: FAOSTAT, 2005, 2005

Map 1: *Location of principal milk production and processing systems in Senegal.*



Source: adapted from Ba Diao, 2004 and Dia, 2004 as cited by Dieye et al., 2005
Source: Dieye *et al.,* 2005

Pastoral milk production prevails in the northern central part of Senegal in the area of Ferlo. It is based on transhumance between the Senegal river valley and the Jolof in search for water and pastures. This system accounts for 32 percent of the total cattle population in Senegal (MAE, 2001) and for 38 percent of the national cow milk production (Diao, 2003). Household food supply is to a large part derived from the livestock herd of the family (Touré, 1987). The milk is mainly used for home consumption and the surplus is processed into fermented milk and butter oil. Commonly, the wife of the herder is responsible for collecting and selling the milk produced by one or two cows, which are not kept with the rest of the herd but near the living area and are used for daily milking (Gning, 2004). Milk, as opposed to meat, apart from being fed to the calves, provides a regular food source for the family. Milk is sold only if there is a surplus after the needs of the family and the calves have been met (Vatin, 1996; Dieye *et al.,* 2005).

The **agro-pastoral system** comprises 67 percent of the national cattle herd (MAE, 2001) and accounts for 61 percent of national milk production (Diao, 2003). Cows are mostly kept in one location and receive more feed, thus having higher milk yields than in the pastoral system. The local breeds can produce between 1 and 3 litres of milk

per day, with large variations between the dry season and rainy season (Diao, 2003). The major part of the milk produced is used for home consumption while the surplus is sold. The proximity to an urban market is a determining factor for the market-orientation of this system. In the milk production systems in the river valley, the groundnut basin, eastern Senegal and in the Casamance cattle also serve for the preservation of soil fertility through their use for manure and traction (Dieye *et al.,* 2005).

The **improved extensive system** is characterised by better herd management and higher productivity, through cross-breeding in combination with improved housing and marketing of products. Additionally, producers pay more attention to reproductive performance, animal husbandry and the integration of pastoral and agricultural activities (manure and draught animals). These improved systems are mostly located in the regions of Kolda and Tambacounda in the south of Senegal. They comprise less than one percent of the national cattle herd. The improved extensive system is commercially oriented with 75 percent of the production being marketed in the dry season and 52 percent of production marketed in the rainy season (Dieye *et al*., 2005). In the dry season the major part of the milk production is marketed through mini-dairies while in the rainy season when supply is abundant, it is sold directly to consumers. The mini-dairies absorb less than 2 percent of the daily milk flow during this period (Dieye *et al.*, 2005).

In the 1980s, private investors, mainly from Dakar, began **intensive** dairy production introducing exotic breeds in the Dakar periphery. These entrepreneurs took advantage of the introduction of exotic breeds, under the support of state research institutions, to create farms (Diao 2003; Broutin *et al.* 2000; Gning, 2004). The intensive system is primarily commercial. It is characterised by high inputs, especially feeds (concentrated, mineral-vitamin complexes and cultivated forages), the use of biotechnology to improve production, the employment of specialised labour and good veterinary support. Productivity of the dairy cows in this system is far higher than in the other production systems, however, it comprises at most only one percent of the national cattle population (MAE, 2001).

Presently, the majority of the intensive dairy farms in Senegal are located in the region of Dakar and the Niayes but some are also found in the region of Thiès. Most are small farms of less than 1 ha, and the dairy herd consists of less than 30 animals, which are of local and exotic dairy breeds. The remainder are either medium sized farms with land holdings of 1 to 4 ha and 30 to 80 head of cattle with similar numbers of local and exotic breeds or large farms that typically have land holdings of above 4 ha and more than 80 cattle of which the majority are of exotic breeds. Milk is normally produced throughout the year. Milk production activities are in some cases combined with fattening, aviculture but also with kitchen gardens or tree crops. Products, due to their high price, target a limited group of consumers and only cover a very small proportion of overall consumer demand (Dieye *et al.,* 2005), mainly marketed in urban centres like Dakar.

The strong seasonal character of milk production has major impacts on production costs and market access as well as consumer prices. During the rainy season feed supply is abundant and production costs are low, the only costs being labour costs of herding and milking the animals. The payment herders receive varies and occasionally they are paid in kind and get the milk of one day each week (Dieye *et al.*, 2005). Reliance on family labour is also very frequent during the rainy period. Profit margins for milk are high but isolated producers can face problems of market access. Depending on the mode of transportation, transport costs vary between 0.02 USD in Kolda where plastic cans and bicycles are used and nearly 0.26 USD for transport in cooling trucks (Dieye *et al.*, 2005).

In the peri-urban zone both extensive and intensive production systems prevail. Improved extensive production systems are located in rural areas close to urban

centres. Examples are the region of the Niayes and the Petite Côte in the area of Nguekokh. In Nguekokh livestock product marketing benefits from the proximity of the tourist centre of Mbour and the city of Dakar. A constraint for livestock keeping in this area is the lack of space and feed resources. With increasing urbanisation and land allocated to other uses, pasture land has become scarce. Despite the high demand of urban populations for dairy products, the future of the improved extensive system in peri-urban areas is more and more threatened by the scarcity of land (Dieye *et al.,* 2005).

During the dry season, when grazing is not possible, feed costs become the principal production costs. In peri-urban systems around Kolda where feed supplements are used to sustain production year round, feeding costs account for 70 to 80 percent of total production costs (Dieye et al, 2005). The availability and costs of fodder are also the crucial factors for the performance of the intensive milk chains. On intensive dairy farms near Dakar and Thiès 65 percent of daily revenues from milk sales are spent on feed.

Margins obtained in the intensive dairy chains are quite small. To maximise income farmers follow diversification strategies combining milk production with other activities to reduce costs or the selling of the major part of the milk produced on urban markets where prices are higher. The processing of fresh milk into fermented sweetened or pasteurised milk, yogurt, cheeses or butter oil permits to add value to the fresh milk and expand markets.

Compared to other coastal West African countries milk consumption per capita per year is relatively high in Senegal. However, by international comparison per capita dairy consumption is still very low and has been very variable over the last thirty years. Variability in consumption levels is mainly caused by the variability in dairy imports as domestic milk production has been stable over this period. Falling dairy imports, for example after the devaluation of the CFA Franc in 1994, led to a drop in dairy consumption per capita per year from 51.9 kg in 1992 to 35.9 kg in 1994. Since then, per capita dairy consumption has even declined further to 23.9 kg/year in 2002 (FAOSTAT, 2005).

Household expenditure for dairy products amounts to an average of 3.6 percent of food expenditure with the respective shares being 2.5 percent in rural and 4.3 percent in urban areas (Metzger *et al.*, 1995).

The Senegalese population consumes milk predominately in the forms of milk powder or fermented milk. Only middle- to high-income urban dwellers or the producers themselves consume fresh milk frequently. However, there is an increasing trend in urban areas for fresh milk being substituted with processed products. In the rural areas, milk and dairy consumption is rooted in the traditions of the livestock keeping populations. Milk is consumed either fresh or fermented, often together with cereal gruel. Quantities consumed vary according to season with consumption being highest in the rainy season. In the absence of processing equipment and with long distances from urban markets about 80 percent of the milk production in rural areas is consumed on farm.

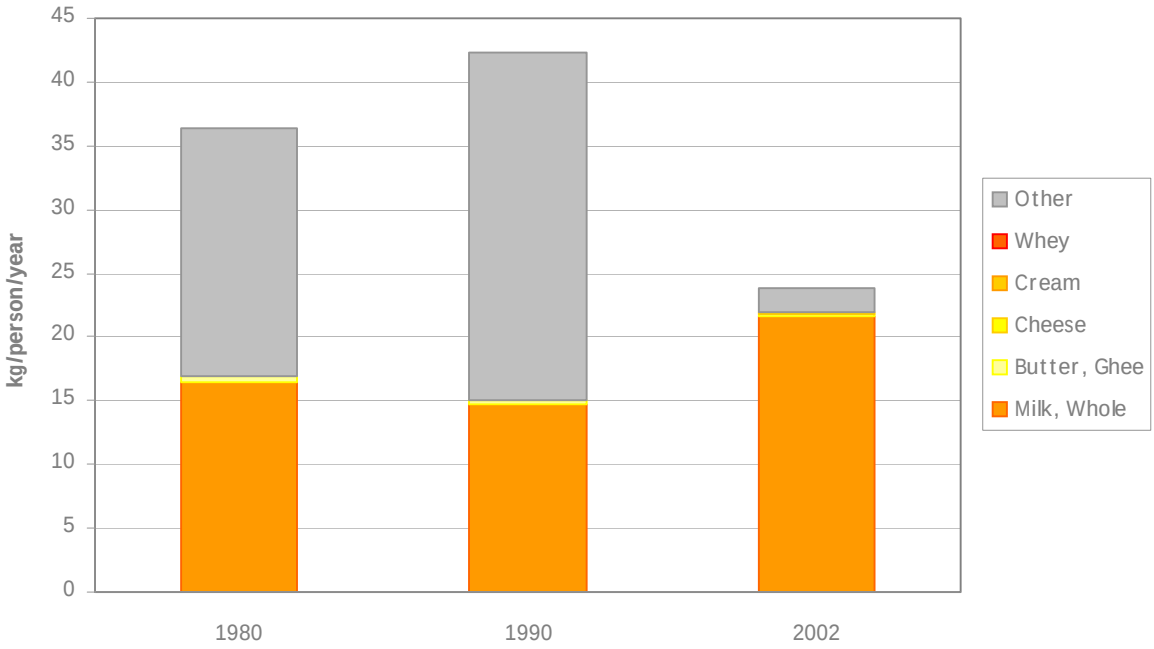
Milk powder is the most widely consumed product among the imported dairy products and accounts for the major part of milk supply in urban centres. In contrast to other dairy products, milk powder is available all year round, competitively priced and easy to store. It is sold in individual serving size quantities that are packaged either by a local boutique owner or by an industrial distributor. These individual sized servings permit even the poorest family to purchase milk. In Dakar, milk powder represents between 90 and 95 percent of the milk consumption (Corniaux, 2003; Duteutre, 2004). In secondary cities milk powder is less widely consumed but still constitutes 50 percent of the milk market in Saint-Louis for example. In rural areas, powdered milk is less common, but present nonetheless. Concentrated milk, butter and cheeses are

consumed to a lesser extent. Cheeses are upmarket products that are only sold in niche markets.

Fermented milk is traditionally the most important dairy product in Senegal. It can either be produced from fresh local milk or from imported milk powder. Fermented milk produced from fresh milk is the most widely consumed local dairy product in urban areas. Consumption of fermented milk is highest during the rainy season when there is ample supply and prices are low.

Consumer purchasing power is a determining factor of dairy product consumption. Low income levels are a major obstacle to the access and diversification of dairy product consumption. In Dakar a litre of fresh milk can easily cost 30 to 50 percent of a worker's daily earnings and a litre of reconstituted milk costs half this price (Broutin and Diokhané, 2000). In the region of Saint-Louis the majority of milk products are unaffordable for regular consumption for the great majority of consumers, the exceptions being milk powder and fermented milk (Corniaux, 2003).

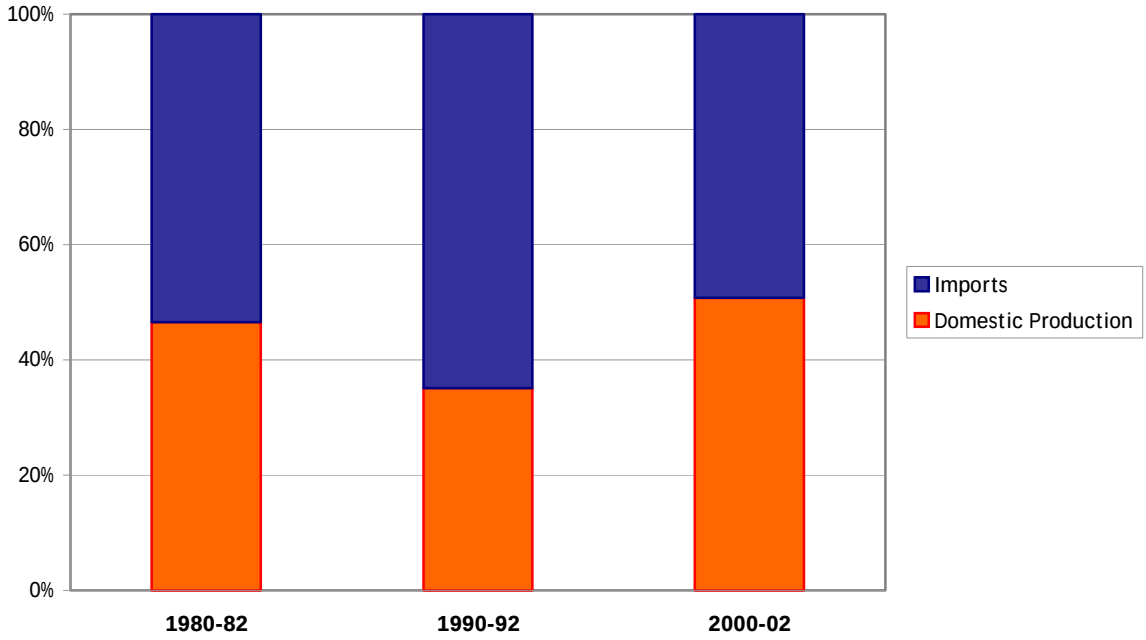
Figure 13: *Dairy consumption per capita per year in Senegal.*



Source: FAOSTAT, 2005

Senegal's dairy sector is dominated by imported milk powder which accounts for 70 to 80 percent of the value of total average annual dairy imports. Imported milk products cover over half of Senegal's milk supply (see Figure 13). The amount of imported milk powder has been on the rise since the 1980s, reaching its peak of nearly 227,000 tonnes in 1993. In 1994 with the devaluation of the CFA Franc, imports fell by approximately half, and only slightly recovered since (FAOSTAT, 2005). In 2003, expenditure on dairy product imports accounted for 7.5 percent of the total expenditure on agricultural imports (FAOSTAT, 2005).

Figure 14: *Origin of the dairy supply in Senegal.*



Source: FAOSTAT, 2005

4.3 Milk Marketing and Processing

Milk production in Senegal has a very pronounced seasonal character with 80 percent of production occurring in just the two months of September and October. Milk is only sold during the rainy season when calving peaks, pastures are widely available and milk production is high. During the dry months the market is almost empty. Only transhumant livestock keepers who live close to urban centres sell milk all year round. During the rains, direct sales are the main mode of marketing. The fresh milk is consumed by the family and surpluses are processed into fermented milk, skimmed milk, butter and butter oil. Women play an important role in milk processing and marketing at household level which secures them important revenues (Dieye *et al.,* 2005).

Across Senegal's interior, particularly in the agro-pastoral zone, the distance between the producer and market poses serious problems for the sale of milk. The facilities to conserve the milk in order to transport and sell it in Dakar or any of the secondary cities often do not exist. Even fermented milk cannot always be conserved for the time required to deliver it to Dakar. Roads are poor and refrigerated trucks are rare. The difficult transportation conditions also raise the cost of milk to the consumer and reduce the profits to the producers. Even when small producers manage to get milk to an urban market selling it can be difficult. Sellers are forced either to go from door to door or to sell their milk to kiosks located in suburbs rather than in the centre of the cities (Gning, 2004).

In the Fulani societies in Ferlo, milk production is entirely controlled by women who have the sole control over the production and the sale of the surplus. As fresh milk is very difficult to conserve under the climatic conditions in Senegal it is sold directly to

consumers near the place of production or bartered for cereals while fermented and skimmed milk, butter and butter oil are also sold on rural or urban markets (Dieye *et al.,* 2005). Fresh milk and unsweetened fermented milk are the dominating products. The milk is sold on rural markets or in the cities through door by door sales. A few mini-dairies also source their milk through this channel, profiting from the low prices for milk during the rainy season (Dieye *et al.,* 2005).

Apart from farmers transporting their milk to markets themselves, milk collectors are engaged in the sale of traditional dairy products on rural and urban markets (Dieye *et al.,* 2005). These are often the wives of livestock producers or other local women who either sell the fresh milk at local markets or sell it on too others who then sell the milk door-to-door or take it to different markets. In the evening the women return to collect their profits. These second-degree resellers often accumulate a large quantity of milk, which they can then supply to mobile saleswomen who will transport it to more attractive markets the next day after having transformed it into fermented milk. They often target government workplaces, large enterprises, banks and well-off neighbourhoods for sale. This system of processing is most common in the interior regions, but also plays an important part in supplying the Dakar market (Gning, 2004).

Initiatives to set up mini dairies sourcing milk from surrounding villages were started in 1994. These small processing entities were mostly set up in small cities (see Map 1) in the southeast (Tambacounda, Vélingara, Kolda, Sédhiou) in the centre (Thiès, Mbour), in the north (Saint-Louis, Matam) and in the northeast (Linguère, Dahra). Milk collection is mostly carried out within a radius of 15 km. These small milk processing units are either family businesses or are run by cooperatives. Milk is supplied all year round by peri-urban dairy farmers and seasonally by pastoralists and agro-pastoralists. Processed quantities typically range from 25 to 300 litres a day. Products sold include fermented milk, pasteurised milk, yogurt, cream, different types of cheese and butter oil. During the dry season most mini-dairies use dry milk for processing. Mini-dairies that are run by women source their milk through contracted farmers (Corniaux, 2003; Dieye *et al.,* 2005).

These small processors or pasteurizers generally operate with the support of NGOs or development agencies[2]. They use very simple equipment and technology. Mini-dairies can have difficulties in getting significant quantities of milk, as they depend entirely on the network of milk suppliers within their system especially during the dry season. In addition, they cannot be sure of the market demand for milk at a given time and will tend to purchase small quantities of milk to avoid having a surplus (Gning, 2004).

The tendency among processors to purchase only small quantities of milk from producers is one of the major difficulties of this system. Often it is difficult for producers to pay the debts that they have accumulated for the provision of feed and other care for their cows. The prices offered by the mini-dairies are generally lower than the market price, and producers are tempted to sell on the market (Gning, 2004).

Organised collection of milk from pastoralist zones was carried out by Nestlé between 1991 and 2003. Nestlé collected milk in the area of Ferlo and transported it to an

[2] The mini-dairies that collect milk in the pastoralist areas are operated either by the Hunger Project in Dahra, the *Association pour le Développement de Yang Yang et Dodji (ADYD)* in Dahra or the *Fédé Bamtaaré Aynabé Djoloff (FBAJ)* in Linguère. The processing unit of the FBAJ has a capacity of 250 litres of milk per day and is sourced principally by 110 women living in seven villages around Linguère organised in producer groups. Between 2000 and 2003 a volume of 81,447 litres was collected and processed by the mini-dairy.

The women's milk processing unit in Dahra has a capacity of 100 litres of milk per day and is entirely financed by the Hunger Project which has among others taken charge of the training of fifteen trainers in milk processing techniques. The dairy is sourced by milk producers living around the city of Dahra. The litre milk is bought from the farmers for 200 F CFA and pays them every fifteen days. The only product sold is fermented milk at a price of 500 F CFA per litre. The milk is sold in cans of 5 litres or sachets of 500 ml. Sale is mostly local (Dieye *et al.,* 2005).

industrial processing plant in Dakar. Collection was organised in villages grouped around fixed cooling centres that had been installed in five rural communities as well as around mobile collection and cooling centres using replaceable containers. With this setup Nestlé collected nearly 2.8 million litres of milk between 1991 and 2002, which were used for the production of sweetened and unsweetened concentrated milk (Dieye *et al.,* 2005). The flows of milk that went through these channels however remained quite small compared to the amount of milk that could potentially have been collected. Despite a total processing capacity of 20,000 litres a day the average daily collection varied between 3,000 and 4,500 litres (Gueye, 2004).

The strong seasonality of milk production constituted a major obstacle for the profitability of Nestlé's investment (Broutin and Diokhané, 2000). The fresh milk collected by Nestlé never constituted more than one percent of the factory's milk input (Vatin, 1996). For reasons linked to the high collection costs and imported milk powder being available at lower cost, Nestlé decided to withdraw from milk collection in the pastoral area in 2002 (Dieye *et al.,* 2005). In September 2003, the Nestlé-Senegal dairy production unit was closed (Duteutre, 2004). However, Nestlé continued selling its dairy products in Senegal (supplied by its processing plant in Ghana) using its retail chain for bouillon cubes which reaches from wholesale and retail stores over supermarkets.

In 2002, the transfer of the infrastructure and the collection equipment from Nestlé to the *Direction de l'Emploi (DE)* safeguarded the continuation of milk collection. Nestlé also conceded the revenues of the last two years of collection (2001 and 2002) to UPPRAL. In July 2004, the control was transferred to the *Union des Producteurs et Préposés au Rayon Laitier (UPPRAL)* who bought milk for 175 FCFA (USD 0.36) the litre from the producers (Dieye *et al.,* 2005). UPPRAL subcontracted the Wayembam farm and the *Directoire Régionale des Femmes en Elevage (DIRFEL)* from Dakar to market the fresh milk. The contracts foresaw the sale of 1,500 litres per week to DIRFEL and of another 10,000 litres per week to the Wayembam farm. The litre of milk is sold directly to consumers for 300 FCAF (USD 0.62), for 290 FCFA (USD 0.60) to DIRFEL and for 285 FCFA (USD 0.59) to Wayembam. DIRFEL has one processing unit with a capacity of 1,000 litres and sells diverse products (pasteurised milk, fermented milk, butter oil) through a network of 21 kiosks in different quarters of Dakar (Dieye *et al.,* 2005). The advantage of the systematic collection and processing system is that it is regularized throughout most of the year, it guarantees stable product quality, it helps to secure inputs, and it can help limit the time and distance involved in milk sale (Gning, 2004).

Processing costs are very variable and consist of labour costs, costs of sugar and flavours, energy and water, packaging costs and distribution. Processing costs range from 0.19 USD to 0.39 USD for informal processing in the peri-urban zone around Dakar, over 0.39 USD to 0.48 USD for semi-intensive processing in Kolda to 1 USD for industrial processing by Nestlé (Diao, 2003). The highest margins are achieved for fermented milk, which is one of the main products for consumption, and together with butter oil is also the product with easiest conservation and the longest average shelf-life.

Cheese production is carried out by farmers in the Thiès region (Keur Moussa and Petite Côte; mostly goat cheese), Italian type cheeses are produced by the 'fromagerie de l'Association des Jeunes Agro-pasteurs du Département de Sédhiou' (AJAPDS), fresh cheeses are produced by the 'fédération des éleveurs du Djoloff' (FBAJ) in Linguère. The cheese-dairy of Sédhiou collects 100 to 500 litres of milk per day and produces a dozen of Italian type cheeses. The products are sold on markets along the river but mostly to supermarkets in Dakar.

Imported dairy products are supplied to the Senegalese market either through the retail channel which imports mainly value-added dairy products or through the industrial channel importing milk powder. The retail channel is operated by agro-food

companies (SOPRODAL, PATISEN, NESTLE, SAPROLAIT etc.), food retailers such as supermarkets and wholesalers (DAMAG, Chaîne de Distribution Alimentaire), as well as co-operatives. Imported dairy products come mostly from Europe (Belgium, the Netherlands, France, and Ireland). Imported products include UHT milk, pasteurised milk, butter, cheese, concentrated milk and milk powder (Dieye *et al.*, 2005).

The industrial dairy channel is operated directly by the dairy industry and small and medium enterprises that import milk powder. Three types of processing enterprises use imported milk powder. The first type are informal micro-enterprises that sell reconstituted fermented milk in sachets. Bulk retailers of milk powder generally set up business in the centre of Dakar and sell to smaller bulk retailers who then sell to the small store owners. These small store owners then divide the powdered milk into small, individual sized packets for resale or use the powdered milk to produce fermented milk for sale at their store. These 'cantines' are localised in the different districts of the main cities. Informal processing of dry milk into fermented milk is controlled by men and is structured around ethnic and family networks that operate in sourcing as well as selling the product and are either members of a cooperative or have formed a tax-exempted private firm (so-called 'groupements d'intérêt économique'). The 1990s were marked by the spreading of small firms for processing and reconstitution of milk powder (Gning, 2004).

The second type of processors using milk powder are medium-size dairy companies that transform powdered milk primarily into pasteurised milk or fermented milk which is sold in either plastic sacks or containers with local brand names and apparently high sanitary standards. These companies are one of the more interesting developments in Senegal's dairy sector at present. Their products appeal primarily to medium- to high-income Senegalese, as they are more expensive than 'cantine'-made fermented milk. These medium-sized enterprises are financed by Senegalese capital and appear to be doing quite well on the market (Gning, 2004).

The third type are re-packaging industries. They import dairy powder and sell it under local brands. There are currently four big companies processing slightly more than 50 percent of the total imports of powder milk: Satrec SA (Vitalait, Roilait), CC Bara Mboup (Baralait) and Wonderfood SA (Cowbell) and Senico. The largest importer of powdered milk products is the Senegalese company SATREC. Apart from repacking the milk powder some of the companies also modify the dry milk by adding vegetable fats, vitamins, and flavouring. Products are then sold in bags of 400 or 500 g or micro portions of 40, 22.5, and 7.5 g. Products are sold through supermarkets, gas station mini-markets, bulk retailers, hotels and restaurants. The practice of adding non-animal fats to the powdered milk has recently come under debate as the type of labelling and the marketing used by the local industry often misleads the consumers on the origin and contents of the products (Duteutre, 2004; Gning, 2004).

Overall, the processing sector has gone through major changes with a strong increase of informal processing and growing numbers of small and medium-size processing companies. A variety of processed dairy products can be found on the markets Mounkala (2002) (as quoted by Dieye *et al.,* 2005) reports the existences of 22 different brands on the Dakar market. Of those 22 brands, 14 (66 percent) were local and 8 (34 percent) international brands. In 1998, the number of small processors was estimated at 15,000 (Gueye, 1998 as quoted by Dieye *et al.,* 2005). The very high diversity of dairy enterprises using milk powder underlines the positive effects of imports on employment and growth. In Dakar, there are several thousands of 'cantines' selling fermented milk produced with imported milk powder. The re-packaging industries offer employment for more than 400 workers in Dakar. Moreover, and despite the failure of Nestlé in its experience of collecting local milk in pastoral areas, the local industry seems to show progressive interest in local farm milk, especially around Dakar (Duteutre, 2004).

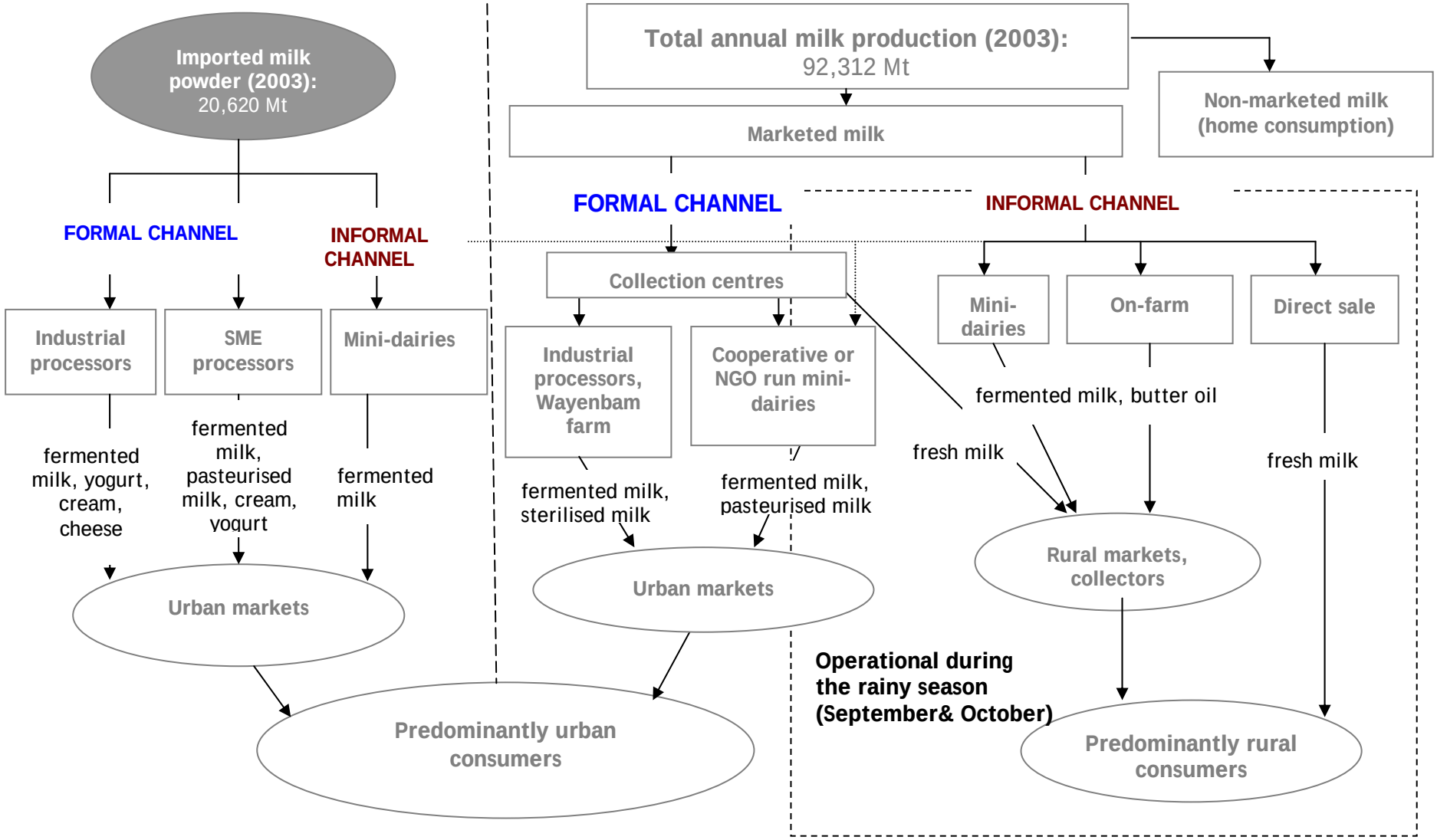
Also, the impact of imports on prices of local milk is quite moderate as, despite competition from imported products, producer prices are relatively high. In January 2004, the collection price of milk in rural areas was 0.44 USD/litre in Kolda, 0.33 USD/litre in Dahra and around 0.50 USD/litre in Dakar, which represent a very high price level in comparison with other countries in the world (Duteutre, 2004).

Despite a price increase of 42 percent between 1994 and 2000 (Broutin and Diokhané, 2000), for the equivalent of one litre milk, milk powder remained the cheapest product on the Senegalese market. The price for reconstituted powder milk of 400 F CFA for the equivalent of one litre of milk is only half of that for UHT milk, sterilized and fermented milk and only a third of the price of flavoured sterilized milk. Reconstituted powder milk in micro-portions sold by small businesses is as expensive as milk powder sold in larger quantities by the processing industry (Mounkala, 2002 as quoted by Dieye *et al.,* 2005).

Especially in smaller cities the processing of milk powder into fermented milk is important, for instance in Saint-Louis 90 percent of the milk powder is processed into fermented milk.

With the 1994 devaluation, importers saw powdered milk consumption plummet, but most were able to overcome this fallback. Either by reducing the amount of milk in individual sized sacks of powdered milk, by diversifying production, or cutting back temporarily on production, they were able to remain competitive. Industrial processors face low tariff barriers. The customs tax on powdered milk destined for industrial processing is only 5 percent, and no value added tax is charged. If the powdered milk is not intended for industrial processing, the tax is approximately 25 percent. Bulk retailers may have a harder time making powdered milk profitable with these tax levels (Gning, 2004).

Figure 15: *Senegal milk marketing channels.*



Source: adapted from Dieye *et al.*, 2005

4.4 Dairy Policies

Production

The overall objectives of government support to milk production are an increase of the domestic milk production and the reduction of the dairy import bill. Public interventions in dairy production include emergency feed supply operations, subsidies for animal feed, for vaccination programmes and epidemiological follow-up and genetic improvement through the programme for artificial insemination. These interventions are implemented through public structures or projects like the '*Projet pan-africain de contrôle des épizooties*' (PACE) and the '*Projet d'Appui á l'Élevage*' (PAPEL), but also through private veterinarians with the public mandate to carry out vaccinations. NGOs and research departments operate in the area of capacity building and credit provision (Dieye *et al.*, 2005).

The first programmes were carried out in the end of the 1970s dealing with research and diffusion of different dairy breeds in the region of the Niayes. More recent actions are an artificial insemination program started by PAPEL in the groundnut basin in 1995 and the national program for artificial insemination carried out by the '*Direction de l'Élevage*' (DIREL) in all regions of the country that donated heifers and bulls to herders organisations in 2004. During the second phase of PAPEL, a centre for genetic improvement shall be established at the Animal Husbandry Research Centre in Dahra. Actions taken so far are difficult to evaluate due to the absence of a clear national program or strategy on genetic improvement including selection schemes, breeds used and animal husbandry. The actions undertaken so far have generated information on the quality of dairy products, production levels for cross-bred cows and sanitary constraints, and possibilities for improvement of production through the introduction of fodder plants (Dieye *et al.*, 2005).

Marketing

The Ministry of Employment has been involved for some years in the promotion of small scale dairy processing units in the northern and southern parts of Senegal. The strategy aims at improving access to markets for rural dairy producers. In Dahra, the collecting facilities will be managed by two new partners: the Weyembam farm and the *Directoire National des Femmes en Elevage (DINFEL)* (Duteutre, 2004).

Consumption

The Senegalese government does not have any specific dairy consumption promoting policy in place. However, pressure from urban consumers on the government to keep dairy product prices low is quite strong (Gning, 2004).

Trade

As a member country of the '*Union Economique et Monétaire Ouest Africaine*' (UEMOA), Senegal cannot levy tariffs on imports from within the UEMOA. Imports from outside UEMOA are subject to the common external tariff (TEC) which was introduced with the establishment of the customs union in January 2000. Under the TEC regime imports of skim milk powder in quantities of more than 25 kg are taxed with 5 percent while other dairy products (milk and creams with a fat content between 1 and 6 percent, cheeses, butter and milk) are classified as final consumption goods and are subject to a 20 percent tariff. The processing industry pays lower taxes than ordinary importers (Dieye *et al.,* 2005).

4.5 Likely Impacts of Milk Powder Imports

With imported dairy products currently covering over half of the national dairy supply, Senegal is heavily dependent on imports to meet consumer demand. Furthermore, with very low productivity and production volumes that lead to very high collection and transport costs, there is currently not much scope for a significant reduction in imports without severely affecting urban consumption. Even though dairy imports sharply declined following the devaluation of the CFA in 1994, domestic production has not significantly responded.

Apart from milk production in peri-urban areas, producers face great difficulties in getting their milk to the consumers as the pastoral and agro-pastoral production systems are located at a considerable distance from the major markets and transportation is difficult and costly. A further factor limiting for the expansion of collection and marketing of domestically produced milk is the strong seasonality of milk production, with 80 percent of production occurring in just the two months of September and October. These difficulties taken together constitute a major obstacle for the profitability of formal milk processing and marketing as confirmed by Nestlé abandoning its milk collection and processing operations in Senegal.

Instead the establishment of small processing units in minor cities all over the country in the 1990s seems to have been quite successful. These mini-dairies source their milk from the surrounding villages and provide a reliable outlet for small producers who receive relatively high prices for fresh milk (as high as European dairy farmers) but at the same time can only absorb relatively small quantities. As many of these mini-dairies are still supported by NGOs and development agencies it is not clear, however, whether they would be sustainable once support is withdrawn.

A unique feature of the dairy sector in Senegal is that a large number of small businesses in Dakar and other cities flourish through small-scale processing or repackaging of imported milk powder. In contrast to other developing countries where milk powder is exclusively distributed in branded form or used as an input by large processing companies, in Senegal small-scale milk powder marketing is a profit generating opportunity for micro-enterprises.

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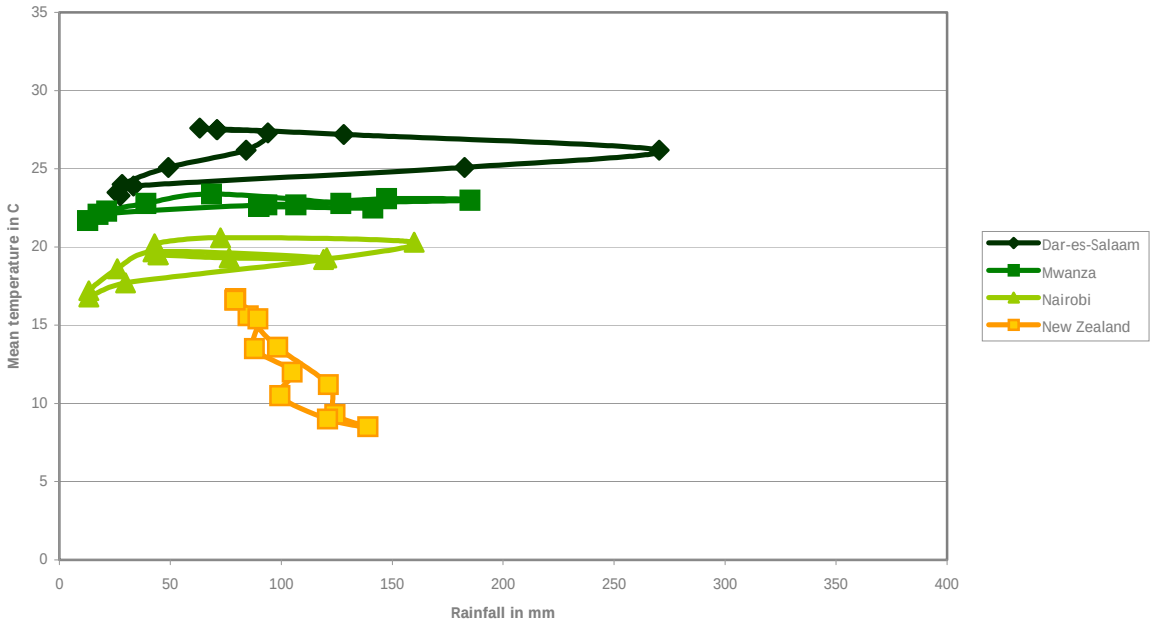
5. TANZANIA

5.1 Background

The climate in Tanzania varies from tropical along the coast to temperate in the highlands. The terrain is characterised by plains along the coast, a central plateau and highlands in the north and south.

Tanzania has a land area of 884,000 square kilometres of which 45.4 percent is classified as agricultural land, 87.3 percent of which is constituted by permanent pasture.

Figure 16: *Climograph of Tanzania*.*



* Data for Nairobi is given as an approximation for the highland area as data for Arusha was not available

In 2003, Tanzania had a population of 35.9 million people, of which an overwhelming majority of 78.1 percent were engaged in the agricultural sector. Rural poverty reached a level of 38.7 percent.

The agricultural sector contributed 45 percent to GDP in 2003 and within agriculture dairy production contributed 6.5 percent to total agricultural production in value terms.

Table 4: *Tanzania country statistics.*

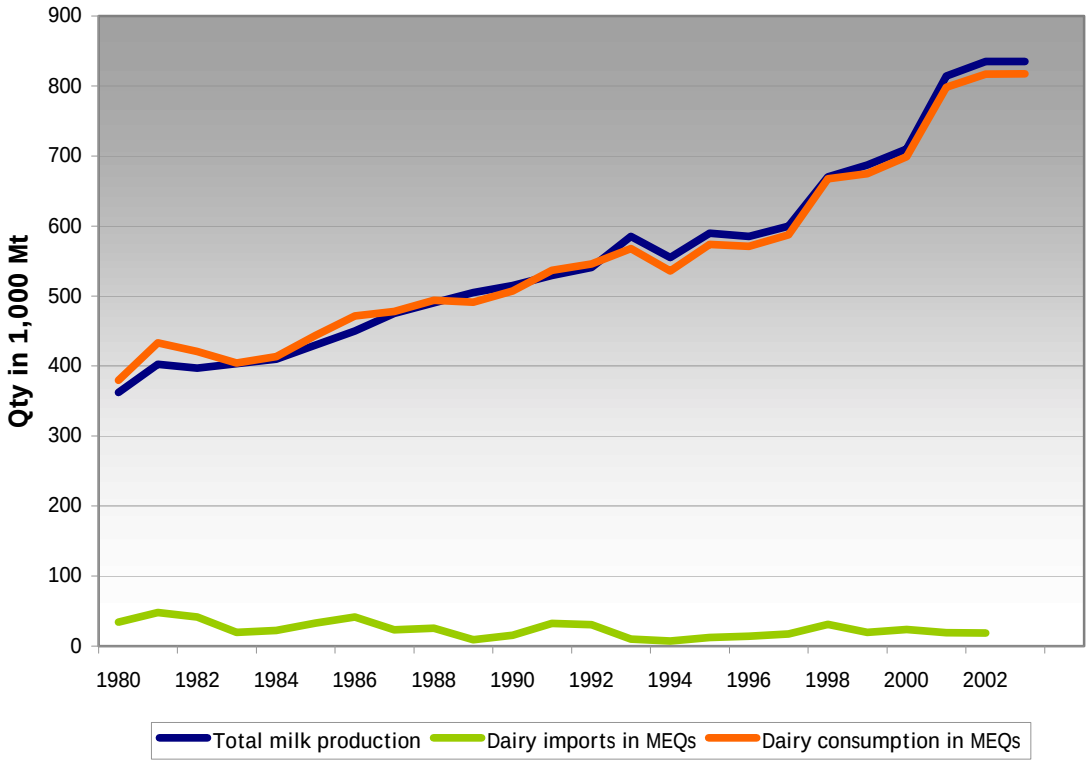
Demographics		Year	Source
Human population (million)	35.9	2003	WDI
Rural population density (people per sq km)	577.6	2002	WDI
Population in agriculture (%)	78.1	2000	FAOSTAT, 2005
Urbanization (%)	35.4	2003	WDI
Rural poverty (% of rural population)	38.7	2001	WDI
Land			
Land area ('000 sq km)	884	2002	FAOSTAT, 2005
Agricultural area (%)	45.4	2002	FAOSTAT, 2005
Share of permanent pasture of agricultural area (%)	87.3	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	11,100	2003	WDI
GDP annual growth rate 1993-2003 (%)	4.5		WDI
GDP per cap (constant 2000 USD)	308.7	2003	WDI
GDP per cap PPP (constant 2000 USD)	587.0	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	45.0	2003	WDI
Livestock GDP as share of agriculture GDP (%)	30.0	2003	FAOSTAT, 2005
Livestock GDP as share of total GDP (%)	13.5	2003	FAOSTAT, 2005
Dairy GDP as share of livestock GDP (%)	22.1	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	6.5	2003	FAOSTAT, 2005
Trade			
Dairy export value (1,000 USD)	54	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	2,720	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	2,666	2002	FAOSTAT, 2005
Value of dairy net imports as share of total agricultural imports (%) (Average 1999 – 2003)	1.1	2002	FAOSTAT, 2005
Dairy Production			
Cattle (1,000)	17,700	2003	FAOSTAT, 2005
Grade 'Dairy' cows (1,000 head)	500	2003	MWLD, 2005
Dairy cattle as share of all cattle (%)	3	2003	MWLD, 2005
National milk production (tonnes)	840,000	2003	FAOSTAT, 2005
Milk yields (kg/year)	153-3,717		Chilonda *et al.*, 2001
Proportion of milk marketed (%)	27		
Ag HH with dairy cows/Dairy farms	60,000*	1995	Tanzania Bureau of Statistics, 1995
Average dairy herd size (cows)	Na		
Number of cooperatives	Na		
Cooperative members	Na		

* only grade cattle

5.2 Production, Consumption, Trade

In 2003/2004 a total of about 840,000 Mt of milk were produced in Tanzania. Most of the milk produced in the country comes from the traditional sector using Tanzanian short horn zebu while the remainder is produced by the commercial sector relying on temperate dairy breeds. Within the commercial dairy sector small scale producers, with 1 to 5 'dairy' cattle per household and producing 2 to10 litres of milk per day, account for about 82 percent of the milk output, while the remaining 18 percent comes from large-scale producers. Although small in comparison to the traditional system, modern dairy production has been gaining in importance. While the commercial sector only accounts for about 2 percent of the national herd it now produces more than 30 percent of the country's milk while the traditional system, with 97 percent of all cattle, accounts for about 70 percent of total national production (PPLPI, 2003; Mutagwaba, 2005; NEI, 1999).

Figure 17: *Production, consumption and imports in milk equivalents, 1980-2002.*



Broadly, five production systems with a significant dairy component can be distinguished in Tanzania (PPLPI, 2003).

1. 'Rural' smallholder dairy farming systems that are integrated with perennial crops like banana and coffee are found in the northern regions (Kilimanjaro/Arusha), in the region of Kagera in the north-west and the southern highlands of Tanzania. These highland farms only dispose of small areas of land but enjoy reasonable climatic conditions even for temperate zone dairy breeds. Most farmers practice zero grazing and use the manure for maintaining soil fertility for banana cultivation. The dry season is in most cases rather short and crop residues from bananas are fed to the dairy cattle. However, in several locations there is a lack of fodder and farms in isolated locations often also lack supplementary feeds.

Average milk production lies between 5 to 10 litres of milk per day per cow (NEI, 1999).

2. Dairy farms that are integrated with annual crops are found in the central part of Tanzania. In this farming system, maize and other cereals like sorghum are the most important crops. Climatic conditions are diverse, from good rainfall in the south to rather adverse conditions in the central part of Tanzania. Areas cultivated are relatively large. Crop residues are not commonly used for feed and also the application of manure for fertilizer is not commonly practised. Supplementary feed is mostly locally available in reasonable quantities. Whether traditional or 'improved' breeds are used depends on the quality of the locally available feed resources and the climatic conditions (NEI, 1999).
3. Peri-urban smallholder dairy production integrated with horticulture is found in the coastal belt, mainly near Dar-es-Salaam, Tanga, Morogoro and other urban centres where rainfall is modest and irregular. Cassava is a major food crop next to cashew nut trees and some coconuts along the coast. Peri-urban dairy production is characterised by high input costs, particularly for purchased forage, and high milk sales prices due to high and stable demand. Pure-bred temperate dairy breeds are not best suited for this environment but it is possible to obtain 5 to 10 litres of milk per day per cow from good grade cows (NEI, 1999; Omore and Staal, 1998).
4. Specialised medium-scale dairy farms with little or no cropping and herd sizes of 10 to 50 cows are found near large urban centres such as Dar-es-Salaam, Tanga, Mwanza and Musoma. Milk production is the main economic activity of these farms, however, the level of mechanisation remains limited. Feed management is most commonly paddock grazing rather than zero-grazing (NEI, 1999).
5. A small number of large-scale and estate dairy farms with herd sizes of above 50 cows operate in Tanzania. In total, these farms owned about 10,000 dairy cattle in 1996. Most of these large-scale farms are government and parastatal farms that are in the process of being privatised. Privately owned large-scale farms are located in the Iringa and Arusha region. These farms occupy relatively high potential areas in terms of soil fertility, weather and market access. As they own some of the best dairy cattle in the country, they are often used as the source for heifers and bulls for smallholders and dairy development projects (Omore and Staal, 1998). Most of these farms have competent management and considerable experience in commercial farming (NEI, 1999).

Commercial smallholder dairying is concentrated in Arusha, Kilimanjaro, Tanga, Iringa, Kagera, Dar-es-Salaam and Mbeya regions where the majority of cattle are found (MWLD, 2005).

Rising milk production in Tanzania has mainly been due to increased cattle numbers rather than increases in productivity (Kurwijila and Boki, 2003). However, while the number of indigenous cattle increased by 12 percent between 1994/95 and 2003/4 the number of crossbred dairy cattle more than doubled over the same period and was estimated at around 500,000 in 2003 (MWLD, 2005).

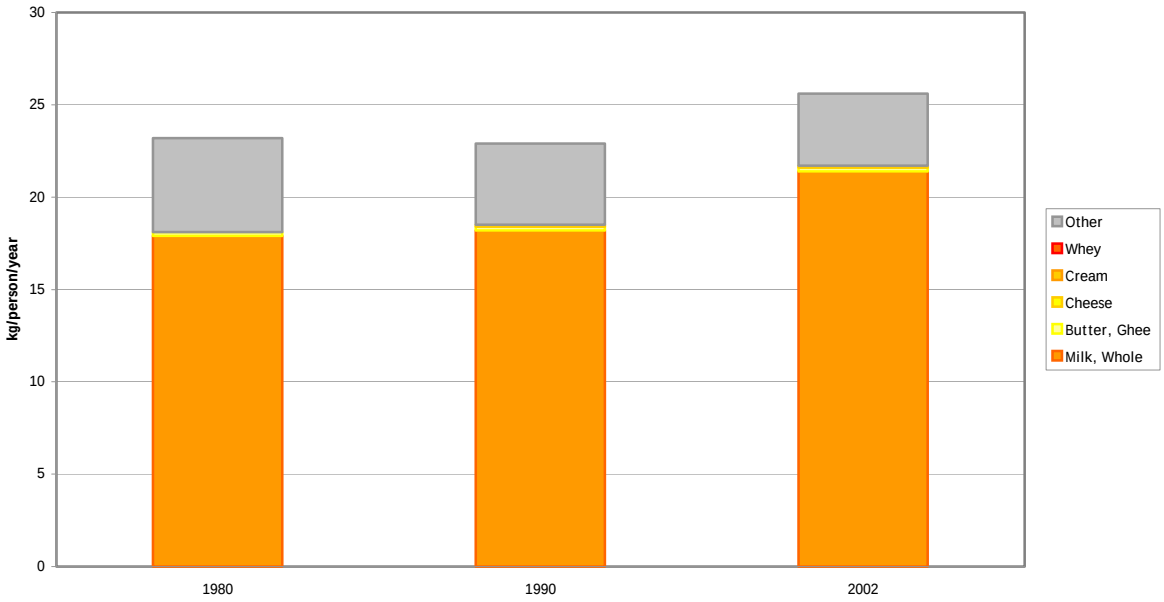
Milk production in Tanzania peaks just after the rains when lush pasture is available and progressively declines the further into the dry season. Milk prices vary inversely to the production pattern peaking in January before the onset of the long rainy season and decline gradually to their lowest level as the year progresses. The seasonality of the milk price is further magnified by the demand pattern, with demand slumping during the rainy season (March and April) and the cold season in June (Nyange, 2004).

Annual per capita milk availability in Tanzania is less than 30 litres which is lower than the East African average and has only increased slightly since 1980 (Figure 18). Milk consumption is concentrated in urban and highland areas (30 litres/year) while in those parts of the country where cattle are not kept (mainly due to tsetse infestation) milk consumption is traditionally very low (15-20 litres/year).

Overall, raw fresh milk is by far the most widely consumed and preferred dairy product, followed by fermented milk and milk powder. This pattern does not seem to change with rising incomes (Omore and Staal, 1998; Kurwijila and Boki, 2003).

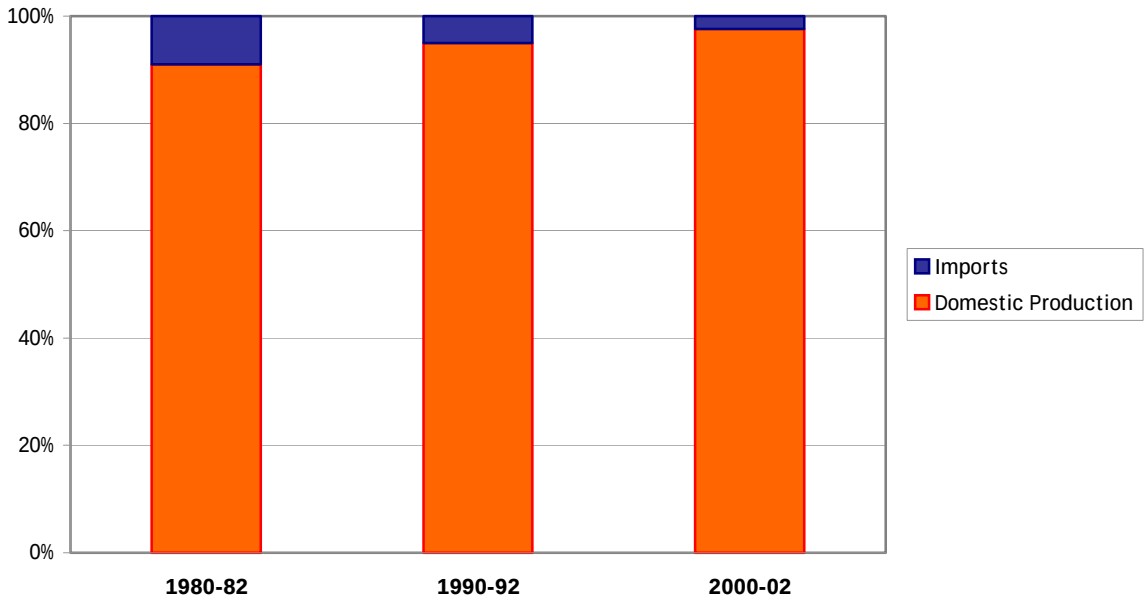
Average consumer prices for the major dairy products show wide variations with fresh milk being generally the cheapest product. In comparison, Tanzanian milk prices are much higher than those in most parts of Kenya (excluding the coast) as well as internationally (Omore and Staal, 1998).

Figure 18: *Dairy consumption per capita per year in Tanzania.*



As domestic production of milk and milk products does not satisfy national demand, particularly in urban areas, Tanzania imports around 20 million tons of milk equivalent each year which accounts for about 2 percent of the domestic supply (see Figure 19). In 2003 Tanzania spent 3.9 million USD on dairy product imports which accounted for about 1 percent of the total agricultural import bill for 2003 (FAOSTAT, 2005). Major imported dairy products are powdered milk (whole and skimmed) followed by butter, concentrated and condensed milk, and UHT milk. Imported dairy products mostly originate from South Africa, New Zealand, United Arab of Emirates, Kenya and from Europe (Nyange, 2004).

Figure 19: *Origin of the dairy supply in Tanzania.*



5.3 Marketing and Processing

Most of the milk produced in Tanzania is consumed on the farms or sold to neighbours. In the traditional sector, which accounts for most of the milk produced in the country, nearly all the milk (around 90 percent) is not marketed but consumed on farm. The small amount that is marketed from the indigenous herds is drawn from herds close to large urban consumption centres especially Dar-es-Salaam, Arusha, Mwanza, Shinyaga and Tabora (Omore and Staal, 1998; Mutagwaba, 2005).

Despite the fact that the commercial dairy sector has a stronger market orientation than the traditional sector, even there only 67 percent of the milk produced is marketed (57 percent through the informal sector and 10 percent through the formal sector) while 33 percent are consumed on farm. Overall, less than 10 percent of the milk produced in Tanzania is marketed as processed milk and milk products (Kurwijila and Boki, 2003).

A striking feature of the milk market in Tanzania is its highly fragmented character. Milk producing areas are far away from the major urban centres where the demand is concentrated and links between the various sub-markets are very weak or inexistent. Due to the perishable nature of fresh milk and the lack of cooling chains, milk is mostly consumed in the area of production, unless processing enables transport without losing quality (Kurwijila and Boki, 2003).

The predominant channel for informal milk marketing (an estimated 60 percent of all marketed milk) is through direct sales from farmers to consumers. Sales are made directly to neighbours who collect it from the farm or milk delivered to the consumer by the farmer. The second most important marketing channel, after home delivery, is through street vendors, who handle most of the remainder of the milk. These vendors are common in Dar-es-Salaam, Arusha, Kilimanjaro, Tanga, Mwanza and Mbeya. The majority of traders buy milk directly from producers and sell directly to consumers. Most use bicycles, foot or public transport to move around farms to collect the milk

and deliver it to markets. Some of the milk traders are producers themselves who supplement their supplies by buying from other farmers. The most common outlet for these flows are individual households, hotels and restaurants. The amount handled by each small trader mostly ranges from 10 to 100 litres a day. The average distance travelled daily by the traders lies between 20 and 40 km and their gross margins range from TSH 50 to 95 (USD 0.08 to 0.15) per litre (Omore and Staal, 1998).

In urban areas, especially in Dar-es-Salaam, milk is also increasingly sold through milk kiosks and bars. In these places milk is boiled and cooled before sale and part of it is fermented (Omore and Staal, 1998). Local retail shops and markets are important outlets for milk, especially in Arusha-Kilimanjaro, Mwanza-Kagera and coastal zones. In 1998 only very few households purchased milk or milk products from supermarkets (Omore and Staal, 1998).

Recent studies indicate that the quality of a considerable proportion of raw milk and milk products marketed by the informal sector is below the standard set by the Tanzania Bureau of Standards and adulteration and the presence of antibiotic residues above permissible maximum limits are issues for concern (Kurwijila and Boki, 2003).

Dairy cooperatives play a relatively small role In Tanzania, only handling some 5 percent of marketed milk. They collect, boil, cool and market milk when fresh or soured. Only the Tanga Dairy Cooperative Union (TDCU) pasteurises milk. A few cooperatives in the Kagera region produce cheese to avoid spoilage and wastage though markets for cheese are limited and it is difficult to sell unless markets are established beforehand. The best established dairy cooperatives are Nronga and Ng'uni Women's Dairy Cooperatives (in Kilimanjaro) and TDCU with its nine primary cooperatives (Omore and Staal, 1998).

Out of the marketed milk, about 40 million litres are processed in dairy factories, ranging from micro-dairies processing less than 500 litres per day to small scale factories processing up to 5,000 litres a day. There are only three factories (Royal Dairy in Dar-es-Salaam, Musoma Dairy in Musoma and New Northern Creameries in Arusha) processing over 15,000 litres per day (Kurwijila and Boki, 2003). Processing plants are mainly found in areas which have a milk surplus or in urban areas where the demand for processed milk is relatively high.

Processors located in the major production areas in the highlands benefit from relatively low producer prices and low storage cost due to cooler temperatures but abundant milk supply and limited demand lead to low sales prices while the transport of the milk to urban markets is associated with high costs. In contrast, processors located in the coastal areas face relatively high producer prices due to high consumer demand for unprocessed raw milk as well as resulting from the low productivity and low milk yields due to adverse climatic conditions. Furthermore, processors incur high energy cost due to cooling requirements. However, demand for milk is strong and sales prices are relatively high (Nyange, 2004).

Milk collection is mostly organized in two different ways. Within three hours after milking the raw milk is transported over short distances to milk collection points without cooling facilities and is subsequently picked up by a lorry and transported to a milk-processing factory within 4 to 5 hours post milking. This system is in operation around Chalinze along the Morogoro-Dar-es-Salaam road. Alternatively, milk is brought by farmers or milk vendors to private or co-operatively owned milk cooling centres. The cooled milk is later transported in milk cans in insulated box trucks or bulk tanks to milk processing plants. This is common in Tanga and to a lesser extent in Arusha/Kilimanajaro (Kurwijila and Boki, 2004).

The common practice in processing plants includes boiling and cooling of raw milk. Though some processors have diversified into dairy products such as butter, yoghurt, cheese and ice cream in recent years, liquid milk remains the dominant product in all processing plants (Nyange, 2004; Omore and Staal, 1998).

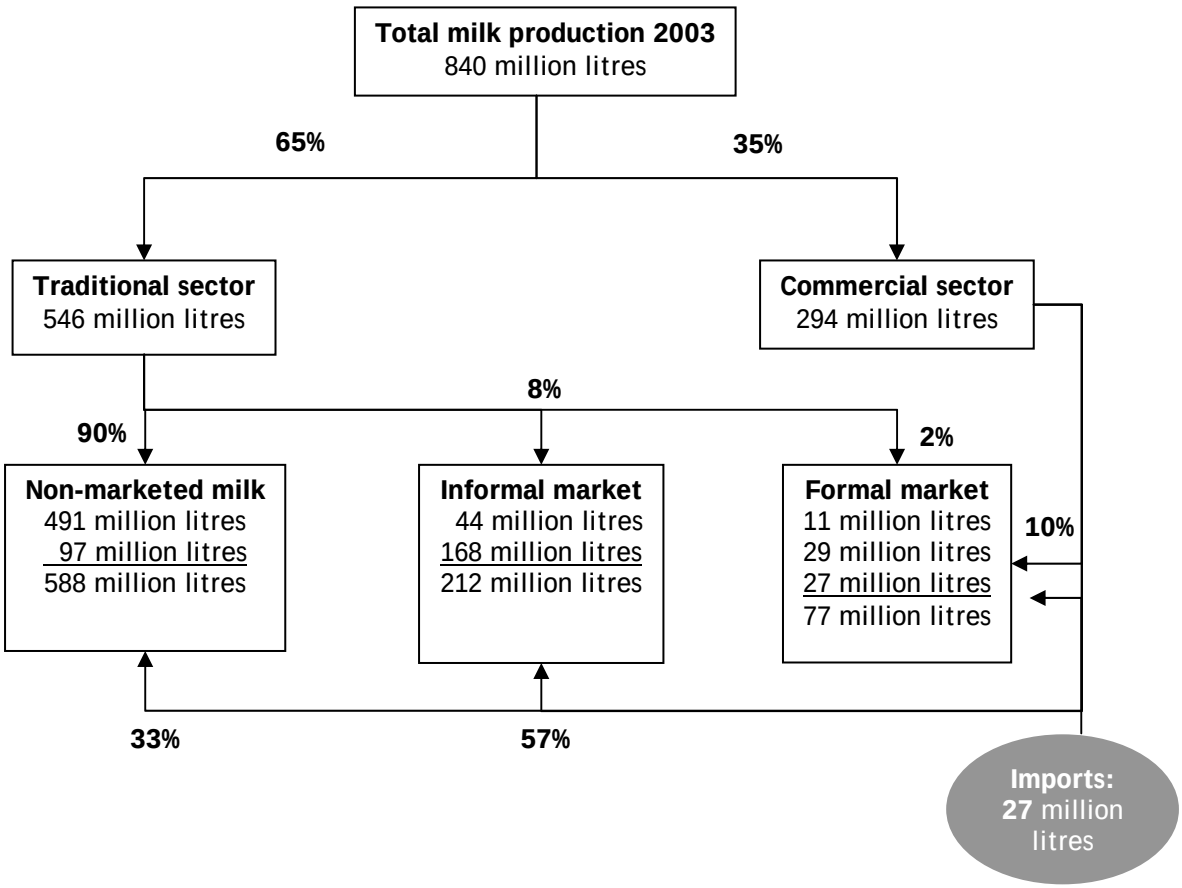
Both large-scale as well as small processing units face problems of underutilization of processing capacity and usually operate below 50 percent of capacity. In the case of the mini-dairies this is mainly due to electricity shortfalls for operating coolers (Kurwijila and Boki, 2003).

The processors buy milk directly from producers, vendors or smaller cooperatives and mini dairies. However, as milk processors mostly offer uncompetitive prices of only 50 to 70 percent of what a producer would get by selling directly to end consumers, farmers have little incentive of selling to processors and will only do so if they have limited market outlets. Only for larger producers can it be profitable to sell to processors to reduce distribution costs (Nyange, 2004).

Besides price competition with informal raw milk traders who offer farmers better prices, seasonality of supply is another problem for processors. Large processors reconstitute imported powder milk during the off-season. The variation in milk prices between the rainy and the dry season can be as high as of 50 percent (Nyange, 2004).

The poor infrastructure is a major constraint for the collection and hence processing of milk with hauling costs comprising 10-30 percent of total milk processing costs (Nyange, 2004). Packaging materials and electricity are other major cost items for the dairy industry. The import duty on packaging materials is considered a major constraint by the sector. The sales tax on cheese, butter and ghee also hampers profitable production from fresh milk in the formal sector. These high costs involved in formal milk processing make it very difficult for the dairy industry to compete with informally marketed milk (Kuwijila, 2001b). Moreover, the strong consumer preference for home delivery of milk that is provided by the informal market adds to the formal sector's difficulties to compete with the informal sector. Even for milk processed in the formal sector quality assurance systems are weak or absent and competition with imports takes place mainly on the basis of quality differences rather than price (Kurwijila and Boki, 2003).

Figure 20: *Tanzania milk marketing channels.*



5.4 Dairy Policies

Over the last decades agricultural and trade policies in Tanzania have been changing in line with general economic policies, which can broadly be subdivided into three periods, post independence (1961-1966), socialism (1967-1984) and liberalisation (1985-present) (Nyange, 2004).

Under the socialist regime most private enterprises, including commercial dairy farms and processing plants, were nationalized and put under the management of state companies. These state companies had a monopoly in all sectors despite the continued operation of some small private enterprises. Most prominent was the government-owned Tanzania Dairies Limited (TDL) which had a monopoly in milk processing and distribution. TDL sourced its milk supply from state dairy farms run by the Dairy Farms Company (DAFCO). In addition, Tanzania Dairies Limited purchased milk from smallholders but also imported powder milk for reconstitution. As TDL was the sole distributor of processed milk in the country it assumed a price setting role (Nyange, 2004).

The socialist approach to milk production and marketing led to disappointing outcomes as state-owned farms were often poorly managed and operated at high costs. Although TDL built large modern processing plants close to consumers, which produced good quality pasteurised products, processing costs were high. This in turn made it difficult for TDL to offer attractive prices to farmers, and thus capacity could

only be filled by using imported skim milk powder. Processing relied heavily on the recombining of milk powder and butter oil supplied by the World Food Programme. Though the rationale behind the milk powder provision was to replicate the successful Indian experience with 'Operation Flood', of gradual replacement of milk powder by locally produced fresh milk, the availability of food commodity aid did not encourage the local industries to establish the infrastructure needed to procure local milk as imported milk tended to be cheaper and more convenient to handle (Kurwijila and Boki, 2003). Thus when skim milk powder imports declined in the 1980s, owing largely to national economic problems and the loss of import capacity as well as the scaling down of food aid, the processing plants found themselves operating substantially below capacity with correspondingly high overheads per litre of milk processed (Mdoe and Wiggins, 1997).

When DAFCO's problems became clear, a new approach was adopted in 1983, switching attention to the promotion of smallholder dairying. It was decided to supply improved cattle, animal feeds, veterinary medicines, extension services etc. to smallholders and to improve price incentives. However, despite increases in the price paid by TDL for fresh milk, prices remained unattractive as compared to those offered by the informal sector (Mdoe and Wiggins, 1997).

The deregulation of the economy started gradually in 1984, in line with a structural adjustment program; however, serious reforms were only instituted in 1986. In the livestock sector the reforms included the withdrawal of the government from fixing producer and consumer prices, the removal of input subsidies, the removal of restrictions on imports and exports of livestock products and the privatisation of state companies. Reforms, which targeted the economy as a whole but influenced the livestock sector, included the deregulation of foreign exchange rates and the relaxation of import and export trade restrictions as well as the promotion of private sector participation in the economy (Nyange, 2004).

Recently the government has shifted focus and is aiming at the promotion of market-oriented smallholder dairying with improved dairy cows which includes (i) the promotion of creating an inventory of dairy breeds and their characterisation, evaluation and selection (ii) the encouragement of dairy development in suitable areas, (iii) the promotion of the use of appropriate technologies that increase productivity, (iv) gender mainstreaming, (v) support of farmer groups and co-operatives, (vi) support of cattle breeding and multiplication and (vii) the strengthening of demand-driven technical support services for dairy production (MWLD, 2005).

5.5 Likely Impacts of Milk Powder Imports

The Tanzanian dairy sector is characterised by fragmented markets with milk mostly being consumed on farm or sold to consumers close by and only rarely transported over longer distances. About 98 percent of the dairy products (in milk equivalents) consumed in Tanzania in 2002 was produced domestically. Imported milk powder is either used for recombination by milk processors (especially during the dry season when local milk supply is scarce) or sold directly to consumers in urban areas, mostly in Dar-es-Salaam (Nyange, 2004). In instances where imported and locally produced dairy products compete with each other such as on supermarket shelves, consumer decisions depend less on prices, as these tend to be similar, but rather on higher quality of the imported products. Furthermore, industrial processors that use milk powder for reconstituting milk, argue that imported milk powder is not cheaper for the factories but rather more convenient to use due to reliability of supply and easy storage (Nyange, 2004). Sourcing from local farmers can be difficult for the formal

sector as farmers use processors as buyers of last resort and prefer selling their milk to the informal sector where they receive better prices.

Another distinguishing feature of the Tanzanian milk market is the very strong consumer preference for fresh milk which is preferably bought from neighbours or trusted vendors. For instance, during the transition period of TDL privatisation urban consumers reverted to their consumption habits and returned from processed to raw milk consumption (Nyange, 2004).

Taken together, the evidence indicates that dairy sector development has not been affected by massive milk powder imports and that small dairy farmers' production and incomes are currently not threatened by imports. Firstly, milk powder imports are relatively low as compared to domestic production and only reach urban areas, whereas market outlets for small farmers are predominantly in the vicinity of their farms and secondly consumers have a very strong preference for fresh milk even in urban areas.

Stakeholders that are affected by milk powder imports are those processors that use locally produced fresh milk and have to compete with processors that use imported milk powder. However, dairy farmers are currently not affected by processors' decision as to how to source their milk as they have sufficient outlets through the informal market, which in addition offers better prices.

In order to strengthen the formal against the informal market it would be necessary to facilitate milk collection in rural areas through improvements in infrastructure. Also the efficiency with which processors operate would need improvement as currently operating costs are to high – for either offering farmers competitive prices or competitively priced dairy products to consumers.

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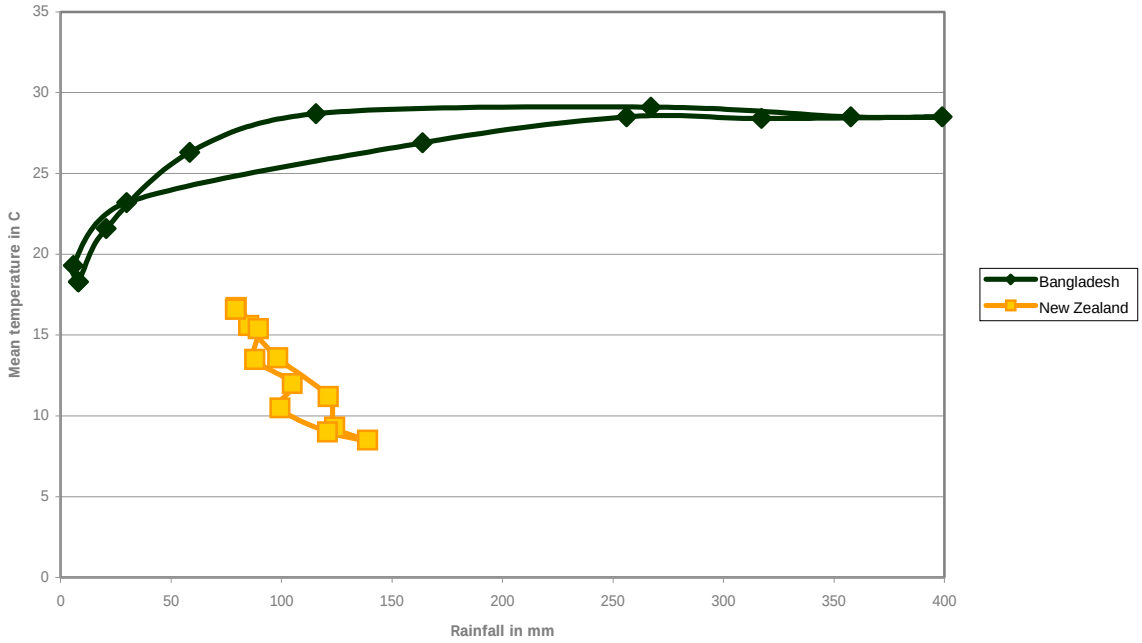
6. BANGLADESH

6.1 Background

Most of Bangladesh is situated on deltas of large rivers flowing from the Himalayas: the Ganges unites with the Jamuna (main channel of the Brahmaputra) and later joins the Meghna to eventually flow into the Bay of Bengal. The climate is tropical with a mild winter (October to March), a hot, humid summer (March to June) and a humid, warm rainy monsoon (June to October). The terrain is mostly flat alluvial plain and hilly in the south-eastern part with much of the country routinely inundated during the summer monsoon season.

Bangladesh has a land area of 130,000 square kilometres of which 69.4 percent is classified as agricultural land. Only 6.6 percent of the agricultural area is permanent pasture.

Figure 21: *Climograph of Bangladesh.*



In 2003, Bangladesh had a population of 138.1 million people, of which 55.6 percent were engaged in the agricultural sector. Rural poverty reaches a level of 53 percent.

The agricultural sector contributed 21.8 percent to GDP in 2003 and within agriculture dairy production contributed only 1.8 percent.

Table 5: *Bangladesh country statistics.*

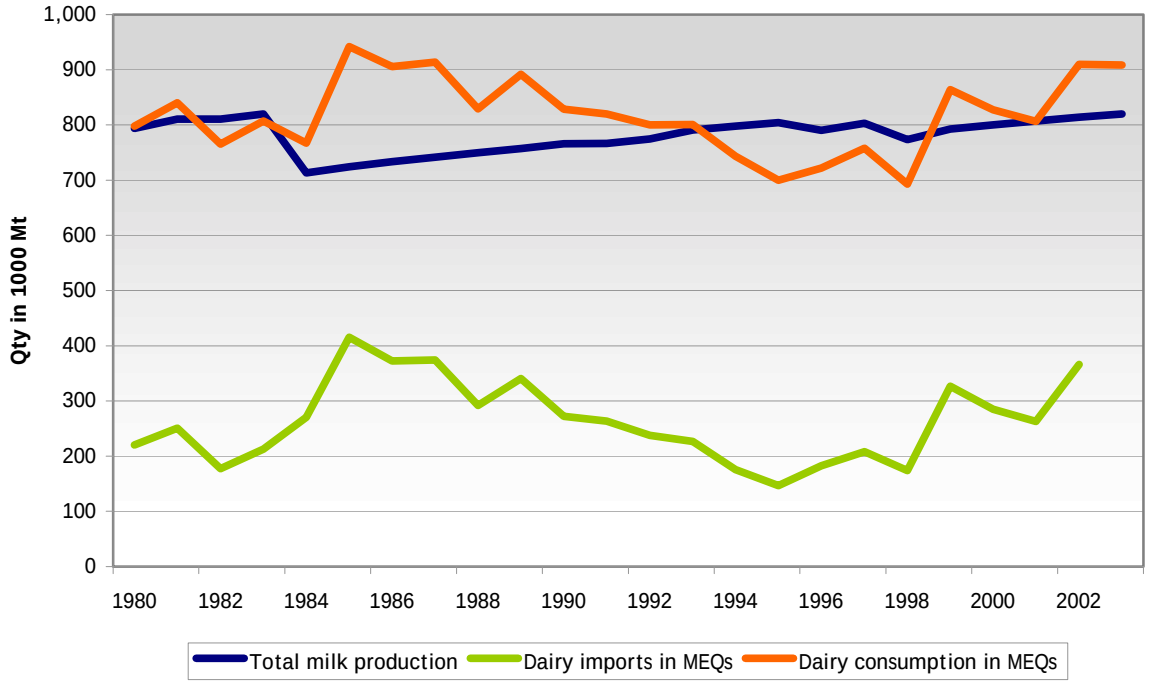
Demographics		Year	Source
Human population (million)	138.1	2003	WDI
Rural population density (people per sq km)	1,249.0	2002	WDI
Population in agriculture (%)	55.6	2000	FAOSTAT, 2005
Urbanization (%)	26.8	2003	WDI
Rural poverty (% of rural population)	53.0	2000	WDI
Land			
Land area ('000 sqkm)	130	2002	FAOSTAT, 2005
Agricultural area (%)	69.4	2002	FAOSTAT, 2005
Share of permanent pasture of agricultural area (%)	6.6	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	54,589	2003	WDI
GDP annual growth rate 1993-2003 (%)	4.9		WDI
GDP per cap (constant 2000 USD)	395.4	2003	WDI
GDP per cap PPP (constant 2000 USD)	1,672	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	21.8	2003	WDI
Livestock GDP as share of agriculture GDP (%)	11.9	2003	FAOSTAT, 2005
Livestock GDP as share of total GDP (%)	2.6	2003	FAOSTAT, 2005
Dairy GDP as share of livestock GDP (%)	15.1	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	1.8	2003	FAOSTAT, 2005
Trade			
Dairy export value (1,000 USD)	3	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	69,425	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	69,422	2002	FAOSTAT, 2005
Value of dairy net imports as share of total agricultural imports (%) (Average 1999 – 2003)	4.1	2002	FAOSTAT, 2005
Dairy Production			
Cattle/Buffalo (1,000 head)	25,400	2003	FAOSTAT, 2005
Grade 'Dairy' cows (1,000 head)	6,000*	2001	Dugdill *et al.*, 2001
Dairy cattle as share of all cattle (%)	2.8** 26	2001 2001	Saadullah/DLS, 2001 Dugdill *et al.*, 2001
National cow/buffalo milk production (tonnes)	819,800	2003	FAOSTAT, 2005
Average milk yields (kg/cow/year)	200	2004	Hemme *et al.*, 2004
Proportion of milk marketed (%)			
Ag HH with dairy cows/ Dairy farms as proportion of total HH (%)	29,600 16	2000 2004	DLS, 2000 Mainuddin, 2004
Average dairy herd size (cows)	3.5	2004	Hemme *et al.*, 2004
Number of co-operatives	n/a		
Co-operative members	>60,000	2001	Saha and Haque, 2001

*cows kept for milking
** cross-bred dairy cattle

6.2 Production, Consumption, Trade

Between 1980 and 2003 milk production only increased by 3 percent from 794,000 tonnes to 820,000 tonnes (FAOSTAT, 2005). Milk production is dominated by small-scale farmers with over 70 percent of dairy cattle/buffalo being kept in herds with an average of 3.5 animals (Hemme *et al.*, 2004). Landless and small-scale farmers own 18.4 and 29.6 percent of cattle respectively and produce the bulk of milk (Saadullah, 2002). Overall, about 18 percent of the households keep draught animals while dairy animals are kept by 16 percent of the households. Of about 25 million cattle in Bangladesh most are indigenous type multipurpose animals (Mainuddin, 2004).

Figure 22: *Production, consumption and imports in milk equivalents, 1980-2002.*



Source: FAOSTAT, 2005

Milk yields in Bangladesh have increased slightly between 1996 and 2002. For local cattle breeds, which constitute the majority of cattle in Bangladesh, milk yields increased by around 5 percent while for cross-bred cows they increased by 4 percent (Hemme *et al.*, 2004). However, at 200 litres per year, milk yields per dairy cow/buffalo are very low - less than half of those achieved in Pakistan and India (Hemme *et al.*, 2004).

Milk production has a pronounced seasonal pattern with peaks in January/February and May/June. In the lean season between July and October milk production can drop to one third of peak levels (Dugdill *et al.*, 2001).

Nearly half of the milk in Bangladesh is produced in the north of the country, where fodder availability is better and various dairy development programs are located (Hemme *et al.*, 2004). The four major milk sheds in Bangladesh are Tangail, Manikgonj, Tekerhat (Madaripur) and Baghabari (Sirajgani). About 38 percent of the primary milk co-operative societies are located in the Baghabari milk shed, which is the leading milk production area in Bangladesh (Khan, 2005).

Cows are traditionally multi-purpose animals, but are increasingly being kept solely for their milk. Nevertheless, a considerable number of cows in rural dairy production are still used as draught animals (Mainuddin, 2004). The use of crossbreds such as Pabna-Sahiwals, Pabna-Friesians and Pabna-Jerseys to improve milk production has been expanding at both the smallholder level in the milk collection areas and, more recently, on small commercial dairy farms spread throughout the country (Dugdill *et al.,* 2001).

Dairy production can be classified into three types (a) rural, (b) pocket, and (c) peri-urban dairy (Mainuddin, 2004).

Most of the dairy cows in the country are located in rural areas. **Rural** dairy producers keep one or two cows with or without other animals and follow traditional husbandry practices, such as the feeding of agricultural residues and weeds. Cattle are mostly grazed on non-arable land, and due to its scarcity, arable land is not used for livestock feed production (Saadullah, 2001). Rural smallholder dairy producers sell milk when facing immediate cash needs and only consume very little (Khan, 2005).

'Pocket dairies' have developed in different regions of the country through contractual agreements between the milk producers and milk processors, with the latter providing marketing and technical support to the producers. The milk prices producers receive are specified in advance in their contract with the cooperative. The Bangladesh Milk Producers Cooperative Union Ltd (BMCUL) and a number of private companies are supporting pocket dairies in selected areas of Bangladesh (Mainuddin, 2004).

Peri-urban producers keep the majority of the crossbred cows in the country, use better feeding management and have easier access to marketing facilities and technology than farmers in rural areas. As a consequence, they achieve milk yields of 800 to 1,000 litres/per cow/per year (Khan, 2005; Saha, 2002).

Milk production shows a strong response to marketing facilities. According to the Bangladesh Livestock Research Institute (BLRI), the average herd size, milking cows per farm and daily production per farm were 10.1 and 3.82 animals, and 21.5 kg in areas with marketing support while in non-supported areas these numbers were 5.03 and 1.62 animals, and 5.98 kg respectively (Mainuddin, 2004).

Hemme *et al.* (2004) find that the production costs in Bangladesh of 22 USD per 100 kg of milk are about 20 percent below the cost of production in the EU (28 USD per 100 kg) but 40 to 50 percent above the level in other South Asian countries such as India and Pakistan where producers can achieve production costs below 15 USD per 100 kg.

Low national milk production and a large human population result in low per capita milk production volumes of 13 kg/year which is only 16 percent of the per capita milk production achieved in India (Hemme *et al.*, 2004). As a consequence, despite imports, per capita dairy consumption is low (slightly above 14 kg/year). This is despite the fact that dairy products have traditionally played an important role in the diet of Bangladeshi people (Mainuddin, 2004).

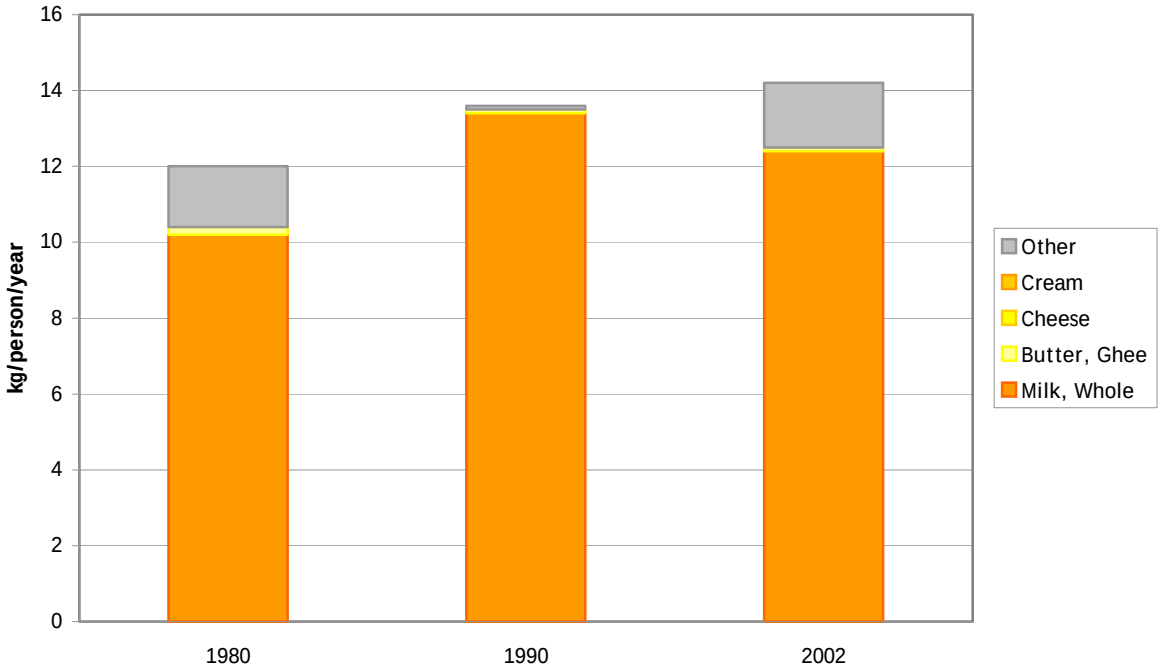
Starting from very low levels, per capita dairy consumption has increased slightly from 12 kg in 1980 to over 14 kg in 2002 (see Figure 23). This has happened despite a rise of milk and milk product prices in both nominal and real terms. Between 1996/97 and 2003/04 the nominal price increased by about 50 percent and the real price by about 18 percent. The factors that have led to an increasing per capita demand for milk and milk products, despite rising prices, are a rise in real per capita income, diversification of available milk products, quality improvement and the development of more efficient marketing networks (Mainuddin, 2004).

Dairy consumption in Bangladesh is dominated by traditional sub-continent products such as channa (soft cheese), dohi (sweetened yogurt) and ghee (clarified butter) produced by a small-scale processing sector (FAO, 2003). Health and nutrition

awareness and campaigns for nutritious food have led to an increasing demand for fresh milk, which is considered an ideal food (Mainuddin, 2004).

The increase in milk consumption has been much stronger in urban than in rural areas with rapid urbanisation having also favoured the demand for high value milk products such as ice creams, chocolates etc. (Mainuddin, 2004).

Figure 23: *Dairy consumption per capita per year in Bangladesh.*

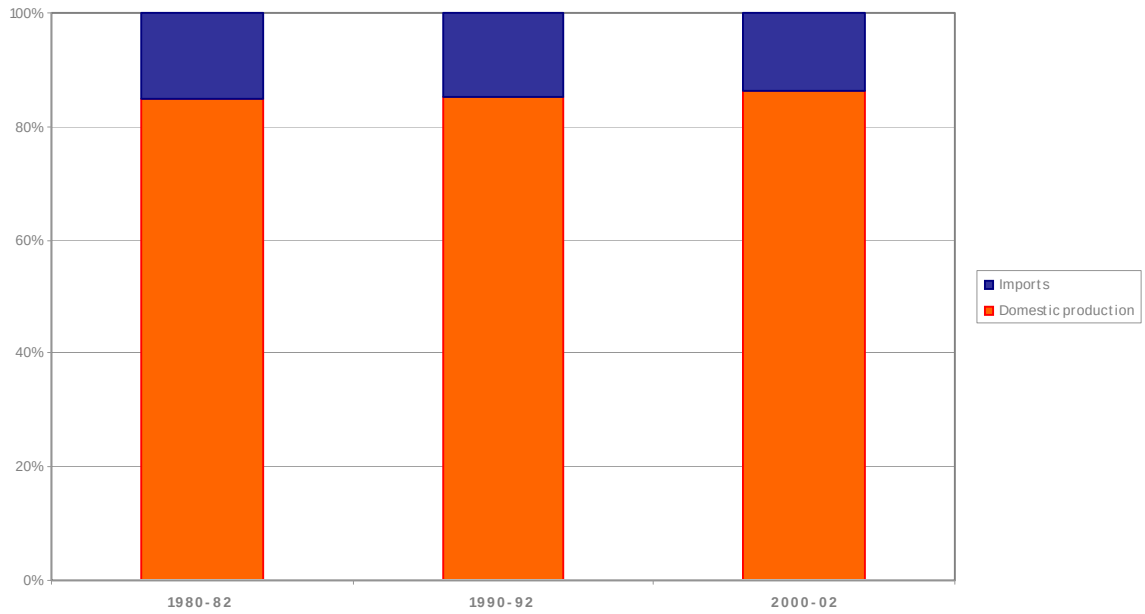


Source: FAOSTAT, 2005

Imported milk powder played a significant role in meeting consumer demand in the past. At their peak in the mid-1980's, imports reached more than 400,000 tonnes liquid milk equivalent a year, which was over 27 percent of the total domestic supply. However, as the local industry gained momentum and world milk powder stocks declined (and prices increased), imports fell to about 200,000 tonnes of liquid milk equivalent by the mid-1990s.

Since the middle of the 1990s, dairy imports have been rising again and the country continues importing substantial quantities of milk powder and infant formula. The total value of milk and milk product imports was 63 million USD in 2003 compared to 90 million USD in 1990 (Mainuddin, 2004; FAOSTAT, 2005). However, the share of imported dairy products in total domestic milk supply has stayed more or less stable around 16 percent over the last twenty years (see Figure 24).

Figure 24: *Origin of dairy supply in Bangladesh.*



Source: FAOSTAT, 2005

6.3 Marketing and Processing

An estimated three percent of the milk produced in Bangladesh flow through the formal channels of processing. The remaining 97 percent are informally traded as liquid milk through small travelling / distributing traders (Hemme *et al.,* 2004).

Rural subsistence farmers usually consume most of their farm milk in the form of fresh liquid milk and of various home-made dairy products (such as curd and ghee) and sell or barter the surplus milk (products) in the village (Hemme *et al.,* 2004). Commercial farms near major population centres usually sell their milk directly to the end consumer as the milk prices in towns are very attractive (Hemme *et al.,* 2004).

The vast majority of raw milk reaches the markets through the informal dairy chain and adulteration occurs frequently. In many areas, organised milk collection is absent and milkmen are the only buyers of milk. Selling to milkmen is attractive for farmers as milkmen tend to pay higher prices than dairy co-operatives while selling to milkmen has the disadvantage that farmers cannot profit from short-term price rises as milkmen often pay the milk in cash in advance (Khan, 2005). More recently, simultaneous with the growing numbers of crossbred cattle in rural areas, middlemen and wholesalers have joined in collecting milk and selling to sweet shops, curd, butter and ghee makers who then transport it more and more often to urban markets. More commercially-oriented rural farmers, mainly those with three or more dairy animals, take their fresh milk to nearby village markets, which usually operate for 2 to 3 hours either in the morning or in the afternoon every day.

Bangladeshi dairy farmers receive the highest milk prices in South Asia (over 23 USD per kg of fresh milk, Hemme *et al.,* 2004). However, prices vary considerably with

the location of the farm and season and in remote areas milk prices will only be a fraction of those in the vicinity to cities (Khan, 2005). Where distance and/or time prevents the collection of fresh milk, it is converted into traditional products such as ghee, channa (concentrated skimmed milk used as a base for making traditional sweets) or yoghurt (dohi) (Khan, 2005).

Most informal milk processing is done at the household level but also sweetshops, producing traditional sweetened dairy products that are consumed as a sweet snack and or dessert, play an important role. Sweetmeat is by far the most popular dairy product sold by the informal sector followed by ghee and some other typical sweets (Hemme *et al.,* 2004). Chain sweetmeat shops that collect raw milk through their agents are an emerging feature and are replacing traditional independent shops both in rural and urban areas. Especially in the larger towns and cities, chain sweetmeat shops selling high quality products are emerging and growing rapidly. However, they may find it difficult to grow much further in the urban areas where consumers are becoming increasingly brand conscious (Mainuddin, 2004).

The formal sector comprises both public and private milk processing companies and is highly concentrated with the biggest five milk processing companies handling over 93 percent of the total formally processed milk. The formal sector, led by co-operative societies, extracts cream from the raw milk to produce ghee and butter. The resulting milk is further processed into pasteurised (3.5 percent fat content) milk, which is sold in plastic bags of 0.5 and 1.0 litre (Hemme *et al.,* 2004). Although formal milk processing started with pasteurised milk, several other products have gradually been added to production lines and currently include: pasteurised liquid milk, butter, ghee, powder milk, ice cream, flavoured milk, curd, condensed milk etc., with the processing plants expanding their production along with product diversification (Mainuddin, 2004).

The Bangladesh Milk Producers Cooperative (BMPCUL), popularly known as Milk Vita after their brand name, owns the largest processing plant in the country. Milk Vita collects milk from 565 primary associations of milk producers each comprising 60 to 80 members. Milk Vita is also the oldest dairy venture in the country and provides feeds, vaccines and artificial insemination services to an estimated number of 40,000 to 60,000 members in 10 milk sheds. The farmers supply milk to the primary village co-operative societies twice a day and receive a year-round guaranteed price. The milk is processed in 11 processing plants operated by the co-operative (Saadullah, 2001; Saha, 2002).

The larger milk processing plants offer financial assistance to their suppliers. Milk Vita and BRAC-Dairy offer interest free loans to their milk producers to buy improved dairy cows, arrange vaccinations and supply feed to contracted farmers (Mainuddin, 2004).

The processing plants procure milk from the farmers/producers through milk collectors. Milk collection centres are located in different regions, predominantly in rural areas, depending on availability of milk at low prices based on field assessments. Each collection centre is equipped with a chilling plant and quality testing equipment. Milk suppliers are grouped into associations and are given membership certification (Mainuddin, 2004).

Primary producer associations and members are required to supply an agreed quantity of milk to the chilling centre on a daily basis. Milk is also collected from non-members; this happens especially when the association fails to supply the agreed quantity of milk to the processing plants. Members often sell a part of their milk on the village market instead of supplying the processing plants. This practice becomes more frequent when the market price rises significantly above the price paid by the processing plant (Mainuddin, 2004)

Processors pay the milk collectors/suppliers on a weekly basis with the collection centre keeping records of daily milk supply. Occasionally, conflicts between the processing plant and the suppliers arise on the quality and quantity of milk delivered. Milk production associations and their members will receive warnings from the processing plant if they fail to supply the required quantity of milk, and continuous failure to supply the agreed quantity of milk leads to the cancellation of the membership in the association (Mainuddin, 2004).

In recent years, processing plants have emerged as important actors influencing the milk market. As more large(r)-scale processing plants have emerged, competition for raw milk has increased and processors have started to extend their procurement network into rural areas where prices of milk are still relatively low. Chilling centres are being established in rural areas that are accessible by roads and farmers producing in these areas benefit from the demand created by these processing plants (Mainuddin, 2004).

Although large milk processing plants have adopted and implemented the Bangladesh Standards and Testing Institute's (BSTI) standards for milk products, they follow their own system of grading the milk supplied by the producers. At the collection point / chilling centre, the lactometer test is used to determine water content and chemical tests are conducted to detect the presence of preservatives that may have been added by the suppliers. Milk is accepted or rejected based on the test results. Having reached the processing plant, milk is tested for microbiological quality.

Several smaller private companies have also started producing dairy products. Recently these small-scale milk processing enterprises, apart from collecting milk in rural areas, have also become involved in the collection of milk from contract farmers in urban and peri-urban areas. The private milk processing enterprises operate in smaller areas than the co-operatives and are unable to provide services to dairy farms (Saadullah, 2001).

Most of the small-scale processing plants do not comply with the BSTI requirements, and therefore, do not have BSTI certification (Mainuddin, 2004). As a result of regular testing at the chilling centres and rejection of milk not complying with the standards, the supply of adulterated and contaminated milk has been drastically reduced. The collection from farmers' groups/co-operatives acts as a safeguard against the supply of contaminated or adulterated milk by any single member, as this would lead to the rejection of milk from the entire group (Mainuddin, 2004). However, milk that has been rejected by the chilling centres is often sold through the informal channels. There is virtually no control of quality and standards in the informal milk market as there is no enforcement of laws/regulations concerning food safety. End consumers, however, check the cleanliness of the milk container and conduct some informal milk testing (Mainuddin, 2004). Many small processors have problems with their milk spoiling before it reaches the consumers, which leads to a general consumer perception of local dairy products being unhygienic and unsafe (FAO, 2003).

Retail stores and supermarkets procure milk products from the agents/distributors of the processing plants/dairy companies. Large-scale processors like Milk Vita, Brac-Dairy, Pran Milk and Aftab Milk supply pasteurized milk to selected cities including Dhaka. The marketing network of Milk Vita covers the largest number of towns, followed by Brac-Dairy. Other companies cover only a small number of cities. Most of the retailers sell milk of different brands. Traditional retail stores receive pasteurized milk on a daily basis from the dairy companies' agents/distributors. Other milk products are generally supplied on a weekly basis (Mainuddin, 2004). In addition to pasteurized liquid milk, most of the traditional retail stores in the urban areas sell ice-cream, butter, butter oil etc. (Mainuddin, 2004)

The supermarkets only procure products certified by BSTI. Some products, especially pasteurized milk and butter supplied by Milk Vita, are frequently in short supply. Therefore, good relationships between retailers and the dairy companies'

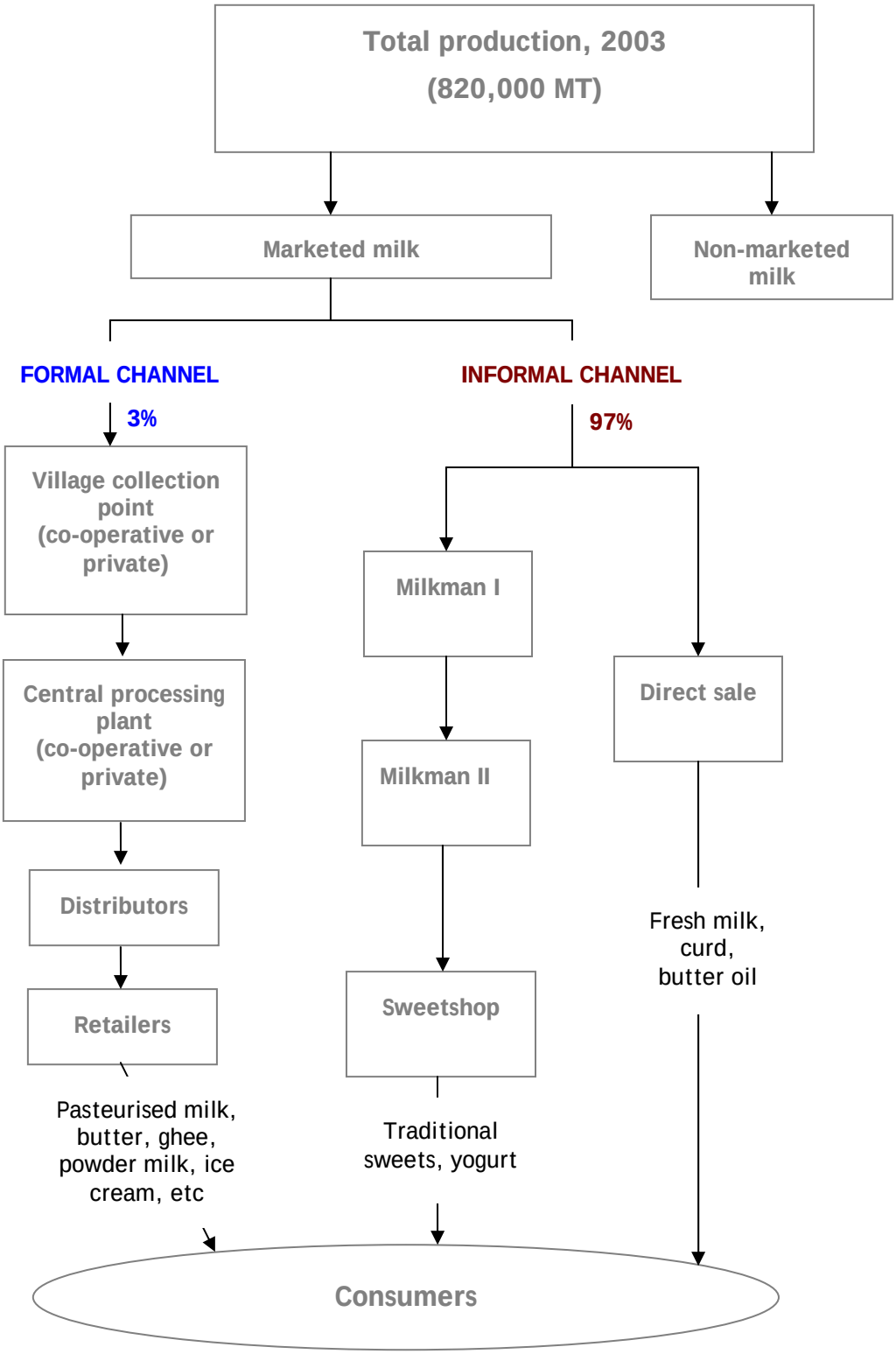
agents/distributors play an important role in securing an adequate supply. In cities and large towns, supermarkets and chain shops are likely to play an increasingly important role in retailing, despite only accounting for a small share of the retail sector at present.

Industrially processed milk products occupy an increasing share of the milk market in large cities and other urban areas. Dairy products available in urban centres of Bangladesh include pasteurised liquid milk, butter, ghee, ice-cream and ice lollies, full cream milk powder, skim milk powder, flavoured milk, sweet curd, cream and rasa malai (sweetmeats). However, pasteurized liquid and powder milk dominate the urban market while the market for expensive and higher quality products specially targeted to rich urban consumers is rapidly expanding. Milk powder in polyethylene bags is cheaper and more popular than milk powder in tin containers (Mainuddin, 2004). In the past, milk powder was exclusively imported but is now also produced locally by Milk Vita and a number of private sector manufacturers. Locally produced milk powder is marketed in different packing sizes through retailers.

With the improvement of the road network in the country the marketing chain is gradually expanding to rural areas. Although pasteurised liquid milk, flavoured milk, and ice cream produced by the large processing plants are exclusively supplied to cities and selected large towns (in rural areas pasteurized liquid milk is not available), other milk products including powder milk, butter, ghee and condensed milk are also available in smaller towns and rural areas. Powder milk is available through traditional independent retail stores in the rural markets.

Imported milk products are distributed by the importers through a conventional marketing network comprising wholesalers, regional agents and retailers throughout the country. Multinationals are engaged in the marketing of their milk products through their national subsidiaries. A number of joint venture initiatives to manufacture and market milk products have also been launched in the country (Mainuddin, 2004).

Figure 25: *Bangladesh milk marketing channels.*



Source: adapted from Hemme *et al.* (2004)

6.4 Dairy Policies

Production

Government policies for the dairy sector are mainly aimed at increasing milk production and target small farmers owning cross-bred cows. Among the measures taken by the government are farmer training on vaccination of cows and free distribution of vaccines. Vaccines produced by the Livestock Research Institute (LRI) under the Department of Livestock Services were distributed to the farmers for free until 1998 when partial cost recovery of vaccines was introduced. The government also registers cattle and dairy farms (Mainuddin, 2004). Furthermore, the government provides direct financial incentives to farmers engaged in rearing improved crossbred cows. Farmers producing at least 5 litres of milk per day are considered eligible for financial support by the government. The amount of support varies from BDT 3,000 to 15,000 per farmer depending on the number of cows (for each crossbred cow farmers receive BDT 3,000 financial support, up to a maximum of five cows). However, only a small fraction of eligible farmers has actually received government support (Mainuddin, 2004).

Although the government encourages the co-operative dairy sector, a detailed 'dairy policy' with special reference to small-scale dairy farmers that addresses issues such as product standardisation, taxation, infrastructure development, food safety and the role of imports has still to be developed.

Marketing

Milk processing plants receive a subsidy of 20 percent of their total electricity bill. The electricity subsidy was increased from 15 to 20 percent in the 2004/5 fiscal year (Mainuddin, 2004).

Pasteurised milk is exempted from value added tax (VAT) while other milk products are taxed (Mainuddin, 2004).

The Bangladesh Standard and Testing Institution (BSTI) is responsible for setting standards and ensuring food quality including that of milk products. The BSTI also provides a quality seal and certifies quality of processed milk products (Mainuddin, 2004).

Consumption

Through the sale of donated surplus commodities from the United States Department of Agriculture (USDA), the US-based co-operative Land O'Lakes began a school milk program in 2002. The program aimed at distributing fortified milk and fortified biscuits to 211,000 primary school children by the beginning of 2003 (Griffin, 2002).

Trade

Import tariffs on dairy products are 38 percent *ad valorem*, with the exception of milk powder and dairy spreads that are only levied with import tariffs of 25 percent (AMAD, 2001).

6.5 Likely Impacts of Milk Powder Imports

With a pronounced gap between availability and demand of milk, resulting from low production that only grows very sluggishly on the one side and a fast(er) growing demand for dairy products on the other side, Bangladesh is dependent on importing dairy products to meet domestic demand. The gap between supply and demand is further exacerbated by the fact that the Bangladesh milk market remains in large parts disorganised leading to a frequent mismatch of supply and demand within the country itself. Particularly farmers in rural areas often only have a restricted outlet for their milk and therefore the commercial orientation of milk production remains limited. Cows are still widely used as draught animals while supplying milk as well.

Currently, the overwhelming majority of the milk moves through informal marketing chains with adulteration and spoilage of milk occurring frequently leading to the consumer perception that local dairy products are both unhygienic and unsafe.

The literature on the dairy sector in Bangladesh does not mention that the imported milk powder represents a threat for the domestic dairy farmers, however, affordable and efficient collection, processing and marketing systems could significantly increase the amount of locally produced milk available to processors and consumers as well as lower the public health risk.

However, in general Bangladeshi dairy farms will have difficulties to compete with imports of dairy products as long as world market prices remain beneath the production costs of milk in Bangladesh. Furthermore, milk producers in Bangladesh are not competitive on a regional scale as producers in both India and Pakistan have much lower production costs. In order to improve their competitiveness and benefit from the growing domestic demand, dairy farms in Bangladesh will have to significantly improve the productivity of their production systems to lower production costs while on the other hand collection and marketing have to guarantee milk products with a reliable quality.

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World Bank, World Development Indicators WDI, databank, various years.

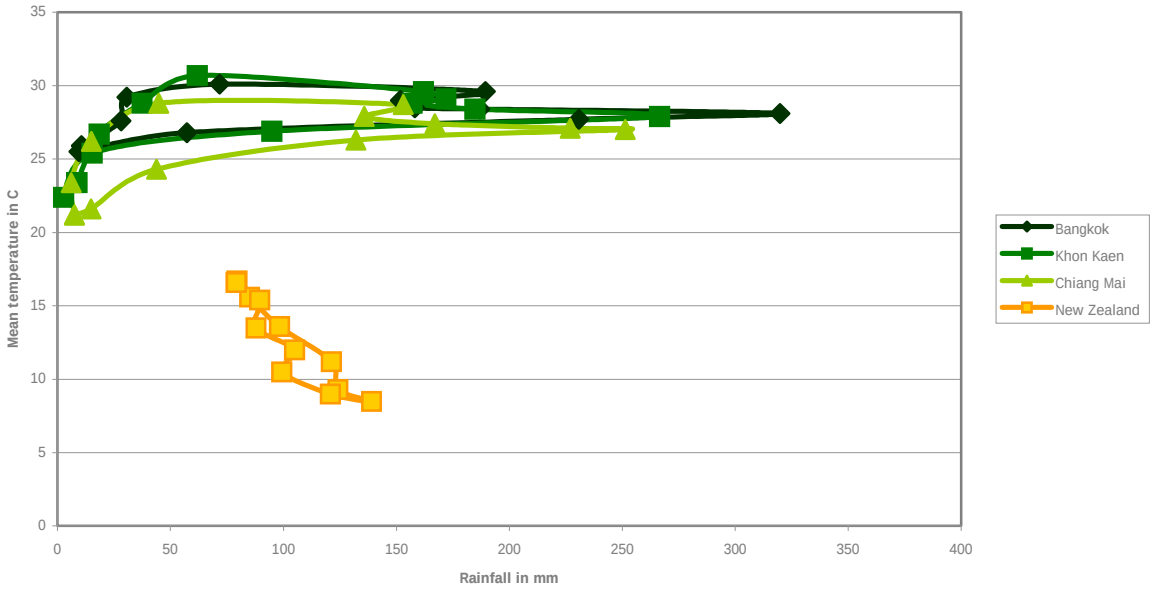
7. THAILAND

7.1 Background

Thailand has a tropical climate, characterised by a rainy, warm and cloudy southwest monsoon (mid-May to September) and a dry, cool northeast monsoon (November to mid-March), the southern isthmus of the country being always hot and humid.

Thailand has a land area of 511,000 square kilometres of which 39.5 percent is classified as agricultural land. Only four percent of the agricultural area is permanent pasture.

Figure 26: *Climograph of Thailand.*



In 2003, Thailand had a population of 62 million people, of which 49 percent were engaged in the agricultural sector. Rural poverty reached a level of 15.5 percent.

The agricultural sector contributed 9.8 percent to GDP in 2003 and within agriculture dairy production contributed one percent to total production in value terms.

Table 6: *Thailand country statistics.*

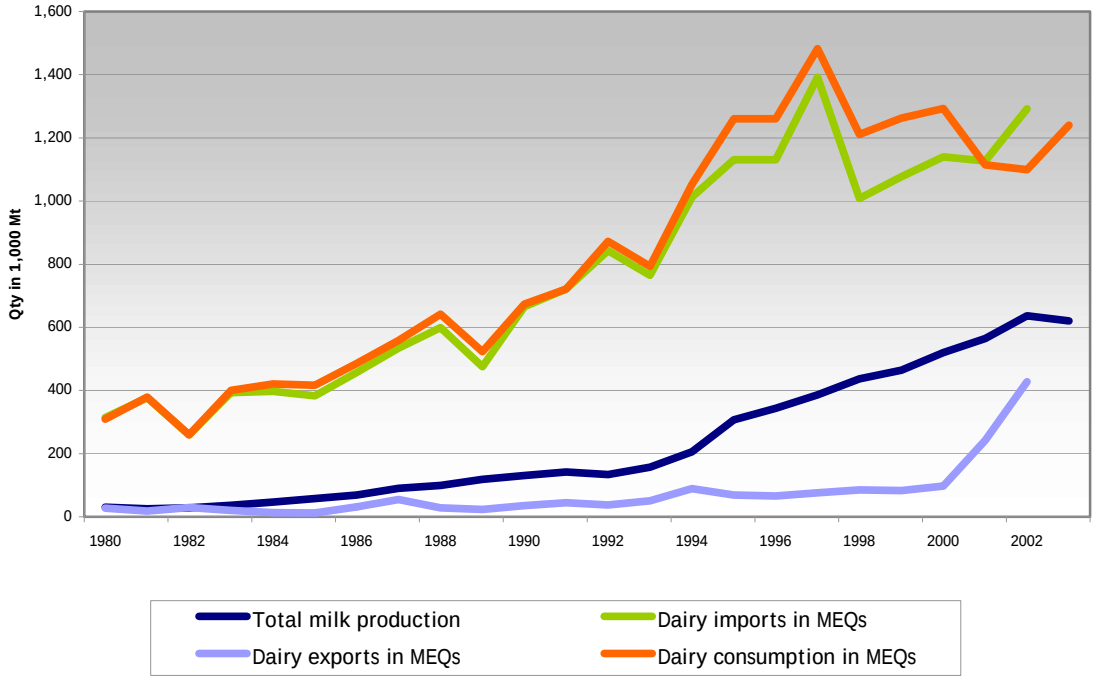
Demographics		Year	Source
Human population (million)	62.0	2003	WDI
Rural population density (people per sq km)	309.8	2002	WDI
Population in agriculture (%)	49.0	2000	FAOSTAT, 2005
Urbanization (%)	20.4	2003	WDI
Rural poverty incidence (%)	15.5	1992	WDI
Land			
Land area ('000 sqkm)	511	2002	FAOSTAT, 2005
Agricultural area (%)	39.5	2002	FAOSTAT, 2005
Share of permanent pasture of agricultural area (%)	4.0	2002	FAOSTAT, 2005
Economy			
GDP (million constant 2000 USD)	141,000	2003	WDI
GDP annual growth rate 1993-2003 (%)	3.3		WDI
GDP per cap (constant 2000 USD)	2,276	2003	WDI
GDP per cap PPP (constant 2000 USD)	7,175	2003	WDI
Agriculture, Livestock and Dairy			
Agriculture GDP as share of total GDP (%)	9.8	2003	WDI
Livestock GDP as share of agriculture GDP (%)	20.9	2003	WDI
Livestock GDP as share of total GDP (%)	2.0	2003	WDI
Dairy GDP as share of livestock GDP (%)	4.6	2003	FAOSTAT, 2005
Dairy GDP as share of agriculture GDP (%)	1.0	2003	FAOSTAT, 2005
Trade			
Dairy export value (1,000 USD)	139,685	2002	FAOSTAT, 2005
Dairy import value (1,000 USD)	243,988	2002	FAOSTAT, 2005
Value of net imports (1,000 USD)	104,303	2002	FAOSTAT, 2005
Value of dairy net imports as share of total agricultural imports (%) (Average 1999-2003)	9.1		FAOSTAT, 2005
Dairy Production			
Cattle/Buffalo (1,000 head)	5,000	2003	FAOSTAT, 2005
Grade 'Dairy' cows (1,000 head)	408	2004	Thailand Ministry of Agriculture and Cooperatives, 2006
Dairy cattle as share of all cattle (%)	8.2	2004	Author's calculation
National cow milk production (tonnes)	620,000	2003	FAOSTAT, 2005
Average milk yields (kg/year)	3,000	2005	Garcia *et al.* 2005
Proportion of milk marketed (%)	~100	2005	Garcia *et al.* 2005
Ag HH with dairy cows/Dairy farms	23,000	2004	Thailand Ministry of Agriculture and Cooperatives, 2006
Average dairy herd size (cows)	20	2005	Garcia *et al.* 2005
Number of cooperatives	117	2004	bilaterals.org Thai Holstein Friesian Association
Cooperative members	40,000	2004	

*****Rabobank

7.2 Production, Consumption, Trade

Milk was never an important product in traditional Thai society and cattle and buffalo used in traditional Thai farming were predominantly used for draught power rather than milk production. The low level of urban demand for milk products that did exist prior to the 1960s was satisfied by imports. However, since the 1960s the Thai dairy industry gradually developed and became one of the fastest growing livestock sectors in the 1990s (Murphy and Tisdell, 1996).

Figure 27: *Production, consumption and imports in milk equivalents, 1980-2002.*



Source: FAOSTAT, 2005

The strong growth in milk production that Thailand has witnessed over the last years was encouraged by a government policy in support of the dairy sector. Between 1980 and 2003, Thai milk production grew 20-fold, from 30,000 tonnes milk produced in 1980 to 620,000 tonnes milk produced in 2003. Between 1995 and 2002 the total number of dairy animals grew by 44 percent and milk yields per dairy animal per year increased by 32 percent (Rabobank, 2004). Simultaneously, with increasing farm mechanisation the buffalo population fell to 60 percent of its 1996 level (Garcia et al., 2005).

The north central part of Thailand has traditionally been the dominant milk producing region with over 65 percent of national production, followed by the north eastern region with about 25 percent. Although all regions have increased their production, the north eastern region has increased its share in the national production (from 20 to 23 percent) while the north central has lost some part of its share (from 71 to 67 percent) in the period between 1999 and 2001 (Garcia et al., 2005).

Between 95 and 99 percent of dairy farms in Thailand can be classified as small-scale mixed crop-livestock farming systems and around 70 percent of the farms in Thailand keep less than 20 head of cattle. Smallholder dairy farms in rural areas integrate

their dairy operations generally with the production of rice, upland crops, orchards crops or various plantation crops. The low numbers of cows held per farm are largely due to farmers' lack of investment capital for (high-producing crossbred) dairy animals, farmland, and dairy equipment to expand their operations (Garcia et al., 2005). Nevertheless, there is a general tendency for the number of milking cows owned by each smallholder to increase. Moreover, there is a steady shift in the role of dairying from providing a source of supplementary income to becoming a major or specialised enterprise in mixed farming systems (Chantalakhana and Skunmun, 2001).

Crossbred cows (Holstein Frisian with local breeds) are the main type of dairy animals. This crossbred dominance is driven by the replacement of buffaloes as a source of draught power by tractors, increasing demand for beef, and strong demand for milk. Crossbred cows are found to be ideal to capitalize on not only the strong milk and beef demands, but also the higher-than world-market prices that Thai producers get for these two outputs. On average, Thai dairy farms achieve milk yields of above 3,000 kg milk per dairy animal per year (Garcia et al., 2005). Buffaloes are used only for draught power and do not contribute to milk production in the region.

The majority of Thai dairy farms are run with family labour while medium-sized farms with crop activities and large farms tend to hire labour. Grazing of fallow and forest land is occasionally practised but typically dairy farms keep animals confined all year long. Most farmers do not have their own pastures but have to cut grass from natural communal grassland and bring it back to feed their animals. Alternatively, feed rations are based on agricultural by-products such as rice bran, rice polish, broken rice and pulses meal. Commercial cattle feed is also used by all types of farms, including mineral mixes and injectable vitamins. Milking is done with a small locally manufactured machine and imported pipeline and portable milking buckets (Garcia et al., 2005; Itsaranuwat and Robinson, 2003).

The costs of milk production for an average size farm are slightly above the New Zealand milk price of USD 0.20 per litre. Lowering these costs would mean that these farms could compete with dairy product imports and also produce milk for export, provided international quality standards can be achieved and the dairy chain being internationally competitive (Garcia et al., 2005).

Traditionally, Thai people are not milk drinkers. Milk consumption started to increase steadily from very low levels of less than 8 kg/per capita/per year in 1980 to almost 20 kg/per capita/year in 2002. Since the 1980s consumption of milk and dairy products has been growing rapidly with an average annual growth rate of 9 percent between 1980 an 1997 (see Figure 28). In the years following the Asian economic crisis of 1998, the growth of raw milk production has outpaced the growth of consumption due to a slump in consumption induced by the crisis (Rabobank, 2004). Since then, demand has gradually rebounded and total consumption increased by around 13 percent between 2002 and 2003 (FAOSTAT, 2005).

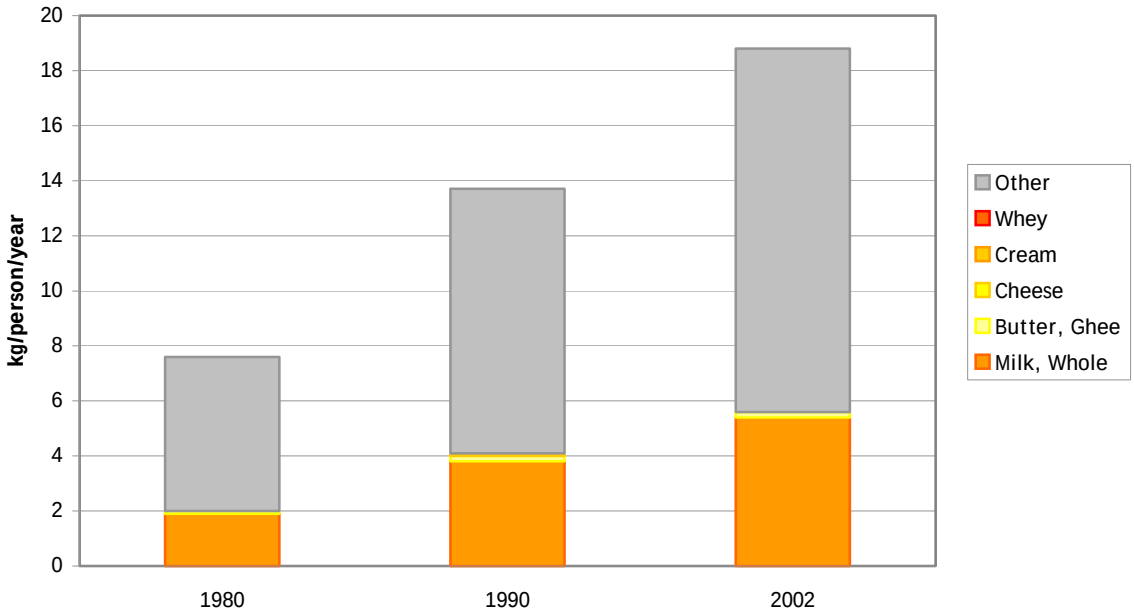
Milk consumption, especially of liquid milk, is confined almost exclusively to urban or peri-urban populations where marketing facilities and purchasing power are concentrated (Chantalakhana and Skunmun, 2001). Accordingly, consumers in Bangkok show the highest per capita dairy consumption while the lowest consumption is recorded in the northeast (Rabobank, 2004). In general, farmers themselves drink little milk and if they do they have a strong preference for purchased milk (Garcia et al., 2005).

Population growth, income growth, price developments and tourism are the key determining factors for the demand in dairy products. The dominating milk products in Thailand are UHT milk, drinking yogurt, sterilized milk and yogurt and pasteurized milk. Among those, UHT milk is the product with the largest market share (around 39 percent). Dairy consumption patterns are very variable, with preferences for different products changing quickly in reaction to price changes and advertising campaigns. This flexible consumer behaviour and the absence of strong product

preferences can be attributed the non-existence of any tradition for dairy product consumption. Moreover, there is a strong competition between different products as any given category of dairy products tends to grow at the expense of other dairy products, while at the same time, dairy products are also in competition with fruit juice products and soy milk (Itsaranuwat and Robinson, 2003; Rabobank, 2004). While nominal milk prices increased by 40 percent between 1996 and 2003, over the same period real prices have fallen by 15 percent (Garcia et al., 2005).

The demand for drinking milk is strongly linked to the Thai government's school milk program, which purchases almost 45 percent of the ready-to-drink milk production. Demand for raw milk peaks when schools are open, and drops sharply during school breaks. This cyclical demand has led to various problems for the Thai dairy sector (Rabobank, 2004).

Figure 28: *Dairy consumption per capita per year in Thailand.*

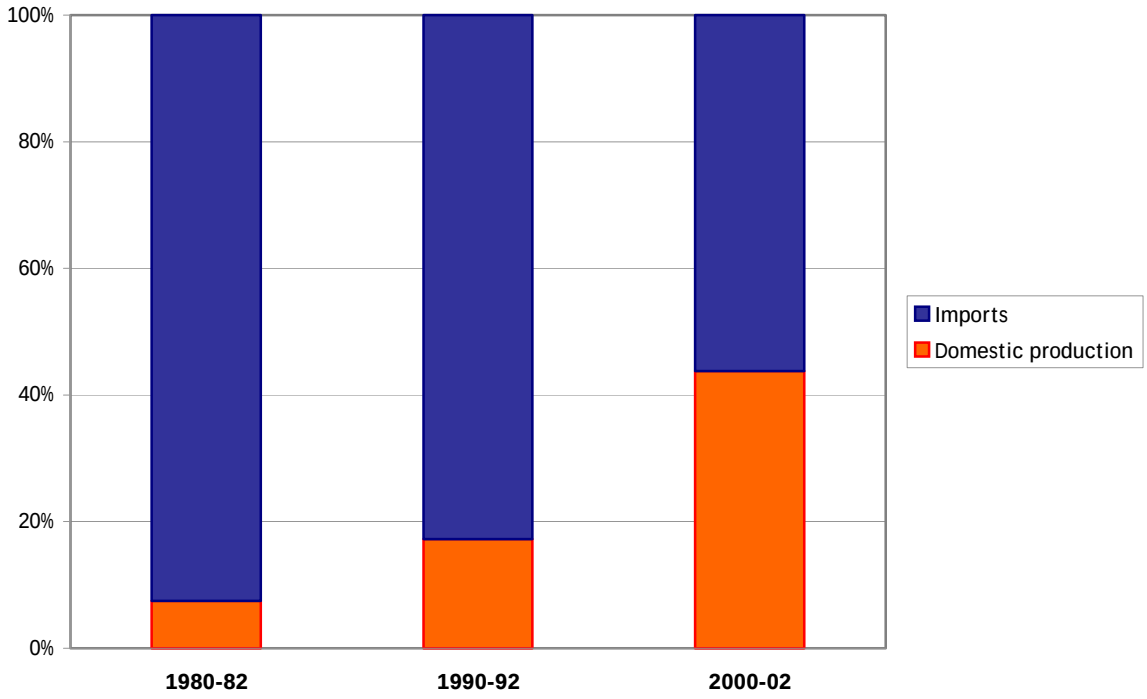


Source: FAOSTAT, 2005

Historically, nearly the entire dairy product supply in Thailand was sourced through imports. With rising consumption levels of milk and dairy products since the 1980s imports have risen markedly. Dairy imports dropped following the economic crisis in 1997/98 but have recovered since, however, they have not yet again reached the 1997-level (see Figure 27). With milk production in Thailand starting to increase in the 1980s the share of domestically produced milk in total domestic supply rose strongly from 7 percent in 1980/82 to 44 percent in 2000/02 (see Figure 29).

In addition to processing locally produced milk, Thailand acts as a manufacturing hub for condensed milk and some other dairy products. Imported dairy ingredients are reconstituted into condensed milk and subsequently exported to neighbouring countries, such as Cambodia, Lao DPR, Myanmar and Malaysia. Overall Thailand exported 428,000 Mt milk equivalents in 2002 (Rabobank, 2004). Moreover, live Thai dairy cattle are exported to neighbouring countries as Thailand is already relatively advanced in breeding dairy cattle adapted to tropical climates (MOAC, 2006).

Figure 29: *Origin of dairy supply in Thailand.*



Source: FAOSTAT, 2005

7.3 Marketing and Processing

A significant segment of the Thai dairy sector is organised along co-operative lines with cooperatives having been organised as part of the government's dairy promotion program. According to the Thai Holstein Friesian Association, in 2004, there were about 117 dairy cooperatives with 40,000 members in Thailand which means that roughly 20 to 25 percent of all dairy farmers are organised in co-operatives.

These dairy co-operatives which are organised under the Co-operative Promotion Department of the Agricultural Ministry are mainly located in the major milk sheds of Saraburi, Ratchaburi, Nakhon Pathom and Chiang Mai (Itsaranuwat and Robinson, 2003). Especially in the areas where co-operatives operate a large share of the milk produced enters the formal market. An study conducted by the international farm comparison network (IFCN) found that 95 percent of the milk produced in the Thai province of Chiang Mai is captured by the formal sector. The remaining 5 percent are sold from farmer to retailer or the final consumer (Garcia *et al.,* 2005).

While in 1993, about 80 percent of the total domestically produced milk came from members of co-operatives, this share had fallen to 67 percent in 1999 (FAO, 2002; Chantalakhana and Skunmun, 2001). Milk that is produced outside the cooperative system is either sold to collection points run by private companies, small local-retailers/middlemen or directly to consumers. Farmers have a strong incentive to sell their milk to the co-operatives as these tend to pay slightly higher prices than the middlemen. Furthermore, the direct sale of fresh milk to consumers is discouraged by (even rural) consumers' strong preference for industrially processed milk (Garcia *et al.,* 2005).

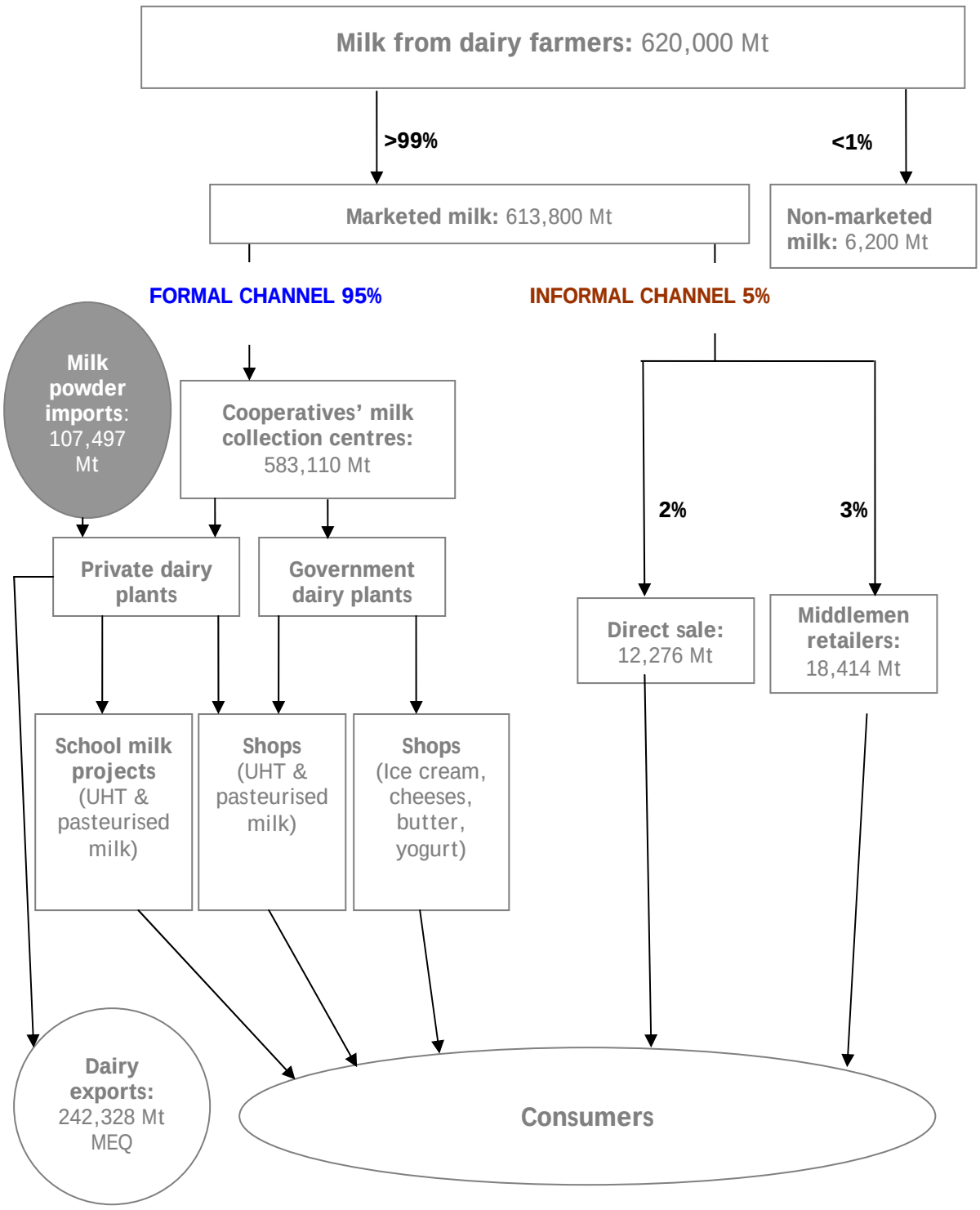
Approximately 95 percent of the milk delivered to the processors is used to produce ready-to-drink milk, while the rest is processed into other kinds of dairy products, mainly cheese. In 2005, there were 75 factories producing ready-to-drink milk (15 UHT and 60 pasteurized milk factories), 8 factories producing cheese and 82 milk-related processing plants in Thailand (MOAC, 2006).

UHT and pasteurised milk marketed through the formal sector have 3.15 to 2.23 times the margin of informally marketed (un-pasteurised) milk. The farmers' shares in the total consumer prices vary between 38 and 47 percent for UHT and pasteurised milk in the formal channel; while it is 65 percent for milk sold in the informal channel (Garcia *et al.,* 2005).

Dairy co-operatives operate collection points. They pay farmers around THB 11.0 (USD 0.28) per kilogram milk and sell the same milk for THB 12.5 (USD 0.32) to either private or government owned dairy processors. Another function of these co-operatives is to market processed dairy products, obtained from the formal processors, to their members (Garcia *et al.,* 2005). The government-owned processing plants produce UHT and pasteurised milk, but the bulk of their milk is destined for higher value dairy products such as ice creams, yoghurts, butter and cheeses. UHT milk is sold in tetra packs and pasteurised milk in plastic bags. Consumer preference for these products is based, among other factors, on wide availability (found in small shops all over the city), reasonable price and awareness of the nutritional value of dairy products (Garcia *et al.,* 2005). In the informal market, boiled milk is the dominating dairy product. Locally produced sweets (milk bars, caramel, etc.) are also a product of the informal sector, but production volumes are relatively insignificant (Garcia *et al.,* 2005).

A challenge for the Thai dairy sector is the influx of foreign direct investment. Currently, approximately 15 dairy companies are operating in Thailand, with the top five being: Friesland (Dutch), Dutch Mill (Thai), CP Meiji (Japanese), the Thai Dairy Industry (Thai) and Dumex (Singapore). More foreign firms are likely to follow as the Thai dairy market is one of the most interesting markets in Asia with respect to its growth potential. With growing competition in the mature markets of Europe and the USA, more and more Western dairy companies are looking into the growth opportunities that Asian markets can offer. Growing foreign involvement is likely to accelerate the pace of development in the industry (Rabobank, 2004).

Figure 30: *Chiang Mai milk marketing channels.*



Source: Adapted from Garcia *et al.*, 2005

7.4 Dairy Policies

Production and marketing

Government support for the dairy sector has a long tradition in Thailand. Whereas the dominating objective of government policies regarding the dairy sector used to be to increase domestic production and self-sufficiency (and to reduce imports to save foreign currency), relying mainly on the promotion of cross-bred cattle, government later added the objective of reducing poverty and increasing income of farmers in the poor north-eastern provinces. Public intervention in the sector includes:

- promotion and supervision of cooperatives by the Cooperative Promotion Department which encourages the establishment of cooperatives with the objective of improving the standard of living of their members. It also monitors the management and operation of the cooperatives to ensure that they are run according to government regulations (FAO, 2003).
- credit supply through the Bank of Agriculture and Agricultural Cooperatives (BAAC), a semi-governmental institution, which is the main lender to the agricultural sector in Thailand including the dairy sector. Farmers now have access to complete promotion packages that consist of financial support at low interest rates, advice on production and assistance in market promotion (Itsaranuwat and Robinson, 2003). Among others the BAAC offers a long-term loan to rice farmers to move out of rice production with paddy fields being transformed into forage plots for dairy farming (FAO, 2003).
- support and training services through the Dairy Farming Promotion Organisation (DFPO) and the Department of Livestock Development, including extension, veterinary services and artificial insemination. The Department for Livestock Development (DLD) and the Dairy Promotion Organisation (DPO) have organised a dairy development programme founded on milk production enhancement at farm level, establishment of milk collection infrastructure in rural areas, and processing and distribution of products such as pasteurised milk, long-life milk and drinking yogurt in urban areas. Linked to this is a programme to upgrade milk quality to meet increasingly stringent food safety standards and to allay consumer concern about the safety of locally produced milk (TCP/THA/2802(A)). Furthermore, farmers are trained in hay and silage making and are provided with seeds of grasses and legumes so that they can upgrade their pastures. Agricultural extension officers visit farmers to provide technical support (Itsaranuwat and Robinson, 2003).

Most farmers receive credits from the Bank of Agriculture and Agricultural Cooperatives (BAAC). Moreover, many of them receive loans from commercial banks, relatives or local money lenders. Dairy training for farmers as well as animal health care and artificial insemination are generally offered by dairy cooperatives or government services, such as the Dairy Promotion Organisation of Thailand (DPOT), Department of Livestock Development (DLD) or the Department of Cooperatives Promotion (DCP) (Chantalakhana and Skunmun, 2001).

Due to applied policy measures, farmers in Chiang Mai province receive about 30 percent higher output prices for milk and beef, while they also pay about 20 percent higher prices for their tradable inputs (mostly from duties on feed imports) than they would under free market conditions (Garcia *et al.* 2005). Furthermore, dairy farms benefit from domestic policies that undervalue domestic resources (labour, land and capital) to around 70 percent of the value that would be expected to prevail under undistorted market conditions. Thus, for each 1 USD profit made by the farmers, they receive net supports of 1.19 USD and 1.80 USD in the case of larger and smaller farms respectively. While all of the farms require heavy support to be profitable, the

smaller farms are by far the most rewarded through the policies in place (Garcia *et al.,* 2005).

Consumption

The government of Thailand actively promotes the consumption of milk. To this end the National Milk Drink Campaign Board and the National Youth Bureau have, since 1985, undertaken campaigns to promote the widespread and sustained consumption of milk (Itsaranuwat and Robinson, 2003). A highly successful school milk programme was launched in the 1990s to promote milk drinking among school children living outside urban areas with the aim of improving children's health. The involvement of village-based milk production systems is a cornerstone of the dairy development strategy. The school milk programme involves the entire farmer-processor-distributor chain and is largely driving the rapid growth in milk consumption (Chantalakhana and Skunmun, 2001).

Trade

Thailand has stringent import regulations for dairy products. In 1983 the Ministry of Industries introduced the Skimmed Milk Importation Regulation which required producers of pasteurised or UHT milk to use a mixture of at least 1:1 raw fresh milk to recombined milk or 1:20 for skim milk powder to fresh milk. At the same time, the Ministry of Commerce introduced the Import and Export Products Regulation foreseeing a permit system for imports of milk (Chantalakhana and Skunmun, 2001). However, with its accession to the WTO Thailand had to loosen the strict import regulations. The quota restriction on whole milk powder imports was abandoned while the quota on skim milk powder remained. This quota has increased every year since 1995 from 45,000 tonnes to 55,000 tonnes in 2004 in accordance with Thailand's WTO commitment. In addition, processors who source SMP from non-WTO members are obliged to buy local milk at a ratio of 20:1. In 2004, the tariff within the quota remains at 20 percent while a tariff of 216 percent is applied to imports beyond the quota.

Although an amount of 55,000 tonnes of SMP has been set as the import quota in line with WTO commitments, the Thai government has given market access to an amount greater than this quantity every year because of the strong demand from the domestic markets. Import quotas are allocated in varying proportions to dairy manufacturers with the largest quota allocations usually received by the manufacturers of dairy products for export (almost 50 percent of the total import quota).

Under the bilateral Thailand Australia Free Trade Agreement (TAFTA), which was officially signed in July 2004 and which entered into force in January 2005, dairy tariffs on powdered milk and yoghurt imported from Australia fell altogether whereas tariffs on processed foods (such as ice cream) fell by 30 per cent.

7.5 Likely Impacts of Milk Powder Imports

Milk and dairy product consumption and production have a relatively short history in Thailand and per capita consumption levels remain very low. Due to the lack of a milk drinking and production tradition until the beginning of the 1980s nearly all the milk consumed in the country was imported. Although the Thai dairy market remains heavily dependent on imports, government efforts to promote domestic dairy production and consumption as well as effective tariff protection from cheaper milk

imports has boosted milk production in Thailand and led to an increased degree of self-sufficiency.

Under Thailand's commitment as a member of the WTO, the country had to ease quotas and barriers on milk imports by 2003; this means that the country has to allow free trade in dairy products and must reduce its import tariffs from 5 percent to 1 percent on other products such as powdered infant milk. Thailand must also withdraw the local content requirement which was introduced in 1983 to promote dairy farming (Itsaranuwat and Robinson, 2003). It is feared that the liberalisation of dairy imports will lead to a strong increase in milk powder imports and decrease in purchases of locally produced milk to the detriment of local dairy farming (Itsaranuwat and Robinson, 2003).

However, with Thailand's accession to the WTO and various bilateral free trade agreements (among others with Australia – one of the major milk exporting countries) it becomes more and more difficult for the Thai government to maintain the level of protection for domestic dairy production. As milk production in Thailand is relatively uncompetitive on a global scale, milk processors have an incentive to buy cheaper imported milk powder rather than the relatively expensive local milk which might lead to a falling share of locally produced milk in domestic supply. This prospect for the Thai dairy industry may be aggravated by the entry of more and more multinational dairy companies into the Thai market. There might be more scope to develop a processing industry using imported primary products than to further increase domestic dairy production which is not competitive by regional and global standards.

7.6 Sources

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8. DISCUSSION AND CONCLUSIONS

The aim of this study was to provide insight into the question of whether and to what extent dairy sectors in developing countries, which are often dominated by smallholder dairy producers serving informal markets, have been harmed by the dumping of subsidised milk powder on the world market practised by some OECD countries. Rather than taking an approach based on statistical analysis of a large set of indicators from a wider set of countries, this assessment is based on a thorough review of the dairy sectors of selected case study countries. The countries were chosen to include situations where (a) concerns about damage to the domestic dairy sector through milk powder imports from OECD countries had been raised (Jamaica and Tanzania), (b) import dependency for dairy products is relatively high despite apparently good domestic capacity or potential for milk production (Bangladesh and Peru) or (c) emerging urban markets for dairy products in traditionally low dairy consumption settings have led to high dairy import bills (Thailand and Senegal).

Individual country dairy sector assessments

The dairy sectors in the study countries face very different general economic conditions from increasing per capita incomes leading to strongly rising total and per capita consumption of dairy products in Thailand to stagnant per capita incomes and falling total and per capita dairy consumption in Jamaica. Similarly, government policies regarding the dairy sector and commitment towards dairy sector development differ widely across countries and, within countries, over time.

Problems of milk sectors in the study countries stem from a number of sources of which importation of subsidised milk from developed countries does not appear to be the major one (and is the least easy to address as it lies beyond developing countries' policy making scope). The case studies highlighted constraints to dairy sector development at the level of primary production, milk collection and dairy processing.

In **Senegal** for example, extreme seasonality of traditional milk production in agro-/pastoral zones coupled to relatively constant demand for dairy products by more affluent urban populations in coastal zones have led to imports covering around 50 percent of national dairy consumption. Small-scale processing and repackaging of imported milk powder has become an important economic activity in urban centres. It appears doubtful that this practice has a major detrimental effect on local production as producers receive high prices for fresh milk (as high as European dairy farmers) and domestic production has not significantly responded to the sharp decline in dairy imports following devaluation of the CFA in 1994.

Import dependency, currently close to 80%, is extremely high in the oft-quoted example of **Jamaica**. However, it is doubtful whether the liberalisation of milk powder imports in 1992 is the main cause for the decline of the Jamaican dairy sector since the 1990s. Jamaica has historically always imported more than 60 percent of its dairy supply and relatively few medium to large dairy farmers, owning around 90 percent of the island's dairy cattle while constituting a mere 20 percent of dairy farmers form the backbone of Jamaica's dairy sector. While it is true that the establishment of the JCTC as sole importer of skim milk powder in 1987 and the imposition of tariffs on dairy products coupled with subsidies for dairy producers led to a reduction in dairy imports and to a production peak in 1992, the reduction of tariffs in 1992 did not lead to an increasing trend in dairy import volume. The stark decline in milk production and the exit of small-scale producers is thus more likely to be related to the withdrawal of the producer subsidies. Currently, costs of milk production in Jamaica lie between 24 to 33 US$ per 100 kg, which is comparatively high internationally, while the low capacity utilization of local milk processing plants leads to high processing costs. As a result, consumer prices for dairy products in

Jamaica are high by international standards and consequently per capita dairy consumption is in continuous decline since 1980. Overall, it appears that the Jamaican dairy sector has suffered from a lack of long-term vision leading to its exposure to frequent policy swings which dissuade private investment required to make the sector competitive at least in the fresh milk segment of the domestic market.

In the second case in which it was claimed that dairy imports seriously affect the development of the domestic dairy industry, namely **Tanzania**, this claim is even harder to substantiate. Over the past 20 years, total milk production in Tanzania has grown steadily, imports have declined to around 2 percent of dairy supply and per capita consumption of whole milk has slightly increased. A distinguishing feature of the Tanzanian milk market is the very strong consumer preference for fresh milk which is preferably bought from neighbours or trusted vendors. The informal market thus dominates and formal processors face supply shortages as well as high costs for packaging materials and energy. The stakeholders affected by milk powder imports are therefore processors that use locally produced fresh milk and have to compete with processors that use imported milk powder. However, dairy farmers, which constitute the vast majority of people in the dairy sector and are driving its development, are currently not affected by processors' decision as to how to source milk as they have sufficient outlets for their milk through the informal market, which in addition offers better prices.

Dairy sector development in **Bangladesh**, a South Asian country with a tradition of dairy consumption (and production) appears to follow a similar pattern to that described for Tanzania. Based on smallholder dairy production systems, milk production in Bangladesh has continuously increased at a slow but steady pace since the mid 1980s leading to a gradual increase in per capita consumption of milk and milk products with imports of dairy products relatively stable at around 15 percent of domestic consumption. As in Tanzania, the informal sector dominates and the formal sector only caters for higher income consumers in or close to major urban centres. The literature reviewed on the dairy sector in Bangladesh does not mention imported milk powder as a threat for the domestic dairy farmers, while affordable and efficient collection, processing and marketing systems could significantly increase the amount of locally produced milk available to processors and consumers. The major threat for the Bangladesh dairy sector is likely to stem from other South Asian countries such as India and Pakistan, which are currently producing milk at much lower costs than dairy farmers in Bangladesh, without resorting to producer subsidies.

Among the six case study countries **Peru** seems to be the only one where limiting the importation of milk powder appears to have affected dairy sector development. Since the introduction of an efficiently working tariff protection in the early 1990s, with a variable levy that keeps the price of imported milk powder constant and evens out fluctuations in the world market price level, the Peruvian dairy sector has not been exposed to cheap milk powder imports. Since the introduction of this tariff regime, national milk production, that had been constant during the 1980s, has grown by over 4 percent a year. Simultaneously the share of local fresh milk used in industrial processing has increased.

However, with increasing pressure for tariff liberalisation and Peru's ambitions to join MERCOSUR, the South American Free Trade Union, local milk producers will be put under severe competitive pressure, not from subsidizing OECD countries, but from cheaper dairy products originating in Uruguay and Argentina, where milk production costs are considerably lower than in Peru.

Milk and dairy product consumption and production have a relatively short history in **Thailand** and per capita consumption levels remain very low. Due to the lack of a milk drinking and production tradition until the beginning of the 1980s nearly all the milk consumed in the country was imported. However, determined government

efforts to promote domestic dairy production and consumption as well as an effective tariff protection from cheaper milk imports has boosted milk production in Thailand and somewhat increased self-sufficiency in milk production. While the domestic dairy industry is likely to come under pressure with Thailand's accession to the WTO and various bilateral free trade agreements (among others with Australia – a major milk exporting country), Thailand currently serves as a hub for re-export of dairy products to other South-East Asian countries. There might be more scope to develop a processing industry using imported primary products than to further increase domestic dairy production which is not competitive by regional and global standards.

General difficulties for dairy sector development

Among the main obstacles for the development of dairy sectors in the countries studied is the low productivity of dairy farms coupled with often high production and transportation costs.

Strong seasonality and low production volumes per farm as well as long distances between milk production areas and consumption areas lead to high hauling costs which in turn often cause an under-utilization of processing capacity. As a consequence processing costs per litre tend to be high and consumer prices for processed dairy products tend to be unaffordable for large parts of the population (despite at times low production costs), resulting in low effective demand, and competition from sophisticated import products.

Competition from imported milk powder seems to occur mainly when processors find it too costly to collect local milk and instead use imported milk powder rather than in direct competition for end consumers between local and foreign milk producers. In many of the case study countries, imported milk powder is only sold in urban centres and dairy farmers who sell to rural consumers through informal channels are not affected by these competing imports.

The situation of dairy farmers is normally quite favourable in the countries where they have an outlet for their milk through the informal sector, selling to milk traders and small informal processors, catering for traditional consumers of raw milk and traditional milk products.

Particular problems faced by smallholder dairy farmers

Small farms often face difficulties in competing with large farms for milk outlets – especially when selling to the formal sector. Higher production volumes makes sourcing milk from large farms more attractive to processors due to lower hauling costs when collecting milk from few large milk producers than from many small and dispersed farms.

A further obstacle for small scale dairy farmers stems form the fact that the processing sector frequently comprises only a few large processors with price setting power vis-à-vis small milk producers.

Larger farms, in turn, have a stronger bargaining positions vis-à-vis processors and often manage to negotiate higher prices for their milk which allows them to afford the use exotic breeds and high quality fodder and sustain higher production costs than small farms.

Overall conclusion

Arguments that speak against a significant negative effect of cheap milk powder imports are the fact that there often is no countrywide distribution of imported milk powder but it only gets sold in the major cities so that rural dairy producers that sell

to rural areas are not experiencing competition. Furthermore, of the countries studied, those with the highest proportion of dairy imports, Jamaica, Senegal and Thailand offer the highest producer prices, suggesting that imports are a result of supply shortages rather than their cause. In the case of Senegal, milk powder imports sustain a vibrant small-scale repacking industry and lead to employment creation.

While subsidised milk powder imports in some cases are likely to have contributed to the difficulties of the dairy sectors in the case study countries, in none of them has it been the major one. Though Thailand and Peru where effectively protecting their dairy market through tariff barriers from lower price milk powder import this strategy has an uncertain future as increasing trade liberalisation and bilateral trade agreements make it more and more difficult for developing countries to keep up high levels of tariff protection.

As in many developing countries climatic conditions for dairy production are unfavourable for high-yielding breeds and productivity and production volumes are low while demand for dairy products substantially exceeds domestic production, dairy product imports serve to bridge the gap between domestic demand and production, particularly in the lean season.

It seems that often the claim of dumping is used as an opportune explanation for slow development and lack in competitiveness of domestic dairy sectors that frees policy makers from the necessity to address home made obstacles for development. A forward looking strategy for national dairy production would therefore focus on improving competitiveness of production and processing as well as limit concentration of a few large companies that control the whole sector.