Patterns of consumption of dairy products in West Africa

LED Working Document No. 11

Senait Seyoum

June 1988

Livestock Economics Division (LED)
International Livestock Centre for Africa

P.O. Box 5689, Addis Ababa, Ethiopia

LED

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Acknowledgements

I wish to thank all ILCA colleagues and staff for their help and cooperation in the preparation of this paper. I owe a great debt to Mr Stephen Sandford whose idea it was that I undertake this study. His constant encouragement and substantial comments on several drafts of this paper have contributed a lot to its present shape. Any errors of fact or judgement remain, however, mine alone. To Dr T. Williams, I am indebted for his help in bringing consistency to the data I have used and suggesting ways of improving the paper. I am also grateful to Dr R. Brokken for his time in reading and reviewing the paper while involved in so many other pressing matters.

1. Introduction

1.01 Although consumption of dairy products in West Africa is very low by international and indeed by Eastern and Southern African standards, it is growing fast both in aggregate and on a per caput basis. Aggregate production in the region has been growing at lower rates while imports have risen at higher rates. In 1983/85 imports, expressed in liquid milk equivalents, accounted for an average 45% of dairy consumption in the West African region. However, in some countries dependence on imports was much higher e.g. 90% in Côte d'Ivoire, 85% in Ghana, 81% in Liberia, 74% in the Gambia. In absolute terms, Nigeria was the single biggest importer and was dependent on imports for 61% of its consumption.

1.02 This growing importance of dairy imports can partly be ascribed to lack of comparative advantage in domestic milk production. With the variety of livestock disease, breeding, nutrition and management problems in West Africa, the productivity of local herds has indeed been quite low. In many areas, beef and cropping activities have been more profitable than dairying. Often, the traditional dairy sector has also not been well adapted to the needs of the existing marketing and processing infrastructure. Consequently, many West African countries have had to rely on lower cost dairy imports to satisfy their requirements. Nevertheless, indications are that opportunities for increased domestic production still exist in parts' of West Africa. In some areas local fresh milk commands a substantial price premium over the corresponding imports (ILCA Bulletin no. 4, 1979; von Massow, V. 1985; Nigeria Dairy Reconnaissance 1987). In other areas, local fresh milk also appears to be a product most accessible to the majority of the poor often because it is sold in a convenient form (Kofod, H. 1960; Bouscharain, G. 1965; Autret, M. 1980; Bellot, J.- M. 1980). Cases can also be mentioned where the consumption of imported dairy products was not favoured by indigenous people while the consumption of similar locally prepared products was only limited by short supply (FAO/ISCDD. 1974). In such instances, little effort has been made to exploit the potential of the traditional dairy industry.

1.03 Against this background, this paper investigates whether general assumptions about the nature, scale and location of demand for dairy products and about the substitutability of fresh local milk for imported dairy products, are adequately based for ILCA to launch a major research project in the moist areas of West Africa. In chapter 2, the paper goes into a description of aggregate trends in production, imports, and demand for dairy products in the West African region. On this basis, it attempts to get a general picture about where a substantial amount of demand (i.e. demand expressed in actual, consumption and purchases) for dairy products unmet from domestic supply (hereinafter "domestically unmet demand ") is found. In chapter 3, some of the evidence on factors influencing dairy consumption patterns in West Africa, particularly population growth, urbanization, incomes, consumer preferences and prices, is examined. Estimates of aggregate potential demand for dairy products in the West African region are then drawn in a final chapter where the results of the exercise are discussed.

2. Aggregate trends in production, imports and consumption of dairy products in West Africa

2.1 Production trends

2.01 Data on milk production in West Africa are scarce and often unreliable. Very little is in fact known about the quantity of milk produced, lift for calf feeding and human consumption, processed into different types of dairy products, consumed at home or sold through formal and/or informal marketing channels. This is often reflected in FAO milk production statistics which are usually based on data on number of lactating cows, probable milk yields of these, and production in modern dairy sectors. All this argues for conducting primary data surveys in order to better assess the dairy production situation in West Africa. Until this materializes, however, aggregate milk production data from FAO can be used to provide general indications about regional production patterns and consequently location of demand for milk in the region.

2.02 Table 1 provides aggregate data on the production of milk and other dairy products in West African countries roughly classified according to whether they are predominantly dry i.e. arid and/or semi-arid (A/SA) or moist i.e. humid and/or sub-humid (H/SH). As shown in the table, a sharp division exists between drier and moister areas with respect to levels of domestic production and some differences are also apparent in the types of dairy products produced. Drier areas exhibit relatively higher levels of production and this is particularly evident for fresh milk and to some extent also for cheese. Clearly, fresh milk is the major dairy product in West Africa, butter and cheese being of only minor importance. Moister areas place more emphasis on butter and cheese production than do drier areas. The 1974/76–1983/85 production growth rates in Table 1 show that growth in dairy output has generally been slow in West Africa and especially so in relation to human population growth. Between 1975 and 1984, except for Mali, Guinea and Benin, per caput production growth was negative or close to zero in almost all West African countries. Thus, average per caput consumption of domestically produced milk is mostly declining in West Africa.

Table 1. *Production of milk and milk products in West Africa. Volume of production (`000 MT) and annual growth rates (%) 1974/76–1983/85.*

Region/country	Ecol. Zone	Total fresh milk (LME)		Butter (LME)		Cheese (LME)		Total dairy products (LME)		Per caput Production Growth Rate 1974/76–1983/85 %
		Volume (1000MT) 1983/85	Growth Rate 1974/76–1983/85 %	Volume (1000MT) 1983/85	Growth Rate 1974/76–1983/85 %	Volume (1000MT) 1983/85	Growth Rate 1974/76–1983/85 %	Volume (1000MT) 1983/85	Growth Rate 1974/76–1983/85 %	
West Africa		1482	2	118	3	74	3	1674	2	–1
*Mauritania	A/SA	228	3	4	3	7	4	239	3	0
*Senegal	A/SA	99		2	0			101	0	–3

Gambia	A/SA	5			5			5	0	–2
Burkina	A/SA	123	1	8	–1			131	1	–1
Chad	A/SA	114		14	5	38		128	0	–2
Niger	A/SA	244	3	35	3	45	3	317	3	0
Mali	A/SA	191	5					191	5	2
Sub-total	A/SA	1004	2	63			4	1112	3	0
*Cote d'Ivoire	H/SH	15	–5					15	-5	–8
*Nigeria	H/SH	353	2	54	2	29	2	436	2	–2
G. Bissau	H/SH	9	3					9	3	–1
Guinea	H/SH	48	2	1				49	2	1
S. Leone	H/SH	17						17	0	–2
Benin	H/SH	19	3					19	3	1
*Liberia	H/SH	3						3	0	–3
Togo	H/SH	7	2					7	2	–1
*Ghana	H/SH	7	–1					7	-1	–5
Sub-total	H/SH	478	2	55	2	29	2	562	2	–2

Notes:
(i) Data on milk production related to total production of whole fresh milk excluding the milk sucked by young animals. where official statistics on milk production were not available, estimates based on food consumer surveys and other indicators have been used by FAO.
(ii) Data shown for dairy production generally refer to total production whether manufactured in milk plants or on farms.
(iii) Total fresh milk includes cow's milk, goat's and sheep's milk. Butter includes ghee which is butter clarified by boiling. Cheese includes cheese of all kinds.
(vi) All production volumes are expressed in liquid milk equivalents (LME). Calculations in terms of LME are based on FAO (1978) conversion factors : 1 kg Fresh milk =1 kg LME; 1 kg butter = 6.6 kg LME; 1 kg cheese = 4.4 kg LME.
(v) Per caput production growth rates between 1974/76 and 1983/85 were calculated using average of total dairy volumes (in LME) for this period and 1975 and 1984 population estimates from FAO.

* indicates relatively high income West African countries defined as those with a 1985 per capita GNP of US$ 350 or more in constant 1983–85 US $ (World Bank 1987).

A/SA = Arid and/or Semi-Arid. H/SH = Humid and/or Sub-Humid.

Source: FAO Production Yearbooks 1980 ; FAO. 1978. Milk and Milk Products: supply, demand and trade projections 1985.
ESC: PROJ/78/3. Rome; World Bank. World Development Report 1987. Washington D.C.

2.03 To a large extent, the patterns and trends outlined above reflect the varying agro-climatic/ecological conditions prevailing in West Africa. In dry areas, where the scope for non-livestock activities is limited, livestock populations are large and in many cases provide the sole means of sustenance. Even in these areas however, dairying, is nowadays a secondary rather than a primary activity, the major concern of herdsmen often being beef production. This competing livestock enterprise is, in some ways, more profitable than dairying because of government incentives to beef producers or of the ease of marketing live animals. As one moves to moister areas, the numeric as well as economic importance of livestock decreases. Trypanosomiasis and increased opportunities for activities like cropping can be assumed to be the major obstacles to the existence of more extensive and permanent livestock production systems in moister areas.

2.04 Though not indicated in Table 1, dairy production in the majority of West African countries grew faster in the last decade than in the 1961/65–1974/76 period, suggesting Some improvements on the supply side. Promising milk yields have indeed been obtained from local and exotic cattle crosses on experimental stations; some progress has been made in research on crop residue use as feed and on trypanosomiasis control; and small ruminants' milk output has become increasingly important in drier areas. Many governments have seen rapid increases in foreign exchange expenditures for dairy imports and developed countries' dairy policies, as opportunities to promote production in their countries. Livestock herds have also recovered from the 1970s drought and this will have been favourable to dairy production. One would also expect that awareness of growing malnutrition problems and implementation of structural adjustment programs in some West African countries, have resulted in more government commitment to improving the livestock sector, where this is possible. However, for all these influences to be effective and to continue being favourable to dairy production in future, their plausibility in a country specific West African context still has to be considered.

2.2 Import trends

2.05 In sharp contrast to the picture drawn for milk production in the previous section, imports of milk and milk products in West Africa have been substantial and have grown fast. No West African country, even among the relatively better endowed drier countries, exports dairy products. With increasing demand, lagging domestic production, inadequate infrastructure for marketing domestic milk and plentiful supplies in world markets, there has in fact been a natural tendency to import dairy products in West Africa.

2.06 Table 2 shows the volume of different types of dairy imports (expressed in thousand metric tons of liquid milk equivalents (LME)) into West Africa in 1983/85 with the corresponding 1974/76 –1983/85 annual growth rates. Values of total net dairy imports, and growth rates of these are also given. It appears that in 1983/85, total net imports of milk and milk products into

West Africa amounted to a value of about US$ 266 million (average over 3 years) corresponding to a volume of 1356 thousand metric tons LME.

2.07 As can be seen in Table 2, import patterns have differed between dry and moist countries. Domestic production in drier areas was shown to amount to almost double the volume produced in moister areas in Table 1. The pattern for imports is reversed in Table 2, with moister countries importing over twice the volume imported by drier countries in 1983/85. In absolute terms, the four major West African importers of dairy products were Nigeria and Cote d'Ivoire from the moister zone and Mauritania and Senegal from the drier zone. Clearly, all four countries which can be classified as "high income", ones (per Caput GNP of US $ 350 or more in 1985 according to the World Bank) by West African standards, could afford to pay for large import volumes. The high import growth rates recorded further indicate that shortfalls in domestic milk supply were mostly met by imports of dry and evaporated/condensed milk and to some extent of butter.

Table 2. *Net imports of milk and milk products into West Africa. Volume and Total Value of Imports and Annual Growth Rates (%) between 1974/76 and 1983/85.*

Region/country	Ecol. Zone	Fresh milk (LME)		Dried milk (LME)		Evap. /cond. milk(LME)		Butter and Ghee (LME)		Cheese and curd (LME)		Total LME Volume Value			
		Net Imports 1983/85(1000MT)	Growth Rate 1974/76 – 1983/85 %	Net Imports 1983/85 (1000 MT)	Growth Rate 1974/76 – 1983/85 %	Net Imports 1983/85 (1000 MT)	Growth Rate 1974/76 – 1983/85 %	Net Imports 1983/85 (1000 MT)	Growth Rate 1974/76– 1983/85 %	Net Imports 1983/85 (1000MT)	Growth Rate 1974/76 - 1983/85 %	Net Imports 1983/85 (1000MT)	Growth Rate 1974/76– 1983/85 %	Net Imports 1983/85 (1000 MT)	Growth Rate 1974/76– 1983/85 %
West Africa		25	14	649	8	597	13	75	5	10	0	1356	10	265900	5
*Mauritania	A/SA	8	17	84	14	14	12	40	26			146	16	23557	13
*Senegal	A/SA	2	(+)	136	17		(–)	10	0	2	0	150	13	21242	2
Gambia	A/SA			12	32	2	8					14	24	2602	14
Bukina	A/SA			33	21	12	13	1	–11			46	15	11217	7
Chad	A/SA			23	16			1	(–)			24	15	3683	10
Niger	A/SA			20	6	5	20					25	7	4903	7
Mali	A/SA			22	–1	3	–6	1	0			26	–2	4097	–3
Sub-total	A/SA	10	20	330	13	36	7	53	12	2	0	431	12	71301	6
*Cote d'Ivoire	H/SH	4	17	47	14	76	8	7	–5	3	0	137	8	47523	8
*Nigeria	H/SH	8	17	198	4	467	16	6	0	1	–11	680	10	121150	5
G. Bissau	H/SH			2	–4			1	0			3	–3	367	–12
Guinea	H/SH			7	(+)	3	0					10	14	2741	12
S. Leone	H/SH		(–)	15	11	3	–3	1	0	1	0	20	6	4595	1

Benin	H/SH			11	(+)	5	6					16	20	3837	14
*Liberia	H/SH	1	0	6	5	4	3	1	0	1	(+)	13	4	5124	7
Togo	H/SH	2	(+)		(–)	3	13	1	(+)	1	(+)	7	10	3496	11
*Ghana	H/SH			33	–1			5	–6	1		39	–2	5766	–3
Sub-total	H/SH	15	13	319	5	561	14	22	–3	8	0	925	9	194599	5

Notes:
(i) All figures expressed in liquid milk equivalents (LME). FAO (1978) conversion factors are: 1 kg dried milk = 7.6 kg LME; 1 kg condensed/evaporated milk = 2 kg LME. LME conversion factors for fresh milk, butter and ghee, and cheese and curd are as give in Table 1.
(ii) Where it was not possible to compute net import growth rates between 1974/76 and 1983/85 (+) and (–) signs have been used to indicate an increase or decline in imports. Blanks in the growth rate columns mean that products refered to were not imported at all and 0 growth rates show that import volumes have remained the same levels in the period considered.

*As defined in Table 1 A/SA = Arid and/or Semi-Arid; H/SH = Humid and/or Sub-Humid.

Source: FAO Trade Yearbooks 1980 and 1985; Livestock Statistics Handbook. 1987 LED Draft; Table 1.

2.08 Of particular concern here are the dairy import growth rates registered. In value terms, the annual growth rate in West African dairy imports between 1974/76 and 1983/85 stood at 5%. However, prices were declining and the corresponding growth rate in terms was 10% p.a. In all but one case (Liberia), import volume growth rates were higher than or equal to import value growth rates and the growth differential was more marked in dry countries. On the whole, dairy imports appear to have grown faster in drier compared to moister countries during the 1974/76–1983/85 period. Not only was growth in dairy imports into West Africa substantial but it also exceeded by far, observed domestic production growth rates in almost all West African countries (see production growth rates in Table 1). The three exceptions to this situation were Mali, Guinea Bissau and Ghana, where imports actually declined. Even then, only in Mali was the decline in imports offset by a more than average growth in domestic dairy production. Factors responsible for the decline in total available domestic milk supply may have been foreign exchange problems, diseconomies in local production versus imports, inappropriate policies etc.

2.09 In terms of the composition of imports by volume, almost 48% was dry milk, 44% evaporated/condensed milk and the remaining 8% was distributed between butter, fresh milk and cheese. Because fresh milk imports are protected by high international transport and storage costs, their imports in West Africa have been relatively low but they have grown very fast (14% p.a. growth rate between 1975 and 1985), especially in drier areas. Imports of dry milk, a product usually reconstituted into liquid milk, used for infant feeding and often donated as food aid, were also substantial and appear to have grown faster in drier areas. Imports of condensed and evaporated milk have, on the other hand, been almost exclusively directed to moister countries where they increased at a rate of 14% between 1974/76 and 1983/85. In fact, drier countries

imported more butter than condensed milk, their, growth rate in butter imports being 12% as against a negative decline of 3% in moister countries.

2.3 Consumption trends

2.10 Aggregate consumption of milk and milk products in West Africa can roughly be estimated by adding up the dairy production and net import figures provided in the previous two sections. Table 3 summarizes such information for 1983/85 and gives some additional indicators on human populations and incomes in the region. For West .Africa as a whole, aggregate dairy consumption amounted to about 3 million metric tons LME in 1983/85, this total being almost equally distributed between drier and moister areas. However, a sharp division can be seen in the extent to which dairy consumption in these areas, was _supplied by domestic production or imports. While the majority of West African countries, be they in the humid or arid ecological zones, were importers of dairy products, net dairy imports accounted for an average 62% of total dairy consumption in moister areas and for only 28% of consumption in drier areas.

Table 3. *Indicators of Dairy Consumption in West Africa in 1983/85.*

Region/country	Ecol. Zone	GNP Per Caput 1985	1983/85						
			Human Pop.	Total Dairy Prod.[1]	Net Dairy Imports[1]	Total Dairy Cons.[2]	Net Dairy Imports as % of Cons. %	Per Caput Dairy Consumption[3]	
		(US $)	('000)	(1000 MT LME)				(KG LME/pers.)	% Growth Rate 1974/76–1983/85
West Africa			168327	1674	1356	3030	45	18	2
*Mauritania	A/SA	420	1835	239	146	385	38	210	4
*Senegal	A/SA	370	6285	101	150	251	60	40	3
Gambia	A/SA	230	631	5	14	19	74	30	9
Burkina Faso	A/SA	150	6781	131	46	177	26	26	1
Chad	A/SA	110	4907	128	24	152	16	31	–1
Niger	A/SA	250	5949	317	25	342	7	57	1
Mali	A/SA	150	7863	191	26	217	12	28	1
Sub-total	A/SA		34251	1112	431	1543	28	45	2
*Cote d'Ivoire	H/SH	660	9496	15	137	152	90	16	2

*Nigeria	H/SH	800	92154	436	680	1116	61	12	3
G. Bissau	H/SH	180	872	9	3	12	25	14	–3
Guinea	H/SH	320	5938	49	10	59	17	10	1
S. Leone	H/SH	350	3540	17	20	37	54	10	1
Benin	H/SH	260	3935	19	16	35	46	9	5
*Liberia	H/SH	470	2125	3	13	16	81	8	0
Togo	H/SH	230	2876	7	7	14	50	5	2
*Ghana	H/SH	380	13167	7	39	46	85	3	–5
Sub-total	H/SH		134076	562	925	1487	62	11	2

1. Total dairy production and net import data from Table 1 (column 13) respectively.

2. Total dairy consumption = Total dairy production + Net dairy imports.

3. Per caput dairy consumption is calculated as total dairy consumption in 1983/85 over human population estimate in the sample period.

*As defined in Table 1 A/SA = Arid and/or Semi-Arid; H/HS = Humid and/or Sub-Humid.

Source: FAO Production and Trade Yearbooks. Various years.

2.11 Based on total dairy consumption figures, eight countries i.e. Mauritania, Senegal, Chad, Burkina Faso, Niger, Mali, Cote d'Ivoire and Nigeria, emerge as major milk consumers. Of these, four: Mauritania, Senegal, Nigeria and Cote d'Ivoire, were relatively high income countries where total dairy consumption grew particularly fast (6 to 7% p.a. growth rate between 1974/76 and 1983/85). The remaining four countries, were comparatively low income countries located in the arid/semi-arid (A/SA) ecological zone where dairy consumption grew only modestly (2 to 4% p.a. between 1975 and 1985). In aggregate terms, Nigeria, a relatively moist country endowed with petroleum resources and an urbanised network, and a densely populated area, accounted for nearly 40% of the total volume consumed by these eight countries.

2.12 Corresponding per caput consumption levels suggest that dairy consumption patterns roughly follow production patterns. In 1983/85 per caput dairy consumption averaged 11 kg LME in moister areas and 45 kg LME in drier areas. Although per caput consumption was relatively low in moister areas, its growth over the 1975–1985 decade averaged 2%, the rate observed in drier areas during the same period. It would thus seem that milk consumption in moister areas is gaining importance despite the considerable constraints posed to livestock production and the existence of traditionally established non-milk high quality foods.

2.13 On the whole, aggregate statistics for West Africa suggest that dairy consumption in the region is increasing. The patterns of consumption outlined above also indicate differences in

consumer preferences for different types of milk closely related to consumption habits, availability of substitutes for milk and/or butter, location of demand, world prices of these products and also probably, promotional strategies for the consumption of certain types of imports. As a case in point, a survey carried out in Cote d'Ivoire, where vegetable oils and fats are widely used for cooking, showed that use of butter and imported milk was restricted to urban areas and within these, to higher income groups (Enquâte Budget Consommation, 1979). More recently, it has been noted that milk reconstituting plants in Nigeria were substituting locally produced vegetable fats like palm oil and copra for imported butter-oil as a result of the price of butter-oil having increased on the world market (Fremlin 1986). Such substitution may however not be feasible in drier countries where butter has traditionally been consumed and where vegetable oils may not be readily available. Following sections of this paper will look at some of these demand factors in more detail.

3. Considerations in the estimation of aggregate demand for dairy products in West Africa

3.1 Demographic Trends

3.01 In its 1984 population assessment, the United Nations prepared four variants of population projections based on varying assumptions about fertility rates, patterns of migration and mortality. The medium variant which represented the most plausible course of population trends from 1980 to the year 2025, is presented in Table 4 to provide estimates of total, rural and urban populations in West Africa during 1985. Given the 1980–85 UN growth rates, 1983/85 population figures were extrapolated to get "standardised" 1988 total, urban and rural population estimates.

Table 4. *Distribution of West African rural and urban populations in 1985 and standardised 1988 population estimates.*

Region/country	Ecol. zone	1985 Human Population			Urban as % of Tot. Pop.	Total Growth Rates1980–85[1]		Standardised 1988 Pop.[2]		
		Total pop.	Rural pop.	Urban pop.		Total pop.	Urban pop.	Total pop.	Urban pop.	Rural pop.[3]
		('000)				(%)		('000)		
West Africa		173495	130157	43338	25	3.12	5.5	190235	50990	139245
Mauritania	A/SA	1888	1234	654	35	2.93	8.0	2060	826	1234
Senegal	A/SA	6444	4101	2324	36	2.55	3.3	6951	2584	4367
Gambia	A/SA	643	514	129	20	1.94	4.0	681	145	536
Burkina Faso	A/SA	6942	6395	547	8	2.39	4.7	7453	628	6825
Chad	A/SA	5018	3663	1355	27	2.28	7.5	5370	1687	3683
Niger	A/SA	6115	5126	989	16	2.82	6.9	6649	1211	5438
Mali	A/SA	8082	6629	1453	18	2.81	3.6	8785	1616	7169
Sub-total	A/SA	35132	27662	7470	21	2.60	5.1	37949	8697	29252
*Cote d'Ivoire	H/SH	9810	5693	4117	42	3.65	6.1	10929	4923	6006
*Nigeria	H/SH	95198	73286	21912	23	3.34	5.8	105096	25978	79118
G. Bissau	H/SH	889	648	241	27	1.91	4.5	941	275	666
Guinea	H/SH	6075	4727	1348	22	2.33	5.4	6511	1580	4931
S. Leone	H/SH	3602	2584	1018	28	1.77	4.6	3797	1166	2631
Benin	H/SH	4050	2623	1427	35	2.96	7.4	4422	1771	2651
Liberia	H/SH	2191	1325	866	40	3.16	5.6	2407	1021	1386

Togo	H/SH	2960	2305	655	22	2.95	6.2	3231	786	2445
Ghana	H/SH	13588	9304	4284	32	3.23	3.8	14952	4793	10159
Sub-total	H/SH	138363	102495	35868	26	3.20	5.7	152286	42293	109993

1. Annual total and urban population growth rates from UN 1986 (except for sub-regional totals).

2. Standardised 1988 total and urban populations calculated using growth rates provided in preceding two columns.

3. Standardised 1988 rural population = difference between standardised 1988 total and urban populations.

Source: UN. 1986. World Population Prospects. Estimates and projections as assessed in 1984. United Nations. Department of International Economic and Social Affairs. Population Studies No. 98.

3.02 While the figures in Table 4 give an overview of the distribution of rural and urban populations in West Africa, they present only a rough picture of the distribution of populations by ecological zone. In view of this, an attempt is made in Table 5, at disaggregating the 1988 population estimates provided in' Table 4, by specific ecological zones. The disaggregation is based on Jahnke (1982) and on a recent review of " the allocation of urban populations in West Africa to different ecological zones " (LED 1987). Note that Jahnke's " distribution of human agricultural populations in tropical Africa by ecological zone " was done in 1979 and that it is assumed that his proportions have remained constant since then. The urban population categorisation by ecological zone which is based on information for towns with populations of 100,000 or more in 1988, likewise assumes that the ecological location of large cities is representative of the distribution of West African urban populations as a whole. Though subject to inaccuracies, to inconsistencies and inevitably to changes, the figures in Table 5 nevertheless provide an idea of the populations living in different ecological zones.

Table 5. *Distribution of West African rural and urban populations[1] by ecological zones in 1988.[2]*

	Stand. 1988 Pop.			1988 Urban Population living in:					1988 Rural Population living in:				
	Total Pop.	Urban Pop.	Rural Pop.	Arid Zone	Semi-arid Zone	Sub-humid Zone	Humid Zone	High-lands	Arid Zone	Semi-arid Zone	Sub-Humid Zone	Humid Zone	High-lands
Region/Country	('000)			('000)					('000)				
West Africa	190235	50990	139245	1177	11150	14905	23498	260	11898	51514	27023	45645	3165
Mauritania	2060	826	1234	826	0	0	0	0	938	296	0	0	0
Senegal	6951	2584	4367	181	2248	155	0	0	568	3755	44	0	0
Gambia	681	145	536	0	145	0	0	0	0	536	0	0	0
Burkina Faso	1453	628	6825	0	402	226	0	0	68	5801	956	0	0

Chad	5370	1687	3683	0	1282	405	0	0	1289	1915	479	0	0
Niger	6649	1211	5438	170	01041	0	0	0	3643	1795	0	0	0
Mali	8785	1616	7169	0	1616	0	0	0	645	5879	645	0	0
Sub-total	37949	8697	29252	1177	6734	786	0	0	7151	19977	2124	0	0
Cote d'Ivoire	10929	4923	6006	0	0	0	4923	0	0	0	4505	1501	0
Nigeria[3]	105096	25978	79118	0	4416	11690	9612	260	4747	30856	8703	31647	3165
Guinea Bissau	941	775	666	0	0	275	0	0	0	340	326	0	0
Guinea	6511	1580	4931	0	0	0	1580	0	0	49	3501	1381	0
S. Leone	3797	1166	2631	0	0	0	1166	0	0	0	737	1894	0
Benin	4422	1771	2651	0	0	1711	0	0	0	292	2359	0	0
Liberia	2407	1021	1386	0	0	0	1021	0	0	0	0	1386	0
Togo	3231	786	2445	0	0	0	786	0	0	0	2127	318	0
Ghana	14952	4793	10159	0	0	383	4410	0	0	0	2641	7518	0
Sub-total	152286	42293	109993	0	4416	14119	23498	260	4747	31537	24899	45645	3165

1. Total; rural and urban populations in 1988 as in Table 4.

2. Rural and urban populations by ecological zones calculated under assumptions set out in text.

3. Due to inconsistencies between Jahnke's figures and official government figures on the distribution of the Nigerian rural population by ecological zones, proportions of rural populations living in different ecological zones of Nigeria were calculated from the 1982/83–1983/84 National Integrated Survey (NISH) of Households.

Sources: UN. 1986. World Population Prospects ; Jahnke 1982 ; Table 4 and own calculations.

Nigeria. 1985. National Integrated Survey of Households (NISH). " Report of Rural Agricultural Sample Survey 1982/83–1983/84." Federal Office of Statistics, Lagos. September 1985.

3.03 Table 6, which is based on Table 5, gives summary 1988 data on the distribution of human populations in West Africa by rural/urban category and by ecological zones. It appears that in 1988 about 190 million people are living in West Africa, most of them in moister areas. While West Africa as a whole is experiencing a major transformation from a largely rural to an urban area, urban populations predominate particularly in the humid and sub-humid zones where most high income countries are located. Nigeria alone accounted for 100% of they highland urban population, for almost 80% of the urban population in the sub-humid zone, and for over 55% of the urban population in the humid zone. Relative to these areas, arid and semi-arid zones have remained very much rural. Underlying such demographic trends are high rates of natural population increase and migration from rural to urban and from drier to moister zones. These migratory movements may, to some extent, be attributed to problems e.g. drought, encountered

in the rural Sahelian zone and to the attraction of prosperous coastal West African countries especially in the late 1970s.

Table 6. *Aggregate Distribution of West African Human Populations in 1988 by Ecological Zone and Rural/Urban Category (thousands and percentages).*

		Population living in:					
		Arid Zone	Semi-arid Zone	Sub-Humid Zone	Humid Zone	Highlands	Total
Rural	'000	11898	51514	27023	45645	3165	139245
Population	(%)	(6I)	(270)	(149)	(24%)	(2I)	(73%)
Urban	1000	1177	11150	14905	23498	260	50990
Population	(%)	(1%)	(6%)	(8%)	(12%)	(0%)	(27%)
Total	1000	13075	62664	41928	69143	3425	190235
Population	(%)	(7%)	(33%)	(22%)	(36%)	(2%)	(100%)

Source: Own calculations based on data in Table 5.

3.2 Levels of milk consumption

3.04 Table 7 summarizes survey information on rural/urban differences in per caput milk consumption for some West African countries. The evidence from Table 7 should be used with caution as the figures come from different surveys, do not consistently cover rural/urban populations for the same years, and often relate to specific community groups in West Africa. Despite the not strictly comparable data, the figures in Table 7 confirm suggestions made by a 1976 FAO study which reports that: "the frequency and quantity of urban, milk consumption exceeds levels observed among settled rural populations although it is not as high as among nomads and (that) inequalities .in consumption are also more marked." (FAO 1975–1990). While this picture is consistent for countries of the humid and sub-humid zones and for pastoral communities in Table 7, it is however less apparent for more settled communities in dry areas. In the Malian case, for instance, rural milk consumption among the settled community of the Sudanian zone appears to have stayed quite close to urban consumption.

3.05 The high consumption rates registered for pastoral communities in Table 7 can be attributed to the ready availability of milk, to problems related to its marketing and to established milk consumption habits. Given their higher urban incomes, the greater exposure of urban populations to imported milk, the high costs of distributing imports to rural consumers and the relative scarcity of locally produced milk in moister areas, it is also not surprising that per caput consumption of milk in the humid and subhumid zones is higher in urban than in rural areas. The high rural consumption level for Northern Nigeria probably applies to communities mostly living in drier areas of the country. As far as settled rural communities are concerned, limitations to herd growth and productivity, climatic variability opportunities for specialisation in production

(e.g. involvement in cropping, emphasis on beef at the expense of milk production) and market exchange, government policies, access to dairy imports etc. have also no doubt combined to moderate rural milk consumption levels. Within the settled rural groups, consumption differences are however evident depending on their specific ecological location and their particular economic and cultural circumstances.

Table 7. *Per caput Consumption of Dairy Products (kg per caput per year). (Household Level Data for Selected West African Countries).*

Country/ City	Ecol. Zone	Urban and Rural Milk Consumption Levels						National per caput Cons. Aver. 1983/85 FAO (kg p.a.)
		Urban			Rural			
		Per caput Cons. (kg p.a.)	Year of estimate and source[1]		Per caput Cons. (kg p.a.).	Year of estimate and source[2]		
Burkina Faso	A/SA	3 #	1985 P	(i)	* 151 < 1	1968 1960s	(iv) (iv)	26
Chad	A/SA	20	1965	(ii)	–	–		30
Niger	A/SA	10 –	1980	(iii)	* 68–360 * 26	1981 1984	(iv)(x) (xi)	56
– Niamey	SA	40 #	1965	(iv)	–	–		
– Madoua	A	146 #	1965	(iv)	–	–		
– Zinder	A	172 #	1965	(iv)	–	–		
Mali	A/SA	23	1975	(v)	* 70–240	1982	(xii)	27
– Sahel	A	–			* 40–120	1978	(vi)	
– Soudan	SA	–			15–25	1978	(vi)	
– Bamako	SA	18	1978	(vi)	–	–		
Senegal	A/SA	–			* 90	1962	(iv)	39
Côte d'Ivojre	H/SH	15 –	1985 P	(i)	12	1956 1969	(iv) (iv)	15
– Abidjan	H	35	1985	(xiv)	12	1985	(xiv)	25
– Other urban	H	30	1985	(xiv)	–	–		
Nigeria	H/SH	15–18	1972	(vii)	* 37–90	1975/84	(vii)(xiii)	12
- North	SA/SH	–			* 30	1972	(vii)	

- South	H	–			7	1972	(vii)	
Togo	H/SH	–			3	1968	(iv)	5
		–			< 1	1960	(iv)	
Guinea	H/SH	–			6	1961	(iv)	10
Ghana	H/SH	9	1975	(viii)	–	–		3
Benin 1983	H/SH	15–17	1983	(ix)	–	–		9

(–) means not available or not applicable. # sign against figure for Burkina Faso applies to only condensed milk.

sign against urban Niger data indicates that estimate assumes that all milk produced will be used for human consumption, calf needs and normal losses not being taken into account.

1. The years in this column indicate year of survey. P is figure or estimate of per caput consumption projected to the specified years from the survey years by authors) of source materials. Small roman numerals (i) – (xii) in parentheses give sources of references.

2. A * sign indicates that the communities considered are pastoral or agro-pastoral. Highest consumption levels usually apply to nomadic societies.

Sources : (i) SOEC 1973; (ii) Bouscharain 1965; (iii) Sidibe 1982; (iv) May 1968; (v) Strebelle 1975 ; (vi) FAO/ISCDD Mali 1978; (vii) FAO/ISCDD Nigeria 1975; (viii) Ghana. Household Economic Survey 1974-75; (ix) FAO/ISCDD Benin 1984; (x) Boureima, S. 1981; (xi) Sizaret and Paci 1985; (xii) Wagenaar - Brouwer 1983; (xiii) Waters-Bayer 1985; (xiv) Atse-Atse 1987.

3.06 The features of milk consumption discussed so far are too general and incomplete to permit a quantitative differentiation of consumption by ecological zone. However, since milk consumption is conditioned by milk availability which is roughly determined by domestic production and imports, we can make use of aggregate FAO milk production and import data to get crude averages of rural and urban milk consumption levels in different ecological zones of West Africa. The derivation of such indicators not only allows aggregate comparisons between regions but also provides a basis for assessing aggregate demand for milk and milk products within each ecological zone in terms of rural/urban differences. For purposes of this exercise we will treat the production and import components of milk availability separately.

3.07 As evidenced elsewhere in. Africa, local milk production in West Africa has retained a predominantly rural character. A tentative 1979 distribution of livestock - populations by ecological zone and by country was done by Jahnke (1982) for the whole of tropical Africa. By selecting Jahnke's figures for West African countries and by retaining his annual milk yield averages for the different species, the volume of milk produced in different ecological zones of

West Africa in 1979 can be calculated. By assuming that the proportions yielded by these 1979 figures are applicable to 1983/85 milk production data, rough .estimates of milk produced by ecological zone in 1983/85 are deduced in Table 8. Having done this, there is a need to establish how much of the milk produced in each ecological zone is actually consumed in rural areas. This cannot be determined with any precision but by incorporating considerations about the different livestock production systems prevailing in West Africa, one can arrive at some approximate figures for rural milk consumption in different ecological zones: Thus, it is assumed in Table 8 that a constant 1096 of milk produced (defined as excluding intake by the calf) in any ecological zone will be damaged, wasted or simply unfit for human consumption. Furthermore, due to the subsistence role of milk in the arid zone and to the very low level of domestic dairy production in the humid zone, it is assumed that virtually all of the milk remaining in these areas will be consumed by rural people. In contrast, marketed milk which has been defined as rural production reaching major urban centres, gradually gains in importance in the semi-arid (10%) and. subhumid (20%) zones, and more particularly in the highlands where as much as 30% of available milk is assumed to be marketed. Given 1983/85 rural population figures (calculated from Table 4) and allowing for dairy imports consumed in rural areas, probable 1983/85 per caput rural milk consumption figures for the different ecological zones of West Africa are calculated in Table 8.

Table 8. *Probable levels of rural milk consumption in West Africa by ecological zone in 1983/85.*

Ecological zone	1983/85						
	Total milk prod. [1]	Imports sold to rural areas [2]	Prod. loss [3]	Prod. sold to urban areas [2]	Rural cons. balance	Rural pop. est. ('000)	Per caput rural cons. (kg LME/pers.
	('000)						
Arid	676	3	68	–	611	11025	55
Semi-arid	670	40	67	60	583	46938	12
Sub-humid	174	71	17	31	197	24987	8
Humid	131	141	13	–	259	41402	6
Highlands	23	1	2	6	16	2857	6
All zones	1674	256	167	97	1666	127209	13

1. Total 1983/85 milk production figure from Table 1 (FAO 1985). The disaggregation by ecological zone is based on percentages derived from Jahnke (1982). His annual milk yield averages of 200 kg/head of camel, 35 kg/head of cattle (50 kg/head in the Highlands) and 5 kg/head of sheep and goat in the sub-humid and humid zones (7.5 kg/head in other zones) were also retained.

2. Domestic milk consumed in urban areas estimated under assumptions in para. 3.7 of text. Distribution of import consumption based on assumptions in para. 3.9 of text.

3. A constant 10% of milk production is assumed to be lost or damaged.

Source: Own calculations based on Tables 1 , 3 , 4 and 5; and Jahnke (1982).

3.08 The disaggregation of imports by ecological zones following the procedure outlined above for production is problematic since, imports not being produced within national confines, cannot be accurately delimited to specific ecological zones. However, we have already seen that imported milk consumption in moister countries, is important and growing over time. We have also shown that higher income and urbanized countries in West Africa are concentrated in the moister area. Furthermore, we know from a variety of studies on West Africa, that a substantial amount of milk is consumed in urban areas. For instance, Mbogoh's guesstimate of the proportion of imported dairy products consumed in urban areas of West Africa in 1980 was 80%, per caput consumption of net dairy imports amounting to 32.12 kg in urban areas and to 2.54 kg in rural areas (Mbogoh, S. 1984). Von Massow, V. (1985) estimated that in 1982 about 90% of total dairy imports (in the form of fresh milk, butter, cheese and similar luxury dairy products, and including food aid) in Mali were consumed in major urban centres. Of the 90%, 65% was consumed in Bamako and 25% in other towns. In 1984, per caput consumption of dairy products originating from commercial imports approached 26 kg LME in Bamako and 10 kg LME in lesser urban centres. Bouscharain's estimate of the proportion of . total dairy imports to Chad, consumed in N'djamena in 1964 was 70% (FAO 1965). Other authors report similar situations in Niger (Sidibe 1982; Boureima 1981), in Nigeria (Nwoko 1986; David-West 1978), in Cote d'Ivoire (Atse-Atse 1987; Sarniguet 1985) and in other West African urban centres.

Table 9. *Probable Levels of Urban Milk Consumption in West Africa by Ecological Zone in 1983/85.*

Ecological Zone	1983/ 85						
	Net Dairy Imports[1]	Prod. Sold to Urban Areas[2]	Import Loss[3]	Import Sold to Rural Areas[2]	Urban Cos. Balance	Urban Pop. Est.	Per caput Urban Cons.
	('000)					('000)	(kg LME/pers.)
Arid	33	–	3	3	27	896	30
Semi-arid	298	60	30	40	288	9117	32
Sub-humid	393	31	39	71	314	11850	27
Humid	624	–	62	141	421	19048	22
Highlands	8	6	1	1	12	207	58
All zones	1356	97	135	256	1062	41118	26

1. Total 1983/85..net dairy imports figure from Table 3 (FAO 1985). The disaggregation 6y ecological zone assumes that imports follow the ecological distribution of urban population living in towns of 100,000 or more in 1983/85 (calculated following procedure in Table 6).

2. As estimated in Table 8.

3. A constant 10% of net dairy imports is assumed to be lost, damaged or wasted.

Source: Own calculations based on Tables 1, 3, 4, 5, 6 and assumptions set out in text.

3.09 By and large, one would thus expect consumption of imported milk and milk products in West Africa to follow the distribution of urban populations by ecological zones. 0n this assumption, Table 9 relates 1983/85 aggregate FAO data on net dairy imports (from Table 2) to the different ecological zones by using proportions of 1983/85 urban populations living in various ecological zones as a basis for the calculation. On this basis, the humid zone imports the highest proportion of dairy products (46%), the arid, semi-arid and sub-humid zones accounting for about 2%, 22% and 29% respectively of total dairy imports in 1983/85. Given the present state of storage, transport and distribution and the perishability of milk, it has been assumed that about 10% of total dairy imports in West Africa will be damaged or wasted. Obviously, there are also limits to the amount of dairy imports that will reach rural consumers, especially in areas where milk consumption is strongly biased towards urban centres. As a working assumption it has been hypothesized that a higher proportion of imports will reach rural consumers in the humid (25%) and subhumid (20°6) zones than in the arid (1096) and semi-arid (1596) zones. The consumption situation in 1983/85 is reflected in the availability of dairy imports arid domestic milk sold to urban areas, for the 1983/85 urban population. In spite of the high volume of dairy products imported in the humid zone, estimated per caput urban consumption in this zone amounts to only 22 kg because of its large urban populations. This is, to some extent, also true of

the sub-humid zone where per caput urban consumption averages 27 kg. Aggregate availability is less diluted by population pressure in the semi-arid zone where urban consumption reaches 32 kg per caput. In the arid zone, which initially had the lowest proportion of imports, a city dweller is calculated to. consume an average of 30 kg of imported milk.

3.10 Based on the foregoing, a breakdown of rural/urban per caput milk consumption differences by ecological zone is presented in Table 10.

Table 10. *Guesstimates of Rural/Urban Differences in per caput Milk Consumption by Ecological Zone (kg per caput per year).*

	Population Category		
Ecological Zones	Urban	Rural	All
Arid Zone	30	55	54
Semi-arid Zone	32	12	16
Sub-Humid Zone	27	8	14
Humid Zone	22	6	11
Highlands	58	6	9
Average All Zones[1]	26	13	16

1. Average consumption levels for all zones calculated as follows:

Urban Consumption = Total Urban Consumption Balance / Total Urban Population.

Rural Consumption = Total Rural Consumption Balance / Total Rural Population.

Urban/Rural Average = Urban + Rural Consumption Balances / Total Population.

Source: Approximations based on data in Tables 8 and 9.

Though these approximations are crude, they highlight some of the prominent features of milk consumption in West Africa, namely that:

i. except possibly for the arid zone, overall milk consumption levels are low, by developed and even by developing country standards. Often, they are also below what some nutritionists would consider to be adequate levels. As an example consider that per capita consumption of milk in India was estimated to be 50 kg in 1982–83 (Indian Dairy Corporation 1983);
ii. imbalances in consumption occur between ecological zones, average milk consumption levels being highest in the arid zone and lowest in the highland and the humid zones;
iii. despite relatively high rural production in drier areas and high imports in moister areas, per caput consumption in almost all ecological zones is highest in urban areas. The arid zone is perhaps the only area where rural consumption exceeds urban consumption. On average, urban

communities in West Africa appear to be consuming twice as much milk per caput as rural communities;

iv. rural milk consumption in moister areas is evidently low. However, there is little indication as to whether this is due to inflexibility in milk consumption habits or to non availability of milk in these areas.

3.11 The guesstimates in Table 10 are, as we have seen, based on aggregate FAO data. One can attempt a comparison of these guesstimates with survey figures of per caput milk consumption by ecological zone. Table 11 provides some summary statistics of milk consumption estimates by ecological zone derived from survey data in Table 7. Though subject to sharp limitations, the calculated coefficients of variation suggest that the inter-survey estimates for different ecological zones, are less dispersed around the mean in urban compared to rural areas. The greater variability of per caput milk consumption in rural areas points to scarcity of surveys relating to zones accounting for a large proportion of milk consumption and to inadequacy of data in the said reference sources. For instance, survey data do not always differentiate ,between rural and urban consumer categories, between milk and other animal products or between milk production and actual consumption. In addition, most of the survey figures in Table 7 relate to the 1960s and 1970s while the FAO based guesstimates are calculated for 1983/85. If anything, the figures in Table 11 show that available survey figures are neither sufficient nor accurate enough to challenge the guesstimates of per caput milk consumption provided in Table 10.

Table 11. *Tentative Classification of Rural/Urban Survey Estimates of Milk Consumption by Ecological Zone. (kg per* person *per year).*

Per caput urban/rural consumption								
Ecological zones	Per caput urban milk consumption				Per caput rural milk consumption			
	FAO based estimates[1]	Survey based estimates[2]			FAO based estimates[1]	Survey based estimates[2]		
		Mean	n[3] (no of surveys)	CV[4] (%)		Mean	n[3] (no. of surveys)	CV[4] (%)
Arid Zone	30	39	2	35	55	104	7	61
Semi-arid lone	32	18	3	25	12	36	4	49
Sub-Humid lone	27	22	3	27	8	14	3	83
Humid lone	22	18	5	50	6	3	4	71

1. FAO based urban and rural per caput consumption estimates are guesstimates. from Table 10.

2. Survey estimates by ecological zone are derived from data in Table 7. Where survey estimates . appeared to be unreasonably high they were taken to represent milk production rather than milk consumption. Following Wagenaar et al (ILCA. 1986) milk offtake.for human consumption was assumed to account for an average 30% of total milk produced.

3. Number of surveys relating to each ecological zone. Where estimates were available for different years and locations in the same source material(s); they were considered as separate surveys.

4. Inter-survey coefficient of variation.

Source : Tables 7 and 10.

3.12 Increasing aggregate dairy consumption in West Africa cannot be attributed to the effect of population growth alone since dairy consumption in the region has grown faster than human populations. In fact, we have seen earlier that between 1974/76 and 1983/85 aggregate consumption in West Africa grew at an annual rate of 5% while human populations grew at a rate of 3% (FAO. 1976 and . 1985). It appears therefore that dairy consumption is also influenced by factors such as changes in incomes, in prices of dairy products and of other food and non-food items, in tastes and preferences of consumers. Unfortunately, information on these factors, which can be considered representative of the entire West African region, is not available. Though subject to certain limitations, available survey and aggregate data provide insights on how these factors have influenced dairy consumption.

3.3.1 Effects of increasing incomes

3.13 Differences among income groups in frequency and quantity of milk consumption are sometimes difficult to derive because of conceptual and practical problems related to data in consumer surveys. However, calculation of the ratio of the value of food and milk expenditures to total household consumption expenditure provides some basis for assessing differences in expenditure patterns of various income groups. Table 12 summarizes some of the available information on disparities in expenditure on food and dairy products among different income groups for selected West African urban areas. The figures in the table demonstrate Engel's law which states that the proportion of income (in this case, total household expenditure) spent on food declines as income rises.

3.14 As regards milk, the average share of expenditure on dairy products by all households is approximately 2% (ranging from 0.3% to 4%) as against 44% for the proportion spent on all food items. The information in Table 12 does not suggest that, in relative terms, increasing incomes necessarily result in increased expenditure on dairy products. In other words, income elasticities of demand may not be greater than one. However, this suggestion calls for some qualifications. A major qualification relates to the limitations of consumer survey data. For example, note that the food budget shares calculated in Table 12 are rather low. Recent studies (Van der Gaag 1984) have shown that, in 1981, the budget share of food. in total expenditure per capita, was above 45% in most developing countries and reached 70916 in China. Compared to these figures, the proportions in Table 12 may be underestimates exaggerating the economic well-being of urban households in West Africa.

Table 12. *Proportions of Total Household Expenditure spent on Food and Dairy Products in Urban Areas of West Africa.*

Country/City	Ecol. Zone land Year[1]	Household income groups[2]								Source
		Low income		Middle Income		High income		All income		
		% of household expenditure spent on:								
		AFI[3]	DA[4]	AFI	DA	AFI	DA	AFI	DA	
Chad N'Djamena	SA	58	1.0	47	0.7	42	0.6	49	1.2	(i)
	1972	(100)		(300)		(433)		(267)		
Mali Bamako	SA							6.0	4.0	(ii)
	1975									
Sénégal Dakar	SA	57	1.7	44	1.9	26	1.0	44	1.6	(iii)
	1975	(100)		(300)		(733)		(324)		
Sénégal Dakar	SA							46	1.9	(iv)
	1975									
Gambia Banjul Area[5]	SA	59	3.3	51	3.2	45	3.6	52	3.4	(iv)
	1969	(100)		(300)		(600)		(334)		
Ghana	H/SH							46	1.3	(V)
– Main towns	1975									
Ghana[6]	H/SH									
– Eastern Region	1968	53	n.a	49	n.a	47	n.a	50	n.a	(iv)
Nigeria[7]	H/SH/S	53	2.8	51	2.5	46	1.8	50	2.1	(vi)
– Different cities	1981	(100)		(136)		(175)		(146)		
Sierra Leone	H									
– Eastern province	1968	40	1.5	30	1.9	19	0.5	34	1.4	(vii)
		(100)		(350)		(600)		(350)		
– Northern province		38	0.0	31	1.1	25	1.1	29	0.8	(vii)

		(100)		(350)		(600)		(350)		
Sierra Leone	H									
Northern province	1969							36	1.4	(iv)
– Southern Province								41	2.0	(iv)
– Mining Area								34	4.0	(iv)
All of above MEAN		51.0	1.72	43.3	1.88	35.7	1.43	43.9	2.09	

1. When the survey covered more than one calendar year the last of these is indicated.

2. When surveys included classification by more than three income groups only the lowest, middle and highest groups were considered. Where possible, average incomes of middle and high income groups are expressed as indices of average incomes of low income groups. These indices are given in parentheses below AFI figures.

3. AFI = All food items; figures under this column are percents (%) of total household expenditure spent on food items.

4. DA =Dairy products; figures under this column are percents (%) of.total household expenditure spent on dairy products.

5. For Gambia the low income group surveyed were assumed to be households earning 0 –1249 Dalasis/year, the middle income group those earning 1250–2499 Dalasis and the high income those with 2500–5000 (and over) Dalasis per year.

6. In Ghana the low income group were assumed to be unskilled labourers and traders, the middle income group skilled labourers and farmers, and the high income group service workers.

7. In Nigeria the middle income group surveyed were self-employed and the high income group were wage earners; the category "others" was taken to represent the low income group.

Sources: (i) Chad. Enquete Budget 1972; (ii) OMB EVI. 1976; (iii) Senegal Enquetes Budgets Familiaux 1976 ; (iv) ILO. 1979. Household Income and Expenditure Statistics; (v) Ghana 1979. Household Economic Survey 1974–75;.(vi) Nigeria. 1983. National Consumer Survey 1980–81; (vii) Sierra Leone. Consumer Survey 1968.

3.15 There may be several reasons why increasing household incomes do not always bring about relative increases in milk consumption. For one thing, the expenditure priorities of households may be changing. In urban areas in particular, some fundamental expenditures , such as rent, clothing, fuel etc. play a priority role in household expenditure. Furthermore, regardless of the levels of income considered, a major portion of expenditure goes to basic food staples which

may or may not include milk. In such conditions, it is only once these basic requirements have been fulfilled that an increase in purchasing power will be directed to milk purchases. Complications also arise when increases in household income are accompanied by changes in household composition and control of resources, and in consumer tastes and preferences. In many West African urban areas, social conditions e.g. household size and composition, control over household spending patterns and intra-household distribution of food, may be such as not to permit increased expenditure on dairy products. Urban consumers in West Africa have also been known to detach themselves from low priced food staples towards more expensive, and often imported, products like rice or wheat (Byerlee, D. 1987). A certain attraction is in fact taking form, in some . areas, for luxury food and non-food items. To a certain extent, this orientation in consumption has been reinforced by market promotion, information imposed from outside the household and also household behavioural factors like emulation. Although precise knowledge on this subject is lacking, it is probable that these changes in consumption patterns will have partially or even totally offset the expected effects of increases in income on milk consumption, in some urban areas of West Africa.

3.16 Some additional insights can be gained by looking in more detail at household survey information. In urban Chad (1972), for example, expenditure on milk accounted for 1.2% of total expenditure and for 2.5% of food expenditure. At very low income levels (< 10,000 FM/month) relative expenditure on milk actually falls as income rises, suggesting that there are other food priorities to fulfill. For income levels exceeding 10,000 FM/Month, the proportion of expenditure on milk increases consistently with income and there appears to be a switch from curd towards more fresh milk consumption and supplementation with condensed milk as income goes up (Chad. N'djamena Enquete Budget 1972). In Senegal (1975), expenditure on dairy products accounted for an average 1.6% of total monthly household expenditure and for about 3.7% of food expenditure. Again increases in income result in increased relative expenditure on milk.

3.17 Compared with other data in Table 12, the proportion of total household expenditure spent on dairy products by Gambians in Banjul (1969), appears to be relatively high and also less variable between income groups. Reasons for this can only be guessed, but the very small size of the country, the favourable location of Banjul (as a port), income distribution and prices of dairy products in this city may be important factors to consider. Survey data for Ghana, though not controlled for the income effect, suggest that expenditure on milk and milk products .forms a somewhat higher proportion of total household expenditure in large cities (1.3%) and other urban areas (1%) than in rural areas. (0.5%). The two most widely consumed dairy items appear to be fresh milk (fresh, bottled or in cartons) and unsweetened evaporated tinned milk, the former being mostly confined to rural areas and the latter to urban areas.

3.18 Though not indicated in Table. 12, consumption of packed milk in Cote d'Ivoire (Enquete Budget/Consummation 1979) appears to be common among all groups (even among the inactive and non-qualified in Abidjan). This is understandable since Cote d'Ivoire imports substantial amounts of powdered milk which are usually reconstituted into packed milk. Yoghurt and cheese are the next two most popular dairy items consumed by all occupational groups. Fresh milk consumption appears on the other hand to be restricted to clerks and qualified employees and is, in all cases, lower than yoghurt and cheese consumption.

3.19 National household level data for Nigeria (1980-81 National Consumer Survey) suggest that in urban areas of the arid and semi-arid zone food expenditure takes somewhat more than half of total expenditure while it takes a little less than 50% in urban areas of the humid zone. In percentage terms, self employed (SE) households spent more on food than wage earners (WE) and less on dairy products. Expenditure on dairy products was also similar in urban areas of the arid and humid zones. In a survey carried out in three rural villages of Zaria, Simmons (1970-71) found that the proportion of money spent on food varied from 20% for the highest income group to 80% for the lowest. Cash expenditure on food was twice as high in semi-urban villages than in rural villages (Simmons 1970/71). Furthermore, demand for milk was positively related to increasing incomes; the income elasticity of demand for all milk being 0.6 (double that of all cereals). On the other hand, other animal products e.g. meat, fish, poultry had higher elasticity coefficients than milk. Even so, it seemed probable that milk, marketed in the right way, could offer good prospects for additional consumption if incomes increased, especially in areas where milk prices had remained relatively low and seemed to be very competitive.

3.20 Though a bit outdated (1968–69), the figures for Sierra Leone give a good example of how expenditure patterns vary between regions of the same country. Northern Province has a relatively favourable grazing ecology and is inhabited by Fula cattle holders; milk, in urban areas of this province, is an expensive luxury for the majority of the poor who have no direct access to rural milk supplies or imports. A rise in income in this region might nevertheless be expected to bring milk within the range of purchases acceptable by the poor. The high proportion registered for expenditure on milk in the Southern Province is most probably a reflection of the purchasing power available there; mining being the most important industry in Sierra Leone in terms of both government and private employment and exports.

3.21 On the whole, available evidence from consumer surveys in urban West Africa, does not permit one to arrive at precise conclusions regarding the proportion of expenditure allocated to dairy products by households at successively higher levels of income. Nevertheless, past trends in milk consumption and available aggregate statistics for West Africa show that the demand for dairy products rises with income. For instance, FAO 1975-2000 projections indicate that income elasticities of demand for milk are positive and appear to lie between 0.50 and 1.20 in most of West Africa. There is also evidence that variations occur in the consumption of different types of milk with occupation (household consumer surveys for various years and countries), season of year, ecological zone, tradition of consuming milk, household demographic characteristics, education and perhaps also with ethnic background (Stewart and Ogley, 1975). In Mali, those employed in the private sector appear to be the main consumers of milk (Strebelle 1975, OMBEVI 1976). In both Cote d'Ivoire and Nigeria, clerks and wage earners were found to be the major consumers of dairy products (Consumer Surveys 1979 and 1981-82). In Sierra Leone, Lebanese mining prospectors were probably the main consumers of milk (see para. 3.20 above). All this underlines the important effects of factors closely linked with incomes on dairy consumption and the need to take account of these in food consumption studies.

3.3.2 Effects of prices

3.22 It is often argued, on broad economic grounds, that dairy demand in West Africa is responsive to price changes. While this is probably true of most urban areas in West Africa, it is

however hard to generalize this argument to the whole region. Only a few empirical studies, and these dealing mostly with dairy imports, are indeed available to substantiate the argument. It is also to be noted that large differences in consumption habits exist in West Africa which make milk products vary from essential to luxury commodities. These and factors such as consumer pricing policy are likely to affect prices and consequently the response of dairy demand to price changes. In view of the complex and many facetted nature of the price issue, it is therefore worth considering, at the outset, some of the price related determinants of dairy demand in West Africa.

3.23 A major feature of West African dairy consumption, in the last decade, has been a widespread tendency to import dairy products from developed countries. As has been pointed out earlier, a substantial portion of these imports have been directed to urban areas where they have generated or promoted new patterns of dairy consumption, especially among the urban middle and high income groups. Price inducements and subsidies, operating at both international and domestic levels, have undoubtedly contributed to encouraging this imported demand. World trade in dairy products is dominated by the EEC which, in 1985, accounted for over 50% of world dairy exports, this proportion rising to as much as 70% for skim milk powder (Raikes, P. 1986). Since the 1970s the EEC has explicitly subsidized its dairy exports and the world dairy market has been characterised by steadily increasing EEC surpluses and relatively low dairy prices which have tended to decline over time. As just one example, the world market price of skim milk powder declined from US$ 800/T in 1976 to US$ 470/T in 1978-79, rising to US$ 1000/T in 1981 to go down again to US$ 600/T in 1985 (Atse-Atse, P. 1987). This price development has, to a certain extent, stimulated import demand in West Africa where the aggregate volume of dairy imports more than doubled between 1974/76 and 1983/85 (FAO. 1976 and 1985). Developed countries have also provided technical advice, training and in some cases direct assistance for the establishment and/or operation of dairy plants in West Africa. Especially in the 1970s, multinationals like Nestle, were also actively promoting the use of powdered milk for infant feeding in urban areas (Latham, M.C. 1982). On the whole, it appears that the world dairy market situation in the last decade, has been favourable to the consumption of dairy imports in West Africa.

3.24 A number of factors on the domestic side have also influenced dairy consumption in the region. Because of the generally small and variable volumes of milk supplied by the domestic sector, dairy imports have often come to be regarded as welcome sources of supply. Import dependent milk processing plants have as a result often received substantial government support and/ or investment in many areas. Explicit or implicit tariffs on imports, though variable between countries and categories of milk products, have also not been very effective in reducing dairy import demand. Where such import control measures have been adopted at all, they have been selective and product specific. For instance, duties on imports of condensed and evaporated milk have typically been kept low in Cote d'Ivoire (Atse-Atse, P. 198?); in Mali (von Massow, V. 1985) and in Nigeria (Nwoko, S.G. 1986). Overvaluation of exchange rates in several West African countries, will also have contributed to the subsidisation of dairy imports, often at the expense of locally produced dairy products (von Massow, V. 1985). Worthy of note is also that urban middle and upper income groups, who consume much of the imported dairy products, have been influential interest groups capable of biasing government policy interventions towards dairy imports.

3.25 The influences described so far suggest that prices reflect not only underlying market forces but also qualitative differences in consumption and in policy interventions, the effects' of which are difficult to quantify. Although these influences are likely to have resulted in reduced prices of imported dairy products to urban consumers, they have remained largely out of reach of the lower income groups. Bachmann, M. (1979) reports, for instance, that the production price of a litre of milk varied from 12% to 111% of the 1978 average daily wages of skilled and unskilled labourers in urban areas of Chad and Niger. Instances where powdered milk for infant feeding was over diluted in order to make it last longer have also been observed in Cote d'Ivoire and Ghana (FAO, 1979). All this suggests that consumer prices in most of West Africa, are beyond the reach of the vast majority of urban, let alone rural, consumers.

3.26 Some of these features of consumption are illustrated in Table 13 which provides some evidence on prices of dairy (mostly liquid) products in a number of West African countries. For convenience, all prices were converted to US dollars at the official exchange rates prevailing in the countries and years in question (FAO. 1985). A rough differentiation was made with respect to import based and local milk products. This, however, should not be taken too categorically as it was often impossible to distinguish between import and/or local components of dairy products. For example, both pasteurised or sterilised milk and yoghurt can be manufactured from imported or local milk. While industrial processing of imported products is usually confined to the organised dairy sector, in some areas, small scale producers also use imports to manufacture processed dairy products which they sell on urban markets. To some extent, large scale dairies also use local milk to produce milk recombined with imported items. Border price equivalents in Table 13 were calculated using FAO data. For reconstituted milk and yoghurt the calculation of border prices took into account the c.i.f. price of dry milk, the international f.o.b. price of butter-oil and the costs of processing and recombining milk. No adjustments were made for overvaluation of currencies, inflation, transport, distribution and delivery costs.

3.27 Though no uniform picture emerges across countries or products, it appears from Table 13, that prices of milk products, in most of the countries considered have been relatively high. Some insights can also be got regarding interactions between prices and dairy consumption, marketing and processing. For instance, in 1983/84, the Malian Union Laitiere de Bamako (ULB) paid local milk producers US$ 0.36/litre of milk and resold this for US$ 0.53/1 on the urban consumer market while a petty trader could sell this same amount of milk for as much as US$ 0.60/1 (von Massow, V. 1985). Consumer prices of reconstituted, condensed and evaporated milk in Mali were, in this period, lower than their border price equivalents. This suggests that the Malian government has subsidised the consumption of both local and imported dairy products in urban areas. The cases of Niger and Nigeria indicate that the margin between the producer price of local milk and its sale price on the official consumer market has been quite high for the organised dairy sector. As a result, consumer prices of processed local, and even imported, milk on the official market, were higher than prices charged on the local market. Many consumers appear in fact, to have turned away from the standard quality milk sold by government parastatals towards lower priced, probably also lower quality and better adapted, products sold on local markets. Nigeria also provides a good example of how prices of dairy products have followed, if not exceeded, inflationary trends that affected all food items in 1983–84. The increase in the local retail price of evaporated milk in 1985 was so rapid that it led to the government selling this product to schools, cooperatives, hospitals etc. at a subsidised price.

Table 13. *Producer, consumer and border equivalent prices of local and import-based milk in some West African Countries. (all values in US $ per litre or kg of specified dairy product).*

Country and nature of milk product	Year	Prices				Border equivalent prices[c]	Source
		Producer prices[a] on:		Consumer prices[b] on:			
		Local Market	Official Market	Local Market	Official Market		
Burkina Faso	1983/85						
– Liquid milk		0.53	–	–	0.85[d]	0.65[d]	(i)(ii)(iii)(iv)
– Dry milk		–	–	–	–	0.91	(iii)
– Imported fresh		–	–	–	–	0.63	(iii)
Niger	1982/83						
– Local fresh milk		0.40[e]	0.35[e]	0.46	0.65	–	(v)(vi)
– Import-based milk							
* Sour milk/yoghurt		–	–	0.45–0.52[f]	0.65	0.51	(ii)(iii)(iv)(v)
* Dry milk		–	–	–	1.27–1.32	0.90	(iii)(vi)
* Nido		–	–	4.23	–	0.95	(iii)(v)
* Gloria		–	–	5.51–6.50	–	0.85	(iii)(v)
* Condensed milk		–	–	1.64–1.76	–	0.82	(iii)(v)
Senegal							
– Milk	1975/76	0.73[g]	–	–	–	0.19[h]	(vii)
– Dry milk	1985	–	–	–	–	0.95	(iii)
– Cond. & evap. Milk	1985	–	–	–	–	0.83	(iii)
Mali I							
– Local fresh milk	1984	0.35	0.25	0.52	0.46	–	(viii)

– Import-based milk							
* Reconstituted milk	1983	–	–	–	0.34	0.39	(viii)
* Dry milk in cans	1983	–	–	0.57	1.14	1.07	(viii)
* Cond. & evap. Milk	1983	–	–	0.34	0.57	0.77	(viii)
Cote d'Ivoire	1985						
– Local fresh milk		0.35-0.37[j]	–	0.39[j]	–	–	(ix)
– Import-based milk							
* Past. and reconst.		–	–	0.27[k]	–	0.28	(ii)(iii)(iv)(ix)
* Sterilised milk		–	–	0.48[k]	–	0.28	(ii)(iii)(iv)(ix)
* Yoghurt		–	–	0.44–0.60[k]	–	0.33	(iii)(ix)
Nigeria							
– Local fresh milk	1981	–	0.51[l]	0.75[m]	1.07[n]	–	(x)
– sour milk	1986	–	–	0.60[o]	–	–	(xi)
– Import-based milk							
* Fresh pasteurised	1987	–	–	1.68	–	1.10	(ii)(iii)(iv)(xii)
* Evaporated milk	1985	–	–	3.07[p]	2.54[q]	1.55	(iii)(x)(xiii)
* Condensed & evap.	1983	–	–	–	0.91[r]	0.88	(iii)(x)
Ghana							
– Milk	1975/76	0.27–0.62[g]	–	–	–	0.19[h]	(vii)
– Fresh pasteurised	1985	1.25[s]	–	–	1.13[s]	0.73	(i)(i)(iii)(iv)

(–) means not applicable or not available.

a. Producer prices on local markets are prices paid to milk producers by petty traders or observed farmgate prices. Producer prices on official markets are prices usually paid by government parastatals or collection centres.

b. Urban retail prices of milk sold by traders direct to consumers (local market) or by government dairies (official market).

c. Border prices are unit c.i.f. import values calculated from FAO Trade yearbooks (various years). The border price equivalent of a litre of reconstituted milk or yoghurt has been calculated as 0.1 dimes the border price of dry milk plus 0.03 times the international f.o.b price of butter-oil in the corresponding years, plus an allowance for processing costs averaging 55% of local consumer market prices in the countries considered. According to Nwoko (1986) the cost of processing milk in Nigerian dairy plants amounts to roughly 54% of the total cost of supplying milk. For Bamako (Mali), von Massow (1985) estimated that processing costs for reconstituted liquid milk amounted to US $0.20/1 i.e. to 58% of the 1983 domestic market price of reconstituted milk.

d. It is not clear whether the market price is that of processed local milk or of milk reconstituted from imported dry milk and butter-oil. The border price is calculated on the assumption that the milk in question is reconstituted.

e. The lower producer price is the average 1982 price paid by OLANI to local milk producers, according to Sidibe (1982). The higher value is the 1983 producer price in Maradi, as quoted by Maidagi (1983–84).

f. Women in Niamey buy milk powder to manufacture yoghurt at home. Yoghurt of this type is sold on a per ladle basis (US$ 0.26/0.51) or in gourds (US$ 4.50/101). There appears to be a scale bias against smaller containers, the price of yoghurt sold in this way being higher than the price of yoghurt sold in large containers (Sidibe 1982). Such scale aspects are observed for other products as well e.g. Nido powdered milk (sold in 400g cans) and Gloria condensed milk (in 300 to 2500g packs).

g. Average of 1975–76 prices paid to milk producers on formal and traditional markets (ILCA Bulletin no. 4, 1979).

h. Average of 1975–76 prices paid to milk producers in EEC member states (ILCA Bulletinno.4,1979).

i. All prices for Mali from von Massow, V. (1985)

j. As per Atse-Atse (1987) producer prices are calculated on the assumption that retail producer price margins are about 10-20 F CFA/1 or US$ 0.022–0.045/1. The market price given is an average of retail prices in different localities.

k. Average retail prices for various brands of pasteurised, reconstituted and sterilised milk in different department stores (Atse-Atse, P. 1987). For yoghurt, the exact size of containers was

not specified and the minimum and maximum of observed prices are given. Yoghurt and probably also sterilised milk may be entirely imported.

l. Average of 1981 producer prices paid by six government dairy plants in Nigeria (Nwoko 1986).

m. Average of 1981 local retail prices for fresh milk sold in Funtua, Gusau,Gombe, Abet and Kurimin Biri (Nwoko 1986).

n. Average of 1981 factory gate milk prices for milk processed by six government dairy plants in Nigeria (Nwoko 1986).

o. 1986 litre price of nono i.e. sour milk in Zonkwa rural town according to Waters-Bayer, A. (1986).

p. 1985 retail price of unsweetened evaporated milk (170g tin) in Lagos (Nigeria. Dairy Reconnaissance Survey. July 1987).

q. Government subsidised price of "Peak" evaporated milk to public institutions in Anambra State in 1984 (Nwoko 1986).

r. Landed unit price of condensed and evaporated milk in 1983 (Nwoko 1986).

s. Farm-gate price of local milk in remote area and reported urban retail price of fresh pasteurized milk. The latter is probably reconstituted. (Livestock Statistics Handbook. 1987).

Sources: (For full titles see References section).

(i) ILCA. 1987. Livestock Statistics Handbook. LED. Draft; (ii) Dairy Handbook. Alfa Laval; (iii) FAO. Trade Yearbooks (various years); (iv) FAO. 1986. Food Outlook No. 1 and other issues; (v) Maidagi, B. 1984; (vi) Sidibe, B. S. 1982; (vii) ILCA. 1979. Bulletin no. 4; (viii) von Massow, V. 1985; (ix) Atse-Atse, P. 1987; (x) Nwoko, S.G. 1986; (xi) Waters-Bayer, A. 1986; (xii) Nigeria. Iwo Road Dairy, Ibadan. 1987; (xiii) Nigeria. Dairy Sector Reconnaissance Survey. 1987.

4. Aggregate demand for dairy products in West Africa

4.1 Aggregate demand

4.01 Given the information provided so far on the distribution of West African human populations in 1988 (Table 6) and the guesstimates of per caput milk consumption (Table 10), the aggregate demand for milk and its distribution by ecological zones and by rural/urban category can be roughly estimated. This is done in Table 14 where it is assumed that the 1983/85 per caput milk consumption levels, estimated in Table 10 for different ecological zones, will prevail until 1988. By deducting projected 1988 milk supply estimates from aggregate 1988 milk demand estimates, the magnitude of " domestically unmet demand " for milk can also be gauged. This latter estimation of demand may of course be misleading since West African countries, especially 'urban' centres of the moist zone, have in reality been supplied by dairy imports. Nevertheless, the estimates are useful in giving a general picture of the present West African situation.

4.02 On this basis, it is estimated in Table 14 that the total demand for milk and milk products in West Africa in 1988 is about 3.1 million metric tons of LME. Out of this total, almost 57% occurs in rural areas and 43% in urban areas. The percentages in Table 14 also show the larger demand for dairy products in rural areas of the arid and semi-arid zones. The picture for urban areas is somewhat different, a larger proportion of demand for milk occurring in the humid and sub-humid zoned than in the arid and semi-arid zones. For West Africa as a whole, domestically unmet dairy demand in 1988 is calculated to be about 1.3 million metric tons LME i.e. roughly 42% of total dairy demand in 1988. In this respect, the largest deficit is observed in the humid zone, followed next by the sub-humid zone. In the semi-arid zone domestically unmet demand amounts to 250 thousand metric tons LME. Only the arid zone shows a surplus of domestic supply over demand equivalent to 43 thousand metric tons LME, no doubt in reflection of the traditional predominance of livestock and the low human population densities prevailing in this zone.

Table 14. *Estimated 1988 Aggregate Demand for Milk in West Africa by Ecological Zone and Urban/Rural Category ('000 MT LME).*

	Ecological zones					
	Arid Zone	Semi-Arid Zone	Sub-Humid Zone	Humid Zone	Highlands	Total
– Standardised 1988 Rural Pop (in '000)	11898	51514	27023	45645	3165	139245
– Est. per caput cons. of milk (in. kg/p.a)	55	12	8	6	6	
Derived Rural Demand for Milk						
(in 100O .MT)	654	618	216	274	19	1781

(in % of total)	(21%)	(20%)	(7%)	(8%)	(1%)	(57%)
– Standardised 1988 Urban Pop						
(in '000)	1177	11150	14905	23498	260	50990
– Est. per caput cans. of milk						
(in kg/p.a)	30	32	27	22	58	
Derived Urban Demand for Milk						
(in '000 MT)	35	357	402	517	15	1326
(in % of total)	(2%)	(11%)	(13%	(17%)	(0%)	(43%)
Derived Total 1988 Demand for Milk						
(in '000 MT)	689	975	618	791	34	3107
(in %)	(23%)	(31%)	(20%)	(25%)	(1%)	(100%)
Domestic Milk Supply in 1988*						
(in '000 MT)	732	725	188	141	25	1811
Domestically Unmet Demand in 1988**						
(in '000 MT)	43	–250	–430	–650	–9	–1296

* Figures of 1988 domestic milk supply in different ecological zones projected from data in Table 8 at an annual growth rate of 2% (1974/76-1983/85 production growth rate in West Africa. Table I).

** Rough estimates calculated by deducting 1988 domestic milk supply from total 1988 demand.

Source: Calculations based an data in Tables 6, 8 and 10.

4.03 In practical terms, the consumption of milk in dry areas seems to have been constrained by the low purchasing power of urban populations and the slow growth of milk production from traditional herds. This becomes clear when one considers that out of the six West African countries classified as predominantly arid or semi-arid, only two i.e. Mauritania and Senegal, were relatively high income countries in 1983/85. Most of these countries have unorganised dairy sectors and rely on the traditional sector for their milk supplies. Though consumption in rural areas of the dry zone has traditionally been high, the large deficits occurring in the semi-arid zone suggest that this is no more the case. Possible reasons for this decline in milk consumption were cited in section 3 of this paper and we need not go into these again.

4.04 As mentioned earlier, a basic assumption in Table 14 is that domestic milk supply and dairy imports in 1988 will be maintained at 1983/85 levels. While an annual growth rate of 2% for

domestic milk supply can easily be visualized, it is however hard to ascertain that dairy imports have recently grown as fast as is implied in Table 14. Of particular concern is therefore the substantial . amount of dairy demand, unmet from domestic supply, calculated for the moist zone. Large shorfalls in domestic supply in this zone, have in the past been met through dairy imports, especially in urban areas where consumer habits are changing with increasing ethnic heterogeneity, exposure to a variety of foods as well as growth in population and income. Though imports have, in some cases, pushed themselves into rural areas of the moist zone, a large number of people in these areas are still with practically no possibilities of consuming milk. It would thus seem that the likelihood of the moist zone sustaining the very large import volumes required to meet dairy demand in future, is very uncertain.

4.2 Individual milk products and consumption trends

4.05 Dairy products are consumed in a variety of different forms. Sour milk is as widely consumed as fresh milk in most of West Africa and more so in rural than in urban areas. Butter, cheese and cream consumption occurs to a lesser extent and appears to be restricted to particular localities (e.g. rural) and/or ethnic groups (e.g. Western Yorubas in Nigeria appreciate Wagashi cheese) or income groups (e.g. expatriates or African urban elites consuming imported products). Fermented milk is clearly quite popular in both dry and moist areas. Much as they are appreciated, fermented foods are however fast becoming expensive because they cannot be produced on a commercial scale and in large enough quantities (Omololu, A. 1985). Bland foods, including no doubt items such as powdered reconstituted milk and in some cases fresh milk, are taking over in most areas, whereas fermented foods are becoming delicacies limited to certain villages.

4.06 Some authors appear to use the terms yoghurt, curd, sour or fermented milk interchangeably. But since these products may differ in terms of composition and quality, we will, in subsequent sections, retain on each occasion, the actual terms used by the authors) concerned. Some people have explained the preference for sour milk in humid areas of West Africa on grounds that certain ethnic groups suffer from lactose intolerance. Lactose intolerance (here-in-after LI) is caused by a deficiency or an insufficiency in the activity of the lactase enzyme which hydrolyzes lactose into glucose and galactose in the human intestine. Common gastrointestinal symptoms of LI include bloating, flatulence, abdominal cramps and in some cases diarrhea, within an hour or two after drinking fresh milk (American Academy of Pediatrics 1974; Mathan 1985).

4.07 Research results indicate that LI may be more usual, especially after the age of 2–3 years, among the world's population than was once thought. For instance, Kretchmer et. al. (1971) reported that in Nigeria 99% of Yorubas and Ibos (mostly non-milk consuming tribal groups), 64% of Fulatiis and Hausas (traditionally milk consuming ethnic groups) and 20% of nomadic Fulanis malabsorbed lactose after the age of one 'and a half to three years Similar findings have .been documented by Vis and Brasseur (1985) for Shi and Havu agriculturalists (88–97% of cases found to be lactose intolerant), for Hutu agropastoralists (64–88% of cases were lactose intolerant) and for Tutsis pastoralists (5–23% of cases lactose intolerant) in the highlands of Central Africa: The adverse symptoms of LI also seem to be a function of the quantity and

quality of milk consumed, of intervals between consumption and of other foods consumed along with milk (Boor et al. 1984 quoting Simoons et al. 1977; Bachmann 1979).

4.08 In fact, evidence shows that small doses of lactose (up to l0g of lactose which is equivalent to approximately 250 ml milk) can be tolerated by most individuals. Fermented dairy products including buttermilk, sour milk or yoghurt and cheese, have also been observed not to cause any LI problems. Two possible explanations forwarded for this phenomenon are: (i) the very low lactose contents of fermented milk products (Boor et al. 1984 quoting Johnston et a1. 1974) – though sourmilk is not completely free from lactose, its lactose content is reduced to about three fourths of the original amount in milk (Bachmann 1979 (ii) a ß-galactosidase of bacterial origin in fermented milk is able to hydrolyse lactose and may prevent the occurrence of symptoms of LI (Mathan 1985).

4.09 On the whole, available evidence on LI shows that: (i) the value of lactose tolerance tests, on which arguments to discourage fresh milk consumption are based, is questionable since these tests usually involve administration of massive doses of pure lactose (from 2 to 100g lactose per kg body weight in some experimental studies) rather than the sort of quantities involved when milk is consumed in normal amounts. According to Omolulu (1974), 60g of lactose diluted in 400m1 of water, and administered to an individual on an empty stomach is the equivalent of 1200m1 of whole milk, an amount rarely consumed by the average Nigerian, (ii) the favourable response of patients suffering from malnutrition (most of these being low income and non-milk consuming ethnic groups) to treatment with milk (Oyedeji 1984 is partial evidence that milk proteins can be satisfactorilly absorbed in the human intestines. Thus, it may be , inappropriate, on the basis of present evidence, to discourage programmes to improve diets and increase milk production because of fears of lactose intolerance.

4.10 Coming back to the composition of dairy demand, it appears that liquid milk products, whether fermented, fresh, reconstituted or recombined, constitute the largest form of dairy consumption in West Africa. In 1954, Feuteun estimated that some 160 million litres of milk were consumed in West Africa, 60 million litres (38%) as fresh milk, 80 million litres (50%) as curd and 20 million litres (12%) as butter. For Nigeria in 1972, the ISCDD reports. that some 438 million kg of liquid milk were consumed, 75% in soured form drunk traditionally by pastoralists, and the remainder as fresh milk. Claesson's (1978) potential demand estimates for various dairy products in Nigeria amounted to about 4 million litres LME per day (18–20 litres per, caput per, year), of which almost 2 million litres (50%) was yoghurt, 1.5 million litres (38%) evaporated milk, 0.3 million litres (1%) UHT or sterilised milk and 0.1 million litres (0.3%) pasteurized milk. Potential demand for dairy products in Nigerian state capitals and major cities in the same period (1978) was estimated at 449,630 litres/day of which 8,000 litres (51%) was yoghurt, 182,800 litres (41%) was evaporated milk, 31,050 litres (7%) UHT and sterilised milk, and 7,780 litres (2%) pasteurised milk. At this point, a closer look at the composition of aggregate dairy demand, met through either imports or domestic production, is required to arrive at more specific estimates of the distribution of West African dairy consumption between different products.

4.11 In paragraph 2.9 of this paper it was shown that in .1983/85, dairy imports constituted about 45% of total dairy consumption in the West African region, the bulk of these imports being dried

(48%) and evaporated/condensed milk (44%) followed by butter and. ghee (6%), cheese and curd (1%) and fresh milk (1%). A note is balled for here regarding the production of pasteurised and sterilised milk. Although pasteurised milk is the cheapest form of liquid milk distribution, its consumption is limited by lack of refrigeration facilities in most areas of West Africa (Claesson 1978). On the other hand, sterilised milk consumption can be expected to be higher than pasteurised milk consumption as it does not require refrigeration and is suitable for a wide range of income groups and urban consumers. The production of both sterilised and pasteurised is however constrained by lack of modern milk processing facilities and distribution channels which require substantial investments and an organised dairy sector.

4.12 Evaporated and condensed milk consumption in West Africa totalled 597 thousand MT LME in 1983/85 and. grew at an average rate of 13% between 1975 and 1984. These two items are already consumed by a large number of people in West Africa. In Nigeria, for example, about 50% of the total population in 1978, mainly tea and coffee drinkers above 15 years of age and older, were assumed to be potential consumers of evaporated tinned "Peak" milk (Claesson 1978). Toyin Onifade (ILCA Ibadan 1987) maintains that in urban areas of Nigeria milk is mainly drunk in tea (though) there are a few cases of people substituting soyabean milk for liquid milk". "Peak" milk was also the predominant dairy product used for bottle feeding in urban areas of Nigeria (FAO/ISCDD 1975). An interesting result of an analysis by Nwoko (1986) was that condensed and evaporated milk imports in Nigeria were highly inelastic to changes in per caput income and in domestic production. The mechanism underlying these relationships warrants further research but it is probable that the consumption of evaporated and condensed milk (mainly unsweetened and sold in small tins) in moist areas of West Africa will increase in future even if prices of these items increase on the world market.

4.13 Consumption of imported fresh milk, butter/ghee, cheese and curd in West Africa seems to be very closely related to consumers' means and disposition to purchase these. Because of the small quantities involved and of their generally prohibitive prices, demand for these items will in all likelihood remain restricted to classes of higher officials, private sector employees and foreigners in urban areas unless prices decrease in future.

4.14 As far as domestic supply is concerned, aggregate FAO data show that 1983/85 domestic dairy production accounted for about 55% of total West African dairy consumption (amounting to 3030 thousands metric tons LME). A significant portion of this domestically met demand was liquid milk (89%); butter (7%) end cheese (4%) making only minor contributions. As hoes been mentioned earlier in this paper, it is difficult to arrive at precise estimates of the distribution of dairy demand between products in different areas of West Africa. Nonetheless, some rough estimates can be made. Since yoghurt and/or sourmilk appear, in any case, to be very popular dairy products in West Africa, it can be assumed that about 50% of domestic liquid milk production in West Africa will be consumed as fresh (solely by pastoralists and people living in dry areas) while the other 50% will be consumed in sour form (mainly by people in urban areas of the moister zone and in rural areas of the dry zone).

4.15 Products other than fresh and sour milk are locally produced in such small quantities in West Africa that it is particularly difficult to come to conclusions about their future demand. However, small traditional dairy enterprises specialising in the production of cheese and butter

do exist in some localities, notably in dry areas. With some encouragement, production and consequently consumption of these products may be substantially increased.

4.16 Given the above arguments and the evidence presented so far, an attempt is made in Table 15 at disaggregating the aggregate milk demand estimate given in Table 14 by product type and origin, by ecological zone and by rural/urban category. The figures in Table 15 are estimated on the basis of proportions calculated from Tables 1, 2 and 3 regarding the distribution of aggregate dairy consumption between imports and domestic production. Due to difficulties involved in disaggregating product specific dairy consumption by ecological zones, the very rough ecological classification used in part one of this paper is kept in Table 15. Ecological zones are consequently described as either dry or moist. The urban/rural categorisation of milk consumption is largely based on data in Tables 8 and 9 and assumes that out of total demand in the dry zone 21% is urban and 79% rural. The equivalent percentages for the moist zone are 60% and 40% respectively. Notice that the urban/rural demand estimates in Table 15 slightly differ from those in Table 14. This difference can be accounted for by the different procedures used in the two tables to estimate demand. Whereas in Table 14 per caput consumption of total milk and population estimates were used to derive demand in different ecological zones, in Table 15 only a rough classification by ecological zone is done. In other words what Table 15 lacks in terms of ecological precision. it compensates for in terms of disaggregation of demand by product type. On the whole however, the conclusions we came to on the basis of Table 14 remain valid for Table 15 as well.

4.17 The figures in Table 15 confirm earlier suggestions made in this paper regarding the distribution of dairy consumption in West Africa. Aggregate 1988 demand for milk and milk products is almost equally distributed between dry (51%) and moist (49%) zones. In the dry zone, a substantial amount of dairy. demand is supplied through domestic production of liquid fresh milk and yoghurt. However, local production is confined to rural areas, only 4% of total locally met West African dairy demand reaching urban areas of this zone: Dairy imports in the dry zone are not very substantial. The bulk of imports is composed of dry milk although small volumes of butter/ghee and evaporated condensed milk are also imported which are almost exclusively consumed in urban areas. In contrast to this, the moist zone primarily relies on imports of evaporated/condensed and dry milk to satisfy urban demand. The urban nature of dairy consumption in this zone is illustrated in the last column of Table 15 where it is calculated that 62% of dairy import demand in West Africa occurs in urban areas of the moist zone. The corresponding proportion for urban areas of the dry zone is only 19%. Though strongly reflecting a lower production base, locally-met dairy demand in the moist zone exhibits a feature similar to that of the dry zone i.e. only 3% of total locally-met West African dairy demand is directed to urban areas of the moist zone. On the basis of information in Table 15, it appears that West African governments/institutions interested in increasing milk consumption in the region would have to commit themselves to increasing milk availability in the region. Such a direction would involve considering a number of options including promotion of domestic dairy production, improvement of herd productivity, provision of milk marketing and processing facilities, increases in dairy imports, influences on consumer habits etc. Whether increased supply should be met through increased local dairy production or imports will obviously depend on the particular circumstances and constraints faced by individual countries. However, there appears to be a fairly wide scope for the promotion of local milk production in many areas of West Africa.

Table 15. *Estimated Distribution of Aggregate 1988 Demand for Milk and Milk Products[1] in West Africa by Type and Origin of Dairy Products[2] Ecological Zone and Rural/Urban Category. (all figures in '000 MT LME and % of total demand).*

Origin and types of dairy products	Ecol. Zone Urban/Rural Cons.							Urban category as % of total[6]	
	Dry zone			Moist zone[3]			Grand total (All zones all categories)[5]		
	Urban Demand	Rural Demand	Total Demand[4]	Urban Demand	Rural Demand	Total Demand		Dry zone	Moist zone
Total Demand	336	1228	1564	921	622	1543	3107 (100%)	11	30
	(11%)	(40%)	(51%)	(309e)	(19%)	(49%)	(100%)		
Import-Met Demand	262	174	435	872	90	963	1398 (45%)	19	62
Dry Milk	167	166	. 333	288	32	320	652 (21%)	26	44
Evap./Cond. Milk	30	7	37	526	58	584	621 (20%)	5	85
Butter/Ghee	44	0	44	18	0	18	62 (2%)	71	29
Cheese and curd	4	0	4	15	0	15	19 (0.69.1)	20	80
Fresh milk	17	0	17	26	0	26	43 (1.4%)	40	60
Locally-Met Demand	74	1054	1128	49	532	580	1709 (55%)	4	3
Fresh milk	39	520	559	11	175	186	746 (24%)	5	2
Yoghurt	27	421	441	30	268	298	746 (24I)	4	4
Gutter/Ghee	6	60	66	6	53	58	124 (4%)	5	5
Cheese	2	54	56	2	35	37	93 (3%)	2	2

1. Note that the aggregate demand estimate (3107 thousand metric tons LME) comes from Table 14. Other figures in this table were calculated using relevant proportions from data in Tables 1, 2, 3, 8 and 9.

2. The term origin is here used to denote demand originating from imports and/or domestic produce; product type refers to the dairy items listed 'in column 1.

3. Ecological zones have roughly been classified as either dry (arid and semi-arid) or moist (humid, sub-humid, and highland areas).

4. Total demand in the dry zone = urban demand + rural demand in the dry tone.

5. Grand total demand = Total, demand in dry zone + Total demand in moist zone.

6. The grand total for West Africa is 3107 thousand MT LME.

Source: Own calculations based on aggregate FAD data in Tables 1, 2, 3, 8 and 9 and arguments in paras 4.12 and 4.18 of text.

5. Conclusion

This paper has attempted to give an overview of milk consumption patterns in West Africa. Emphasis has been laid on differences in milk consumption between rural and urban, and differing ecological zones of the region. Given the small number of consumer surveys with information on milk products the review has relied heavily on aggregate national level data, on FAO/ISCDD mission reports and on some country specific dairy sector studies.

The evidence presented suggests that there is a substantial demand for milk and milk products in West Africa nearly half of which is currently being met by imports. There appear to be considerable differences in the nature and scale of milk consumption between rural and urban areas, moist and dry zones, and low and high income groups. Due to the variety of environmental and socio-economic conditions prevailing in the region, no single strategy for increasing milk consumption in the whole area , can be envisaged. .However, in the face of present day economic developments and of the food crisis observed in many areas there is a need to identify areas in West Africa where conditions are favourable to the promotion and improvement of domestic milk production. Increasing milk production in such areas might not only increase milk consumption but also ensure increased incomes to already existing and potential milk producers in West Africa.

At a more practical level, the prospects for increasing domestic dairy production in West Africa are still unclear. Reliable information on the regional distribution and composition of dairy consumption is lacking. However, available evidence suggests that in the dry zone, local producers generally consume/sell most of the milk they produce at the household/village level. The productivity of local herds is usually low in this zone and inherent characteristics of traditional livestock production systems as well as milk marketing difficulties are serious constraints to the development of dairying. Given incentives like the setting up of rural milk collection centres to which producers from remote areas could sell their milk at reasonable prices, provision for regular feed supply, cattle breed improvement and better milk marketing and processing facilities, it is probable that milk production and consequently consumption would increase in the dry zone. In the moister zone of West Africa, local milk production is still in its beginning. Very little milk is produced in rural areas of this zone and urban areas are very much dependent on imports. Considerable constraints to domestic milk production do indeed exist in the moist zone. Some of these constraints are technical and have mainly to do with livestock nutrition, disease and management problems. Other constraints are socio-economic in nature and relate to aspects such as the profitability of dairying vis-a-vis other alternative livestock and/or cropping enterprises, inflexibility in consumer habits, marketing and pricing of milk and milk products etc. Nonetheless, urbanisation is increasing rapidly in this zone and per caput disposable income levels have for the most part been higher in countries of the moister zone which presently import dairy products on a large scale. In some of these countries, local producers near urban centres, though very few in number, have often benefitted from high milk producer prices. It would thus appear that the possibility of promoting milk production in urban and peri-urban areas of the moist zone is an option to be seriously considered.

In terms of what specific dairy product to promote, indications are that yoghurt or sour milk offer good prospects for development in both dry (rural and urban) and moist (mainly urban) areas.

Liquid fresh milk is also popular in West Africa and its future development will in all likelihood depend on available purchasing power and supplies in dry areas, and influences on consumer habits and import position in moister areas. It has been noted (Nwoko, S.G. 1986) that imports of dry, condensed and evaporated milk in some West African countries are relatively inelastic to changes in domestic milk production. Not much is known about this phenomenon and it is difficult to say at this stage what the response of .demand for fresh liquid milk to changes in import levels will be like. In any case, since very little fresh milk in West Africa reaches local markets without any processing and since little is known about the particular uses and consumption of fresh milk in the region, further research is required to come to valid conclusions regarding its future demand and factors affecting it. For the time being, development of standard quality milk products based on local and imported items and removal of policy induced price disincentives against the production and consumption of local milk appear to be quite reasonable strategies for most of West Africa.

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