

LECTURE 1 & 2: Overview of the Nigerian dairy industry and milk

Summary

Livestock production contributes about 12.7% of the agricultural GDP (gross domestic product) in Nigeria. Pastoral communities produce the bulk of milk consumed in the rural and urban areas of Nigeria.

The gap between supply and demand for dairy products is widening as a result of increases in population and urbanisation. Imports that used to bridge part of the gap have been declining as a result of devaluation of the Nigerian naira, (₦), (US\$ 1 = ₦ 113.5 in November 2001) and reductions in the importation of milk powder and butter oil. Consequently local collection, processing and marketing of milk is becoming increasingly competitive. The World Bank and the National Livestock Project Division (NLPD) seized the opportunity provided by this development to initiate a pilot dairy co-operation programme in Kaduna State.

The programme has progressed well and has been accepted by pastoralists. Over 36 associations have been formed of which 18 (with 1820 members) have been registered as co-operative societies. A number of associations are supplying milk to the scheme. An apex organisation, the Kaduna Federation of Milk Producers' Co-operative Association Limited, which trades under the name MILCOPAL, has been established.

MILCOPAL is responsible for the procurement, transportation, processing and marketing of milk on behalf of all the registered co-operative societies. The board of the federation, made up of all the chairpersons of the various societies including the Managing Director of the federation, is responsible for fixing the price of milk.

The programme has made a profound impact on the lives of the participating pastoralists. It has also established that small quantities of milk produced by smallholders can be collected, processed and supplied to urban areas. However, there are still some problems regarding seasonal fluctuations in production and consumption. Furthermore, a large volume of milk has to be collected from various routes to make the operation viable. A lot still needs to be done to ensure the sustainability and replication of the programme in other areas of the country.

Introduction

Livestock play a very important role in Nigerian agriculture contributing about 12.7% of the agricultural GDP (CBN 1999). The livestock population comprises about 14 million cattle, 34 million goats, 22 million sheep and about 100 million poultry (RIM 1990). Other livestock species of economic importance are donkeys, pigs and camels. The livestock subsector is dominated by traditional systems of production, processing and marketing. Transhumance pastoralists in the drier north of the country rear a very high proportion of the cattle herd and many sheep and goats.

Accurate statistics on livestock production and marketing are not available and therefore, detailed projections of the supply and demand of the livestock subsector cannot be realistically made. It is clear, however, that over the last decade the supply of meat, milk and eggs has failed to keep pace with the increasing population. Somehow, the price elasticity of dairy products has not effectively affected demand.

The supply of animal products has been declining over the past two decades, while demand has been increasing, as a result of increases in population and urbanisation. Consequently, Nigeria has remained a net importer of livestock and livestock products. Restrictions placed on imports of animal products and foodstuffs in the 1980s coupled with the introduction of the Structural Adjustment Programme (SAP), which saw a massive devaluation of the Nigerian currency, initially reduced the importation of meat and dairy products. However, during the period 1995 to 1999, expenditure on the importation of food and live animals has tended to increase (Table 1).

Table 1. *Importation of food and live animals (Nigerian naira (N) × 10⁶).*

Item	1995	1996	1997	1998	1999
Food and live animals	88,349.9	75,954.6	100,640.3	102,165.1	103,489.9

Source: CBN (1999).

Recent statistics on the importation of dairy products in Nigeria are not easy to come by. However, devaluation of the local currency has significantly reduced the importation of milk powder and butter oil on which the local dairy plants depended. The large number of closed dairy plants throughout the country provides evidence of this problem (CBN 1999).

Dairy development in Nigeria

The various activities of the Nigerian dairy industry (viz. milk production, importation, processing, marketing and consumption) have been going on in the country for over 60 years. These activities are, however, unorganised except for the relatively few processing firms that produce and market reconstituted milk products from imported powdered milk. Despite the unorganised nature of the industry, the dairy industry represents an important component of the agricultural sector of the economy with great economic, nutritional and social implications (Olaloku 1976).

The industry provides a means of livelihood for a significant proportion of rural pastoral families in the subhumid and semi-arid ecological zones of Nigeria. According to FAO (1988), an estimated 183 thousand rural households derived some income from the dairy industry in 1986. The industry, through commercial dairy processing plants and marketing segments, provides employment and value. Currently, however, very few of the 63 known processing plants are operating. Those that are still functioning operate at less than 20% of capacity. At present, the market has been taken over by 'cottage' outfits that process and market yoghurt in urban areas. Most of these use milk powder to produce yoghurt.

Improvement of the living standard of Nigerians has been the major focus of various national development plans (first in 1962/68 and the fourth in 1981/85). Consequently, the dairy industry, through which better nutrition can be provided to the citizens, was given adequate attention in these development plans. In some selected areas, the government established dairy farms with local and imported breeds of cattle. In addition, milk collection centres including mobile collection points were established.

Milk collection schemes

These began in the late 1920s when the Veterinary Department set up units in northern Nigeria to which pastoral women brought fresh milk for cream separation and processing into clarified butter fat (CBF). The women were paid only for the cream while the skim milk was returned to them. The various governments of the then northern region encouraged the establishment of milk collection and cooling units. The CBF scheme was set up to encourage the pastoralists to keep their cattle in one place throughout the year, offering them 'an immediate market for all the milk they could produce' (National Archives 1934–48).

The collection scheme was primarily set up to export CBF to England, where the fat was used to make expensive brands of toilet soap (National Archives 1934–48). Other private enterprises, including the United Africa Company, entered the export business, offering higher prices than the government to encourage middlemen to collect more CBF from the pastoralists; this increased CBF exports from 10 t in 1933 to 2400 t in 1939 (Walker 1981).

The delivery of milk for cream separation demonstrated the possibilities of whole milk collection. Therefore, the then Veterinary Department set up a milk processing plant at Vom (Jos-Plateau) in 1939, originally to produce butter and later to produce cheese (Walker 1981). Some milk came from the Vom dairy herd kept by the department, but mostly it came from Fulani women through a network of collection centres. A similar scheme was launched at Kano in 1940.

Growth of the dairy industry in Nigeria could be attributed to wartime (World War II) restrictions on dairy produce imports and a ban on CBF exports. For these reasons, the annual output of the Vom Dairy for 1949–50 was 123.8 thousand kg of butter, 50.8 thousand kg of CBF and 36.7 thousand kg of cheddar-type cheese to suit the taste of expatriate customers (Buchanan and Pugh 1955).

With the lifting of restrictions, after World War II, the government effort did not have any lasting effect. The dairy plant at Vom eventually closed in 1954, due to the availability of imported butter of higher quality in urban markets. According to Walker (1981), the indigenous products were of low quality and they were difficult to sell in competition with imported products which were only slightly more expensive.

The West African Milk Company is now renting the site of the farm and has stocked it with Friesian × White Fulani crosses. A small processing plant has also been established at the site. Milk from the animals is being used to produce pasteurised fresh milk, yoghurt, butter and cheese. Performance data are not available and therefore the economical viability of producing milk from Friesian × White Fulani crosses is not known; however, several problems exist with this production system. First, even though these crossbreds have far higher milk yields than indigenous cattle, they are very expensive to maintain because of their high susceptibility to diseases. Second, the market for products produced by the company is located far away from the production plant.

Establishment of dairy farms and processing plants

Before independence in 1960, dairying in Nigeria was influenced by the colonial experience, which placed complete reliance on large government farms to meet the growing demands of the cities. After the colonial period, and as part of the government's strategy to encourage dairy industrial development, the federal, regional and/or state governments established several dairy-processing plants throughout the country. Among these were Madara Limited in Jos, Plateau State, and Agege Dairy Farm near Lagos. The first herd of indigenous cattle was

upgraded with imported *Bos taurus* cattle, which by 1975 produced nearly 200 thousand litres of milk/year from 69 milking cows. Other government dairy farms were established at Ibadan, Kaduna, Maiduguri, Minna, Ilorin and Kano.

Perhaps, the major achievement of these interventions has been the creation of awareness of the need for dairy development as part of the overall efforts to improve on the performance of the livestock subsector. One of the direct results of this awareness has been the establishment of milk processing plants by both the private and public sectors, as a means of catalysing domestic production. However, the availability of cheap imported milk powder in particular and other dairy products in general has created a disincentive for the development of a domestic dairy industry, particularly as the processing plants have completely neglected the appropriate pricing and milk collection aspects (NLPD 1992).

Since the introduction of the Structural Adjustment Programme in 1986, the processing plants have been operating at less than 20% of full capacity because the price of imported milk powder and butter oil has become prohibitive.

Milk production from traditional herds

The livestock resource survey carried out by the Federal Department of Livestock and Pest Control Services in 1990 puts the cattle population of Nigeria at 13.9 million (RIM 1990). Of these, 13.5 million (96%) are in the hands of the pastoral Fulani. This pastoral herd is the most important source of domestic milk in Nigeria. Only a few imported cattle breeds such as Friesians and Brown Swiss, and their crosses are being kept in experimental milk production farms owned by government agencies. A few privately owned commercially oriented dairy farms, owned by companies and individuals, are known to exist. These farms, which constitute the organised dairy farms, produce an insignificant proportion of the domestic milk supply.

Four major production systems can be identified in the country. They include pastoral systems, usually carried out by the Fulani who control at least 95% of the cattle population. The Fulani are mostly semi-settled, moving to locations where seasonal water supplies make pasture available during the dry season. However, some Fulani are nomadic and are constantly on the move in search of water and pasture. They keep large herds and depend on milk and dairy products for sustenance. Some settled Fulanis also exist.

A study by ILCA (1976) showed that White Fulani or Bunaji cattle, under the traditional system of production, have calving intervals of 22 to 24 months or more. Age at first calving ranges from 48 to 50 months and milk production (i.e. milk drawn excluding that consumed by the calf) is 306 kg over a lactation period of 441 days (253 kg/year). Moreover, calf mortality can be as high as 28%.

Since the majority of the national herd is in the hands of the pastoralists, the ILCA (1976) study, which was conducted with herds in the traditional system, seems to illustrate the present productivity of the national herd. On the basis of cattle population figures for 1990 and an estimated growth rate of 4%, the total cattle population is expected to reach 21.5 million by the end of this year. Based on the productivity of the cattle population under the traditional system of production, it is therefore estimated that domestic milk production in 2001 will reach 515.3 thousand tonnes. Data presented in Table 2 show the predicted size of the cattle population and the magnitude of milk production for the period between 2001 and 2005.

Table 2. *Estimated cattle population and milk production.*

Year	Cattle population	Milking cows (head)	Milk production (t)
2001	21,470,800	3,435,328	515,291
2002	22,329,632	3,572,741	535,911
2003	23,222,817	3,715,650	557,347
2004	24,151,729	3,864,276	579,641
2005	25,117,798	4,018,847	606,827

Source: Livestock Subsector Review Report No.102/92CP-NIR 49 SR/5/8/92.

In addition to the supply of milk from the national herd, an insignificant quantity of milk is supplied by the commercial dairy farms. Several processed dairy products are imported into Nigeria. These include evaporated milk, powdered milk, butter, cheese and cream. Condensed milk and dry powdered milk have dominated the Nigerian milk import trade for a long time.

Milk products

Traditional milk products

The wives of pastoralists usually process fresh milk into various traditional milk products. These include *nono* (sour milk), *kindirmo* (sour yoghurt), *maishanu* (local butter), *cuku* (Fulani cheese) and *wara* (Yoruba cheese). These products are usually hawked around the local area by women or are sold in specific locations, such as the livestock markets in certain towns.

Due to the short shelf life and the fact that hawking is carried out on foot, these products are usually only available within walking distance of Fulani settlements. For the same reasons, these products are also more readily available in the northern states of the country.

Reconstituted dairy products

A number of dairy-processing plants exist in different parts of the country. Most are urban-based and are, particularly the government owned ones, supposed to collect milk from their catchment areas in order to stimulate local production. This aspect has, however, been abandoned and the processing plants rely mostly on combining and reconstituting imported milk powder. The various products from these processing plants include ice cream, chocolate milk, yoghurt, cheese and long life milk. The last census undertaken for these plants (NLPD 1992) put the number of these plants at 63. Most have, however, closed down and those that are still operating do so at less than 20% of their full capacity. Reasons for closure include, among others, shortages of raw materials (particularly imported powdered milk) and breakdown of machinery and equipment as a result of lack of spare parts etc.

Markets for dairy products

Marketing of milk and milk products involves a large number of individuals, including the pastoralists, processors, milk product distributors and retailers. The marketing systems follow the production pattern, which distinguishes between traditional producers, who operate mainly in the rural or semi-urban markets, and the reconstituted milk product producers and milk product importers who operate in the urban markets.

Traditional markets

The traditional marketing system, which involves local dairy products such as *madara* (fresh milk), *nono* (sour milk), *kindirmo* (yoghurt), *maishanu* (local butter) and *wara*, *wagashi* and *chuku* (cheese), is dominated by Fulani women and girls who are directly engaged in the collection, processing and sale of the dairy products. The milk produced by the cows is for both household consumption and direct sales to local consumers as fresh milk, clarified fat (ghee) or other forms of traditional dairy products.

These milk products are carried on the women's heads, in calabashes and gourds, as they walk to sale points such as rural markets, roadside settlements and semi-urban areas.

Urban markets

The urban milk and milk product markets are the concern of the distributors, wholesalers, depots, bicycle boys, retailers and other market outlets. The milk products include evaporated milk, powdered milk, baby formula, packaged liquid milk, yoghurt, butter, ice cream and cheese.

Demand and supply of dairy products

In 1990, Nigeria had an estimated human population of 86 million based on the figures released by the National Population Commission. With a yearly growth rate of 2.5%, the population is expected to reach 112.75 million by the year 2001. Based on the 1990 figures, Nigeria imported about 512.3 thousand tonnes of liquid milk equivalent. With an estimated 278.9 thousand tonnes of local production in the market, the total milk supply in 1990 was about 791.3 thousand tonnes, giving a per capita consumption of 9.17 kg/year.

Assuming that there has been no change in per capita consumption since 1990, the demand for milk and milk products will be over one million tonnes in 2005 (Table 3).

Table 3. *Estimated human population, and annual demand for and supply of milk from the national herd, 2000 to 2005.*

Year	Human population (x 10 ⁶)	Demand (t)	Supply (t)
2000	110	990,000	495,479
2001	112.75	1,014,750	515,291
2002	115.56	1,040,004	535,911
2003	118.45	1,066,050	557,347

2004	121.42	1,092,780	579,641
2005	124.45	1,120,005	606,827

Source: Livestock Subsector Review Report No: 102/92 CP-NIR 49 SR 5/8/92.

As prices, income and education are major factors dictating the demand for milk and milk products in Nigeria, demand will likely increase and more pressure will be brought to bear on the system and the government to satisfy the increase in demand. However, it is unlikely that the nation will continue to have foreign exchange to expend on imports of dairy products. The structural adjustment programme will continue to curtail most forms of importation including the import of dairy products. This point underscores the necessity and urgency for developing local dairy resources so that most of the population can have access to milk and milk products.

Smallholder dairy co-operatives: NLPD's experiences

Background

The NLPD, a division of the Federal Department of Livestock and Pest Control Services, was established in 1974. It was given the sole responsibility for the implementation of the first World Bank-assisted Livestock Project. The division, whose headquarters is in Kaduna, has offices in all the 36 states of the federation. Four zonal offices co-ordinate project activities in states within the zone. When the Second Livestock Development Project (SLDP) was approved, as a follow-up of the completed First Livestock Development Project, the NLPD was again given the responsibility for implementing the project nation-wide. The SLDP became effective in April 1987 and was closed in June 1995.

During a mid-term review of the SLDP, a pilot dairy development programme was added to the SLDP in order to seize the opportunity provided by the devaluation of the naira, which made local milk collection, processing and marketing competitive. Kaduna State was chosen as the area in which the pilot programme was to be implemented. Producers were organised into groups and the small quantities of milk produced by pastoral families were collected, processed and marketed on their behalf. The profit was returned to the producers for use in other community development endeavours.

Kaduna State lies within the subhumid agro-ecological zone of north central Nigeria; this zone has an annual rainfall ranging from 600 to 1000 mm. The area is suitable for the production of crops such as sorghum, yam and maize. The state also provides a dry season sanctuary for cattle because of its relatively high rainfall, which supports the growth of pasture.

The cattle population of the state is estimated at 1.007 million head. More than 90% of these are owned and managed by traditional, semi-settled pastoralists (RIM 1992). The cattle, mostly Bunaji, are managed and milked by the men; however, the women, who usually use the proceeds for the financing of household expenditures, carry out the processing and marketing of milk and dairy products (Waters-Bayer 1985).

Supply of and demand for dairy products in Kaduna State

Daily milk offtake per lactating cow averages 0.74 litres/day, ranging from 0.36 litres in the dry season to 1.27 litres in the wet season (World Bank 1993). Thus, in 1990, total milk offtake in the state was estimated to be between 20 and 25 thousand litres. Nevertheless, milk offtake has the potential to increase to between 75 and 95 thousand litres if milking is carried out twice a day, and nutrition and market channels are improved.

In 1991, a total of 275 thousand tonnes of dairy products was imported into Nigeria; the national average per capita consumption for the population being estimated at 3.1 kg. The average annual imported quantity sold in Kaduna State (population = 3.9 million in 1991) was estimated at approximately 2.0 kg of liquid milk equivalent per capita. When the total annual imported quantity of around 8 thousand tonnes is added to the 21 to 27.4 thousand tonnes (low and high estimates) sold from domestic production, the total average per capita consumption is estimated to be 7.3–10 kg/year.

Organisation and management of milk co-operatives

Dairy was not included in the SLDP because during the design and appraisal phases, economic conditions favoured importation of highly subsidised raw materials (mainly milk powder and butter oil) rather than reliance on local sources of raw milk. A seven-fold devaluation of the naira, coupled with the doubling of powdered milk prices in the international market shifted the comparative advantage to local production. The pilot dairy scheme was therefore incorporated into the redesigned project to encourage small-scale dairy production. The strategy was to establish a vertically integrated 'farmer organisation' based dairy industry, with self-sufficiency in dairy products as the underlying objective.

A small-scale dairy development unit was established in the NLPD and given responsibility for the implementation of the programme. A spearhead team was established and sent to the NDDB in India for a short training in 'farmer organisation and development'. On the return of the team, a mobilisation drive was initiated. The mobilisation was started at Kachia grazing reserve where pastoralists have been settled and provided with infrastructure under the SLDP. The first Village Milk Co-operation Association was established at Kachia grazing reserve in 1991. Today there are 36 identified associations with 1820 members spread across Kaduna State, of these associations 20 have been registered as co-operative societies. Each society has an elected chairman and an appointed secretary. The secretaries act both as administrators of the societies and as record keepers for the milk supplied by members of the societies. The secretaries are paid from the commission that the federation pays to each society (on a per litre basis) for the quantity of milk supplied.

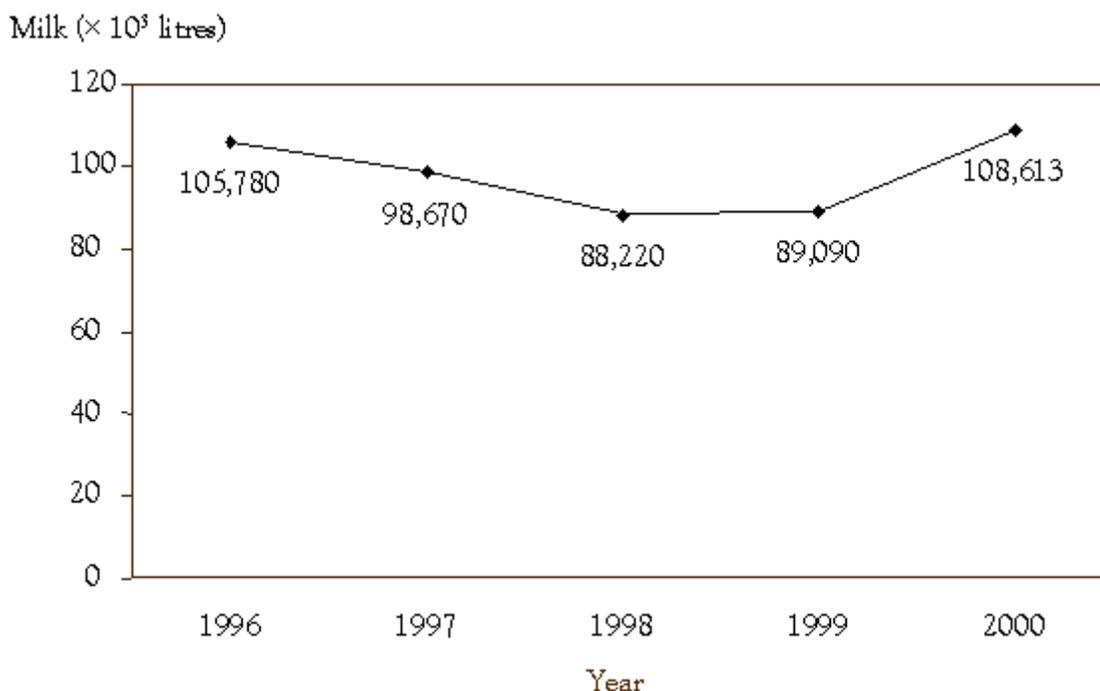
As the number of members of the association increased and the volume of milk also enlarged, it was felt necessary to establish an apex organisation that would be solely responsible for the procurement, transportation, processing and marketing of milk supplied by the associations. Thus, the Kaduna Federation of Milk Producers' Co-operative Association Ltd. was born. The federation which now trades under the name of MILCOPAL not only provides the services mentioned above to all its member societies, but also supplies supplementary feeds and animal health care at full cost to the various associations. Conversely, the Dairy Development Unit under the NLPD is responsible for sourcing improved dairy technologies from research institutes and extending them to the members of the various societies.

Prior to the closure of the SLDP and in view of the potential shown by the programme, the World Bank decided that a grant could be given to MILCOPAL to purchase controlling shares in the Kaduna Dairy Processing Plant. Previously, this processing plant was used by the federation, but owned solely by the Kaduna State Government. Consent was obtained from the State Government, and the World Bank released the grant and the shares were purchased accordingly. Today, the federation holds 55% of shares in the plant while the Kaduna State Government owns 45%.

The NLPD, through the World Bank project, provided the vehicles for procurement and marketing of milk. It also provided the initial seed capital for milk procurement and operation. The management of MILCOPAL was also provided from the staff of the NLPD. With the exception of veterinary drugs, all development activities of the federation are funded by the NLPD, while commercial operation (e.g. milk procurement, transportation, processing and marketing including operating staff salaries) is funded directly by MILCOPAL.

A total of 490.3 thousand litres of raw milk was procured from its member societies over the last five years. This volume could have been greater if it was not for the transhumance practised by the pastoralists that drastically reduced the quantity supplied in the dry season. Some collection routes had to be abandoned because they were unviable.

However, there are indications that milk collection will increase as dry season milk supplies are slowly increasing consequent to increases in the purchase of supplementary feeds and a tendency among pastoralists towards sedentarisation (Figure 1).

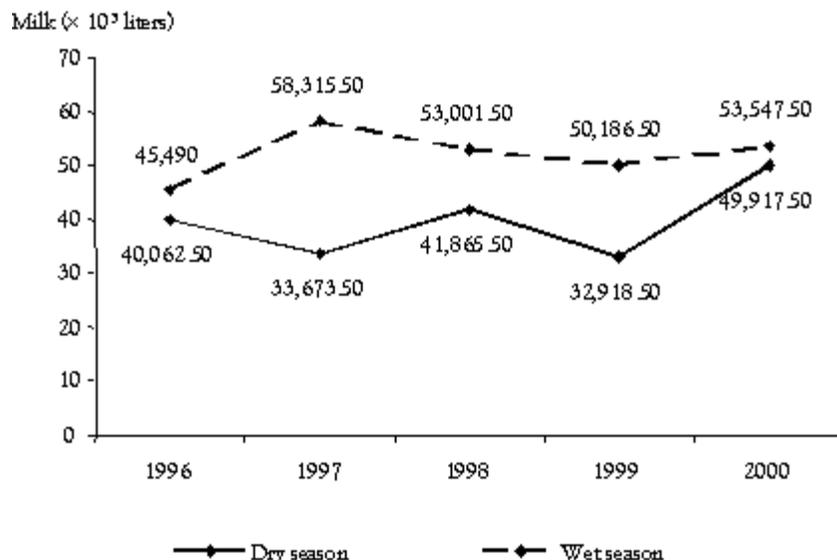


Source: World Bank (1993).

Figure 1. Annual milk procurement.

Marketing of dairy products

Seasonal variation in the supply and marketing of milk and other dairy products poses a serious challenge to MILCOPAL. In the rainy season when feeds and water are available, productivity of the animals increases substantially and more milk is available to be supplied by the various societies. Unfortunately, as indicated in Figure 2, demand for milk and other dairy products is lowest during the rainy season.



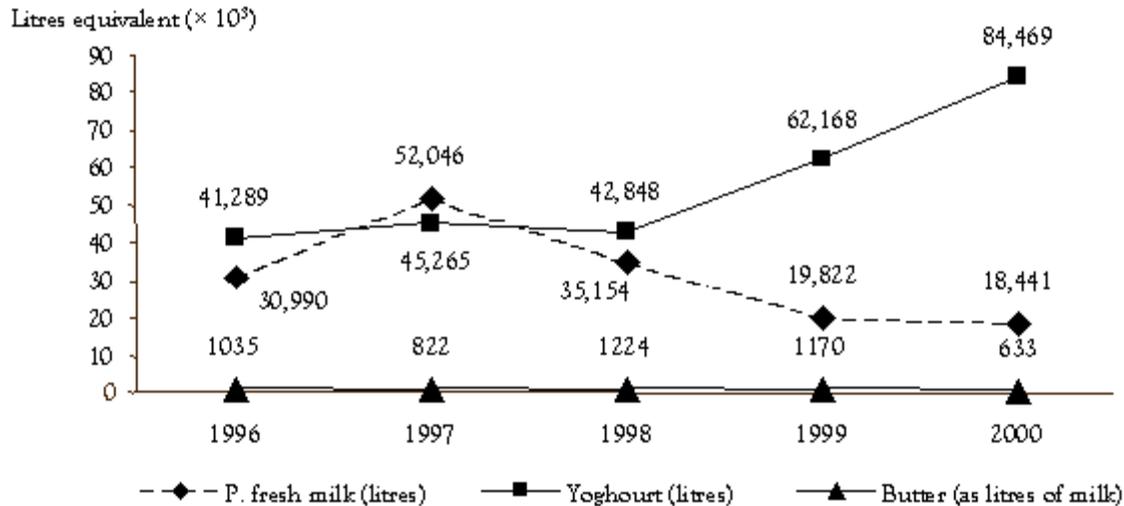
Source: World Bank (1993).

Figure 2. Dry and wet season supply of milk by the various co-operative societies.

During the rainy season, MILCOPAL has to produce butter from the excess milk. In addition, more effort has to be put into marketing to enable the federation to dispose of all the milk products; this extra work is very costly to the organisation. However, there have been recent improvements in the previously unpromising market for butter.

During the dry season, when production is low as a result of low availability of forage resources, demand for milk products is highest. Sometime the federation has to supplement milk supply with powdered milk in order to retain its customers. The customers do not seem to be able to differentiate between products made from natural cow milk and those made from milk powder, as their loyalty does not seem to alter.

Of the three products produced and marketed by MILCOPAL, viz. yoghurt, fresh milk and butter, yoghurt seems to be the most popular (Figure 3).



P. fresh milk = pasteurised fresh milk.

Source: MILCOPAL Annual Marketing Report.

Figure 3. Consumer preferences for dairy products in Kaduna State.

Fresh milk, which costs the federation less to process and is probably more profitable, appears to be unpopular with Nigerian consumers as it accounts for only 30% of total products sold. Therefore, the future of the dairy industry in Nigeria and perhaps that of the operations of the federation will depend more on the production of yoghurt and other sour milk products, which seem to be very popular with Nigerian consumers, than on sales of fresh milk. Packaging will, however, pose a very serious challenge. Currently, the federation resorts to serving out large shapeless quantities in order to keep production cost low and maintain affordable prices.

Cost/benefit analysis of the operation of the farmer organisation

As stated above, the development costs of the federation are being shouldered by the NLPD. These include, among others, the payment of salaries for the seconded staff, the costs of provision of animal health care (excluding the cost of the drugs), and the sourcing and dispersal of dairy technologies. In addition, the initial seed capital was provided as a grant to the federation. It is doubtful that the federation's commercial operations would have survived this long without continuous injections of funds, in the form of grants from the NLPD. (Annex I).

The most important lesson learnt from the operation of MILCOPAL is that smallholder agropastoralists in Nigeria can supply milk to urban centres. It is evident, however, that dairy development requires considerable amounts of skilled manpower for milk handling, processing and marketing, for organising farmer associations and for training farmers how to manage these associations. This skilled input has been required even though the volume of milk (490,373 litres in 5 years) collected and marketed has been lower than that expected. A valuable lesson learnt from the pilot scheme is that trained and experienced manpower would be very useful in expanding the programme in Kaduna State and the nation in general.

The pilot Dairy Co-operative Development Programme has had a profound impact on the socio-economic status of the participating pastoralists, especially the women. Women have benefited most, because collection of milk from their doorsteps has relieved them of the enormous burden

of hawking their milk to markets far away from their places of abode. The programme has also provided the pastoral families with a regular income. A few of the societies have used their commission to carry out some community development programmes. For example culverts have been constructed across roads to facilitate collection of milk in the rainy season.

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Annex I. Commercial operations of MILCOPAL*

Profit and loss	1995	1996	1997	1998	1999	2000
Turnover	4,593,544	5,754,828	4,494,644	4,432,094	5,362,190	8,018,542
Less: cost of sales	4,135,411	5,369,266	4,218,618	5,157,461	4,438,138	4,093,963
Gross profit	458,143	385,562	276,026	(725,367)	924,052	3,924,579
Other income	633	12,313	73,768	103,306	317,240	3200
	458,776	397,875	349,794	(622,061)	1,241,292	3,927,779
Less: administration/general expenses	2,575,763	3,164,583	3,215,087	3,221,344	5,835,645	3,495,316
Net loss/profit for the year	(2,116,987)	(2,766,708)	(2,865,293)	(3,843,405)	(4,594,353)	(432,463)

* MILCOPAL = Milk Producers' Co-operative Association Ltd.