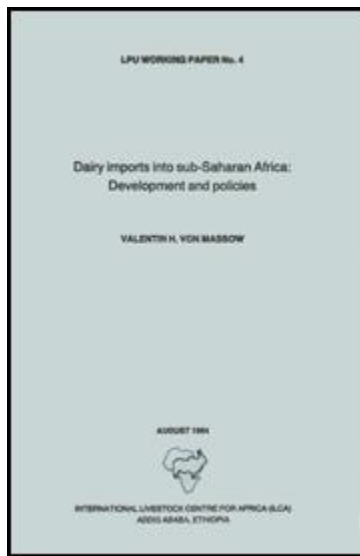


# Dairy imports into sub-Saharan Africa: Development and policies

LPU Working Paper No. 4



*Valentin H. von Massow*

August 1984

International Livestock Centre for Africa (ILCA)  
Addis Ababa, Ethiopia

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## Summary

Commercial imports of dairy products into sub-Saharan Africa have increased sixfold over the last decade to reach \$ 707 million (1981) net of exports plus another \$ 140 million (1981) value equivalent of food aid in dairy products. The sub-continent as a whole thereby imports roughly 30% of its total milk consumption. These imports are not evenly distributed: West Africa imports 46% of its needs and Central Africa 52%. This paper describes the present situation and indicates how national governments influence the level of dairy imports

After a description of the development of African dairy imports the factors that have influenced their recent tremendous increase are noted. The role of national policies with their objectives and instruments, and possible effects, are discussed both in a theoretical context and with examples of actual policies pursued. The paper ends with a brief assessment of how further research may help solve some of the problems that have arisen.

From the data it is obvious that some countries have an alarming dependence on dairy imports, particularly in the form of food aid. No single contributing factor is readily apparent but, in some countries, national policies have a decisive influence. Disincentives to domestic milk production have to be assumed, particularly in those countries where direct competition between reconstituted milk from imported milk powder plus butter-oil and local production occurs. However, in the absence of milk price data and reliable production statistics no further conclusions can be reached. In-depth studies of individual countries and the effects of their national policies on the dairy sector will provide more insight and may be applicable to other African countries.

## Part One: The nature and extent of the problem\*

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\* The author gratefully acknowledges S. Sandford for initially stimulating this study on dairy imports and for providing his valuable advice throughout the process of the work. W. Krostitz, FAO, Commodities and Trade Division, provided the basic trade data which Tibebe Derbie compiled for further analysis. D. Light is to be thanked for his major contribution to the computerized calculations. S. Sandford and J. McIntire were of great help with their comments on an earlier draft, while the sole responsibility for any of the results and their interpretation in this paper rests with the author alone.

1.01. The existence of imports as such—be they rising or decreasing over time—should not be a source of unease. Economic theory provides some very clear arguments to show the welfare-enhancing character of import-export policies that make the best use of comparative advantage. However, there tends to be more concern over imports of basic foods. Governments hesitate to expose themselves and their countries to the uncertainties of highly volatile international markets in basic products particularly foodstuffs, whose supply can affect political stability. Moreover, imports have to be offset by equivalent exports to even out foreign exchange payments. If both these factors raise concern, i.e. if a country faces an increasing dependence on imported food at a time of acute or latent shortage of foreign exchange, then imports may pose severe problems.

1.02. Milk and milk products are important ingredients in a nutritionally balanced diet and their relative importance increases as diet becomes poorer. Butter, dry whole and dry skimmed milk, cheese and curd, condensed and evaporated milk, and to a limited extent fresh cow's milk are traded internationally, whereas milk from sheep, goats, camels and products appear only on local African markets. Over the last decade, there has been a tremendous increase in the volumes and values of dairy imports into sub-Saharan Africa.<sup>1</sup> Yet, in most of the countries concerned, there has been a chronic shortage of foreign exchange. Given the importance of dairy products, both for human consumption and as a source of farm income, the question arises as to the cause and effects of this development. There is a considerable amount of basic literature on the theory of international trade and food policy (see for example Heidhues, 1979 and Oyejide, 1983) and studies into the related problem of cereal imports and policy reactions (McIntire, 1981; Morrison, 1984; and Huddleston, 1984). However, there has been no study of dairy imports, especially those into sub-Saharan Africa (see also Eicher and Baker, 1982).

1. The term 'sub-Saharan Africa' excludes Algeria, Canary Islands, Egypt, Libya, Morocco, Tunisia and W. Sahara as well as Namibia and the Republic of South Africa. It includes Comoros, Reunion and Seychelles. This distinction is made according to geopolitical factors and also reflects ILCA's area of mandate (see App. 1).

1.03. This paper examines the problems posed by dairy imports for the whole of sub-Saharan Africa and, more specifically, for particular regions and countries. Some factors which have influenced this development, and their possible effects are explored and discussed (Part One). The role of national policies, i.e. their objectives, what they can achieve, and their present effects, is dealt with in Part Two. The final section (Part Three) outlines what further research

and the possible contributions of policy makers can do to improve the situation. Within this framework no effort will be made to analyze in detail the development and policies of particular countries. This kind of in-depth country case studies will be covered in future research.

The increase in dairy imports into sub-Saharan Africa

1.04. Commercial imports of dairy products into sub-Saharan Africa have increased steadily since 1960. According to FAO Trade Yearbooks they rose in *value* from \$ 43 million to \$ 113 million from 1960 to 1970 and then doubled three times within the next decade to more than \$ 680 million in 1980.<sup>2</sup> This increase continued until 1981 (\$ 707 million) but seems to have come to a halt in 1982 and 1983 (see figure 1). In 1980, sub-Saharan African countries spent approximately 5% of their total revenues from agricultural, forestry and fishery exports to cover their imports of dairy products.

2. Unless otherwise indicated all figures are calculated as net imports i.e. imports less exports of dairy products.

In *volume* terms the situation does not look much brighter since only 20% of the total change in value can be attributed to any change in prices (calculated in whole liquid milk equivalent (ME), see App. 2). 43% are due to the mere volume effect and 37% are explained by the combined effect of increase in prices and values.<sup>3</sup> Milk in fresh, dry or condensed form<sup>4</sup> made up two-thirds of total dairy imports in 1960 but accounted for almost 90% in the years since 1970. This indicates a change from imports of more luxury items, such as cream, yoghurt or cheese, to imports of the more basic dairy products.

3. The formulae calculate the price effect as 
$$\frac{q_0(p_1 - p_0)}{p_1q_1 - p_0q_0}$$
,

the volume effect as 
$$\frac{p_0(q_1 - q_0)}{p_1q_1 - p_0q_0}$$

and the price/volume effect as 
$$\frac{(p_1 - p_0)(q_1 - q_0)}{p_1q_1 - p_0q_0}$$
 which add up to 1.

4. Referring to SITC—Code 022 in FAO Trade Yearbooks.

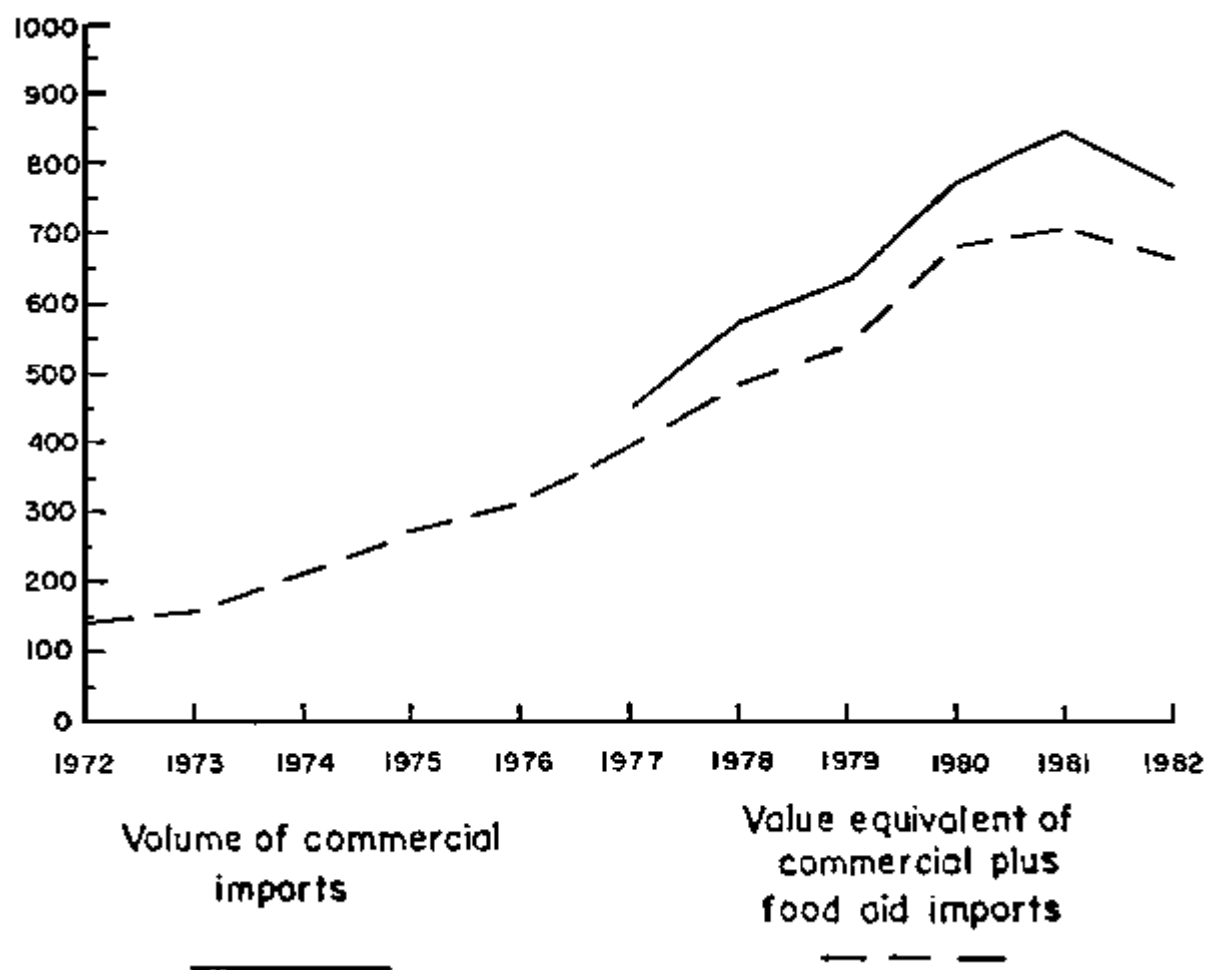
1.05. Before these figures are broken into regional groupings, countries and commodities, the role of non-commercial imports of dairy products, i.e. in the form of food aid, must be mentioned. The major items of food aid are skim milk powder and butter-oil which can be recombined to form liquid milk. In 1981 sub-Saharan African countries received, as food aid, a total of about 88,000 t dried skim milk, and 9,000 t each of butter-oil and other dairy products (FAO, 1984a) equalling almost 770,000 t of liquid milk equivalent. These deliveries are often provided free of charge but sometimes the recipient country has to contribute to shipment and/or

distribution costs. Valued at current prices of commercial imports (c.i.f.) dairy food aid to sub-Saharan Africa was equivalent to almost \$ 140 million, or 16% of the total value of commercial and food aid dairy imports in 1981 (see figure 1 ).<sup>5</sup>

Detailed statistics are available for food aid during the period 1977 to 1981. In this time food aid increased by almost 140% in milk equivalents (ME) against an increase of 43% for commercial imports. On average the share of food aid in total dairy imports (in ME) rose from 22% in 1977 to 33% in 1981 and almost 30% in 1982. Both the quantities of dairy products imported commercially and as food aid, have to be considered when the effects of imports on domestic prices, production and consumption are analysed. However, since food aid can be given in various forms, e.g. as part of projects with special conditions attached to its utilization or as a direct contribution to domestic supplies, its precise effects have to be carefully analysed on a per country basis and according to the conditions of the donation. A few more details will be given below when the figures for sub-Saharan Africa are dealt with more specifically.

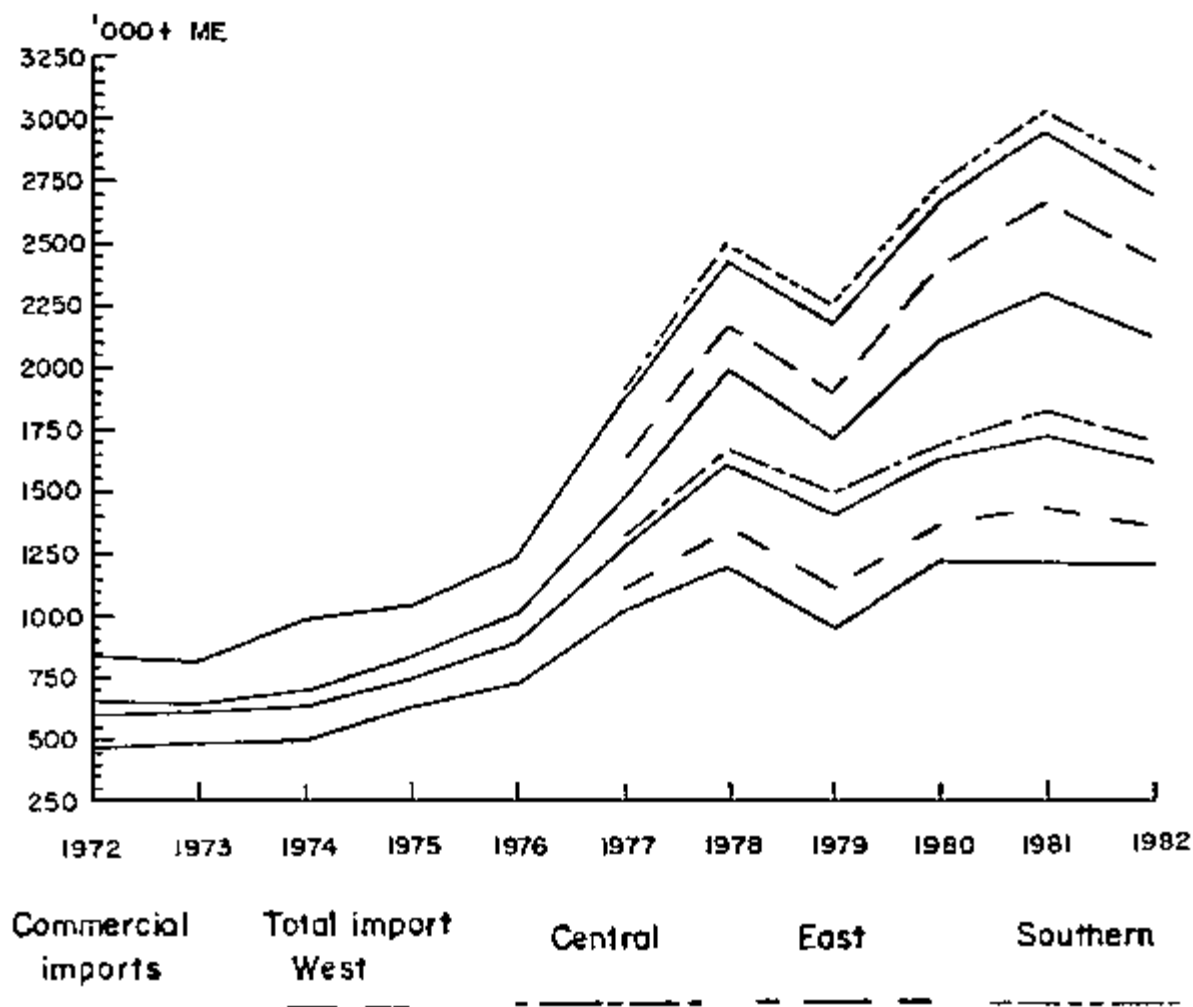
5. Butter-oil has been valued at 1.2 times the c.i.f. price for butter according to the price ratio set for the GATT minimum prices (GATT, 1983). "Other Dairy products" have been valued with the price of condensed milk. A weighted regional average has been used for those countries and commodities where no price for commercial imports for the respective year is available.

**Figure 1.** *Value of net dairy imports into sub-Saharan Africa (\$ million).*



**Figure 2.** *Volume of net dairy imports into sub-Saharan Africa by region.*

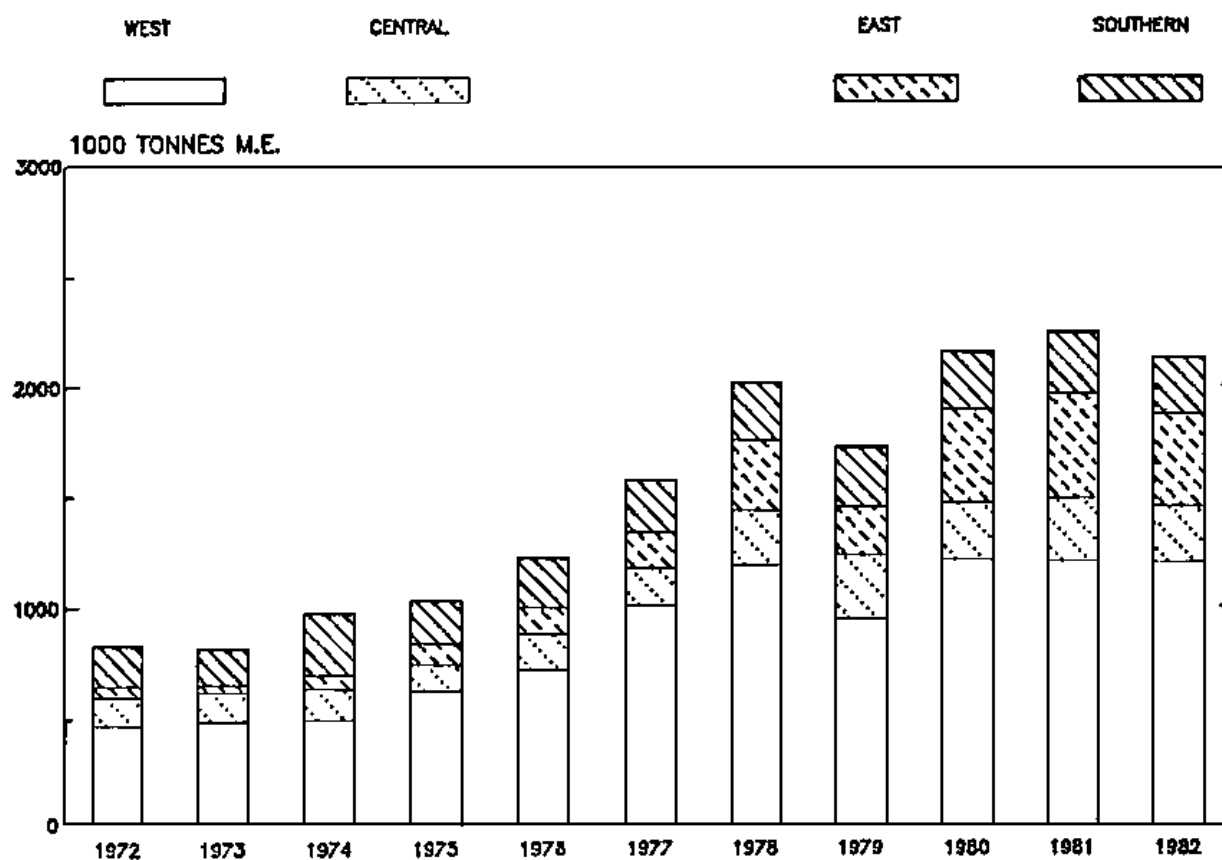




Source: Own calculation based on FAO Trade Yearbooks and FAO, 1984a

1.06. It would be of interest to break down the statistics by ecological zones, but unfortunately no data are available. Instead, all sub-Saharan African countries have been grouped into four regions, i.e. West, central, East and southern African countries (see App. 1). As can be seen from figure 2 and 3 and Appendix 3, the West African countries have held the biggest share with about 55–66% of all commercial imports. The remaining three regions now share the other 40% more or less equally among themselves although East Africa has increased its share from about 5% to 20% in the last decade. With regard to food aid a different pattern emerges. East Africa receives almost half of all deliveries to sub-Saharan Africa (fig. 4) whereas the share of West Africa fluctuates between one-fourth and one-third of the total. Some additional information can be obtained by comparing the respective volumes of dairy imports per head of population between the regions. As can be seen from table 1, only in southern Africa has the volume of commercial dairy imports per caput been roughly stable from 1972 to 1982. East Africa showed the biggest increase in commercial imports from 0.62 kg/head in 1972 to 3.87 kg/head in 1982. Combined food aid and commercial dairy imports have, on a per capita basis, grown by 104%

between 1977 and 1982 in East Africa. With a total of 8.77 kg/head West Africa imports most dairy products per head.



**Figure 3. Commercial dairy imports into sub-Saharan Africa by region**

Source: FAO Trade Yearbooks

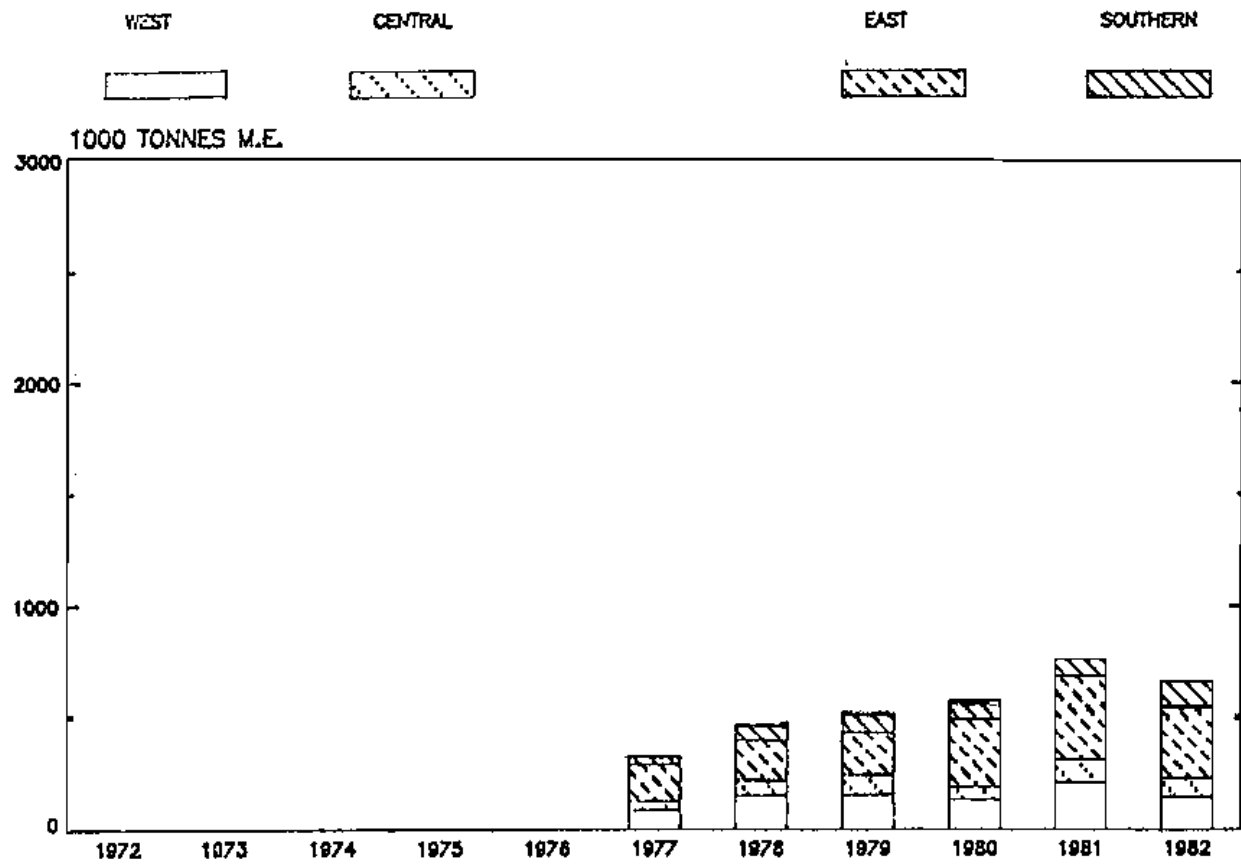


Figure 4. Dairy food aid into sub-Saharan Africa by region

**Table 1.** *Net dairy imports per head of population into sub-Saharan Africa by region (kg ME).*

Year	Type	West	Central	East	Southern	Sub-Saharan Africa
1972	Commercial	4.12	2.71	0.62	5.25	3.00
	Food aid	n.a.	n.a.	n.a.	n.a.	n.a.
	Total	n.a.	n.a.	n.a.	n.a.	n.a.
1977	Commercial	7.59	3.18	1.70	5.91	4.91
	Food aid	0.71	0.81	1.60	0.82	1.00
	Total	8.30	3.99	3.30	6.73	5.91
1982	Commercial	7.78	4.29	3.87	5.52	5.78
	Food aid	0.99	1.36	2.86	2.36	1.77
	Total	8.77	5.65	6.73	7.88	7.55
Source: Own calculation based on World Bank, 1983 and App. 3.						

1.07. The dependence on commercial dairy imports and food aid is best illustrated by comparing them with total milk consumption, i.e. total domestic milk production plus total dairy imports. However, in general milk production data for African countries are not very reliable. Still, the changes in import - consumption ratios may be used, if interpreted cautiously. They are presented in Table 2.

**Table 2.** *Share of commercial, food aid and total imports (ME) in total milk consumption by region.*

Year	Type	West	Central	East	Southern	Sub-Saharan Africa
1972	Commercial	.26	.33	.01	.23	.11
	Food aid	n.a.	n.a.	n.a.	n.a.	n.a.
	Total	n.a.	n.a.	n.a.	n.a.	
1982	Commercial	.41	.39	.07	.25	.21
	Food aid	.05	.13	.06	.10	.06
	Total	.46	.52	.13	.35	.27

Note: Consumption is calculated as all liquid milk production plus total imports. Production figures are the respective 3 year averages.

SOURCE: Own calculation based on FAO Production Yearbook and App. 3.

The overall dependence on dairy imports is highest in West and central Africa with imports comprising around 50% of total consumption. In East Africa local milk producers provide most of the region's consumption but the absolute increase in the ratio between commercial imports and consumption between 1972 and 1982 was as big for East Africa as for the Western part. Furthermore, East African countries are proportionately more dependent on food aid. In two-thirds of such countries food aid comprised 40% or more of total dairy imports in 1982, whereas in other regions less than two out of five countries fall into this category (see App. 4). Five out of the 45 sub-Saharan African countries depend on food aid for more than 50% of their total dairy imports. For these countries precise figures would have to be used to calculate whether specific groups within populations are markedly more dependent than others on such aid shipments. Part Two will provide more information including the extent to which national policies influence the distribution of food aid.

1.08. It is clear, however, that for a country like Somalia where dairy food aid provides 25 kg ME/head of population and total dairy imports about double that amount, there is an alarming state of dependence. Subject to the earlier proviso about unreliable production data, it is evident that sub-Saharan Africa cannot easily, or quickly meet its entire milk demand from domestic supplies. Before the factors that may have caused this development are discussed, the similarities between those countries which are most dependent on dairy imports are described.

1.09. Some indicators have been selected to describe these countries namely:

- total dairy imports per caput,
- the share of urban in total population,
- Gross National Product (GNP) per caput,

- the share of commercial in total dairy imports,
- the share of dairy imports in total cow milk consumption,
- the value of commercial dairy imports compared with the value of all merchandise exports,
- total milk consumption per caput, and
- the calorie supply per capita compared to the theoretical requirement.

Appendix 4 provides most of this data and, where possible, indicators have been plotted in pairs for each country with the implicit assumption that a relationship exists between some of them (see App. 5-10). It emerges that in many countries with a high level of food aid, we also find a high total calorie supply compared to the theoretical requirement. Simultaneously, the proportion of commercial to total dairy imports is high and the absolute level of dairy consumption per caput is rather low (App. 5, 6 and 7). A high share of commercial in total dairy imports is accompanied in many cases by a low milk consumption per caput, but by a higher share of urban to total population and by a higher GNP per caput (App. 8, 9 and 10). These similarities, however, must be interpreted with much caution, since the proviso made earlier about the quality of much of the data also applies here. The fact that just one observation per variable and country has been used also forbids any further conclusion.

1.10. Though limited in its explanatory power the above exercise provides some insights into particular countries' dairy imports. Several groups of countries show similar combinations of the above indicators. To begin with, there are nine countries, i.e. Benin, Congo, Ghana, Ivory Coast, Liberia, Nigeria, Sierra Leone, Togo and Zaire with less than 20 kg milk consumption per caput who import more than 60% of their requirement (see App. 7). These countries are highly dependent on dairy imports. However, except for Ghana and Sierra Leone, all meet at least 90% of the total calorie requirement of the population (see App. 5), i.e. dairy imports do not play a crucial role in overall nutrition in these countries. Ghana and Sierra Leone, with lower nutritional standards are not only dependent on dairy imports but more than 30% of these imports are food aid. Benin, the Central African Republic, Lesotho and Somalia show the somewhat atypical feature of a high share of dairy food aid in total milk consumption. For the majority of countries the proportion of dairy food aid decreases with a rising share of total dairy imports in total consumption (see App. 6).

1.11. The Congo, Ivory Coast, Liberia and Nigeria have been grouped as highly import-dependent yet with a relatively low per caput consumption. However, they all have comparatively high average incomes, i.e. their GNP per caput exceeds \$ 400, and meet their requirements for dairy imports mainly with commercial imports (see App. 8 and 10). At the other extreme, almost one-third of all countries have a GNP per caput less than \$300 - Burundi, Chad, Ethiopia, Malawi, Mali, Somalia, Tanzania, Uganda and Upper Volta. They receive more than 30% of all dairy imports as food aid (see App. 10). All, apart from Somalia, feature within the group of countries with more than 80% of the population living in rural areas. It is also interesting to note that the share of food aid in total dairy imports seems to decrease with increasing urbanization the opposite of what is often believed. However, this does not necessarily mean that the rural population benefits most from dairy food aids because the distribution within the countries is not known.

1.12. To summarize, a dependence on dairy imports, whether commercial or as food aid, has developed in many sub-Saharan African countries within the last decade. While import

dependency can be measured in different ways three main groups of countries can be distinguished whatever the method used, albeit with some overlap between groups. First, there is a group with a high import share and a relatively low per caput milk consumption (see table 3, column:(1)). The majority of such countries, despite an average annual milk consumption of less than 20 kg per caput, have a reasonably well-nourished population (col. (2) of table 3). Four of these countries can obviously afford to pay for most (if not all) of their dairy imports since they are relatively wealthy (col. (3) of table 3). In sharp contrast, the second group of countries imports over 30% of their dairy requirements under food aid schemes and are relatively poor (col. (4) of table 3). These third group, sharing some characteristics with the other two, can be identified as having a high share of imports in milk consumption and by receiving most of this in the form of food aid (col. (5) of table 3). These six countries are highly food aid-dependent. Appendix 11 gives the regional distribution of these countries.

**Table 3.** *Country groups with regard to selected indicators related to dairy imports.*

Group One low consumption and high importers of milk			Group Two poor and dependent on food aid	Group Three dependent on both imports and food aid	
(1)	(2)	(3)	(4)	(5)	(6)
Benin	Benin			Benin	
			Burundi		
			Chad		
			C.A.R.		
Congo	Congo	Congo	Ethiopia	Ghana	
Ghana					
Ivory Coast	Ivory Coast	Ivory Coast			
				Lesotho	Lesotho
Liberia	Liberia	Liberia			
			Malawi		
			Mali		
					Mauritania
Nigeria	Nigeria	Nigeria			

			Rwanda		
					Senegal
Sierra Leone				Sierra Leone	
			Somalia	Somalia	Somalia
			Tanzania		
Togo	Togo				
			Uganda		
			Upper Volta		Upper Volta
Zaire	Zaire				
(1) less than 20 kg milk consumption per caput; over 60% of consumption imported. (2) as (1) and over 90% of the theoretical calorie requirements are actually supplied. (3) over \$ 400 GNP per caput, food aid constitutes less than 30% of total dairy imports. (4) less than \$ 300 GNP per caput; food aid constitutes over 30% of total dairy imports (5) imports over 50% of milk consumption; food aid constitutes over 30% of total dairy imports (6) over 4 kg dairy food aid per caput. SOURCE: Own compilation based on Appendix 4.					

There is a concentration of Group One countries in the humid zones of West and Central Africa and of Group Two countries in the Sudano-Sahelian belt. At first signs it is surprising that many of the supposedly high-potential East African countries receive large quantities of dairy food aid. Even Kenya, although not shown within the second group because of its higher GNP per caput still receives 35% of all dairy imports as food aid. This topic will be dealt with below but the point here is that some differentiation between emergency food aid and those shipments that are given as part of dairy development projects seems necessary.

1.13. Some effort must now be devoted to identifying the factors and causal links that could have influenced dairy import trends. Subsequently, the effects of these trends on producers and consumers, or special groups, in their respective countries are discussed before the role of government policies is introduced in Part Two. However, in this paper no precise quantification of cause and effects will be provided since such detail can only come from analyzing the situation in single countries.

Some potential influences

1.14. This section attempts to illuminate factors that may have influenced dairy imports into sub-Saharan African countries. An important secondary objective is to derive a theoretical background for future analysis of particular countries' dairy imports and policies. At first, there is



the assumption that government policy is neutral with respect to dairy imports. Later on this assumption is dropped and the influence of different policies on some or all of the factors is discussed. Dairy imports can be regarded as any other commodity and starting from a general commodity balance identity we can define

$$(1) \quad M_t^N + Q_t + S_{t-1} = C_t + S_t,$$

where a country's net dairy imports within a certain period ( $M_t^N$ ) plus its domestic production for the period ( $Q_t$ ) and stocks carried over from the previous period ( $S_{t-1}$ ) equal the total milk consumption ( $C_t$ ) and the stocks carried over to the following period ( $S_t$ ). It may be assumed here that stocks of milk and milk products either have a very short shelf-life, e.g. whole milk, or that they are constant over the years as is in the case of factory stocks of milk powder for reconstitution. Equation (1) can then be changed into

$$(2) \quad \Delta M_t^N + \Delta Q_t = \Delta C_t$$

indicating that the change in net imports ( $\Delta M_t^N$ ) plus the change in domestic production ( $\Delta Q_t$ ) will always be equal to the change in domestic consumption ( $\Delta C_t$ ) at the end of a period with constant stocks.

1.15. Two approaches to explaining changes within the commodity identity in equation (2) can then be followed: First, the change in imports can be interpreted as merely balancing changes in the difference between actual domestic supply ( $S_t$ ) and demand ( $D_t$ ), i.e.

$$(3) \quad \Delta M_t^N = \Delta D_t - \Delta S_t$$

In this case, the balance of domestic supply and demand, themselves determined by specific production and consumption relationships, results in a certain amount of imports. This assumes that there are no exogenous factors directly influencing imports and hence, no specific trade policy is involved or needed to be discussed. A more complex, but also more realistic approach, goes one step further. It uses the price as the decisive variable to coordinate all activities. Supply, demand and imports are interpreted as functions of their own specific causal variables and are taken as parts of one conceptual model. At the end of any period, equilibrium results from an interaction between the price mechanism and those factors which influence imports, supply and demand. This interpretation incorporates the following relationships which will be explained below in such a way that each single factor is discussed in isolation, all other things remaining equal. The relationships are explained by the following structural equations:

$$(4) \quad \Delta D_t = f(\Delta N_t; \Delta U_t; \Delta Y_t; \Delta p_{m,o}^c; \Delta P_t)$$

$$(5) \quad \Delta S_t = f(\Delta T_t; \Delta P_{m,o}^I; \Delta P_{m,o}^P; E)$$

$$(6) \quad \Delta M_t^N = f(\Delta X_t; \Delta A_t; \Delta P_{w,d}^n)$$

In equation (4) the change in demand for dairy products in a period is a function of the growth of population in that period  $(\Delta N_t)$ ; the change in the degree of urbanization  $(\Delta U_t)$ ; the change in total available consumer income  $(\Delta Y_t)$ ; the change in the ratio between consumer prices for milk and those for other complementary or substituting consumer goods  $(\Delta P_{m,o}^C)$ , and the change in preferences for the various goods on which the consumer allocates his spendings  $(\Delta P_t)$ . Of those that are generally thought to be major factors influencing the demand side, population growth, urbanization, income and price ratios will be dealt with below.

In equation (5), the change in total domestic milk supply in a period is explained as being a function of the change in dairy production technology available to producers  $(\Delta T_t)$ ; the change in production costs  $(\Delta P_{m,o}^I)$ ; the change in the ratio between effective producer prices for milk and other agricultural products the farmer can produce  $(\Delta P_{m,o}^P)$ ; and a stochastic variable  $(E)$ , comprising the influences of weather and of other unforeseen influences. Only the changes in producer price ratios will be discussed below since a discussion of all influences on milk supply is far too complex a subject to be covered here.

The change in net dairy imports over a given time is described in equation (6) as depending on changes in foreign currency reserves  $(\Delta X_t)$ ; on the extent and conditions under which food aid in dairy products can be received  $(\Delta A_t)$ ; and the ratio between prices on the world markets, i.e. c.i.f. prices in an importer's and f.o.b. prices in an exporter's case, and those prices prevailing on the domestic markets  $(\Delta P_{w,d}^n)$ . All three factors will be discussed briefly below.

## Population growth

1.16. In sub-Saharan Africa, population has increased by an annual average of 2.9% between 1970 and 1980 (World Bank, 1981, p.3). With all other factors remaining constant and assuming no changes in demand brought by changes in age-distribution, this would result in annual increases in milk demand of the same order. The increase in commercial dairy imports (in ME) into sub-Saharan Africa by an average of 9.9% annually during the same period (see App. 3) indicates that population growth is likely to have been a factor in this development, but not the only one.

## **Urbanization**

1.17. Rapid urbanization is widely assumed to boost the demand for all food products in particular. Increased demand, it is argued, will have to be met by increased imports. The mechanism behind this is the change of status from one of rural subsistency to that of the non-productive urban dweller whose food demand, given the present stage of agricultural development in many sub-Saharan African countries, cannot be met by domestic supply. In other words, people may move to the cities but the milk they used to consume cannot do so. This effect increases per caput consumption in the rural areas and (import) demand in the cities. The World Bank (1981) quantifies the process of urbanization for sub-Saharan Africa stating that "urban populations have mushroomed overall by 6 percent a year, and 8.5 percent annually for 35 major capitals" (p. 114). However, there is no calculation available to indicate to what extent this growth is actually translated into growth of dairy imports. The figures discussed in paragraphs 1.09 to 1.11 might even indicate that the influence of urbanization on dairy imports could be less than normally expected, but this will have to be analysed more thoroughly once single countries are studied.

## **Income**

1.18. Available incomes in sub-Saharan countries, in GNP per caput, have increased by an average of 0.8% over the last ten years (World Bank, 1981, p.3). It can be assumed that part or all of this additional income has been spent on food, and on milk products in particular. The share of the households' additional income that is allocated to milk consumption can be measured by the income elasticity of quantitative demand for milk which has been estimated at 0.63 for sub-Saharan Africa in the mid-70's (FAO, 1978a). This means that the demand for milk increases at about two-thirds the rate of the increase in total income. Solely in terms of the income elasticity of demand, an annual growth rate in milk demand of about 0.54% could be expected. However, several complications interfere because a population is composed of individuals, not averages, and high income consumers differ from those on a low income, urban from rural, and consumer preferences can change over time. However, the figure does give some indication of the relationship between income and demand for dairy products.

## **Consumer prices**

1.19. The effect of price changes on the demand for milk is well defined by economic theory. Rising prices for milk will, under the assumption of a normal i.e. negatively shaped demand function, lead to a decrease in demand and vice versa. The extent of any change is determined by the price elasticity of quantitative demand. Cross price elasticities which indicate the effects of changes in the prices of commodities that are complementary to or substitute for milk can also be defined. However, in practice, several problems occur. First, milk can hardly be considered a homogeneous product. Qualitative differences with regard to fat content, purity and above all freshness and taste, may well lead to substantial price differences. It is interesting to note that in many countries reconstituted milk (from milk powder and butter-oil) cannot compete at the same price with fresh milk. This will be dealt with in one of the subsequent paragraphs in more detail. Further complicating the definition of effective consumer prices for milk is the diversity of marketing channels in many countries. Often petty traders compete with cooperatives and/or

parastatals and each tend to provide different services to the consumers. Thus, both the level of service and the quality of milk can have an important influence on price structures. A special problem with regard to the effect of price changes on milk demand is the role of rural producer-consumers. In a system where a significant if not dominant share of milk production is used for the farmer's own subsistence it is sometimes hard to determine what his reaction to changing prices will be. The ratio between milk and cereal prices plays an important role in this respect. Again, very little is known about the size, or even the sign (positive or negative) of the cross price elasticity.

## **Producer prices**

1.20. Many of the points raised above apply also to producer prices. Again, the economic parameters describing the reaction of subsistence producers are either not at all, or insufficiently known. Even overall estimates of aggregate price elasticities of quantitative milk supply are rarely available. There have been efforts to identify several non-price factors on milk supply and to establish some causal links (McClintock, 1984); however, the results are not encouraging. Only guesses can be made about what has caused the decline in African milk production per caput of - 0.4% per year between 1970-80 (see Anteneh, 1984). There is a widespread opinion that there would be a significant response from milk producers to rising prices. With regard to the effect of producer prices themselves only mere economic theory can be repeated here: milk supply will probably increase when the price-cost ratio for dairy production compares favourable with other production alternatives. There is only a modest quantity of price data and only a case study will allow us to draw further conclusions. Unsatisfying as this may be, the price mechanisms is believed to play a crucial role in allocating both demand and supply for milk.

## **Foreign exchange**

1.21. The availability of foreign currency to pay for imports is one of the most direct influences on imports. In the last decade growing balance-of-payments deficits have occurred in most sub-Saharan African countries (World Bank, 1981, p. 17) and this should have curbed rather than stimulated dairy imports. However, with their buying power on the international markets severely restrained, most African countries have resorted to market interference and controls on exchange rate and currency. The figures in Appendix 4 (column 6) show the amount of foreign currency spent on dairy imports in relation to total export revenues, but by themselves they are hard to interpret. Again, the role of governments is believed to have been a decisive influence but for many countries the limit for expenditures on dairy imports does not seem to have been reached.

## **Food aid**

1.22. There are two reasons why dairy food aid should be a factor influencing total dairy imports. First, the decision to supply food aid to particular countries is not influenced by the market prices for milk in those countries; in this respect the availability of food aid must be considered an independent variable. Second, an offer of food aid may well change a country's demand for commercial imports by either complementing or partly substituting for it. Only some general remarks can be made about the factors which influence the availability of dairy food aid. The

EEC as the most important donor for African countries, since 1979, operated within an annual target of 150,030 t of skim milk powder and 45,000 of butter-oil which is allocated to various developing countries and aid organizations or to the FAO - World Food Programme (Commission of the European Communities, 1983). There are various forms of dairy aid. The most frequent are 'Food-for-Work-Programmes' and dairy development projects with the most prominent, and presumably most successful example of these, being India's "Operation Flood" - and unconditional or 'emergency' shipments. In all cases the country has to apply for food aid, that is, a political agreement or contract is required. No overall statistics on the partition between these forms of dairy food aid received by sub-Saharan African countries is yet available. The World Food Programme is committed to dairy projects in 9 African countries (FAO/WFP, 1983) but other organizations also cover dairy development; an example is the EEC deliveries to Mali. From Appendix 3 it can be seen that the share of food aid in sub-Saharan Africa's dairy imports has increased from 20% in 1977 to 34% in 1981 (30% on average for 1980-82). The present dependence of individual countries has already been described. It is hard to foresee whether the EEC's expressed intention to cut back on dairy food aid (Economist, 1984), will stimulate commercial imports or be reflected in curbed consumption. Some may even expect a rise in African milk production due to the withdrawal of food aid and the removal of the disincentive effect sometimes ascribed to it.

## **International prices**

1.23. Relative price differences between individual countries, when translated into absolute price differences by the exchange rate, is the basic mechanism behind international trade. Relative price differences are due to differing patterns in demand and supply and are relatively unchanging. However, when many countries trade in a commodity small countries have little influence on the world market price that emerges. This lack of influence of small countries certainly applies to sub-Saharan African countries and their role in the world markets for milk products. If no government interference and ample foreign exchange is assumed, the ratio between domestic and international prices determines the amount of net imports and assures the balance between supply and demand. In theory, this leads to an adjustment of domestic prices towards world market levels.

1.24. Two amendments to this basic mechanism must be made. First, milk and dairy products are mainly traded in processed forms. Unlike, for example, wheat where one can directly compare the import prices, c.i.f., and the price on the domestic market adjusted for some transport costs, storage etc., with milk the processing charges must be taken into account. Although fresh milk is the major domestic product it is hardly traded internationally and so any comparison of international and domestic prices has to use recombined milk as a substitute. The following example may illustrate the case: skim milk powder at a price (c.i.f.) of \$1,000/t and butter-oil at \$2,500/t can be recombined with water in the proportion 10% skim milk powder, 3.5% butter-oil and 86.5% water. Allowing for a processing cost of 10% the border equivalent price for recombined milk is \$0.21/litre.<sup>6</sup> Translated into domestic currency at the current exchange rate, this "border" price when compared to domestic prices, determines whether imports will flow in or not. A further complication, however, is that usually in the eyes of consumers there is a quality difference in favour of fresh milk in comparison to recombined and this means that the

domestic price for fresh milk can be somewhat higher than the border price of recombined milk and still remain competitive.

$$6. 1000\$ \times 0.1 + 2500\$ \times 0.035 = 187.50 \$/t \div 10\% = 206.25 \$/t = 0.21 \$/litre$$

1.25. The second amendment to the general theory concerns the effect of government policy. Often heavily distorted exchange rates, import duties, import monopolies and other regulations interfere with the free market assumed in the above calculation. Because of this interference any interpretation of the international to domestic price ratio must be adjusted to allow for these policy distortions. In Part Two the aims and instruments of government policy will be elaborated upon but meanwhile the following digression gives information on how international prices for dairy production are set and influenced.

### **Digression: The international prices for dairy products**

1.26 World markets for dairy products have been dominated by growing protectionist pressures and dairy income support policies, particularly in the United States and the EEC. Such policies have depressed international prices (Tangermann and Krostitz, 1982, p. 29 f and FAO, 1983a, p. 46-69). Since 1980/81 the world market prices especially for skim and whole milk powder have fallen substantially. At the end of the third quarter of 1983, stocks of skim milk powder held by the EEC and the United States were approximately double the annual volume of international trade in this product (GATT, 1983, p. 12 f. and p. 32). It is obvious that such price developments will have stimulated dairy imports into sub-Saharan Africa because they provide opportunities for many African countries to import at well below domestic production costs. In the near future any major change in this situation seems unlikely. According to FAO (1984) "dairy markets will remain oversupplied and international prices low" (p.4). Van Dijk et al. (1983) arrive at a similar conclusion. It is also unlikely that the recent change in EEC dairy policy, whereby producer quotas have been set, will have any great effect in the short-term. Thus, sub-Saharan African countries will have cheap dairy imports available for some time to come.

1.27. On a sub-continental scale there are few data to quantify the factors influencing international markets. However, an auxiliary calculation that includes some trend values to break down the reasons behind growth in commercial dairy imports is given below. Population growth and rising incomes are taken to be exogenous factors while for price changes, government policies and other factors such as shifts in consumer preferences, no empirical data are available.

Thus, the total change in dairy imports  $(\Delta M_t^N)$  is explained below by a term for changes in population  $(\Delta N_t)$  plus a term for changes in disposable income per caput  $(\Delta Y_t^+)$  minus a term for changes in domestic milk production  $(\Delta Q_t)$  plus, finally, a residual term  $(e)$  comprising all other factors.

The resulting equation

$$(7) \quad \Delta M_t^N = \frac{1}{1 - RRS} \cdot (\Delta N_t - \eta \Delta Y_t^+ - RRS \Delta Q_t + e)$$

can be derived from equations (4) to (6) above. The influence of the single factors is weighted by the rate of self sufficiency (RSS), i.e. the share of domestic supply in total dairy consumption. Changes in per caput incomes are multiplied by the coefficient of their assumed influence on dairy demand, i.e. the income elasticity of milk demand ( $\eta$ ). Table 4 gives some results of the calculations which are explained in more detail in Appendix 12. The countries are listed in order of the residual term (last column, table 4). That means, the higher a country ranks in table 4, the more we can assume that influences other than population, income and changes in domestic production have stimulated (or curbed) dairy imports. As already stated among such influences are price changes, government policies and shifts in consumer preferences.

**Table 4.** *Indicators of potential policy influence on dairy imports in sub-Saharan African countries.*

Country	Region	Ecological zone <sup>1</sup>	Average annual growth in imports <sup>2</sup> (%)	Share of food aid in total imports <sup>3</sup>	Average annual growth in total per caput consumption <sup>4</sup>	Residual term <sup>5</sup>
Zambia	S	SH/SA	−15.0*	0.32	−10.3*	+19.2*
Siera Leone	W	H/SH	+ 10.2	0.35	+ 9.3*	+10.0*
Ivory Coast	W	H/SH	+ 14.4	0.01	+ 8.7	+ 7.6
Somalia	E	A/-	+ 80.5*	0.49	+ 14.0*	+ 6.4*
Congo	C	H/SH	+ 8.9	0.08	+ 9.8*	+ 5.4*
Togo	W	SH/H	+12.9	0.18	+ 5.9	+ 4.6
Nigeria	W	SH/SA	+15.4	0.01	+ 6.3	+ 4.5
Liberia	W	H/-	+ 6.5	0.10	+ 3.3	+ 3.2
Niger	W	A/-	−0.7	0.25	+ 3.2*	+ 3.0*
Mauritania	W	A/-	+ 5.5	0.35	+ 1.5	+ 2.3
Uganda	E	SH/H	−1.6	0.43	−0.9	+ 2.2
Malawi	S	SH/SA	+ 1.5	0.41	+ 2.8	+ 1.6
Cent. Afr. Rep.	C	H/SH	+ 3.0	0.30	+ 2.0	+ 1.6

Burundi	C	HL/SH	+ 35.0	0.40	+ 2.8	+ 0.4
Upper Volta	W	SA/SH	+ 36.2	0.36	+ 8.0	+ 0.3
Benin	W	SH/SA	+ 12.2	0.39	+ 1.7	+ 0.2
Ethiopia	E	A/HL	+ 21.3	0.40	-0.2	-0.2
Senegal	W	SA/A	+ 5.7	0.19	-0.4	-0.3
Mali	W	A/SA	-0.1	0.32	+ 1.2	-0.3
Lesotho	S	n.a.	+ 10.1	0.51	+ 3.3	-1.2
Guinea	W	SH/H	+ 3.2	0.24	-2.5	-2.7
Ghana	W	H/SH	-2.9	0.30	-5.4	-3.4
Rwanda	C	HL/SH	-3.2	0.95	-2.8	-4.3
Madagascar	S	SH/H	-5.6	0.31	-5.4	-4.3
Cameroon	C	H/SH	+ 8.5	0.17	-1.0	-4.6
Zimbabwe	S	SA/SH	+ 47.2	0.32	-5.6	-5.1
Sudan	E	A/SA	+ 18.8	0.40	- 6.9*	-8.1*
Zaire	C	H/SH	-4.2	0.16	-9.2*	-8.5*
Tanzania	E	SH/SA	+ 0.4	0.51	-8.6*	-10.1*

\* figures are considered particularly unreliable.

1. SH = sub-humid, H = humid, SA = semi - arid, A = arid, HL = highlands (see Jahnke, 1982 p. 233)

2. Commercial dairy imports only, period from 1972-74 (av.) to 1980-82 (av)

3. 1980-82 (av.)

4. Consumption = domestic production + commercial imports (for the same period as under <sup>2</sup> above)

5. i.e. the term (e) in equation (7) above; for the calculation see App.12 (period as under <sup>2</sup> above)

SOURCE: hop. 12 and FAO, 1984a.

1.28. To give an example of how to interpret table 4, Nigeria ranks in the upper quarter. Here commercial dairy imports grew annually by an average of 15.4% ever without food aid. Per caput milk consumption increased by 6.3% per year, mainly due to the increase in imports (compare col. Vb in App. 12). The residual term of +4.5 indicates that population, income and milk production growth in Nigeria can only explain a 10.9% increase in dairy imports. The remaining 4.5% increase must be due to pricing policy, exchange rate controls, or long-term shifts in demand, eg. substitution of milk from sheep and goats by cow's milk. In Cameroon, on



the other hand, commercial imports of dairy products would have increased by another 4.6% annually if policy and other factors had not curbed their growth. Per caput consumption therefore declined by 1.0% on average. The results in table 4 show that in most countries (25 out of 29) the development of per caput milk consumption has been in accordance with equation (7), i.e. a positive residual term (e) contributes to increased commercial dairy imports and growth in domestic consumption and vice versa. In two-thirds of the countries, growth in imports matches a growth in per caput consumption. Both the importance of dairy imports for consumption and the impact of national policies on their development is substantiated by these results.

1.29. To summarize, increasing dairy imports into sub-Saharan Africa must be attributed to a variety of factors of which population growth, urbanization, income and consumer prices have potential influences on the demand side. The effects of changes in producer prices influence the supply side. Foreign exchange, food aid and international prices are the main direct influences on dairy imports. The effect of these various influences can be summarized as follows: on the demand side all factors, although to differing degrees, contribute to rising imports. With regard to prices, both on the demand and supply sides, more analysis is needed, in order to better judge their cause and effects. In many African countries prices are said to have been depressed by government policies and this would further fuel demand for imports. Foreign exchange availability does not seem to have contributed to the increase in total dairy imports, whereas food aid and international prices for dairy products have done so. Government policy although varying widely influences all of this and can even change the direction of impact.

Some possible effects of increased dairy imports

1.30. The complex interactions between prices, demand and supply in domestic markets and those in world markets make it difficult to distinguish causes and effects. However, on the demand side population and income growth and urbanization can be taken as independent variables even though it might be argued that for urbanization, the availability of cheap imported foodstuffs may be one factor that stimulated the migration to the city. In general it appears that increasing dairy imports have increased the total supply of milk and dairy products in importing countries thereby halting upward trends in prices or even lowering them. Consumers benefit from this effect although only detailed analysis will reveal which groups have reaped most benefits.

1.31. In the face of declining or stagnant prices, producers can be expected to cut back on dairy production and shift their resources to more profitable alternative products. One might argue however, that many producers will stay in milk production, even when relative prices fall, simply because they have no production alternatives. Similarly one might hold that the effects of technical innovations, e.g. improvement in management and in breeding stocks would lower costs of production and offset the effect of decreasing dairy prices so milk production continued. The EEC for example, reports an annual average increase in milk yield per cow of 2.2% since 1974, and 3.8% for 1981/82 which is claimed to reflect among others improved herd structure and quality of milk cows (Commission of the European Communities, 1984, p. 132). For sub-Saharan Africa, however virtually no increase in yields has been observed over the last decade, neither per productive animal nor per total herds. The only exception to this rather gloomy picture is West Africa which shows a modest improvement in dairy production (Anteneh, 1984).

Thus, the overall effect of decreased prices must, be interpreted as hampering dairy farmers' output and income potential as well as reducing their economic welfare.

1.32. Unfortunately, the availability and quality of price statistics are very poor for most African countries and it is therefore impossible to quantify, on a sub-Saharan or regional scale, the impact of dairy imports on domestic price levels and production. Presumably, this can be done in a few detailed country studies and should be a priority for future research in this field. The general effects to be expected, as explained above, are depressed domestic prices and disincentives to local production. Allegedly, there have been cases where local milk processing plants have stopped collecting fresh milk because they found it more economical to sell reconstituted milk from cheap milk powder and butter-oil imports.<sup>7</sup> It should also be stressed that there is possibly a circular effect: imports depress local production and this generates ever more demand for imports. Such an effect will balance out towards an equilibrium if prices are allowed to move freely. As mentioned earlier, government interference can alter these effects substantially—and presumably has done so in the past.

7. The dangers of dairy imports are discussed, for example, by the Ministry of Agriculture, Tanzania (1977).

1.33. The level of imports is directly affected by the availability of foreign exchange and variations in the exchange rate. On the other hand growing expenditure on dairy imports poses an additional burden on a country's balance of payments and tends to weaken its currency. The total impact on the economy is not easily quantified but one can compare the value of net imports of dairy products to total export revenues to get a first indication of the burden laid on the balance of payments of a particular country. As can be seen from Appendix 4 there are great variations among the countries for which data are available. For those five countries that spend a larger percentage of total export earnings on dairy imports, i.e. 5% or more, it can be assumed that these imports have been displacing expenditures on long-term development projects because of tight budgets.

1.34. All the effects mentioned above have only been described qualitatively. Lack of appropriate data and problems in methodology hamper many efforts to quantify these effects. Nevertheless an attempt must be made to translate respective price and quantity changes into welfare figures covering as many different consumer and producer groups as possible. A quantification of welfare effects is an important consideration for governments setting policies on dairy imports.

## **Part Two: The role of national policies**

2.01. It appears to be generally accepted that despite severe technical production problems, national policies play a critical role in livestock development (World Bank, 1981, 9. 55). Not only do they structure the overall economic environment for agricultural production but they often interfere directly with the production processes, trade channels, and consumption, as well as with external trade. The term "policies" requires some explanation at this stage. In many cases it is necessary to distinguish between those policies governments really intend i.e. deliberate policies, and for which they design effective instruments, and those they publicly expouse but which they know will not be effective. The next distinction is between policies which are clearly defined and targeted on dairy imports, consumption or production and the indirect effect of other policies not specially directed towards dairy imports. The effect of exchange rate setting on dairy imports may be cited as an example of the latter. Finally, there is the distinction between policies which are consistent in their resulting effects and those which are not, regardless of the government's original intention. A government may make decisions in two areas which by their spillover effects have a perfectly consistent though unintended influence on a related third area. To take a hypothetical case, consider a government that devalues its currency in order to comply with IMF or IDA credit requirements, and decides to impose a duty on beef exports to increase its tax revenues. By curbing imports and reducing the profitability of beef production the government produces a consistent policy that stimulates dairy production.

2.02. The following paragraphs discuss some of the most common policy objectives governments pursue in the general areas of food policy and dairy imports in particular. The major instruments to reach these are presented (paragraph 2.11 et seq.) and some examples from particular countries are given, for illustration (paragraph 2.22 et seq.). Before going into detail, however, the theoretical concept that underlies the discussion should be described. As is shown in figure 5, several causal chains link the policy objectives concerning dairy imports with policy instruments designed to implement these objectives and lead to the final measure of policy impact. The instruments can be directed at the demand and supply sides or directly at dairy imports to influence, along with any indirect policy, the trade flow in dairy products. Any resulting changes in dairy imports will have a direct influence, on government revenues, and will change the prices for milk producers and consumers and their respective production and consumption which can, in turn, be transformed into welfare figures to complete the chain. The following discussion concentrates on the direct links between government policy and dairy imports.

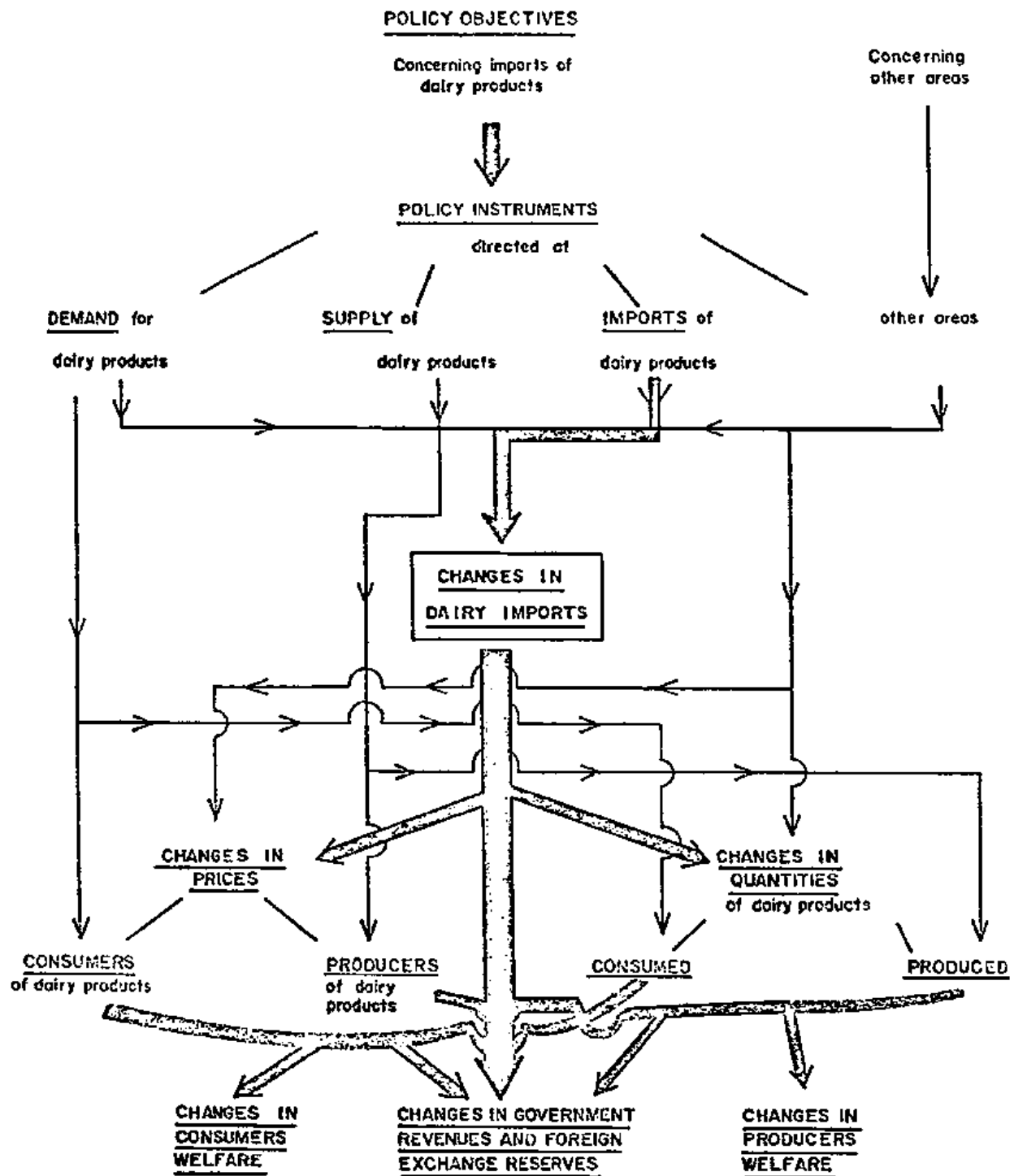


Figure 5. A conceptual model of causality in policies related to dairy imports.

## Objectives of government interference<sup>1</sup>

1. Some of the following points concerning policy objectives and instruments assimilate the material prepared for the "Expert Consultation on Agricultural Price Policies" at FAO, Rome, Nov. 29–Dec. 2, 1983. However, no published report is available yet.

2.03. As Bates (1983) puts it "bluntly, food policy appears to represent a form of political settlement - one designed to bring peaceful relations between African governments and their urban constituents" (p. 297). If true, this attitude is in marked contrast to that in most developed countries, especially the EEC, where the overall objective has usually been to support agricultural incomes (see Heidhues, 1976). For African countries it seems appropriate to assume that agricultural policies favour the consumer rather than the producer.<sup>2</sup> What are the possible objectives behind such policies? Three issues can be mentioned: governments aim to survive; they also have general objectives in the area of food policy; and finally they may have certain, specific objectives relating to dairy imports. To briefly comment on the first two issues, democratic governments will seek re-election and those who came to power by other ways will try to make sure that they are not ousted like their predecessors. Food policy often plays a crucial role in these desires because it has direct effects on the population and their goodwill. Therefore, the objectives of food policy whether it be to secure food supply, to increase self-sufficiency or to support special groups like city dwellers, are often closely related to government self-interest. Of course governments have other objectives (see e.g., Christensen and Witucki, 1982 p. 890) but these are the most common ones.

2. Still, for existing policies careful examination is required, as can be seen, for example, from von Braun and de Haen (1983) who show that the actual policy in Egypt turns out to be much less at the cost of agriculture than generally expected.

2.04. Not all the various policy objectives are necessarily consistent with each other: there may be trade-offs between objectives. Often one objective can only be reached at the expense of cutting back on other ones. To try and provide equally attractive farm incomes and low food prices—without imposing huge costs on the national budget—is a typical example where one objective has to be sacrificed for the sake of the others. In the field of dairy import policy six common objectives are discussed below. These are to meet certain milk consumption targets; to generate tariff revenues; to protect producers against world market competition; to save foreign exchange; to stimulate domestic dairy development; and to realize the benefits of free trade. The starting point for the following descriptions relate to a country that is a net importer of dairy products and whose government has no policy on such imports.

### **The consumption targets objective**

2.05. Whether it be vulnerable groups like children or pregnant women or the population as a whole—any increase in milk consumption will substantially improve their overall nutrition. A government wanting to increase milk consumption will have to do so by way of increased imports if domestic production is insufficient or if market links between producers and consumers are weak. The major instruments used to stimulate imports are a reduction in tariffs, import subsidies or (subsidised) state trading and distribution. Alternatively the government can

request food aid. Depending on the instruments used there will be some burden on the national budget.

### **The tariff revenues objective**

2.06. In a case where dairy imports already exist, the government can try to make them contribute to the national budget. By imposing an import tariff it will create the desired revenues at the expense of the consumers and/or the external suppliers. Since budgetary considerations are the major force behind such a policy, the economic effects on consumers and producers are given lower priority. Trade-offs may occur particularly between this objective and a policy that sets consumption targets.

### **The protection objective**

2.07. Tariffs to raise tax revenues increase domestic prices over world market prices and thereby favour domestic production over imports. The same protective wall around local producers can also be erected by introducing quantitative restrictions, i.e. import quotas, or other non-tariff barriers such as quality requirements, port procedures and fees. In any case, the successful protection of domestic milk producers imposes a burden on consumers, either by way of their having to pay higher prices or through increased taxes that are needed to finance additional government compensation. Again, the protection objective is not compatible with any objective that aims at increased consumer welfare.

### **The foreign exchange objective**

2.08. A government's effort to save foreign exchange is similar in its effects to the protection objective. Dairy imports unless they are in the form of food aid or can be paid for in local currency, can be reduced by one of the above mentioned instruments. The primary effects are the same as in the protection case. However, the secondary effects need to be analysed, to see whether or not the stimulus to milk production increases the demand for foreign inputs. Thus, the net effect on the foreign exchange balance needs to be calculated. In some situations trade-offs occur between the protection and the foreign exchange and/or the tariff revenue objective, although some of the instruments to be used may at first glance seem to serve all three objectives.

### **The dairy development objective**

2.09 It may not be immediately clear how a government can develop the domestic dairy sector other than by reducing imports and increasing domestic prices. However, the dairy development objective can be pursued positively by a channeled *increase* in imports. Two major strategies emerge: the first strategy is based on the assumption that dairy production needs a minimum level of marketing channels and processing facilities to get off the ground. Where production is scattered and insignificant, dairy imports can help create infrastructure and stimulate demand at the same time. However, many reservations apply and such a policy will usually only be a short-term device. The second strategy is based on the same fundamental assumption but includes the concept of using revenues from sales for investment. As in the Indian "Operation Flood", dairy

food aid can be sold locally to generate funds for dairy development. The same procedure is possible with controlled commercial imports if the balance between domestic supply and demand results in prices above world market levels. It is clear that any such dairy development policy incorporates a whole package of policy instruments with dairy import policy instruments prominent.

## **The free-trade-benefits objective**

2.10. The welfare of particular groups like dairy producers, consumers and the government has been addressed. The last objective to be discussed focusses on the free trade argument whereby overall national welfare is considered to be maximized by the undistorted allocation of resources according to their economic value as expressed in international prices. According to the pure theory governments should not interfere with dairy imports. Does this mean 'trade-without policy'? A minimum requirement for a consistent trade policy would be, according to Tangermann (1982), that "those responsible for running the policy take some interest in how agricultural trade flows and international market conditions develop" (p.2). Under such a premise there is a role for government policy and this does not necessarily conflict with the principle of comparative advantage. In particular, there may be reasons to offset price movements on the international markets that are not true indicators of the supply and demand situation, but merely reflections of other countries' protectionist policies. The instruments used to balance out these market defects, for example, anti-dumping tariffs, will be of a transient nature. They may be supplemented by quality controls, price monitoring and other means to ensure fair competition. The difficulty in such an 'adjusted free trade' policy lies in the inherent temptation for governments to lapse into the protectionist stance they originally set out to combat.

### **The major instruments and their effects**

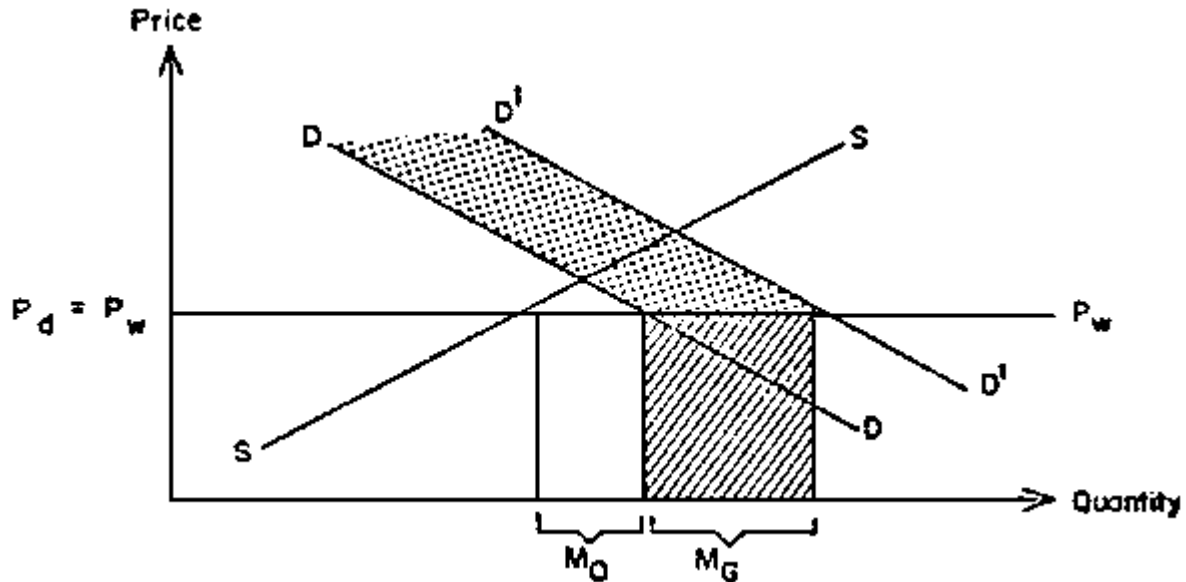
2.11. The following-policy instruments have been mentioned as promoting one or more objectives related to dairy imports, import subsidies or subsidised state trading, requests for food aid, import tariffs, non-tariff barriers, import-development packages and instruments to ensure fair competition. In addition there are other less commonly used instruments and combinations of instruments.

Since many are similar in their main effects only differing in minor details, only their major effects will be presented with the details left for specific case studies. In the following paragraphs import subsidies and import tariffs are discussed and their economic implications analyzed. Some other instruments will be described briefly before the instruments directed at other major policy areas are discussed.

## **Import subsidies**

2.12. A common example of an effort to meet milk consumption requirements of specific target groups is that of a school milk programme. Consider the case of previously balanced market where the government does not interfere in dairy imports. Accordingly the world market price  $P_w$  is also the relevant domestic price  $p_d$  (see figure 6).

**Figure 6.** *Economic implications of a targeted subsidy (school milk programme).*



In figure 6, the country imports originally at the price  $P_w$  a certain amount  $M_O$ . The government's decision to implement a school milk programme adds additional demand to the existing domestic market demand thereby shifting the demand curve to the right ( $DD \rightarrow D^1D^1$ ).<sup>3</sup>

3. For reasons of simplicity  $D^1D^1$  is drawn parallel to  $DD$ . In reality a shift in the demand of one consumer group, i.e. school children, is most likely not only to shift the aggregate demand function but also to change its slope. In any case one would also have to analyse to what extent the subsidised (school milk) demand substitutes for former commercial demand. This substitution also affects the extent of the demand shift.

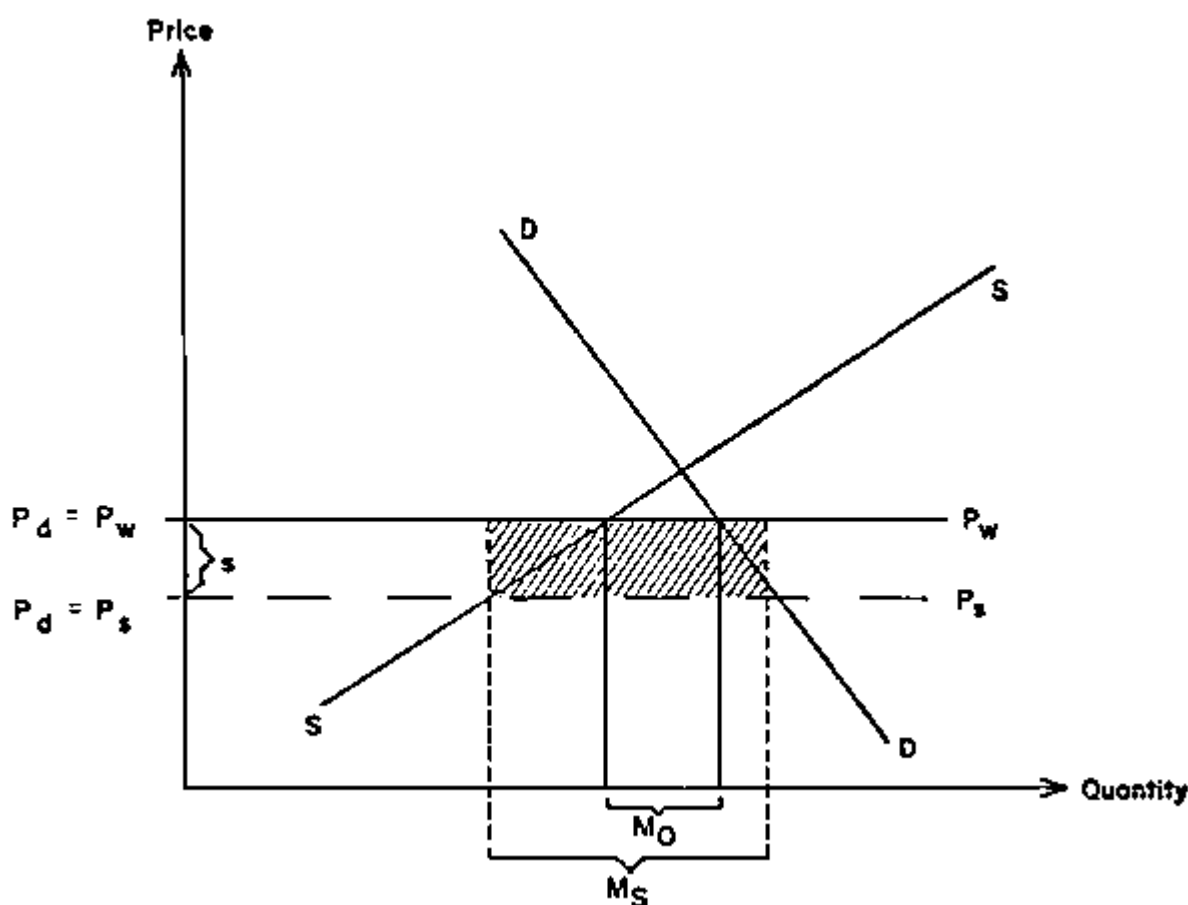
The domestic market price is not affected by this shift since the additional demand can be supplied by imports at the prevailing world market price, i.e. the small country assumption applies. The domestic supply  $SS$  remains unchanged. The additional imports  $M_G$ , however, must be paid by government, for the children cannot afford their school milk. This means that the shifted demand curve  $D^1D^1$  denotes a demand that appears at the market only when the government provides the buying power. Therefore the government's contribution or subsidy equals the value of the additional imports, i.e. the shaded area in figure 6. The change in consumer surplus is denoted by the dotted area above the price  $P_w$  and between the shifted demand  $D^1D^1$  and the original demand  $DD$ .

2.13. Had the government wanted to subsidise milk consumption in general rather than for school children in particular, it could simply subsidise dairy imports with a fixed amount  $S$  per ton (see figure 7). The domestic price would thereby be reduced to  $P_s = P_w - s$  and total imports would increase from  $M_O$  to  $M_s$  in figure 7. However, even if the same amount of total imports as in the previous case is assumed, the effects are quite different ones. The decrease in the domestic price has a disincentive effect on producers, i.e. domestic milk supply decreases and the producers' welfare shrinks by the difference between the  $SS - P_w$  triangle and the  $SS - P_s$



triangle. The government has to pay the difference of the import bill over the value of these imports at the subsidised domestic price, i.e. the shaded area in figure 7, which is (at the same amount of imports) less than in the school milk programme case since the consumers share part of the bill. The consumers nevertheless gain from such policy because they can consume more at lower prices. Their welfare increases by the difference between the  $DD - P_s$  triangle and the  $DD - P_w$  triangle in figure 7. Thus in conclusion, the difference between a targeted and an untargeted import subsidy is that the latter has disincentive effects on domestic production whereas a targeting of import subsidy can avoid disincentives or diminish them at least.

**Figure 7.** *Economic implications of an untargeted import subsidy.*



2.14. Some further remarks are called for concerning the implications of dairy import subsidies. First, treating government expenditures and consumers' surplus independently does not tell the whole story because government expenditure is mainly financed from tax revenues meaning the consumers pay for at least part of their benefits. Second, a different picture emerges if food aid is involved. In figure 6 the government's expenditure could be replaced by free shipments with the same effects on producers and consumers. It is assumed, however, that the extra demand previously did not appear on the commercial market because people lacked the necessary buying power. In figure 7 the availability of food aid would also replace the government subsidy if those imports were simply channelled through to the domestic market. Of course government would benefit from the sales value, i.e.  $M_s P_s$ . However, the disincentive effects on producers would

remain. Finally, all these calculations also apply where domestic prices are above world market prices and the general effects are the same. The subsidy in figure 7 can be interpreted to denote the effect of other countries' subsidies on their producers, i.e. a decline in world market prices due to protectionist policies of major world market participants. Again, the implications are the same except that the importing country does not have to pay for this. Given past developments in African countries' dairy imports, this interpretation may well describe what actually has happened: depressed world market price levels, basically due to USA and EEC dairy policies, have fuelled Africa's milk demand and dairy imports, thereby hampering the continent's dairy development efforts. However, it remains an open question as to whether a single country benefits from such external subsidies or whether action is necessary to counteract such unfair competition.

## **Import tariffs**

2.15. In economic terms a tariff has the opposite effects of an import subsidy and needs only brief treatment here. In reversing figure 7 the starting price would simply be  $P_s$ ,  $M_s$  would denote the tariff, and  $P_w$  would equal the domestic price including the tariff, i.e.  $P_s + s = P_d$ . Government revenues then equal that part of the shaded area which results from multiplying imports  $M_o$  with the subsidy  $S$ . With imports being reduced from  $M_s$  to  $M_o$  local supplies could increase, thereby adding to producers' welfare what was previously a loss (the area between  $P_w$ ,  $P_s$  and  $SS$ ). The consumers would be the losers since milk consumption and real disposable income are reduced as a consequence of higher prices. Their welfare decreases by the area between  $P_w$ ,  $P_s$  and  $DD$ . The overall welfare effect is negative. The consumers' loss exceeds the producers' and government's gains by the two triangles above  $P_s$  and under  $SS$  and  $DD$  respectively. By increasing the tariff, government could force supply and demand to balance and no imports would enter the local market.

2.16. It is important to note that the descriptions above are partial analyses which assume all other factors are constant. In areas not included in the diagrams, however, spillover effects may occur and any estimate of overall welfare effects has to be adjusted. To give an example, if a tariff-induced increase in milk production generates employment in the dairy sector this may offset the negative welfare effect of the tariff. Such issues have to be considered before a final judgement can be given. These dynamic effects widen the number of policy objectives that are involved.

2.17. Many African governments have attempted to control trade in foodstuffs directly. They participate in, or even monopolise import activities, by setting up statal or parastatal organisations that often have far-reaching powers. It is hard to generalise about their effects since they can intervene in the market in many ways. Such organisations can be subsidised as well as taxed, reap monopoly rents or have to supply isolated areas with high distribution costs for no extra recompense. All these activities can substitute, complement or offset dairy import policies with the eventual effects on production, consumption, trade and welfare being difficult to assess. In general, state trading tends to act against the market forces rather than reinforcing or complementing them. Frequently, through state trading governments pursue precisely those objectives which the market will not provide for. Keeping consumer prices at an artificially low level despite insufficient supply, or limiting imports in a similar situation are common examples.

This often means overall welfare losses. The question 'who gains, who loses' depends on the market situation and on the activity undertaken. The most obvious sign of the effects of state trading against the market forces is the existence of 'black', i.e. free, markets—a common feature of many African countries.

2.18. As has been mentioned, the pursuit of a more complex dairy development strategy will probably involve instruments directed at dairy imports and often use dairy food aid which is bound by certain conditions. The World Food Programme (WFP) dairy projects or the EEC's assistance in national 'food strategies' are examples where specific strategies and programmes use trade policy as a tool. A government's request to be considered as a food aid recipient in a particular year must also be included in the category of measures affecting dairy imports. Such influences have played an increasingly important role in sub-Saharan African countries. Their economic effects have been partly covered in paragraph 2.14.

2.19. The setting of exchange rates is a most important instrument which, while generally used in pursuit of grander objectives, has an impact on dairy imports. The economic interpretation of an overvalued exchange rate is that of an import subsidy; this has already been explained above: in effect an overvalued currency effectively decreases the import price. In a more detailed analysis the overall effects of imported inputs and the distinction between tradeable and non-tradeable goods would need to be considered. In a partial analysis, however, the effect is identical to that of an import subsidy. The reverse applies if the currency is undervalued. During the last decade the exchange rates of many African countries have consistently been overvalued (World Bank, 1983, p. 58). Taken on its own, this would be a decisive influence in boosting dairy imports. In Nigeria, for example, there is strong evidence that the overvaluation of the Naira has substantially fuelled dairy and food imports. However, careful examination of individual countries and their various policy instruments is necessary before reaching any conclusion.

2.20. Price policy is another important issue but it is too complex to be thoroughly covered here. In theory almost all the objectives listed concerning dairy imports can be reached by setting producer or consumer prices. To give an example, by suppressing domestic consumer milk prices below world market levels, a government takes away any commercial incentive to import dairy products and thereby saves foreign exchange. Any pricing policy, however faces the major problem of actually controlling administered prices. Sub-Saharan African milk markets in particular, with their abundance of informal marketing channels and direct producer-consumer links are almost impossible to control effectively. Both Kenya and Mali, to name just two of many possible examples, show at least one additional milk price and respective marketing channel besides the official, controlled market price (FAO, 1981 and 1983b). Apart from the feasibility of trying to reach objectives concerning dairy imports by means of pricing policy, there is the argument of economic efficiency. The most directly applied instrument to reach an objective is likely to be that which is economically most advantageous. A common example is trying to provide higher farm incomes by means of higher producer prices. This inevitably leads to higher economic cost—and presumably financial transfers—than a direct income subsidy because of its distortions on the consumption side (see Ritson, 1977). The experience of the EEC agricultural policy illustrates this point. Similarly, in the example given at the beginning of this paragraph, depressing consumer milk prices to reduce the commercial incentive to import, has then unintended consequence of expanding consumers' demand, possibly beyond domestic

supply. The conclusion to be drawn is that the best policy instruments are those that are as closely attached to the respective objective as possible. This means that the best way of influencing dairy imports is through trade policy instruments.

2.21. However, even carefully designed policies can have spillover effects (see Oyejide, 1983) and this complicates any analysis of past effects and makes future policy setting a delicate and complex task. In order to illustrate some of the more theoretical points made and to demonstrate the complexity of the issue, a few examples of actual dairy import policies are given below. This exercise also serves the purpose to further trace the common policy patterns in sub-Saharan Africa that have boosted dairy imports in the last decade. Naturally, within the framework of such a general paper only a rather simplistic description of major policies can be given and only tentative estimates about possible effects or causalities can be made. The presentation of these examples is intended to encourage future research, and help in formulating the framework for such research.

Some examples of policies being pursued

2.22. Unlike other policy areas, dairy import policies do not often feature in African government's official statements. This is not surprising since they involve details which do not lend themselves to public speeches or election promises. The consequence is that information on specific objectives about dairy imports is rare. Some FAO and World Bank livestock sector reports include statements on livestock policies but usually these refer to the meat rather than the dairy sector. Partly this reflects the fact that many governments do not have an explicit dairy or dairy import policy. Nevertheless they do have a policy influence.

2.23. Some suitable parameters to indicate dairy import policy patterns would be statistics on tariffs, trade regulations, and marketing patterns. These are often hard to find but two approximations that are readily available are the relative importance of imports in the domestic dairy sector and what proportion of these imports have been commercial. If both variables are relatively high, one conclusion is that the country has followed a policy of relatively open borders. The two selection criteria to identify a relatively open border policy are whether the share of imports in total milk consumption is over 50%, and at least 55% of dairy imports have been commercial (see appendix 4 and Table 5). An interesting pattern emerges. Other than the islands in the Indian Ocean, all 18 countries that meet these criteria are located along the West and central African coastline, with the only exceptions being the Central African Republic and Zaire (see Table 5). Except for Senegal, which shows a 5% share of the value of dairy imports to total exports, none of these countries' dairy imports seem to put an exceedingly large burden on their foreign exchange account. For Ghana, Nigeria and Senegal the World Bank (1983, p.62) states that they have a high or, in the case of Senegal, medium distortion of the exchange rate, and this may have fuelled dairy imports.

**Table 5.** *Tentative indicators of an open border policy with regard to dairy imports.*

	Imports as % of consumption	Commercial as % of total imports	Value of dairy imports as % of total export revenues
Angola	51	84	2
Cameroon	51	83	1
C.A.R.	56	70	1
Congo	82	92	1
Gambia	68	75	n.a
Ghana	88	70	1
Guinea Bissau	57	66	n.a
Ivory Coast	94	99	3
Liberia	94	90	1
Mauritius	77	91	n.a
Nigeria	66	99	2
Reunion	82	99	n.a
S. Tome	83	68	n.a
Senegal	60	81	5
Seychelles	83	88	n.a
Sierra Leone	69	65	2
Togo	64	72	1
Zaire	91	84	3
SOURCE: see Appendix 4.			

Again, the speculative character of such calculation must be stressed and before any more profound conclusions can be reached, national price statistics for dairy products must be available. Were such price data available, the ratio between domestic and import prices in relation to the quantities imported would allow much more insight.

2.24. Kenya, Tanzania, Botswana and Mali are countries for which some information is available. These countries are located in two markedly different ecological zones and thereby feature different milk production patterns and supply potential, i.e. pastoral semi-subsistence in arid or semiarid areas vs. intensive mixed crop-livestock farming in the highlands. The following descriptions include the findings of country studies within the International Scheme for the Coordination of Dairy Development (ISCDD) (FAO, 1978b, 1979, 1981, 1982 and 1983b). The results of the studies have been approved by the respective governments and it can be assumed that statements about policy objectives and activities they contain more or less mirror the governments' attitude towards their dairy sectors.

2.25. Kenya is generally believed to have the potential for meeting domestic milk demand and throughout the 70's the trade balance in dairy products showed a modest export surplus. The government encourages development of regional cooperative dairies to improve market outlets; maintains growth of smallholder milk production; aims to improve nutritional levels and to provide "a stimulus to dairy development" with a school milk programme; and promotes a change to zero grazing systems in the high potential areas where more than three quarters of all dairy cattle are located (FAO, 1981, p.2 f). The trade-off between producer and consumer welfare is alleviated by the government's commitment to and financing of a school milk programme. The major policy instruments used consist of: setting a basic price at the producer and retail level; providing artificial insemination, animal health and other extension services; and running the school milk programme. The Kenyan Ministry of Livestock Development (1980, p. 34) also records the existence of a 50% import duty and a 15% sales tax on dairy products which it wants to be removed at times of strong import demand. Beyond that, no articulate dairy import policy emerges. However, fast increasing demand and the school milk programme led to a milk deficit in 1979/80 which is likely to persist throughout the 80's. The policy influence of creating extra demand for milk is obvious in this case and has been realised by the government (Ministry of Livestock Development, Kenya, 1980, p. 32f). Since 1983, the FAO - World Food Programme (WFP) is providing milk powder and butter-oil shipments to support the Kenyan government-with its school milk programme (FAO-WFP, 1983).

2.26. In interpreting this developments one can conclude that the more general measures on the production side, e.g. input provision could not match the effects of government policy on the demand side. The role of price setting and the adequacy of the marketing system would need further analysis in this respect. The government's reactions, in terms of calling in the WFP and of considering a tax reduction for dairy imports, are well-targeted steps in an import policy, but their effects cannot be seen as yet. The Kenyan example shows how easily a fairly balanced market can be disturbed by government interference. It also shows that different periods are needed for policy instruments to become effective: stimulating milk production is unlikely to show quick effects, whereas dairy imports and the consumer tend to react immediately to incentives.

2.27. In *Tanzania*, as in Kenya, a large share of the total milk production is retained on farms for food and feed use. Government has followed a long-term dairy development plan since 1975 and claims to place high priority on the growth of the dairy industry (FAO, 1979, p. 77). The policy objectives behind it are gradually to substitute for the dairy imports which represent about one-fourth of total consumption (see App. 4); to strike a balance between affordable consumer prices

and remunerative producer prices so as to increase milk production and supplies to the urban markets. Imports are subject to licensing but according to FAO (1979, p. 89) they are not severely restricted. Imports as food aid are mainly under WFP or stem from the EEC. Total imports equal about 11,000t ME (av. 1980–82) or roughly 6 kg ME per head of population. Despite the stated objectives only irregular and insignificant adjustments to producer prices were made between 1975 and 1980, but prices have more than trebled in the last three years. Now there is a dual price structure, both between regions and between official and free market prices. Milk consumption per head of population is significantly higher in urban than in rural areas; and some processing plants and, therefore, the areas they supply, depend largely on imports for recombination (FAO, 1979, p. 29f).

2.28. There is increasing reliance on imports for the supply of urban areas. Although, at least since 1980, this did not have direct negative effects on producer prices there is always the danger of severe market disruption. Urban and rural markets tend to be separated to the point where processing plants neglect or even stop collecting fresh milk; in the end the necessary infrastructure breaks down or is never developed. A careful examination will be necessary to see how consumption and price levels in urban and rural areas can be balanced to offset the effects of past government policy. As in the Kenyan case, fostering milk production seems to require longer term strategies and consistent policies throughout, whereas milk consumption and imports are easily manipulated.

2.29. In the case of *Botswana* government policy and activities are heavily biased towards the beef industry. Unlike Tanzania and Kenya, there is little scope for the development of an intensive dairy industry. Nevertheless, government states as its objectives "to promote dairy production as part of its import substitution policy" and to provide the incentives needed to "generate small farmer dairy development around the major towns" (FAO, 1982, p. 1 f). All imports are subject to exchange control but there is no special control of dairy imports; these account for 10% of all food, beverages and tobacco imports and for an estimated 30% of Botswana's consumption (FAO Trade Yearbook, FAO Production Yearbook). In the absence of price setting, Botswana's milk prices are influenced by those of the Republic of South Africa and its Dairy Control Board which is the main supplier of Botswana's imports (FAO, 1982, p. 10 f). With increasing pressure to reduce imports substantially the government would have to change its present policy to one of controlling dairy imports and providing price support and/or input subsidies. Although there is a possibility of slightly higher production (Konandreas et al, 1983, in particular p. 43) such a policy is likely to lead to overall welfare losses (FAO, 1982, p. 14) .

2.30. Botswana's direct policy towards the dairy sector so far has been laissez-faire. However, the impact of its beef policy and the substantial subsidies incurred (see Hubbard, 1983, p. 270 f.) must be taken into account for an overall picture of national policies. In comparison with Kenya and Tanzania the income implications of domestic milk production seem to be less important. Obviously, the policies pursued must be different in Botswana from those in the previous examples. A policy aiming at intensified dairy development would have to be critically analysed for its overall welfare Implications.

2.31. The last example to be described is *Mali*,<sup>4</sup> a country with low potential for intensive milk productions. However, the economic importance of livestock is substantial (Wilson et al., 1983,

p. 18 f and FAO, 1978, p. 44). Until now milk policy had effects only in the Bamako region where the country's one milk processing plant Union Laitiere de Bamako (ULB) is located. This reflects both the government's objective to provide the capital with a reasonable supply of milk and the fact that the majority of milk production in rural areas is consumed there (FAO 1978, p. 49). Consequently, on the fresh milk market only ULB buying and selling prices are subject to price fixing and government control. However, effects on the supply side, are negligible since the plant's output is almost exclusively recombined milk. On the demand side, it is interesting to note that the prices for direct sales of fresh milk in Bamako are about 50% above the official ULB retail price for recombined milk. This apparently reflects consumer preferences since no black market for ULB milk exists. Commercial imports are subject to licensing and foreign exchange allocation and the parastatal SOMIEX has a monopoly on imports of milk powder and condensed milk in cans. A total of 25,000 t dairy products (in ME) was imported on average 1980–82, including about one third as food aid. According to FAO (1983b, P. 18) more than half of those total imports are consumed in Bamako but this figure may be an underestimate. The capital's estimated milk consumption in 1984 is believed to be 20–25 kg ME per caput. In some parts of the country especially in the northern pastoral areas per caput milk consumption is substantially higher. However, no reliable production figures are available to derive exact figures for milk consumption in Mali.

4. Part of the information below was acquired from unpublished sources during early 1984; the results will be published in due course.

2.32. The role of the Malian government seems to be somewhat similar to that of Botswana. The main problem is the effects of imports on consumption and production resulting from ULB and SOMIEX policy and price setting. The interactions between ULB and the free market as well as ULB's role as a market outlet for local milk producers are crucial for dairy development in the Bamako region (see also von Massow, 1984).

2.33. From the four country examples it appears that government policies seem to be mainly influenced by the agroclimatic potential and the production systems and their respective potential. Government interference seems to be stronger in the high potential countries, whereas in the case of Botswana and Mali, policies and their application are uncertain. At least in Kenya, Tanzania and Mali dairy imports are such that special import policies are already pursued or seem necessary. This is likely to hold true for quite a number of sub-Saharan African countries.



## **Part Three: The contribution of policy research**

3.01. The foregoing discussion of dairy imports into sub-Saharan Africa and their policy implications has left a number of questions unanswered: the impact of urbanization on dairy and food imports; differences in demand for fresh vs. recombined milk including their respective demand elasticities; the extent to which food aid substitutes or complements commercial dairy imports; and the question of how feasible dairy development alongside the "Operation Flood" concept could be for sub-Saharan African countries amongst others. All these issues should be of considerable interest to policy-makers as a basis for their decisions. However, the ability of any analysis to put the decision-maker in a position to foresee the impacts of his policy, depends on two basic requirements: the availability of sound information and, second, a synchronization of the researcher's contribution and the policy-maker's expectations. These two conditions are obviously linked to each other and will be discussed below with special regard to research on dairy import policies.

### **The information problem**

3.02. The most crucial set of statistical data is that of domestic dairy prices. The close monitoring of a selected sample of markets gives an indication of the success or failure of any policy and enables researchers to advise on any necessary changes. The central role of prices in directing milk production, consumption and imports makes the improvement of price statistics a top priority. Dairy production data are also of great importance but are very unreliable at present. To improve production data is technically and organisationally more difficult than spotting prices. It would be an improvement to monitor the national herds more closely and supplement this by systematic analysis of the changes in animal productivity in some of the major production areas. As with prices, the survey emphasis is on continuity rather than absolute completeness. An improvement in these two areas, i.e. time series for dairy prices and milk production, would yield a high return to the effort and would represent a significant step forward in policy research and formulation.

### **The congruence problem**

3.03. Most economists are committed to the idea and assumptions of the neo-classical theory. However, their perception of a 'welfare-enhancing' policy may be regarded as useless by policy-makers because the economist uses an overall social welfare criterion whereas the politician may pursue very different targets. The question is how to merge these sometimes conflicting attitudes. Does the economist have to bend to the policy-maker's wishes which then effectively render his work superfluous? Or should it be the other way around? A first step in the right direction is the clear definition of the objectives the politician pursues. One aim of the policy research must then be to provide the decision-maker with the relative welfare costs of his present or planned policies. To give an example, a government should know that the present import tariff on dairy products while raising revenues of say, \$ 50 million poses a burden of \$ 200 million on consumers' welfare while benefiting producers by only \$ 75 million, i.e. it leads to an overall welfare loss. The policy research would then have to present the same calculation for policy alternatives, e.g. tariff changes, and to confront the policy-maker with the costs and benefits of the choices available.

3.04. The above argument is based on the understanding that the relationship between policy and research will always be unequal. Research has to serve policy by providing information about costs and benefits of certain policies and their alternatives rather than presenting one 'optimal' solution. Thus, the inherent claim of the researcher, to know better than the politician what might be good for the country or not, should be excluded. This paper, in conclusion, argues that there are a number of dairy import policies in sub-Saharan African countries that may have to be changed. Policy research will have to provide the basic information and policy-makers will have to decide according to their objectives. Both sides should take this to be a challenge for cooperation.

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## Appendices

### APPENDIX 1. Regional grouping of sub-Saharan African countries (total of 45)

<b>West Africa (16)</b>	<b>East Africa (9)</b>
Benin	Comoros
Chad	Djibouti
Gambia	Ethiopia
Ghana	Kenya
Guinea	Seychelles
Guinea-Bissau	Somalia
Ivory Coast	Sudan
Liberia	Tanzania
Mali	Uganda
Mauritania	
Niger	
Nigeria	
Senegal	
Sierra Leone	
Togo	
Upper Volta	
<b>Central Africa (10)</b>	<b>Southern Africa (10)</b>
Angola	Botswana
Burundi	Lesotho

Cameroon	Madagascar
Central African Republic	Malawi
Congo	Mauritius
Equatorial Guinea	Mozambique
Gabon	Reunion
Rwanda	Swaziland
S. Tome and Principe	Zambia
Zaire	Zimbabwe

## **APPENDIX 2. Factors to convert dairy products into whole milk equivalents (ME)**

Commodity	Commodity Code	Conversion factor <sup>1</sup>
Fresh milk	FRM	1.0
Dry milk (skim or whole)	DRM (DSM or DWM)	7.6
Milk, condensed and evaporated	MCE	2.0
Cheese and curd	CHC	4.4
Butter	BUT	6.6
Butteroil	BUO	8.0
Other (as part of food aid)	ODP	2.0
<p>1. To be read, for example, 1 kg DRM = 7.6 kg ME or 1 kg DRM + 0.5 kg BUO = 7.6 kg ME + 4.0 kg ME = 11.6 kg ME.  Source: FAO. 1978. Milk and milk products: supply, demand and trade projections 1985. ESC: PROJ/78/3. Rome.</p>		

**APPENDIX 3. Net dairy imports into sub-Saharan Africa by region (000 t ME and in % of total)**

	West		Central		East		Southern		Sub-Saharan Africa	
	Comm. Imports	Food aid	Comm. Imports	Food aid	Comm. Imports	Food aid	Comm. Imports	Food aid	Comm. Imports	Food aid
1972	472 (56.6)	n.a	127 (15.2)	n.a	51 (6.1)	n.a	184 (22.1)	n.a	834 (100)	n.a
1973	494 (60.2)	n.a	130 (15.8)	n.a	32 (3.9)	n.a	165 (20.1)	n.a	821 (100)	n.a
1974	498 (50.9)	n.a	138 (14.1)	n.a	63 (6.5)	n.a	279 (28.5)	n.a	978 (100)	n.a
1975	626 (60.4)	n.a	120 (11.6)	n.a	95 (9.2)	n.a	195 (18.8)	n.a	1,036 (100)	n.a
1976	721 (58.8)	n.a	163 (13.3)	n.a	118 (9.6)	n.a	225 (18.3)	n.a	1,227 (100)	n.a
1977	1,010 (64.1)	95 (29.5)	169 (10.7)	43 (13.4)	160 (10.1)	157 (46.9)	238 (15.1)	33 (10.2)	1,577 (100)	322 (100)
1978	1,191 (59.0)	163 (34.6)	247 (12.2)	66 (14.0)	322 (15.9)	174 (37.0)	260 (12.9)	68 (14.4)	2,020 (100)	471 (100)
1979	948 (54.8)	164 (31.5)	289 (16.7)	88 (16.9)	217 (12.6)	189 (36.2)	275 (15.9)	80 (15.4)	1,729 (100)	521 (100)
1980	1,215 (56.3)	148 (26.0)	261 (12.1)	54 (9.5)	421 (19.5)	297 (52.2)	261 (12.1)	70 (12.3)	2,158 (100)	569 (100)
1981	1,208 (53.7)	219 (28.5)	288 (12.8)	99 (12.9)	475 (21.2)	368 (47.8)	277 (12.3)	83 (10.8)	2,248 (100)	769 (100)
1982	1,202 (56.3)	153 (23.4)	258 (12.1)	82 (12.5)	421 (19.7)	311 (47.5)	255 (11.9)	109 (16.6)	2,136 (100)	655 (100)

SOURCE: Own calculation based on FAO Trade Yearbooks, FAO 1984a: App. 2.



**APPENDIX 4. Selected indicators related to dairy imports into sub-Saharan African countries**

	Country Code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
West (16)									
Benin	A	3.6	.15	320	.61	.63	.07	9	1.03
Chad	B	2.2	.19	110	.35	.04	.01	52	.74
Gambia	—	21.0	n.a.	n.a.	.75	.68	n.a.	32	n.a.
Ghana	C	5.2	.37	400	.70	.88	.01	6	.88
Guinea	D	1.1	.20	300	.76	.13	.00	9	.77
Guinea-Bissau	—	14.0	n.a.	n.a.	.66	.57	n.a.	23	n.a.
Ivory Coast	E	17.8	.41	1200	.99	.94	.03	19	1.12
Liberia	F	9.2	.34	520	.90	.94	.01	9	1.14
Mali	G	3.8	.19	190	.68	.21	.03	18	.85
Mauritania	H	51.1	.24	460	.65	.49	.07	104	.97
Niger	I	3.1	.13	330	.75	.16	.01	20	.92
Nigeria	K	8.1	.21	870	.99	.66	.02	12	.91
Senegal	L	21.2	.34	430	.81	.60	.05	36	1.00
Sierra Leone	M	11.4	.22	320	.65	.69	.02	16	.89
Togo	N	2.5	.21	380	.72	.64	.01	4	.95
Upper Volta	O	21.1	.11	240	.64	.75	.22	28	.95
Central (10)									
Angola	P	19.7	.22	440*	.84	.51	.02	39	.83
Burundi	R	5.8	.02	230	.60	.29	.04	20	.96
Cameroon	S	5.1	.36	880	.83	.51	.01	10	1.05

Central African Republic	T	2.2	.29	320	.70	.56	.01	4	.94
Congo	U	8.1	.46	1110	.92	.82	.01	10	.94
Equatorial Guinea	–	13.8	n.a.	n.a.	.54	n.a.	n.a.	n.a.	n.a.
Gabon	–	30.9	n.a.	n.a.	n.a.	.94	n.a.	35	n.a.
Rwanda	V	3.4	.04	250	.05	.41	.00	8	.88
S. Tome & Principe	–	n.a.	n.a.	n.a.	.68	.83	n.a.	n.a.	n.a.
Zaire	W	2.1	.36	210	.84	.91	.03	2	.94
East (9)									
Comoros	–	21.0	n.a.	n.a.	.31	.73	n.a.	27	n.a.
Djibouti	–	92.9	n.a.	n.a.	.81	n.a.	n.a.	n.a.	n.a.
Ethiopia	1	3.6	.14	140	.60	.16	.03	22	.76
Kenya	2	6.3	.15	420	.65	.11	.01	55	.88
Seychelles	–	n.a.	n.a.	n.a.	.88	.83	n.a.	n.a.	n.a.
Somalia	3	5.9	.31	280	.51	.61	.06	92	1.00
Sudan	4	4.5	.26	380	.60	.08	.03	54	1.01
Tanzania	5	5.8	.12	280	.49	.23	.02	25	.83
Uganda	6	4.1	.09	220	.57	.14	.03	30	.83
Southern (10)									
Botswana	–	44.8	n.a.	n.a.	.83	.29	n.a.	155	n.a.
Lesotho	11	35.5	.12	540	.49	.71	n.a.	50	1.07
Madagascar	12	2.2	.19	330	.69	.36	.01	6	1.09
Malawi	13	2.7	.10	200	.59	.31	.01	9	.94
Mauritius	–	85.2	n.a.	n.a.	.91	.77	n.a.	111	n.a.

Mozambique	14	3.7	.09	250*	.72	.42	.02	9	.70
Reunion	—	67.7	n.a.	n.a.	.99	.82	n.a.	82	n.a.
Swaziland	—	13.6	n.a.	n. a.	.86	.18	n.a.	75	n.a.
Zambia	15	5.2	.44	600	.70	.34	.00	15	.93
Zimbabwe	16	3.1	.24	870	.68	.10	.00	29	.86

\* 1979 figure

(1) Total dairy imports (ME), average 1980-82, per head of population mid 1981 (kg per caput).

(2) Share of urban population to total population, 1981.

(3) Gross national product per caput, 1981(\$).

(4) Share of commercial dairy imports to total dairy imports (ME), average 1980–82.

(5) Share of total dairy imports (ME) to total cow milk consumption, average 1980–82.

(6) Share of value of commercial dairy imports (\$), average 1980–82, to total exports, 1981

(7) Total milk consumption, average 1980–82, per head of population, 1981 (kg per caput)

(8) Share of total dairy per caput calorie supply to theoretical requirement. 1980.

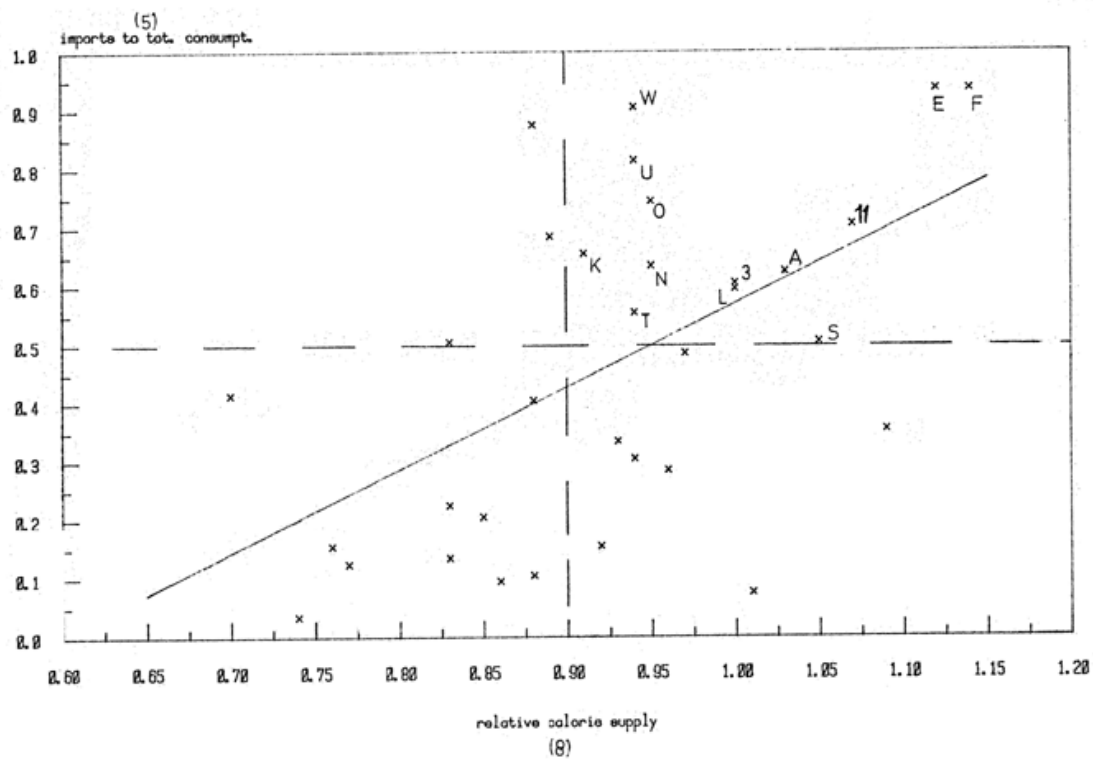
SOURCE: Own calculation based on App. 3; FAO Production Yearbooks; World Bank, 1983.

## Notes to Appendix 5 to 10

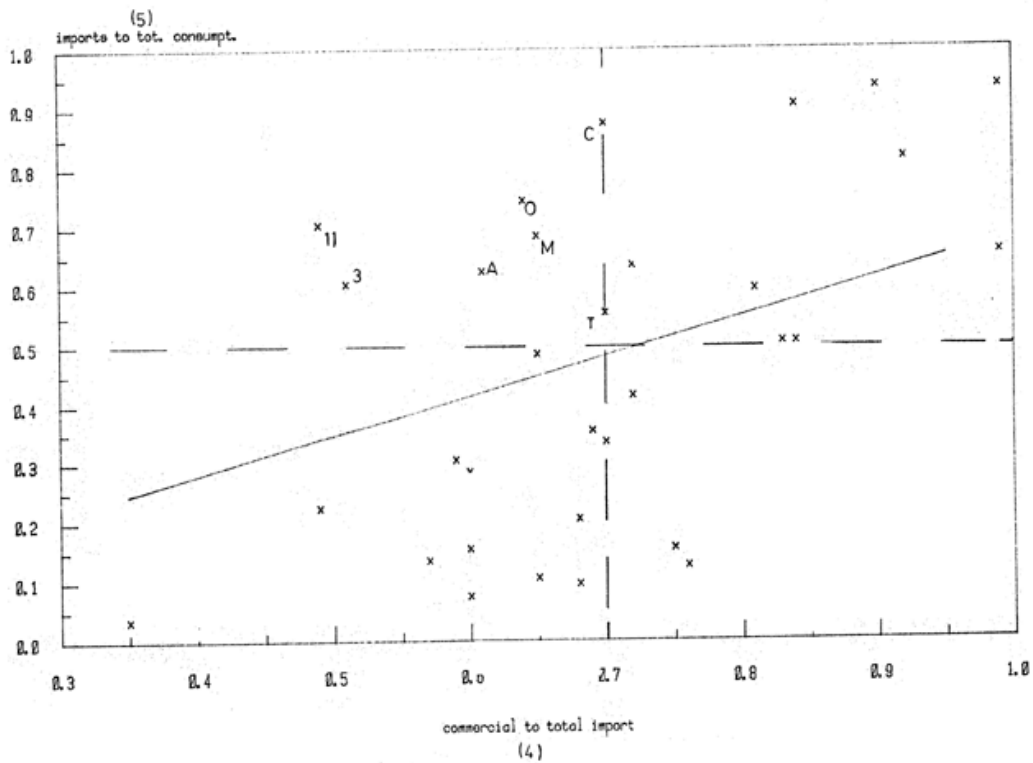
In Appendix 5 to 10 some combinations of the indicators from Appendix 4 are given which relate to dairy imports of single African countries. Each point denotes one country with the country codes being the same as in Appendix 4. The figures in brackets refer to the respective columns in Appendix 4. The separating levels to distinguish different groups of countries have been set arbitrarily but normally reflect upper or lower thirds of the total sample.

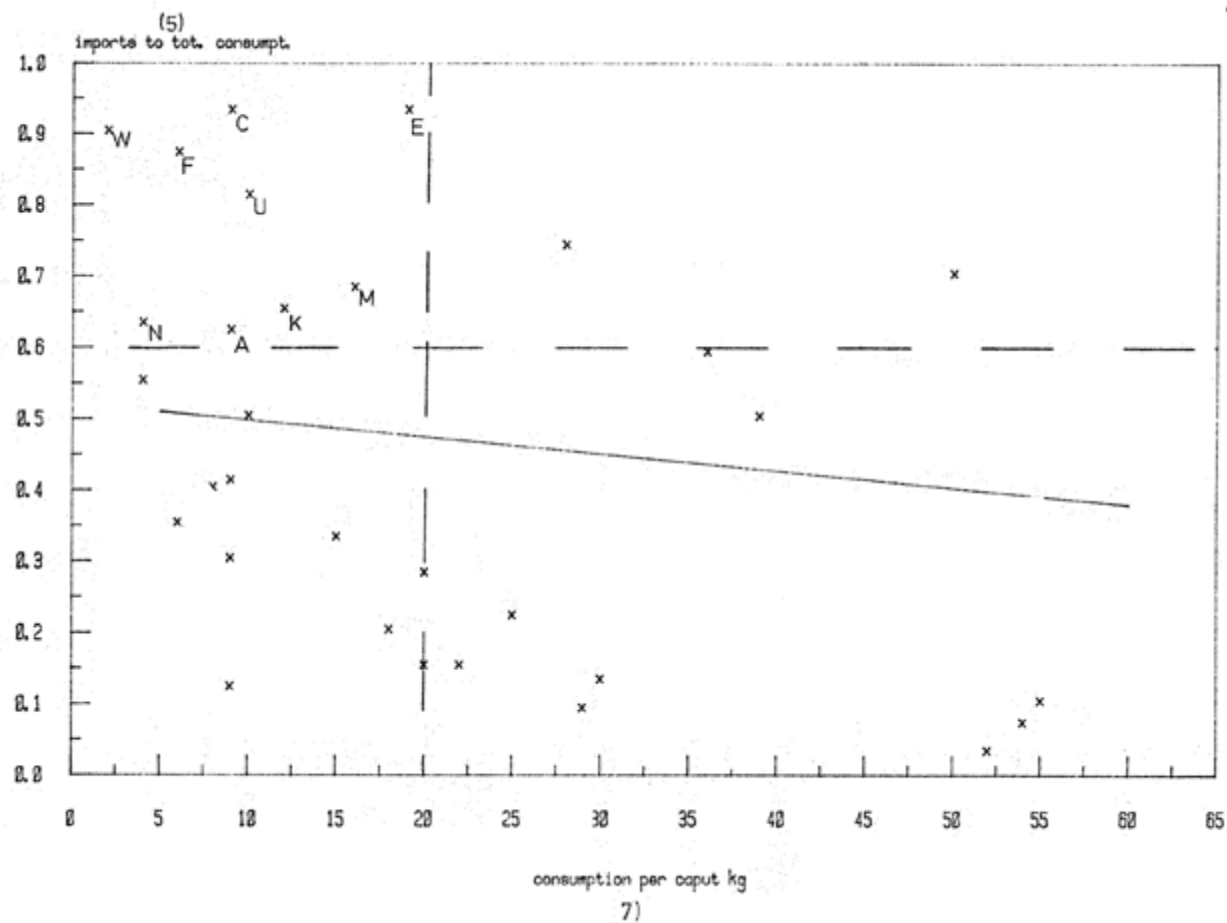
The appropriate interpretation is that of a descriptive cross-country comparison rather than of a correlation between the respective indicators. The linear lines accordingly denote the direction of the *expected* relation between indicators only. More observations and more refined data are needed to establish statistically significant correlations.

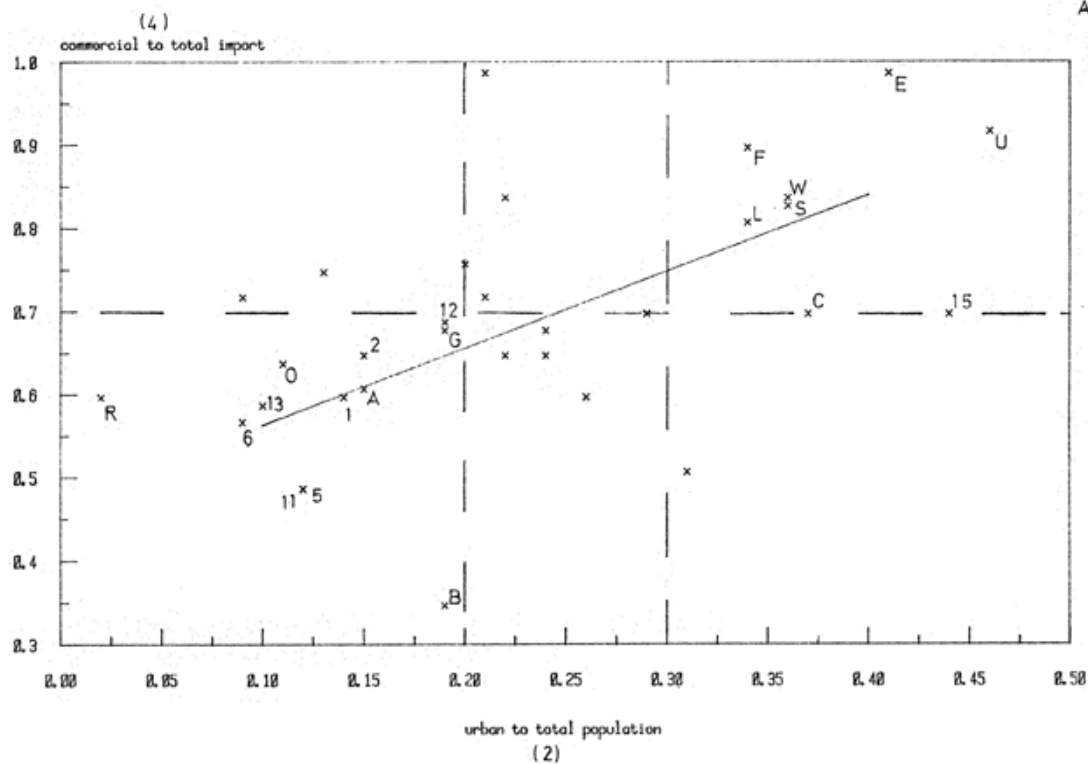
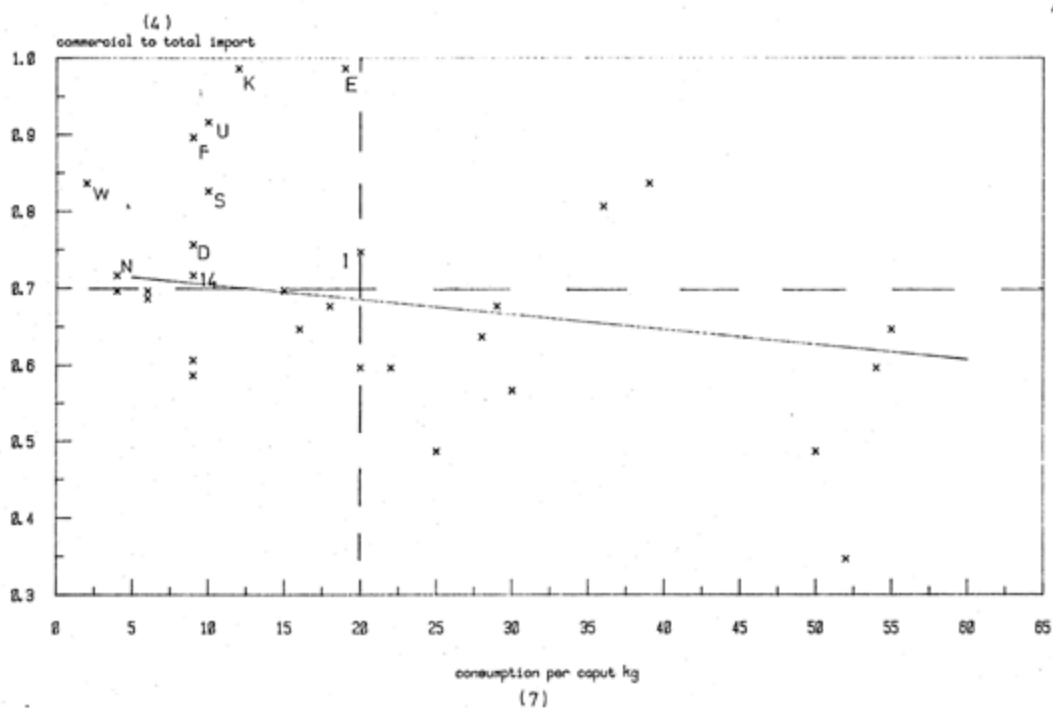
## APPENDIX 5

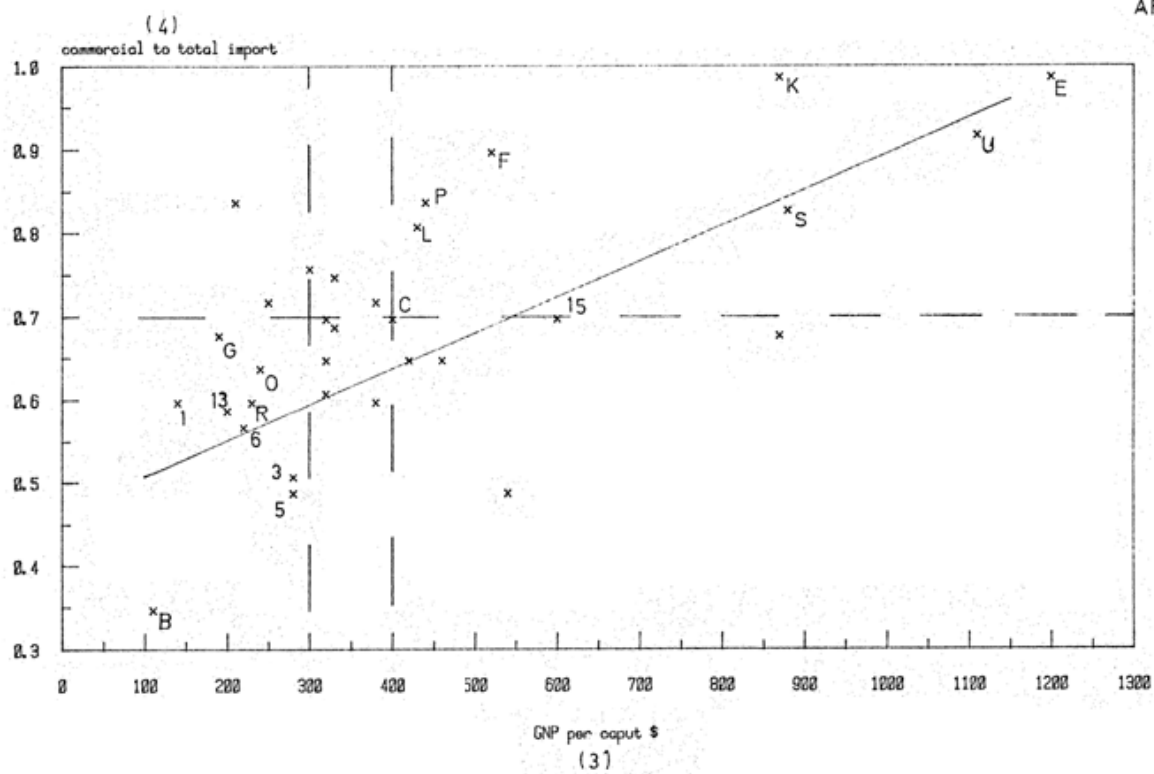


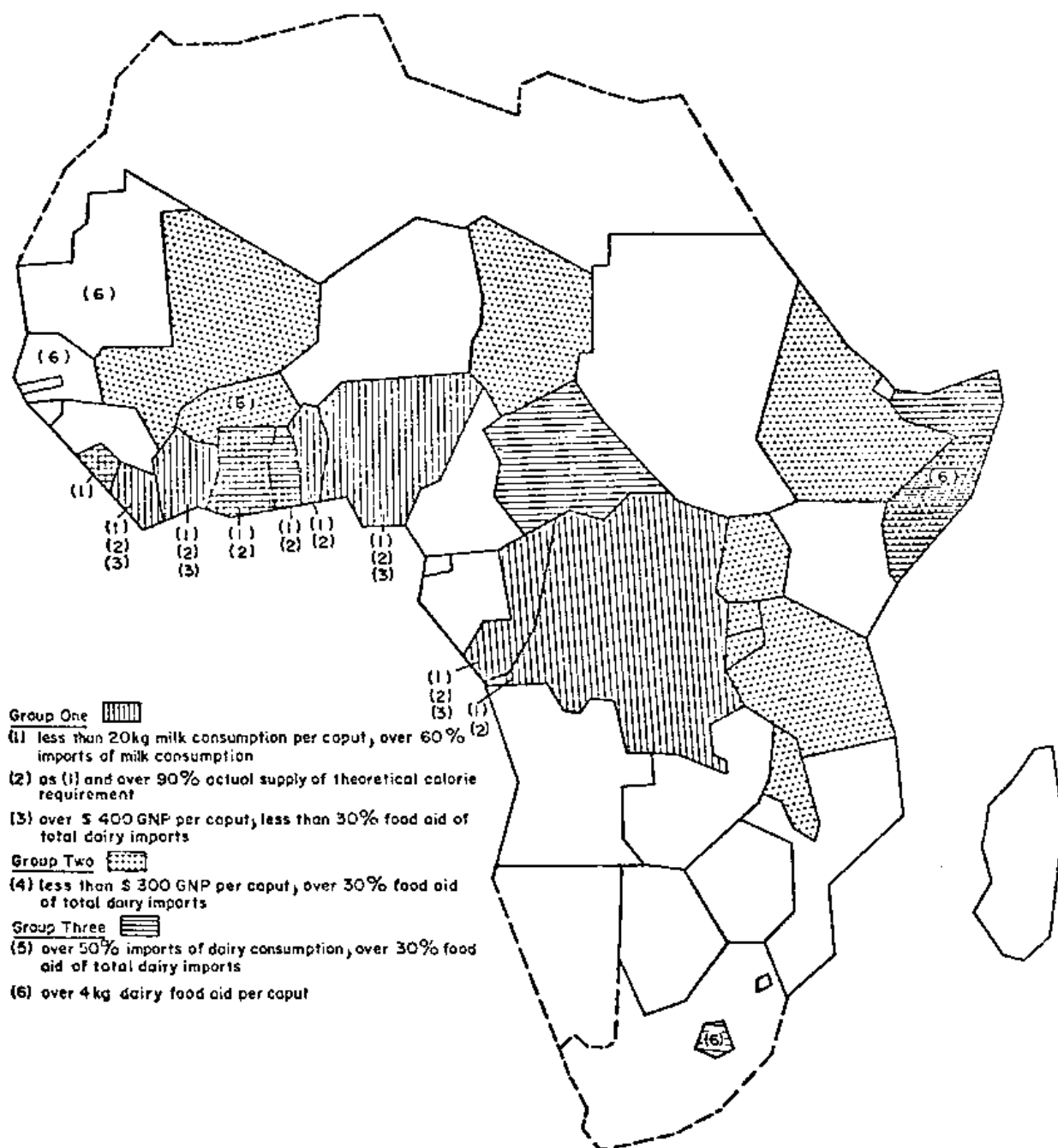
## APPENDIX 6











**APPENDIX 11. Selected indicators related to dairy imports into sub-Saharan African countries. (based on table 3 and App. 4)**



## APPENDIX 12. Factors of influence on dairy imports into sub-Saharan Africa by country.

APPENDIX 12: Factors of influence on dairy imports into sub-Saharan Africa by country.

Country	I	(a) II (b)	III	IV	(a) V (b)		(a) VI (b)		VII
	Average annual growth of commercial dairy imports ("1973" to "1981")	Rate of self-sufficiency (domestic production to total consumption)	Average annual growth of population ("1973" to "1981")	Average annual growth of income induced milk demand $\frac{Z}{Y}$ (1970 to 1981)	Average annual growth of domestic cow milk production ("1973" to "1981")	Average annual growth of domestic milk consumption ("1973" to "1981")	Residual term comprising other factors $\frac{Z}{Y}$ ("1973" to "1981")		
	$\frac{Q}{Q+H}$ "1973" "1981"	%	%	%	total per caput	total per caput	%	%	%
Angola	+ 24.3	0.86 0.53	+ 2.5	n.a.	+ 1.3 - 1.2	+ 7.4 + 4.8			n.a.
Benin	+ 12.2	0.79 0.60	+ 2.9	+ 0.3	+ 1.1 - 1.7	+ 4.6 + 1.7			+ 0.2
Botswana	+ 26.9	0.95 0.75	+ 2.7	n.a.	+ 3.3 + 0.6	+ 6.4 + 3.6			n.a.
Burundi	+ 35.0*	0.98 0.81	+ 2.3	+ 0.6	+ 2.7 + 0.4	+ 5.2 + 2.8			+ 0.4
Cameroon	+ 8.5	0.74 0.54	+ 2.3	+ 2.7	- 2.4 - 4.6	+ 1.3 - 1.0			- 4.6
Cent. Afr. Rep.	+ 3.0	0.60 0.57	+ 2.3	- 0.5	+ 3.7 + 1.4	+ 4.3 + 2.0			+ 1.6
Chad	- 8.9	0.91* 0.98*	+ 2.1	n.a.	+ 11.1* + 8.6*	+ 10.1* + 7.6*			n.a.
Congo	+ 8.9	0.03* 0.19	+ 2.9	+ 1.5	+ 40.3* + 36.3*	+ 13.0* + 9.8*			+ 5.4*
Ethiopia	+ 21.3	0.97 0.90	+ 2.5	- 0.2	+ 1.5 - 1.0	+ 2.3 - 0.2			- 0.2
Gabon	+ 13.3	0.04 0.02	+ 1.0*	n.a.	+ 0 - 1.0*	+ 11.7 + 10.6*			n.a.
Gambia	+ 19.9	0.71 0.43	+ 3.0	n.a.	+ 2.3 - 0.7	+ 9.1 + 5.9			n.a.
Ghana	- 2.9	0.13 0.16	+ 3.1	- 2.2	+ 0 - 3.0	- 2.5 - 5.4			- 3.4
Guinea	+ 3.2	0.91 0.89	+ 2.9	+ 0.1	+ 0 - 2.8	+ 0.3 - 2.5			- 2.7
Guinea Bissau	+ 6.5	0.70 0.55	+ 1.7*	n.a.	- 1.9 - 3.5*	+ 1.2 - 0.5			n.a.
Ivory Coast	+ 14.4	0.07 0.06	+ 5.0	+ 0.8	+ 12.1 + 6.8	+ 14.1 + 8.7			+ 8.4
Kenya	n.d.	1.12 0.92	+ 4.0	+ 1.2	+ 2.3 - 1.6	+ 4.8 + 0.8			n.d.
Lesotho	+ 10.1	0.61 0.45	+ 2.4	+ 4.0*	+ 2.1 - 0.3	+ 5.8 + 3.3			- 1.2
Liberia	+ 6.5	0.05 0.06	+ 3.5	- 0.1	+ 9.1* + 5.4*	+ 6.9 + 3.3			+ 3.2
Madagascar	- 5.6	0.65 0.71	+ 2.6	- 1.5	- 1.9 - 4.4	- 2.9 - 5.4			- 4.3
Malawi	+ 1.5	0.68 0.79	+ 3.2	+ 1.6	+ 8.7 + 5.3	+ 6.1 + 2.8			+ 1.6
Mali	- 0.1	0.78 0.85	+ 2.6	+ 1.3	+ 4.7 + 2.0	+ 3.8 + 1.2			- 0.3
Mauritania	+ 5.5	0.65 0.62	+ 2.7	- 0.7	+ 3.7 + 1.0	+ 4.2 + 1.5			+ 2.3
Mozambique	+ 2.3	0.67 0.67	+ 2.6	n.a.	+ 1.8 - 0.6	+ 2.0 - 0.6			n.a.
Niger	- 0.7	0.79 0.88	+ 3.3	- 0.1	+ 8.0* + 4.5*	+ 6.6 + 3.2			+ 3.0

Country	I	(a) II (b)		III	IV	(a) V (b)		(a) VI (b)		VII
	Average annual growth of commercial dairy imports ("1973" to "1981")	Rate of self-sufficiency (domestic production to total consumption)		Average annual growth of population ("1973" to "1981")	Average annual growth of income induced milk demand $\frac{Q}{Q+M}$ (1970 to 1981)	Average annual growth of domestic cow milk production ("1973" to "1981")		Average annual growth of domestic milk consumption ("1973" to "1981")		Residual term comprising other factors $\frac{Q}{Q+M}$ ("1973" to "1981")
		$\frac{Q}{Q+M}$				total per caput		total per caput		
	%	"1973"	"1981"	%	%	%	%	%	%	%
Nigeria	+ 15.4	0.57	0.35	+ 3.2	+ 0.9	+ 3.4	+ 0.2	+ 9.7	+ 6.3	+ 4.5
Rwanda	- 3.2	0.96	0.96	+ 3.4	+ 1.2	+ 0.4	- 2.9	+ 0.5	- 2.8	- 4.3
Senegal	+ 5.7	0.58	0.45	+ 2.9	- 0.6	- 0.7	- 3.5	+ 2.5	- 0.4	- 0.3
Sierra Leone	+ 10.2	0.50	0.40	+ 2.6	- 0.5	+ 14.0*	+ 11.1*	+ 12.1*	+ 9.3*	+ 10.0*
Somalia	+ 80.5*	0.99	0.56*	+ 2.8	+ 0.7	+ 9.2*	+ 6.2*	+ 17.2*	+ 14.0*	+ 6.4*
Sudan	+ 18.8	0.99	0.95*	+ 3.1	+ 0.7	- 4.5*	- 7.4*	- 4.0*	- 6.9*	- 8.1*
Swaziland	+ 9.0	0.88	0.82	+ 2.6	n.a.	+ 2.7	+ 0.1	+ 3.6	+ 1.0	n.a.
Tanzania	+ 0.4	0.92	0.87	+ 3.4	+ 1.1	- 6.1*	- 9.2	- 5.5*	- 8.6	- 10.1*
Togo	+ 12.9	0.50	0.33	+ 3.0	+ 0.1	+ 2.5	- 0.5	+ 9.1	+ 5.9	+ 4.6
Uganda	- 1.6	0.89	0.92	+ 3.1	- 3.1	+ 2.7	- 0.4	+ 2.2	- 0.9	+ 2.2
Upper Volta	+ 36.2	0.88	0.36	+ 2.5	+ 0.7	- 1.0	- 3.4	+ 10.7	+ 8.0	+ 0.3
Zaire	- 4.2	0.87	0.11	+ 3.0	- 2.1	- 16.7*	- 19.1*	- 6.5*	- 9.2*	- 8.5*
Zambia	+ 15.0*	0.53	0.76	+ 3.1	- 1.8	- 3.2	- 6.1	- 7.5*	- 10.3*	+ 19.2*
Zimbabwe	+ 47.2*	0.99	0.94	+ 3.3	- 1.0	- 3.3	- 6.4	- 2.5	- 5.6	- 5.1

Note: "1973"= average 1972 to 1974, "1981"= average 1980 to 1982

\* Figures are either very high because of a low base period value or are considered particularly unreliable.

n.d. mathematically not defined.

Footnotes to Appendix 12

- 1/ Q = domestic production, M = commercial imports of dairy products
- 2/ calculated as  $dy_t^+ \cdot \eta$ , where  $dy_t^+$  = average annual growth of real per caput income;  $\eta$  = income elasticity of milk demand (= 0.68)
- 3/ calculated as  $e = dM_t^N \cdot (1-RSS) - dN_t - dy_t^+ \cdot \eta + RSS \cdot dQ_t$ , derived from equation (7) in para. 1.27 above, with  $dM_t^N$  = change in commercial dairy imports (col. I),  $RSS$  = rate of self-sufficiency (col. IIa),  $dN_t$  = change in population (col. III),  $dy_t^+ \cdot \eta$  = change in the demand for milk caused by change in income (col. IV),  $dQ_t$  = change in domestic production (col. Va)  
All changes are annual average percentages.

Source: Own calculation based on FAO Production Yearbook; FAO Trade Yearbook; FAO, 1978a; World Bank, 1981 and 1983