

ILCA Research Report

Dairy imports into sub-Saharan Africa: Problems, policies and prospects

Valentin H. von Massow

May 1989

**INTERNATIONAL LIVESTOCK CENTRE FOR AFRICA
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ILCA

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Dairy imports into sub-Saharan Africa: Problems, policies and prospects

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ABSTRACT

Trends in the production and consumption of dairy products in sub-Saharan Africa are reviewed, as is the growing importance of dairy imports in meeting consumption targets. The basic instruments of dairy import policy, their objectives, and the economic effects of selected import measures are then outlined to provide a theoretical background for a cross-country analysis of the common causes of increased dairy imports into sub-Saharan Africa, which follows. This general analysis is complemented by a detailed study of two specific dairy policies – the classical trade control policy pursued in Nigeria and the multi-objective policy of Mali. The potential contribution of dairy food aid to livestock development in the continent has been studied, using the Malian experience to outline the complexity of such a policy.

KEY WORDS

/Africa south of the Sahara//milk products//supply balance//imports//trade policies//food aid/–/economics/
/case study/

RESUME

On trouvera dans le présent rapport un examen des tendances relatives à la production et à la consommation des produits laitiers en Afrique subsaharienne, de même qu'une étude détaillée de la contribution sans cesse croissante des importations de lait à la satisfaction des objectifs de consommation des pays du sous-continent. Les instruments de base des politiques d'importation laitière, leurs objectifs, et l'incidence économique de certaines dispositions prises en matière d'importation sont ensuite succinctement décrits en vue d'explicitier la base théorique nécessaire à l'analyse (pays par pays) des causes communes de l'augmentation des importations laitières en Afrique subsaharienne. Ce tableau général est complété par une étude approfondie de deux politiques laitières bien précises, à savoir les mesures classiques de contrôle des échanges commerciaux mises en oeuvre par le Nigeria, et la politique à cibles multiples adoptée par le Mali. L'impact potentiel de l'aide en produits laitiers sur le développement de l'élevage en Afrique a été étudié sur la base de l'expérience malienne, pour mieux souligner la complexité de cette dernière stratégie.

MOTS-CLES

/Afrique au sud du Sahara//produits laitiers//bilan d'approvisionnement//importation//politique du commerce international//aide alimentaire/–/économie//étude de cas/

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It is precisely because of the enthusiastic involvement of many nationals that I wish that both Nigeria and Mali may draw some benefit from these modest efforts to throw light on their dairy import policies. None of those mentioned, however, and no one but myself can be blamed for any errors and misrepresentations that may remain in the study.

1. INTRODUCTION

The performance of the livestock sector in sub-Saharan Africa over the last two decades has been disappointing; in most African countries, growth in livestock production has been insufficient even to maintain levels of consumption (Addis Anteneh, 1984). Many development policy analysts (see, for example, Schultz, 1976; Bale and Lutz, 1979; Peterson, 1979; USDA, 1980; Bates, 1983a) suspect that a major reason for this inadequate performance has been the prevalence of inappropriate government policies. Bates (1983b) analysed the validity of these suspicions and concluded that policy analysts were on the right track: livestock policies too often have not only failed to assist but also, in some cases, have hampered livestock development (World Bank, 1981).

There are, however, many technical difficulties to be overcome, particularly in the development of the dairy subsector. For example, extensive areas in the humid zone are tsetse infested and hence inimical to livestock production, leaving much of sub-Saharan Africa with no comparative advantage in milk production. In the arid zone and parts of the semi-arid zone where traditional pastoral systems produce milk mainly for subsistence, it is difficult to develop production and marketing systems which can efficiently serve the increasing urban demand. Moreover, African governments have often intervened on behalf of urban interests to the detriment of producer price incentives.

The extent to which dairy production has been inhibited by policies adversely affecting producer prices was addressed in the present study, but limited data availability prevented a very detailed analysis. The study therefore focused on the degree to which policies have stimulated commercial imports to increase more than would be expected from the excess demand arising from increased population and per capita income.

Preliminary calculations in Chapter 6 show that less than two thirds of the changes in commercial dairy imports can be explained by increases in human population and per capita income. Obviously, other factors are involved, of which import prices and government policies are the two most important.

Europe and the United States have substantial dairy surpluses and are prepared to sell significant quantities of dairy products at very low prices or to give them away free. This has a twofold impact, as the availability of cheap or free dairy imports not only discourages domestic milk production, but also stimulates an increase in domestic consumption, exceptions being countries where food aid is being used to help finance dairy development projects.

In addition, a number of African countries maintain overvalued currencies, which also cheapens the domestic price of imported milk, discourages domestic production and encourages domestic consumption. And while some African countries have trade policies which may be designed to protect domestic dairy industry and thus encourage domestic production and/or raise government revenues, such policies have generally been overwhelmed by the effect of overvalued currencies.

It is hoped that this study will help improve the understanding of the effects of African livestock development policies and thereby contribute to the evolution of more favourable policies. The general trends in dairy production and consumption in sub-Saharan Africa, as well as the role of dairy imports in regions and countries with varying thresholds of sensitivity to the importation of certain foodstuffs, are discussed in Chapter 2. The objectives and instruments of dairy import policy are described in Chapter 3, while in Chapter 4 the potential of dairy food aid for dairy development is considered, citing India's Operation

Flood and similar, but so far less successful, projects in Africa.

A general theoretical analysis of the economic effects of different import policies is presented in Chapter 5. Apart from some basic data which are given in Chapter 2, the empirical analysis of dairy imports into sub-Saharan Africa begins in Chapter 6, with a discussion of the factors

that have caused dairy imports to increase. The analysis is refined in Chapter 7 where two typical dairy import policies, those of Nigeria and Mali, are described in detail. And finally, a summary of the results of the study is given in Chapter 8, together with some observations on the methodology used and certain selected implications for policy-makers and policy analysts.

2. FACTS AND FIGURES ON DAIRY IMPORTS INTO SUB-SAHARAN AFRICA

In this chapter, the basic data available on dairy imports into sub-Saharan Africa are compared with those on domestic production in individual countries in order to establish the magnitude of dairy imports in relation to total dairy consumption. This is followed by a discussion of the importance of dairy imports in individual sub-Saharan African countries and regions and by a cross-country comparison of some economic and social parameters related to dairy imports.

A word of caution is, however, necessary: the results presented here must be interpreted in light of the available data which may vary in quality among countries and are subject to substantial error at best. Yet, despite the reservation about the reliability of population and milk production data for sub-Saharan Africa, it can be safely concluded that, within a decade, a large number of sub-Saharan African countries have become increasingly dependent on the importation of dairy products.

TRENDS IN DAIRY IMPORTS, PRODUCTION AND CONSUMPTION

Our analysis covers 45 countries in sub-Saharan Africa, including 16 in West Africa, 10 each in central and southern Africa and 9 in East Africa (Figure 1).

The term 'dairy products' includes fresh milk, skim and whole milk powder, sweetened and unsweetened evaporated and condensed milk, cheese and curd, butter, butter oil, and any other product that results from processing milk. Whole liquid milk equivalents (LME) of various dairy products are shown in Table 1.

Dairy food aid products are those which are given free of charge, and so are outside the normal commercial networks. Although the recipient country sometimes has to contribute towards the shipping and/or distribution costs, food aid is

usually provided as part of bilateral agreements or in emergency shipments. The two main dairy food aid products are skim milk powder and butter oil for milk reconstitution.

Table 1. *Conversion factors expressed as kilograms of whole liquid milk equivalent (LME) per kilogram of milk product.*

Product (1.0 kg)	Conversion factor (kg LME)
Fresh milk	1.0
Skim and whole milk powder	7.6
Condensed and evaporated milk	2.0
Cheese and curd	4.4
Butter	6.6
Butter oil	8.0
Other products	2.0

Source: FAO (1978a).

Commercial dairy imports

Commercial imports of dairy products¹ into sub-Saharan Africa have increased steadily since 1960. According to FAO Trade Yearbooks (various years), their nominal value increased from US\$ 43 million in 1960 to US\$ 113 million in 1970, and then to US\$ 680 million in 1980. Using the index of consumer prices for industrialised countries (1980 = 100), the corresponding deflated values of imports were US\$ 136 million in 1960, US\$ 258 million in 1970 and US\$ 643 million in 1981.

¹ Unless otherwise specified, henceforth it is assumed that gross imports are equivalent to net imports, i.e. exports are negligible.

Figure 1. Sub-Saharan African countries included in the analysis.

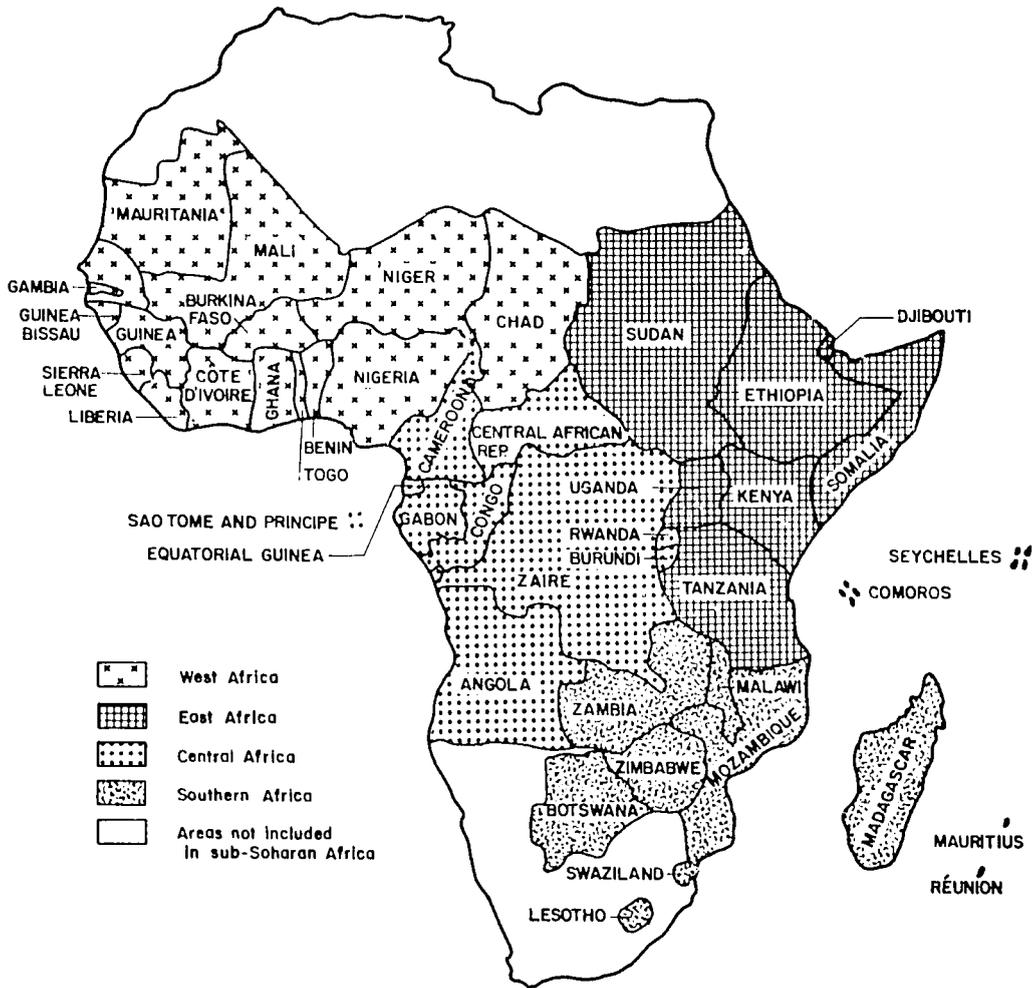


Figure 2 shows the total value of dairy imports into sub-Saharan Africa during 1972–82 in both nominal and deflated terms (the deflator has been re-indexed to 1972 = 100). In nominal terms, the value of commercial imports peaked in 1981 at just over US\$ 700 million, after which both the nominal value and volume began to decline (Figures 2 and 3). The deflated value of commercial and food aid imports combined also peaked in 1981.

In 1980, sub-Saharan Africa spent approximately 5% of its total revenues from agricultural, forestry and fishery exports on imports of dairy products. Whereas in 1960 dried and condensed milk made up two thirds of all dairy imports by value, from 1970 onwards these two products accounted for almost 90% on average. Thus dairy imports have consisted mainly of basic or staple rather than luxury products, such as yoghurt, cheese and fresh milk.

The situation by volume was very similar (Figure 3), as only 20% of the total increase in the nominal value of dairy imports between 1970 and 1980 can be attributed to changes in the average values per unit of LME, whereas about 43% was due to increases in volume and the remaining 37% can be explained by the combined effect of increased unit values and volume².

² The formula to calculate the price effect is

$$\frac{q_0(p_1 - p_0)}{p_1 q_1 - p_0 q_0}$$

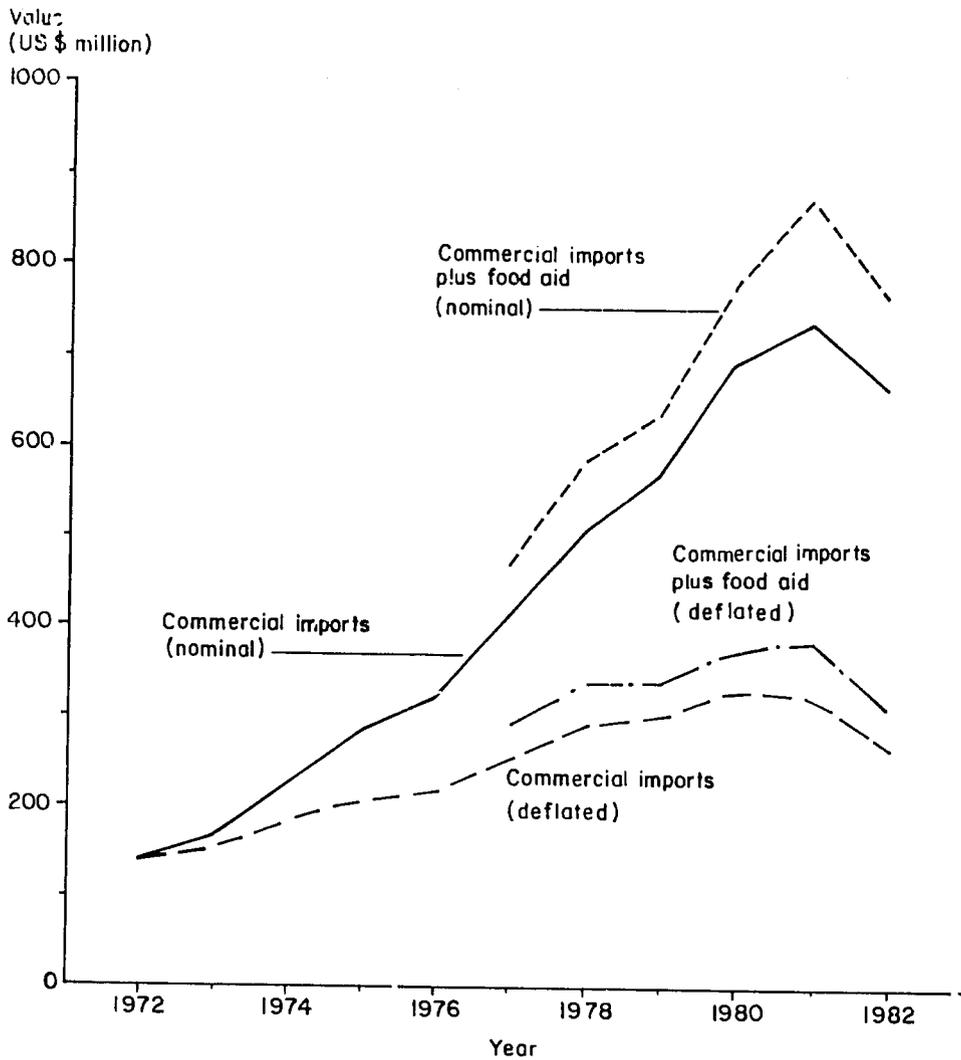
where:

q = volume
p = unit value, and

Subscripts 0 and 1 = beginning and end of the period.

The numerator for the volume and price/volume effects changes to $p_0(q_1 - q_0)$ and $(p_1 - p_0) \times (q_1 - q_0)$ respectively. All three effects together add up to 100%.

Figure 2. *Nominal and deflated¹ values of dairy imports into sub-Saharan Africa, 1972-82.*



¹ Values deflated to 1972 = 100.

Sources: *FAO Trade Yearbooks* (various years) and IMF (1983).

In deflated terms, -7.6% of the increase in total value between 1970 and 1980 is attributed to a price change while the portion attributable to volume change was 193.6% and the remaining -86% was due to the interacting effect of decreased real unit values and increased volume. The largest quantity of dairy products (2.25 million t LME) was imported in 1981 (von Massow, 1984a, App. 3).

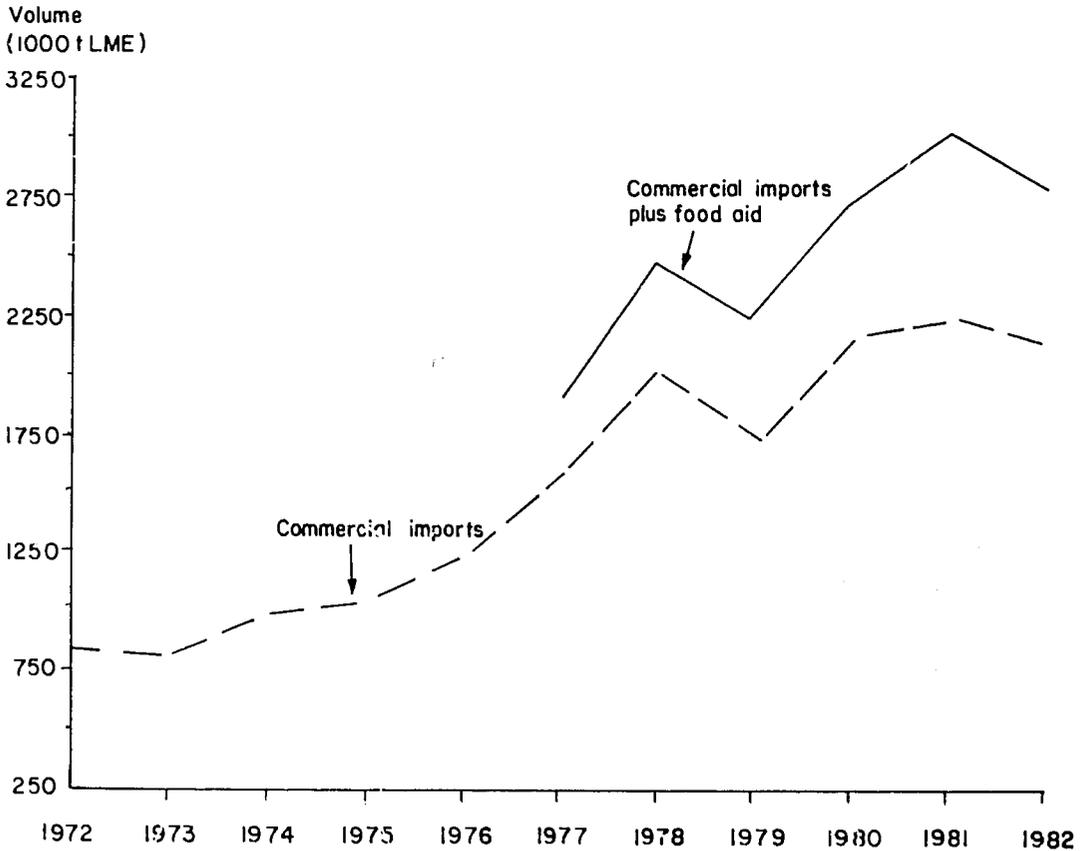
Dairy food aid

Detailed statistics on dairy food aid are available only for the period 1977 to 1982 (FAO, 1984a).

During that period the volume of food aid (in LME) more than doubled (+103%), compared with a 35% increase for commercial dairy imports (Figure 3). In 1981, food aid to sub-Saharan African countries amounted to 88 000 t of skim milk powder and 9000 t each of butter oil and other dairy products (FAO, 1984a), which is equivalent to almost 760 000 t of liquid milk.

The value of these donations can be calculated using the current prices of commercial imports. Butter oil, which is hardly traded commercially, is valued at the import price of butter

Figure 3. *Volume of dairy imports into sub-Saharan Africa, 1972-82.*



Sources: Author's calculation based on *FAO Trade Yearbooks* (various years) and FAO (1984a).

plus 20%, and other dairy products are valued at the price of condensed milk³. On this basis, the value of total dairy food aid in 1981 amounted to almost US\$ 140 million and that of commercial imports and food aid together to roughly US\$ 850 million.

In volume terms (LME), the share of food aid in total dairy imports rose from 17% in 1977 to 25% in 1981 and was 23% in 1982. The quantities imported both commercially and as food aid have to be considered when analysing the effects of imports on domestic prices, production and consumption. Food aid can be given with special conditions attached to its use or as a direct contribution to domestic supplies. Thus the precise

effects of each type of donation must be carefully analysed for each country.

Regional patterns

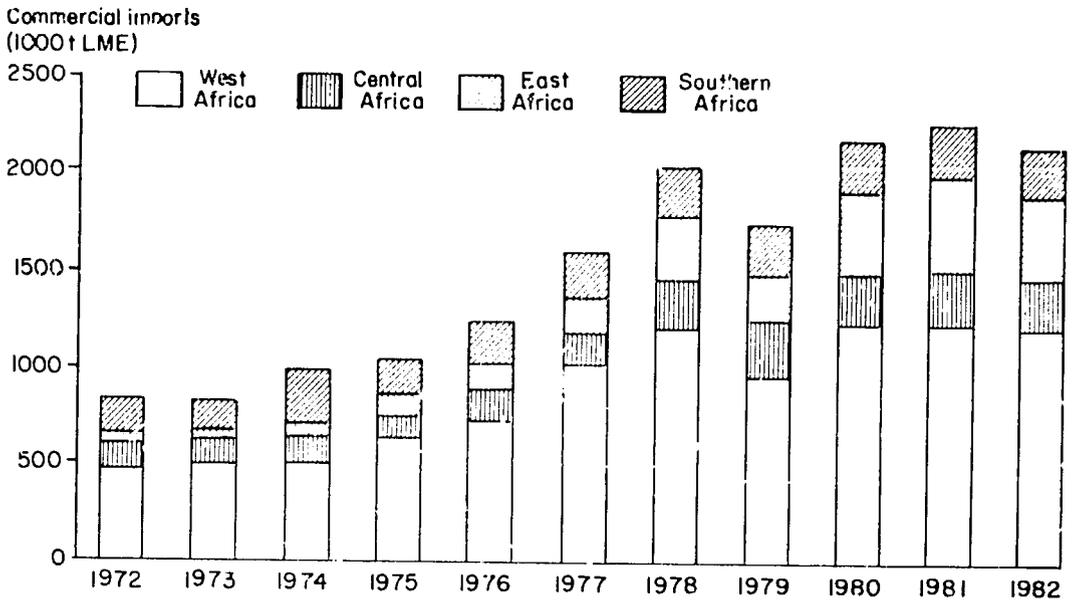
Figure 4 shows the volumes of commercial dairy imports by region. West Africa accounts for more than half of the total (about 55 to 60%), while the other three regions share the remaining 40% more or less equally, although East Africa increased its share from about 5 to 20% between 1972 and 1982.

The pattern for dairy food aid is different: East Africa received almost 50% of all food aid deliveries to sub-Saharan Africa (Figure 5), while in West Africa the proportion fluctuated between 25 and 33% of the total.

More information can be obtained by comparing regional totals of commercial and food aid dairy imports per person. Table 2 shows that in southern Africa, the volume of commercial dairy imports per person was about stable from 1972 to 1982, but that of East Africa increased sharply from 0.62 kg per person in 1972 to 3.87 kg per person in 1982.

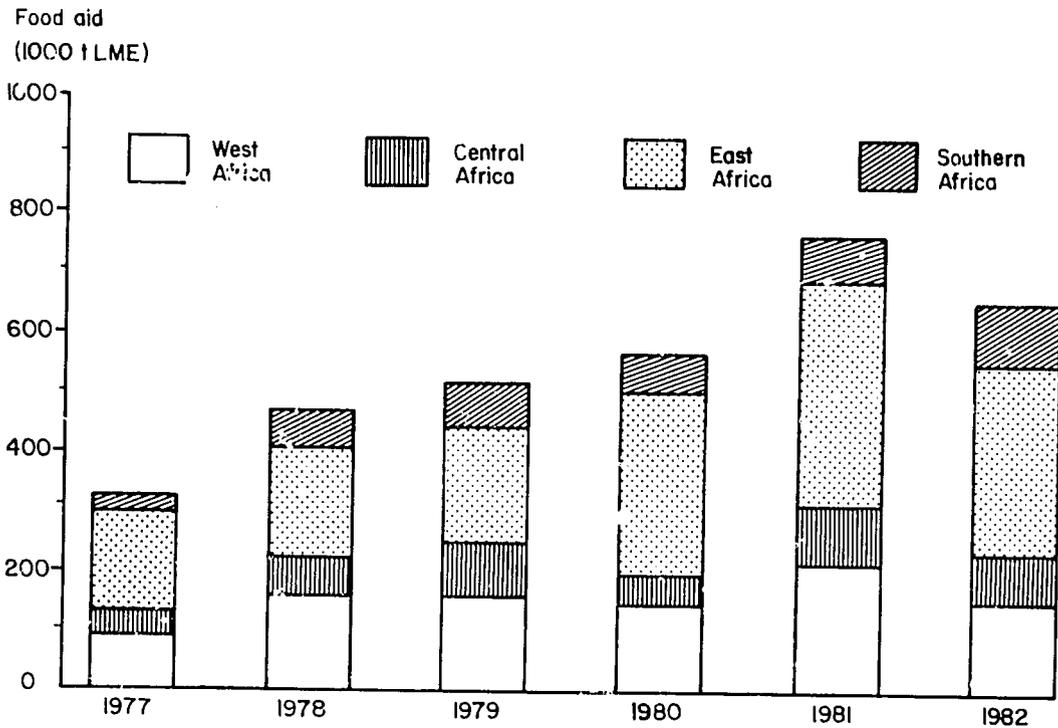
³ The 20% is the price difference between butter and butter oil in the General Agreement on Tariffs and Trade (GATT) minimum prices (GATT, 1983). A weighted regional price average was taken for those commodities and countries where no price for commercial imports was available.

Figure 4. Commercial dairy imports in 9 sub-Saharan Africa by region, 1972-82.



Source: Author's calculation based on *FAO Trade Yearbooks* (various years).

Figure 5. Dairy food aid imports into sub-Saharan Africa by region, 1977-82.



Source: Author's calculation based on FAO (1984a).

Table 2. *Net per capita dairy imports into the regions of sub-Saharan Africa, 1972, 1977 and 1982.*

Year	Type of imports	Net dairy imports (kg LME person ⁻¹)				
		West Africa	Central Africa	East Africa	Southern Africa	Sub-Saharan Africa
1972	Commercial	4.12	2.71	0.62	5.25	3.00
	Food aid	n.a. ¹	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

¹ n.a. = not available.

Source: Author's calculation based on *FAO Trade Yearbooks* (various years), FAO (1984a) and World Bank (1984).

Compared with 1977, combined per capita dairy imports of commercial products and of food aid into East Africa more than doubled (+104%) in 1982. West Africa imported most dairy products at 5.77 kg per person. The largest absolute increase in dairy food aid occurred in southern Africa (from 0.82 to 2.36 kg LME per person), where as West Africa with less than 1 kg LME per person in 1982 ranked lowest in food aid and also had the lowest increase since 1977.

Consumption

Throughout sub-Saharan Africa, commercial dairy imports and dairy food aid together added roughly 8 kg LME to the total per capita consumption of dairy products in 1982 (Table 2). This represents almost 33% of the estimated share of imports in total dairy consumption. Total consumption is calculated as total domestic milk production plus total dairy imports. Since data on milk production in sub-Saharan Africa are not very reliable, changes in dairy imports:consumption ratios may be used instead, if interpreted cautiously. Table 3 gives ratios averaged over 1971-73 and 1981-83 respectively.

West and central Africa, where dairy imports comprised about 50% of total consumption in 1982, are most dependent on imports. In East Africa, local milk producers provide most of the dairy products consumed. However, East Africa is more dependent on food aid; for example, in two thirds (6 out of 9) of its countries, food aid accounted for 40% or more of total dairy imports

in 1982 (the regional average being 46%). In other regions, less than two fifths of the countries fall into this category, but there are five countries (Chad, Rwanda, Comoros, Tanzania and Lesotho) where food aid accounts for over 50% of total dairy imports⁴.

All countries in sub-Saharan Africa import some dairy products on a commercial basis. When commercial and food aid imports are combined, the largest importers by rank are Nigeria, Somalia, Angola, Senegal, Côte d'Ivoire, Ethiopia and Tanzania. Five of the 45 sub-Saharan African countries account for over 50% of total commercial dairy imports into the region. Nigeria is by far the largest importer with 31% of the total volume (LME) in 1982, while Angola, Côte d'Ivoire, Somalia and Senegal together account for another 22%.

Food aid imports of dairy products are much more equally distributed, Somalia being the only country receiving almost 20% of total dairy food aid and therefore ranking second, after Nigeria, in total imports. The other major recipients of dairy food aid are Tanzania (9%), Ethiopia (7%) and Angola (6%). Five countries - Gabon, Côte d'Ivoire, Nigeria, Réunion and Swaziland - did not receive any dairy food aid in 1982.

Total dairy imports may again be related to total domestic consumption of milk and dairy

⁴ For more information at the country level see von Massow (1984a, App. 4).

Table 3. *The proportions of commercial, food aid and total dairy imports in the consumption¹ of dairy products in sub-Saharan Africa, 1971–73 and 1981–83.*

Period	Type of imports	Dairy imports as percentage of consumption				
		West Africa	Central Africa	East Africa	Southern Africa	Sub-Saharan Africa
1971/73	Commercial	26	33	1	23	11
	Food aid	n.a. ²	n.a.	n.a.	n.a.	n.a.
	Total imports	n.a.	n.a.	n.a.	n.a.	n.a.
1981/83	Commercial	41	39	7	25	21
	Food aid	05	13	6	10	6
	Total imports	46	52	13	35	27

¹ Consumption is calculated as total domestic milk production plus total dairy imports (in LME). All figures are averaged over the respective 3 years.

² n.a. = not available.

Source: Author's calculation based on *FAO Production Yearbooks* (various years), *FAO Trade Yearbooks* (various years), FAO (1978a) and FAO (1984a).

products (von Massow, 1984a, App. 4). Imports account for 50% or more of the total domestic dairy consumption in 24 of 45 sub-Saharan African countries. Most of these are coastal countries in West and central Africa which, because of their geographical location, local conditions (tsetse infestation) and climate, have limited livestock potential.

But a calculation of total dairy imports per person shows a very different situation: 12 of the 24 countries import more than 20 kg LME per person and, with a few exceptions, all rank high in total dairy consumption per person. The unweighted average consumption is 33 kg LME over all countries. It is surprising that countries such as Somalia, Mauritania, Botswana and Burkina Faso, which have relatively high cattle population per person, are among the 12 countries which import most dairy products per person.

CROSS-COUNTRY COMPARISON OF PARAMETERS RELATED TO DAIRY IMPORTS

The mere dependency on imports does not by itself create a problem. There is a cause for concern, however, if the overall availability of food is low and imports form a crucial part of food supply, because importation may drain already limited foreign exchange resources from the external trade sector (von Massow, 1985b, p.1).

The situation in any particular country can be assessed by determining:

- the overall availability of food, which is measured by the calorie supply per person in

relation to the theoretical calorie requirement (World Bank, 1984);

- the country's economic situation, which is measured as GNP per capita; and
- the economic importance of dairy products in the external trade balance, which is measured by the value of commercial dairy imports relative to total expenditure on all food and agricultural imports.

In Benin, Congo, Ghana, Côte d'Ivoire, Liberia, Nigeria, Sierra Leone, Togo and Zaire, total milk consumption per person is less than 20 kg, of which over 60% is imported⁵. These countries are highly dependent on dairy imports but, with the exception of Ghana and Sierra Leone, all meet at least 90% of the total calorie requirement of their population, which means that dairy imports do not play a crucial role in overall human nutrition. Despite lower nutritional levels, Ghana and Sierra Leone not only depend on dairy imports, but they also receive more than 30% of the imports in the form of food aid.

The proportion of food aid in total dairy imports usually tends to decrease as the share of imports in total consumption increases, but not without exception. Benin, Central African Republic, Lesotho and Somalia have high proportions both of food aid in total dairy imports and of imports in total consumption.

Countries such as Congo, Côte d'Ivoire, Liberia and Nigeria are highly import-dependent yet have a relatively low consumption and high

⁵ For a detailed analysis see von Massow (1984a, pp. 12–15 and Appendices 5–10).

average income (GNP per capita exceeds US\$ 400). Also, they import most dairy products commercially rather than as food aid.

At the other extreme are Burkina Faso, Burundi, Chad, Central African Republic, Ethiopia, Malawi, Mali, Somalia, Tanzania and Uganda, which have a GNP per capita of less than US\$ 300 and receive more than 30% of all dairy imports as food aid. It is interesting to note that in all these countries except Somalia, more than 80% of the population lives in rural areas. So it would seem that the total dairy imports into these countries and the high proportion of food aid in them are not closely correlated with increasing urbanisation, but there is insufficient evidence available so far to be certain of this.

The economic importance of dairy imports in the external trade balance (which in most sub-Saharan African countries is negative) can be determined by comparing the value of commercial dairy imports with total expenditures on agricultural imports. It appears that many of those countries (except Mali) which in 1981 had GNP of less than US\$ 350 per capita spent more than 10% of their agricultural import bill on dairy

products. This is astonishing since dairy products are not usually considered as basic staple as, for example, grain.

On the other hand, most of the poor countries imported dairy products relatively cheaply; the average value in 1982 was less than US\$ 0.25 kg⁻¹ LME compared with an average of US\$ 0.31 kg⁻¹ LME for sub-Saharan Africa as a whole. It could be, therefore, that the poor countries could not resist importing dairy products because they were relatively cheap on the world markets.

To sum up, dairy imports into sub-Saharan Africa increased tremendously during the 1970s, but their distribution was uneven. West and central Africa now import about half of their consumption of dairy products, while East Africa imports less than 20%. Some individual countries are very dependent on dairy imports which come partly as food aid. Not a single sub-Saharan African country was able to maintain, let alone increase, per capita dairy consumption over the last 10 years without increasing its imports. The products imported were mainly basic foodstuffs, such as milk powder or condensed milk, not luxury goods.

3. POLICY ISSUES

DEFINITION OF THE TERM 'POLICY'

National policies play a critical role in livestock development (World Bank, 1981, p. 55). They not only modify the overall economic environment for agricultural production, but also directly affect production, marketing, consumption and external trade in livestock products. Thomson and Rayner (1984, p. 162) defined national policies as "a collection of governmental instruments - taxes, subsidies, quotas, regulations, state-funded research and development, and even speeches - which are coordinated by politicians and bureaucrats towards the attempted amelioration of perceived problems".

Sandford (1985, p. 5) pointed out that 'having or making a policy' also includes having to choose between different policy options. The definition of policy must therefore include government objectives as well as policy instruments. Hence policy is "a set of decisions which are oriented towards a long-term purpose or to a particular problem" (Sandford, 1985, p.4). In the context of this study, policies are defined as those decisions which affect the dairy sector, particularly dairy imports.

The definition and subsequent analysis of the objectives and instruments of dairy import policy does not cover all the possible policy effects on dairy imports. Thus a distinction must be made between deliberate policies for which governments design instruments which they hope will be effective, and those expedients which are publicly espoused in the full knowledge that they can never succeed. Furthermore, some policies are clearly targeted towards dairy imports or the sector in general, whereas others, such as exchange rate setting, have an indirect effect on them. This may lead to incompatibility, since government decisions in one sphere may well conflict with those in another.

OBJECTIVES OF DAIRY IMPORT POLICY

Dairy imports have implications for food availability, for overall imports and for the development of domestic milk production. Bates (1983b, p. 297) maintains that food policy in sub-Saharan Africa "appears to represent a form of political settlement - one designed to bring peaceful relations between governments and their urban constituents". Other authors (e.g. Christensen and Witucki, 1982, p. 890) have drawn similar conclusions, namely that African governments have in their food and agricultural policies given highest priority to urban consumer welfare. The main objectives of their general import policies are usually to generate revenue for the national budget and to control the balance of foreign exchange, while sector policies usually aim to develop domestic production and achieve self-sufficiency.

Most African governments are motivated by one or more of the following considerations when choosing policy options:

- i) To provide the urban consumer with dairy products at a price which the government feels they can afford to pay;
- ii) To generate revenues from dairy imports for the national budget;
- iii) To control and possibly reduce the amount of foreign exchange that is spent on dairy imports; and
- iv) To stimulate dairy development, thereby generating income for producers and moving towards self-sufficiency in dairy products.

Governments often pursue several objectives simultaneously, some of which may be conflicting. For example, it is difficult to charge low consumer prices for imported dairy products and at the same time reap large benefits from taxing such imports. A balance must then be struck by weighing the relative priorities of the conflicting objectives. As Sandford (1985, p. 6) puts it, "...governments do not have to opt exclusively

for just one objective, but it is important that they consider which of their objectives are the most important and how much progress towards one objective they are prepared to sacrifice in order to make progress towards another”.

The four objectives of dairy import policy are now briefly discussed before considering which instruments most efficiently promote the chosen objectives, which is the second decision facing any administration.

A government may pursue consumer interests (objective i) for the simple political expedient of retaining power, but also because it is concerned about overall consumption or the general level of nutrition of the people within certain areas or among specific groups, such as children or nursing mothers. The objective must be quantified, since there is little point in pursuing it with an inappropriate instrument. For example, before subsidising the importation of baby milk, the desirable price and quantity must be determined, as well as the target group to whom the milk is to be made available.

The main goals of a general import policy – to generate revenue and conserve foreign exchange (objectives ii and iii) – require little elaboration with reference to the dairy subsector. No foreign exchange payments are involved in dairy imports received as food aid, but neither is it politically feasible to charge tariffs on such imports. The two goals, which are otherwise compatible, are then in conflict.

A further characteristic of dairy imports is that, unlike grain, they come in many different forms – butter, milk powder, condensed milk and even flavoured yoghurt. Different tariffs may be levied on these products to generate revenue, but only after taking into account the national objectives towards the consumers.

Both foreign exchange conservation and import taxation increase domestic prices. Such measures protect local dairy producers and increase their share of the domestic milk market, though these effects may not have been the declared policy objectives. Many governments do in fact declare the attainment of self-sufficiency in basic foodstuffs (objective iv) as their chief objective, and this entails three problems.

First, to increase substantially domestic agricultural production, especially of milk, calls for a long-term commitment and consistent policy, but both are frequently lacking. Second, the term self-sufficiency itself needs clarification. By definition, a country becomes self-sufficient if it closes its borders and covers domestic consumption by domestic production. But this begs the

question, at what level of per capita consumption is self-sufficiency to be achieved? Public announcements of self-sufficiency must include figures on both target consumption per person and target production to justify a certain rate of production, or direct measures to boost domestic milk production.

The third problem relative to self-sufficiency concerns a country's overall welfare. Van Dijk et al (1983) challenged the validity of the general argument that the welfare of developing countries will be maximised through free trade in dairy products. They cited such qualifying factors as the allocation of scarce foreign exchange, income or food distribution and the possible indirect effects of dairy production on agricultural development, but these factors qualify the free-trade argument without altogether overturning it (van Massow, 1985b, p.1). A government wanting to follow a welfare-maximising policy must be able to justify any production target deviating from the level that would be achieved under free trade.

INSTRUMENTS OF DAIRY IMPORT POLICY

Having discussed the reasons why governments may interfere with dairy imports, i.e. the objectives of dairy import policy, we shall now consider briefly the methods by which they interfere, i.e. the instruments of dairy policy. For convenience, policy instruments have been grouped under the four objectives discussed above. They are described in general, and their appropriateness to achieve one or more of the objectives in question is assessed.

A general consumption target and/or consumer price level for milk and dairy products (objective i) can be achieved by reducing existing import tariffs, by paying import subsidies and by using food aid. An overvalued exchange rate also stimulates imports. But to reach particular target groups within the population, more specific instruments must be designed, e.g. food stamps or special shops.

An instrument which benefits all milk consumers enriches those who can do without food subsidies. All general consumer-oriented instruments (e.g. import subsidies or untargeted food aid) tend to depress domestic prices, which in turn serves as a disincentive for domestic producers. In contrast, subsidies to defined groups can create a demand for milk that would not otherwise exist.

Targeted import measures help avoid or at least reduce disincentive effects, but they are difficult to implement. For example, it is possible to tax dairy imports at different rates or to subsidise

imports of those products which are usually consumed by the lower-income groups. Such methods, however, are not the best way of reaching selected groups of consumers as they primarily raise the general average level of milk consumption.

Charging tariffs on dairy imports generates revenues (objective ii), but it also reduces the volume of imports. The level of tariff may be specified as a fixed amount, an *ad valorem* rate, or a progressive rate, and this has differential implications for the government's revenues. The different levels also determine the effect of the tariff on the quantities imported and consequently on domestic prices, production and consumption.

Consumers of imported dairy products are usually assumed to be the more affluent members of society, hence better able to bear the burden of taxation. Clearly, imposing import tariffs is not compatible with the promotion of consumer benefit. Thus if the government wants to give the poorer or more vulnerable groups access to cheap dairy products, it must exempt them from duty payments - which presents a considerable administrative problem. Alternatively, dairy imports can be taxed progressively and the revenue used to subsidise milk to specific target groups. But although there are ways of reducing the negative effects of import tariffs for some consumers, the overall welfare effect as a whole will always be negative, because imposing import tariffs conflicts with the consumers' benefit in principle.

Import tariffs also affect domestic producers and have implications for the foreign exchange account. Raising tariffs is compatible with two common objectives of dairy import policy, namely to save foreign exchange and achieve self-sufficiency. Reducing dairy imports reduces the hard currency bill and protects the domestic dairy sector, by increasing the price of dairy products. The rate of self-sufficiency automatically goes up when imports are reduced, but more often than not the increase is merely mathematical rather than a real success for dairy import policy.

Exchange rates are directly influenced by government policy in almost all African countries. If the rate is overvalued, as is often the case, all import prices are comparatively low when translated into domestic currency. Moreover, prices for dairy imports in the mid-1980s were below production costs even in many exporting countries, and are likely to remain so in the foreseeable future (FAO, 1985). Low import prices considerably reduce the drain of foreign exchange.

Governments can impose substantial tariffs on dairy imports and raise revenues from them, yet the price of dairy imports (in local currency, including the tariff) will still not exceed the domestic cost of milk production. Such a policy lessens the trade-off between revenue generation and consumer interests, while the government gets away cheaply in terms of foreign exchange, but the bill for it must be paid elsewhere in the economy.

Foreign exchange can be conserved (objective iii) by imposing tariffs to reduce dairy imports, and directly by controlling the allocation of foreign exchange through import licenses. Allocating foreign exchange for dairy imports has the same effect as a variable import quota, whose limit in volume terms increases with declining international prices.

As with all the other instruments which tend to reduce dairy imports, foreign exchange allocation is not compatible with the promotion of consumer interests. It does save foreign exchange though and serves those objectives that aim to stimulate domestic milk production, thereby helping to achieve self-sufficiency (objective iv).

Dairy development can also be pursued through a channelled increase in dairy imports, rather than a decrease. A number of different instruments are usually involved, including the use of dairy food aid as a major component. The complexity of such a policy, and its potential for general livestock development in Africa, are discussed in detail in Chapter 4.

4. THE SPECIAL ROLE OF DAIRY FOOD AID

Food aid in dairy products differs from commercial dairy imports in three major aspects. First, the food aid commodities are supplied free of charge, so there is no burden on the foreign exchange account of the recipient country. Second, the offer of and the request for food aid are the result of a political decision, not only of market prices and milk supply and demand forces. The availability of dairy food aid, however, may well affect the market price and the demand for commercial imports. Finally, dairy food aid has the potential to contribute to dairy development.

The European Economic Community (EEC) is the most important donor of dairy food aid to Africa. Since 1979, the EEC has annually donated 150 000 t of skim milk powder and 45 000 t of butter oil to various developing countries, aid organisations and the World Food Programme (Commission of the European Community, Brussels, personal communication). The major reason behind the EEC food aid policy is the large surplus of dairy products within the community: stocks of skim milk powder in mid-1982 were 1.6 times that of sub-Saharan Africa's total dairy imports for that year (both in LME), and despite milk production quotas, the surplus is not likely to be substantially reduced in the near future (FAO, 1984b). In addition, the United States and other major dairy producers in the developed world also generate dairy surpluses which are available for food aid.

The agricultural lobby within the EEC constantly presses for more food aid donations, while those responsible for development issues have become reluctant to increase them. Some even favour a reduction, arguing that the use of dairy food aid cannot be effectively controlled (Commission of the European Community, Brussels, personal communication; *The Economist*, 1984).

But the main argument against additional dairy donations is that, because of their price

effect, they may act as a disincentive to local milk production, especially when they are not targeted towards selected groups. Also, local milk processing plants cease collecting fresh milk because they find it more economical and convenient to sell milk reconstituted from imported skim milk powder and butter oil⁶. Another argument against dairy food aid is the lack of control over its distribution: often the wrong people – the more affluent – benefit from the donations.

These arguments against dairy food aid are nevertheless closely related to its one major strength – its potential to contribute to dairy development in the recipient country. Food aid for development purposes must be distinguished from emergency shipments and other consumer-oriented aid such as 'Food for Work' programmes, for it aims to benefit consumers and producers alike. The strategy has been successfully implemented on a large scale in India⁷ through 'Operation Flood'.

The concept is very simple: aid-supplied skim milk powder and butter oil are reconstituted as milk or processed into other dairy products which are sold at commercial prices. (The net revenue thus equals the market value of the products sold, minus processing and distribution costs; no product value is deducted since the raw materials are provided free). Profits realised from the sale of reconstituted milk are then used to support dairy development projects, and in time, dairy food aid imports are replaced by increasing local milk supplies. The particular advantage of food

⁶ See Ministry of Agriculture, Tanzania (1977) and the Malian example in Chapter 7 for case-specific discussions of the dangers of dairy food aid imports.

⁷ For more information on dairy development in India see Mogens (1977) and Patel (1979).

aid for development is that, unlike direct financial aid, it overcomes the problem of underutilised processing capacities until domestic production increases.

An essential aspect of the strategy's economics is to determine the sale price of the reconstituted milk. This is commonly done by taking the proportions of skim milk powder (roughly 0.10 kg) and butter oil (0.035 kg) in 1 litre of reconstituted milk and multiplying them by the equivalent border prices for commercial imports. Adding to this figure transport costs from the border to the area of consumption and processing costs gives the 'border equivalent' retail price. In theory, there is a comparative advantage if domestic production costs, net of all subsidies and taxes, are equal to or lower than the derived price for imports.

In Mali, locally produced fresh milk can claim a substantial premium over reconstituted milk, so that the price of the latter must be adjusted for this consumer preference. For example, if the border price equivalent for 1 litre of liquid milk is US\$ 0.20 and transport and processing costs amount to US\$ 0.15 litre⁻¹, then the 'border equivalent' retail price (net of distribution cost) of reconstituted milk is US\$ 0.35 litre⁻¹. At a price premium of 50% for fresh over reconstituted milk, Mali can invest in dairy development without incurring overall economic losses, as long as the cost of producing domestic milk does not exceed US\$ 0.53 litre⁻¹ [US\$ $0.35 \times (1 + 0.50)$]⁸. The consumer then buys reconstituted milk at world market prices, production takes place at economically undistorted prices, and the government can spend US\$ 0.20

from any litre of reconstituted milk on dairy development.

There are three common pitfalls in the implementation of a dairy development policy based on food aid. First, the government must resist the temptation to win political popularity by selling reconstituted milk at a price below competitive levels, as such a price would serve as a disincentive to domestic production and reduce the funds available for dairy development. Second, all revenues from the sale of reconstituted milk must be reserved for the development of the dairy sector and not used for other urgent matters. And third, the government must withstand the pressure from processing plants to import ever more food aid in order to maximise profits. In this, again, considerable political will is necessary, since it is easier to process imported raw materials than to organise efficient local milk collection.

Some of these pitfalls can be avoided by an appropriate institutional set-up. The processing plant, for example, will give the right emphasis to its collection activities if it is a true farmers' union. Sales revenues from food aid can be better targeted if they are held and administered separately from the general budget. A controlling body should be established by the aid donor with both government and producer representatives and invested with the right to stop aid deliveries or interfere otherwise if the aid programme is not appropriately implemented.

Though necessary, these measures still do not guarantee that dairy production will develop with the help of food aid. On the other hand, failure to implement them is usually the reason for lack of development in the sector. The subject will be discussed further in Chapter 7 where an actual case of food aid for dairy development is considered.

⁸ The calculation is given in more detail in von Massow (1985a).

5. ECONOMIC EFFECTS OF SELECTED IMPORT POLICIES

Before embarking on an empirical analysis of the causes and effects of dairy imports and import policy in sub-Saharan Africa, the theoretical framework for such an analysis must be established. In this chapter, we consider the economic effects of such policy instruments as import tariffs and subsidies, exchange rate setting, foreign exchange allocation, and targeted and untargeted distribution of food aid.

IMPORT SUBSIDY AND IMPORT TARIFF

In economic terms, an import subsidy has the reverse effect of an import tariff. The effects of both instruments on the quantities imported are shown in Figure 6.

In a free-trade situation, the domestic market price P_d is equal to the world market price P_w ⁹. The difference between domestic supply SS and demand DD at the price P_w is met by imports of the quantity M_0 (i.e. imports in free-trade situation). If the government introduces an import subsidy s (a fixed amount per tonne in this case), the effective domestic price is reduced to $P_d = P_w - s$ and imports increase from M_0 to M_1 (i.e. imports after import subsidy has been introduced).

The consumers benefit, for their additional welfare¹⁰ is equal to the area $a + b + c + d + e$, but the producers lose the equivalent of the area $a + b$. The government's subsidy (loss) amounts to the area $b + c + d + e + f$ (imports $M_1 \times$ subsidy s), which is the difference between the import bill

and the value of the imports at the domestic price $P_d = P_w$. The net social gain (loss) is determined by subtracting the losses from the gains, i.e.

consumer gains - producer losses - government costs or

$$a + b + c + d + e - a - b - b - c - d - e - f = -b - f.$$

There is thus a substantial net social loss (represented by the shaded areas b and f) resulting from the import subsidy. This loss is referred to as a 'dead weight loss' in welfare economics (Just et al, 1982).

To summarise, the introduction of an import subsidy (without further specification) will cause consumers to buy more of the imported goods since they can buy them at a lower unit price. The reduced price will cause a reduction or cessation of domestic production. The government outlays are funded from the national budget, but, depending on the relative tax burden, consumers and producers share the cost of the additional government expenditure, and together incur a dead weight loss.

Import tariffs generating funds for the national budget are more common than import subsidies. In Figure 6, let us assume that P_w is equal to the world market price P_w and t is the tariff (a fixed amount per tonne), then the domestic price increases from $P_d = P_w$ to $P_d = P_w + t$ and imports decrease from M_0 to M_2 .

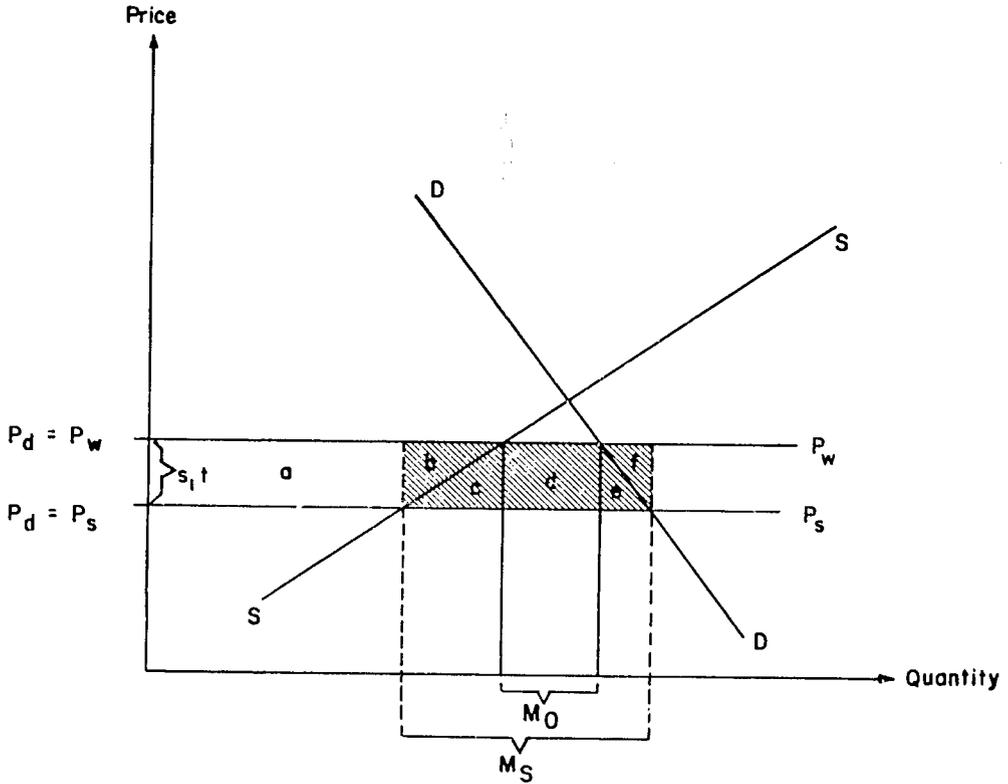
The consumers' loss is equal to the benefit accrued in the subsidy example ($a + b + c + d + e$), while the producers' gain is $a + b$. The government collects tariff revenues equal to the area $b + c + d + e + f$ (imports $M_2 \times$ tariff t), which represents the amount by which the value of imports at domestic prices exceeds the import bill. The effect of an import tariff is thus the opposite from that of an import subsidy in every aspect except the dead weight loss which is again $b + f$.

To summarise, when import tariffs are charged, the consumers buy fewer imported products since they are more expensive, and

⁹ The following assumptions are made: a small country without influence on the world market price; an infinitely elastic world market supply; negligible transport costs between the world and the domestic markets; and all changes treated *ceteris paribus*.

¹⁰ For a discussion of the concept of economic welfare see Corden (1974), Meade (1966) and Samuelson (1972, p. 480 et seq.).

Figure 6. Economic effects of import subsidy and tariff.



producers expand production in response to the higher domestic price. The government collects the tax revenues which may be used to the benefit of society, but in the process generates an overall dead weight loss. The amount of revenues, as well as the changes in consumer and producer welfare and the overall net social loss, depend on the level of the tariff and the price elasticities of domestic demand and supply.

OVERVALUED EXCHANGE RATE

The effects of an overvalued exchange rate can be deduced from Figure 6. Let us take again the free-market situation, where domestic price P_d is equal to the world market price P_w , and give a numerical example. If $P_w = \text{US\$ } 250$ is equal to $P_d = \text{DC } 1000$ ¹¹ (at the undistorted exchange rate of $\text{US\$ } 1 = \text{DC } 4$), then by fixing the exchange rate at $\text{US\$ } 1 = \text{DC } 3$ the government reduces the domestic price of the import to $P_d = \text{DC } 750$.

The effect of an overvalued exchange rate is identical to that of an import subsidy: imports increase, consumers benefit by area $a + b + c + d + e$ and producers lose by area $a + b$. Overvaluing the domestic currency does not have any

direct budgetary implications and there appears to be a net social gain of $c + d + e$, but the analysis of this is incomplete. While government saves on expenditures ($b + c + d + e + f$ in Figure 6), the bill is paid elsewhere in the economy. For example, consumer expenditures are diverted from domestic consumables to imported goods, or domestic production of the commodities that are being imported is reduced. Exports are equally discouraged, which reduces income and employment in all export commodity sectors.

FOREIGN EXCHANGE ALLOCATION

The expenditure of foreign exchange may be restricted by a licensing system. In a free-trade situation, the world market price P_w prevails in the country (Figure 7), and domestic supply S_o and imports M_o meet the total demand for dairy products at this price. A fixed allocation of foreign exchange of $P_w \times M^*$ will reduce imports to M^* and the domestic price will increase to P_d , causing local production to increase to S^* .

As in the case of import tariffs (Figure 6), consumption is reduced and consumers lose the area $a + b + c + d + e$ while producers gain $a + b$. The country's savings in foreign exchange are equal to $P_w \times M_o - P_d \times M^*$ (i.e. the area $g + h + i - d - h$ in Figure 7). The effects of foreign

¹¹ DC = domestic currency.

exchange allocation on producers and consumers are thus identical to those of import tariffs, but the government loses revenue when restricting foreign exchange expenditure.

Area d in Figure 7, which is equal to $(P_d - P_w) \times M^*$, is a quota rent created by the allocation of foreign exchange, and its existence shows that restrictive allocation of foreign exchange has the same effect as any other quantitative import restriction. The rent is usually acquired by the importing traders, but the government can impose a tariff for the same amount or auction the foreign exchange licences¹².

FOOD AID DISTRIBUTION

Food aid is distributed in many ways, but we shall discuss only two: untargeted food aid, which adds to or substitutes for commercial dairy imports, and targeted food aid, which is reserved for specific regions or consumer groups.

In Figure 8, the free-trade situation is depicted by domestic production S_0 and commercial imports M_0 , providing market equilibrium at the world market price P_w . If food aid M_1^A is available, the domestic supply curve SS shifts to S_1S_1 (domestic supply plus food aid), and commercial imports M_0 decrease to M_1 since some of them are replaced by food aid.

If the food aid is distributed at the existing world price, neither domestic producers nor consumers are directly affected by it. They are, however, affected indirectly since the country as a whole benefits by the value of the food aid, which is equal to $P_w \times M_1^A$ or the shaded area in Figure 8. However, for these effects to be valid, a perfectly elastic supply of commercial imports at the world market price P_w has to be assumed.

Consider now the case when the amount of food aid M_2^A coming in is larger than the commercial imports M_0 in the free-trade situation. In a case like this the supply curve (domestic supply plus food aid) shifts from SS to S_2S_2 , providing market equilibrium at a domestic price P_d which is below the world market price P_w .

When food aid M_2^A more than substitutes for all commercial imports, domestic producers have to decrease their output from S_0 to S_2 ,

¹² See Rom (1979) for a further discussion of different forms of import restriction. The likely beneficiaries of such rents are discussed in Rom (1979, p. 143 et seq.) and Tollison (1982).

Figure 7. Economic effects of restrictive foreign exchange allocation.

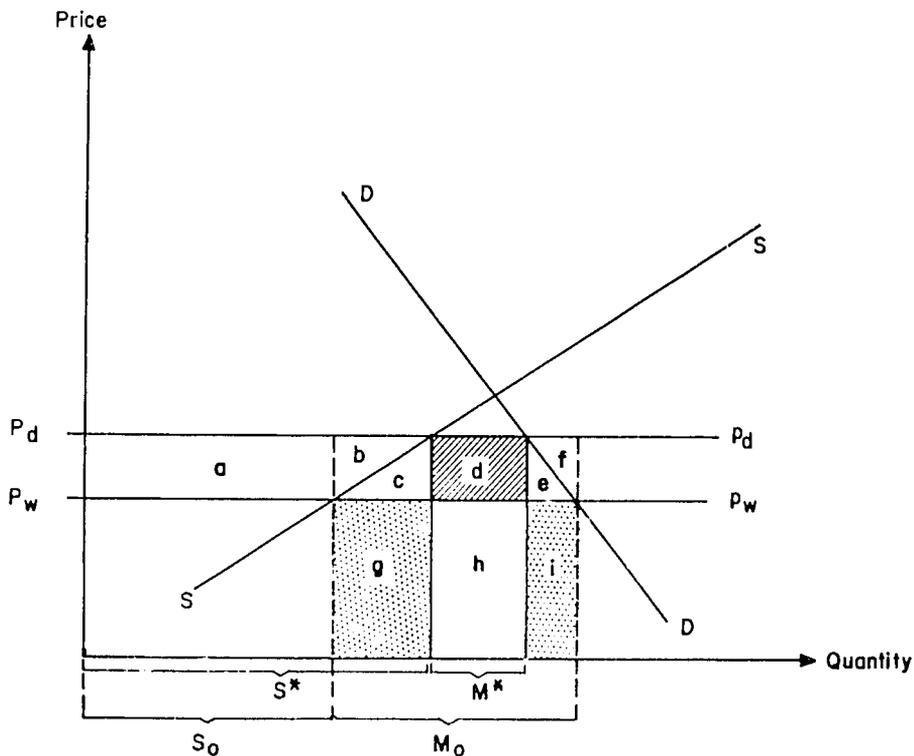
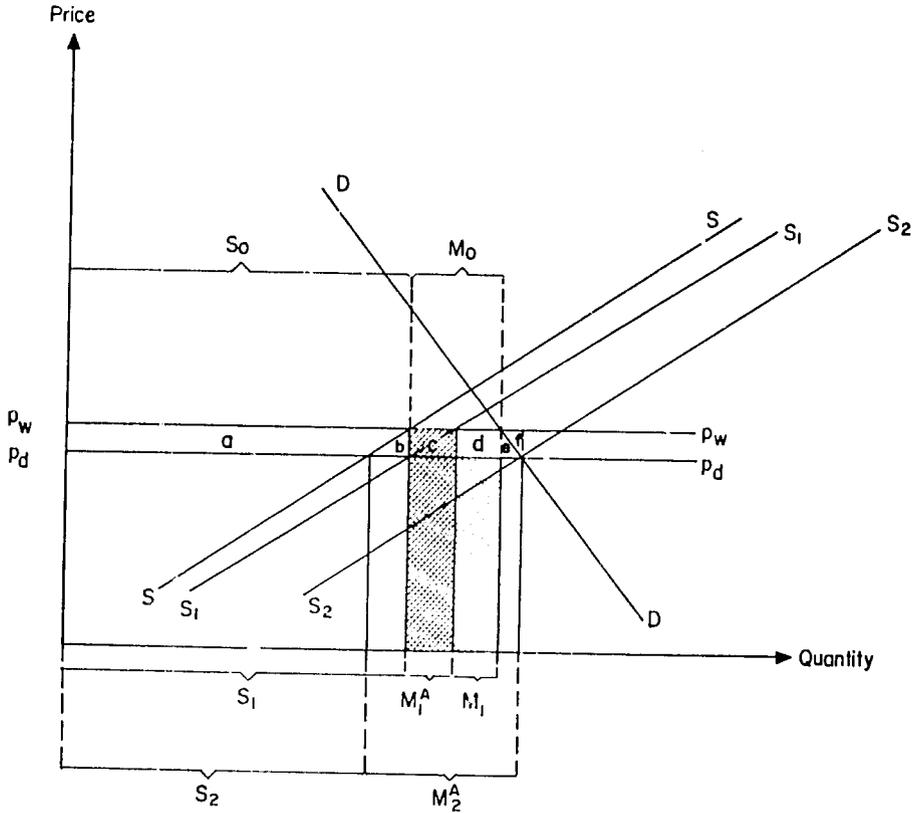


Figure 8. Economic effects of untargeted distribution of food aid.



thereby incurring a welfare loss equal to the area a in Figure 8. Bringing in more dairy food aid than commercial imports thus acts as a disincentive to domestic production. Total consumption, on the other hand, increases from $S_0 + M_0$ to $S_2 + M_2^A$ and consumer welfare increases by the area $a + b + c + d + e$. The country as a whole also gains, in the form of the value of the food aid (the dotted area in Figure 8).

Again, a perfectly elastic supply of commercial imports is assumed. It is also assumed that all those who benefit from the food aid are established consumers of dairy products, i.e. the demand curve DD remains unchanged. This last assumption does not apply in the case of targeted food aid, since this is distributed to groups that have so far been excluded from the market because they either lack the necessary buying power or are far from the existing outlets.

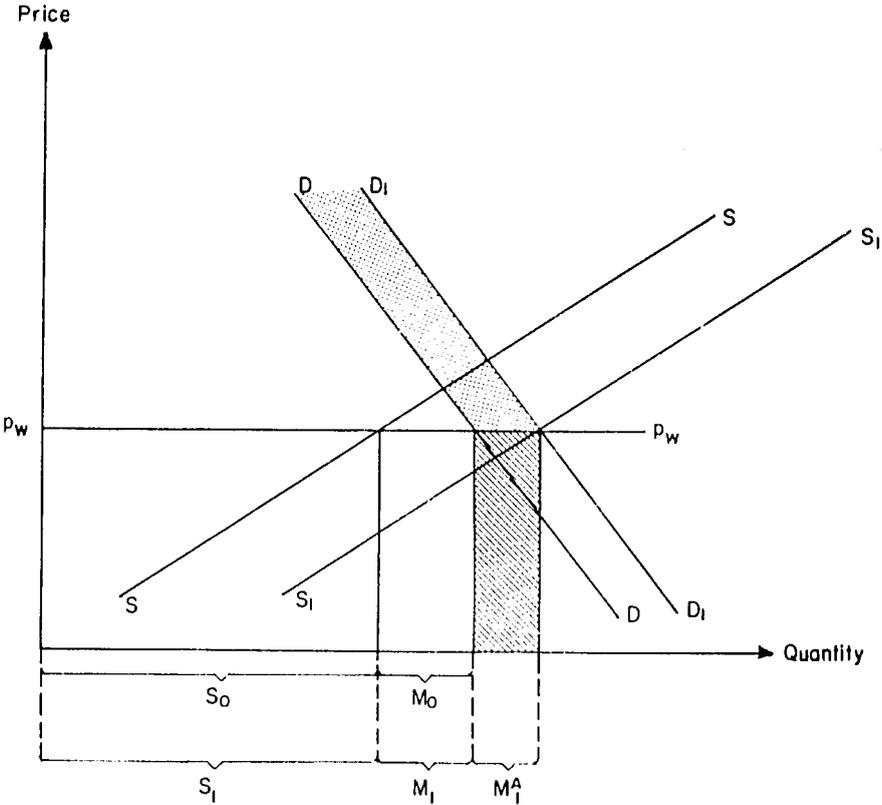
Targeted distribution of dairy food aid is illustrated in Figure 9. Providing dairy food aid M_1^A to an urban slum area where no dairy products were previously consumed shifts the demand

curve from DD to D_1D_1 (i.e. additional demand appears on the market), with S_1S_1 being the aggregated supply of domestic production, commercial imports and food aid.

Targeted food aid does not affect the domestic market price or producer welfare, or for that matter the consumers of commercial dairy imports. Only the target group benefits from the food aid, the benefit equaling the product value (the shaded area) plus the welfare effect (the dotted area).

The real effects of the policy instruments discussed may differ substantially if some or all of the assumptions made do not apply. They also depend on the administrative processes involved, as the marked difference between the effects of targeted and untargeted food aid distribution have shown. Nevertheless, such generalised presentations are very useful in pointing out the underlying implications of different policy instruments, such as whether their effects on consumers and producers are complementary or in conflict, and whether overall social gains are positive or negative.

Figure 9. Economic effects of targeted distribution of food aid.



6. CROSS-COUNTRY ANALYSIS OF THE CAUSES OF INCREASED DAIRY IMPORTS

An increase in dairy imports is a common feature in many African countries, and thus it may be assumed that there are common factors causing it. In this chapter, the potential reasons for the increases are discussed with general reference to various countries. Chapter 7 gives some details on two countries, Nigeria and Mali.

A comprehensive analysis of the effects of increased dairy imports into sub-Saharan Africa is not possible for two reasons. First, the available data base for dairy production, human nutrition levels and household incomes is weak and, consequently, unable to reflect the changes expected from increased dairy imports. There is also the problem of time-lag between the changes in price patterns induced by increased imports and the production modifications in response to them. Second, the effects of dairy import policy on consumer and producer welfare are influenced by a number of other policies which have not been considered in this study.

CHANGES IN DEMAND AND SUPPLY

According to the basic theory on market equilibrium, consumption during any period of time is equal to domestic production plus net imports (plus any net change in stocks, but this will be ignored). In this section it is assumed that:

- consumption is wholly composed of market demand (i.e. non-market elements such as free school milk and other social programmes are excluded), and that
- market demand and domestic supply are not influenced by the level of imports, which means that imports are treated as a residual to fill the gap between supply and demand.

Discussion in Chapters 3 and 5 has shown that the second assumption is not quite true. Governments may interfere directly or indirectly with imports, such that the levels of imports are partly determined by factors exogenous to market

supply and demand, and these factors must be quantified and explained. To do that the actual levels of dairy imports into sub-Saharan Africa are compared with the quantity of imports necessary to fill the gap between domestic supply and demand. The actual development of dairy imports as affected by policy is then compared with a theoretical one which assumes that imports change only as a function of changes in domestic demand and supply. This calculation is done on a per country basis below.

Although population growth and rising real incomes are generally assumed to be the main factors stimulating demand, changes in real consumer prices and the possible effects of urbanisation must also be taken into account. The human population of sub-Saharan Africa increased by 2.9% on average each year between 1970 and 1980 (World Bank, 1981). If all other factors remained constant, and assuming no alteration in consumption caused by changes in age distribution, the demand for milk should have increased at the same rate as the population¹³.

Over the same period, incomes (measured as GNP per capita) increased annually by an average of 0.8% in sub-Saharan Africa (World Bank, 1981). Part of this additional income was probably spent on milk products. The increase in the demand for milk due to rising incomes can be calculated from the income elasticity of the quantitative demand for milk in sub-Saharan Africa, estimated in the mid-1970s (FAO, 1978b) to be 0.68.

Based on this income elasticity of demand, an annual growth rate of about 0.54% could be

¹³ A changing age distribution could have influenced the demand for milk if the proportion of children in the population increased and they consumed more milk per person than adults. But since no empirical data exist, a population elasticity of demand equal to 1 will be assumed.

expected (0.8×0.68). There are, however, several complicating factors, for consumers differ according to their rural or urban status and income, and their preferences change over time. Furthermore, different dairy products have different income elasticities. The income elasticity of 0.68 is, therefore, only a rough indication of the general relationship between incomes and the demand for dairy products.

The data base is inadequate to calculate the income elasticities of milk demand for individual African countries and different products. But when the effects of population growth (2.9%) and of increased per capita income (0.54%) are added, it is obvious that the demand for dairy products in sub-Saharan Africa should have increased by an average of about 3.4% per annum during the 1970s.

The effect of retail price changes on the consumption of milk is well defined in economic theory: rising prices with a normally shaped demand function will lead to a decrease in consumption, and vice versa. The extent of the change is determined by the price elasticity of demand. But while cross-price elasticities could in theory indicate the effects on consumption of the changing prices of commodities which are complementary to or substitute for milk, in practice there are several problems.

First, milk is not a homogeneous product and qualitative differences in fat content, purity, freshness and taste are likely to lead to substantial price differences. Reconstituted milk often cannot compete at the same price as fresh milk because, allegedly, it is of poorer quality. Second, the effect of price on consumption also depends on the distribution systems for milk and dairy products. In most sub-Saharan African countries, petty traders compete with cooperatives and/or parastatals and each tends to provide different services to the consumers, which, combined with differences in product quality, can have important implications on the price elasticity of demand for milk.

Finally, there is the problem of insufficient information on retail prices and their fluctuations. In most African countries, no single price can be established because of the diversity of distribution channels. Some tentative calculations on price ratios and exchange rates are given later, but the information is inadequate to quantify the effects of changing consumer prices on the demand for milk. The effects of changes in import prices and exchange rates are discussed below.

Migration of people from rural to urban areas is often quoted as a major factor determining the demand for food. But while rapid urbanisation

may change consumption patterns, it certainly boosts demand for imported foodstuffs, since the change of status from rural subsistence to that of the urban dweller would seem to force people to meet most of their food requirements in the market place. In most sub-Saharan African countries it is easier to import milk products than to provide them locally, given the state of existing marketing channels and general infrastructure.

According to the World Bank (1981), urban population in sub-Saharan Africa increased during 1970–80 by 6% annually, and by as much as 8.5% a year in 35 major capitals. There are, however, no empirical data available to relate this growth rate to an increasing demand for dairy products, particularly imports.

A number of causal factors affect domestic supply, none of which has ever been quantified. The change in total domestic milk supply in any one period is a function of changes in the accessible production technology; in production costs (both absolute and in relation to other products); in the ratio between effective producer prices for milk and other agricultural products; and of the influences of weather and other unforeseen factors. The difficulties in finding quantitative evidence for these factors are partly methodological (e.g. how to quantify changes in technology) and partly empirical (e.g. how to establish effective farm-gate prices at statistically representative levels).

A further complication arises from the fact that different production systems react in various ways to changes in the relevant factors. This is particularly true in respect of the producer price for milk. Rodriguez (1986) quantified the short-term price elasticity of supply for commercial milk producers in Zimbabwe at +0.63, but found only qualitative evidence for the reaction of communal farmers.

The majority of milk producers in Africa are rural producer/consumers such as the communal farmers of Zimbabwe. These farmers belong to a system where a high, if not dominant, proportion of the milk produced is used for their own subsistence, making it difficult to determine their reaction to changing producer prices. This could be done using the ratio between milk and cereal prices, but very little is known about the size, or even the sign (positive or negative), of the cross price elasticities of either demand or supply.

In view of the practical problems in quantifying the factors affecting domestic milk supply in sub-Saharan Africa, and the difficulties of covering even one country satisfactorily, domestic milk production has been treated as an exogenous variable in this cross-country analysis. Domestic

production of cow's milk increased by an average of 1.3% per year between 1970 and 1980 (Addis Anteneh, 1984, p. 9). Comparing the actual increase in production with the calculated increase in demand (3.4%), it is clear that imports were needed to supply the difference.

Commercial dairy imports into sub-Saharan Africa grew by an average of about 10% per year during the same period. Since this tremendous growth cannot be explained by the effects of population growth and rising incomes alone, other factors must be considered, of which dairy import policies and changes in the real prices of dairy imports are the most important. To quantify these other factors, a rough calculation on a per country basis is given below.

CHANGES IN POLICY AND OTHER FACTORS

The first calculation concerns a general commodity balance identity. The equation is defined as:

$$M_t^N + O_t + St_{t-1} = C_t + St_t \quad (1)$$

where a country's net dairy imports¹⁴ within a certain period (M_t^N), plus its domestic production for the period (O_t) and end-stocks carried over from the previous period (St_{t-1}), equal total milk consumption (C_t) and the end-stocks to be carried over to the following period (St_t).

Stocks of milk and milk products are assumed either to have a very short shelf-life (e.g. whole milk), so that significant amounts are not stored, or to be constant over the years. If this is so, then equation 2, which deals with changes in the variables¹⁵, can be derived from equation 1:

$$\frac{M}{C} \times \frac{dM}{M} = \frac{dC}{C} - \frac{Q}{C} \times \frac{dQ}{Q} \quad (2)$$

i.e. the relative change in imports is equal to the relative change in total consumption minus the relative change in production. All changes have to be weighed according to their respective shares in total consumption in the base period.

Total consumption (C) is believed to be mainly determined by population (N) and per capita income (Y), so changes in these (and their elasticities) are now substituted for changes in C , together with a residual (e^*) comprising changes in all other factors determining consumption.

Equation 2 thereby converts to:

$$\frac{dM}{M} = \frac{C}{M} \left(\frac{dN}{N} + \eta \times \frac{dY}{Y} + e^* - \frac{Q}{C} \times \frac{dQ}{Q} \right) \quad (3)$$

where η is the income elasticity of demand for milk and the population elasticity of demand is assumed to be equal to one.

Isolating the residual term (e^*) and expressing the share of domestic production in total consumption as a rate of self-sufficiency (RSS) gives:

$$e^* = (1 - \text{RSS}) \times \frac{dM}{M} - \frac{dN}{N} - \eta \frac{dY}{Y} + \text{RSS} \times \frac{dQ}{Q} \quad (4)$$

The residual term (e^*) includes all influences on changes in dairy consumption other than changes in population and income. One of these other influences is policy.

We can now define a new variable, e , which is the residual proportionate change in dairy imports that cannot be explained by changes in population, income growth or domestic production. From equations 3 and 4 we can see that

$$e = \frac{1}{1 - \text{RSS}} (e^*) \quad (5)$$

where:

$1 - \text{RSS}$ is the share of imports in consumption.

Table 4 gives the values of the residual import growth rates (e) and those of other variables from which the rate was calculated for 32 sub-Saharan African countries. All figures denoting change (d) are given as annual averages between 1972-74 and 1980-82.

A comparison of signs shows that the sign of the residual term and that of the average annual change in commercial dairy imports were the same for 22 of the 32 countries listed in the table. Thus in almost three quarters of the countries for which relevant data were available, the hypothesis was confirmed that in addition to population growth, increased income per person and short-falls in domestic milk production, other factors were responsible for the increase in dairy imports during the 1970s. It now remains to be determined to what extent did national dairy import policies directly affect this increase.

Let us now give an example of how to interpret Table 4 by using the data for Nigeria. Commercial dairy imports into Nigeria grew by an average of 15.4% annually over the period 1972-74 to 1980-82; no food aid was imported. The residual term value of +10.4% indicates that the balance

¹⁴ Includes only commercial imports; data for food aid are not available for a sufficiently long period.

¹⁵ For reasons of legibility, all subscripts and superscripts have been left out. All imports are net imports, and the calculation covers changes within one period only.

Table 4. *The effects of policy and other factors on dairy imports by country, sub-Saharan Africa, 1972-74 (av.) to 1980-82 (av.).*

Country	Rate (%) of self- sufficiency ^a (RSS)	Changes in ^b :				Residual import growth rate ^c (e)
		Commercial dairy imports (dM/M)	Population (dN/N)	Income ($\eta \times dY/Y$)	Production (dQ/Q)	
----- Percent per year -----						
West Africa						
Benin	0.79	12.2	2.9	0.3	1.1	1.1
Burkina Faso	0.88	36.2	2.5	0.7	-1.0	25.1
Gambia	0.71	19.9	3.0	0.0	2.3	15.2
Ghana	0.13	-2.9	3.1	-2.2	0.0	-3.9
Guinea	0.91	3.2	2.9	0.1	0.0	-30.1 ^d
Côte d'Ivoire	0.07	14.4	5.0	0.8	12.1	9.1
Liberia	0.05	6.5	3.5	-0.1	9.1 ^d	3.4
Mali	0.78	3.3 ^e	2.6	1.3	4.7	2.2
Mauritania	0.65	5.5	2.7	-0.7	3.7	6.7
Niger	0.79	3.9 ^e	3.3	-0.1	8.0 ^d	18.8
Nigeria	0.57	15.4	3.2	0.9	3.4	10.4
Senegal	0.58	5.7	2.9	-0.6	-0.7	-0.7
Sierra Leone	0.50	10.2	2.6	-0.5	14.0 ^d	20.0
Togo	0.50	12.9	3.0	0.1	2.5	9.2
Central Africa						
Burundi	0.98	35.0 ^d	2.3	0.6	2.7	22.3 ^d
Cameroon	0.74	8.5	2.3	2.7	-2.4	-17.6
Central African Republic	0.60	3.0	2.3	-0.5	3.7	4.1
Congo	0.03 ^d	8.9	2.9	1.5	40.3 ^d	5.6 ^d
Rwanda	0.96	-3.2	3.4	1.2	0.4	-108.6 ^d
Zaire	0.87	-4.2	3.0	-2.1	-16.7 ^d	-122.9 ^d
East Africa						
Ethiopia	0.97	21.3	2.5	-0.2	1.5	-6.9 ^d
Kenya	1.12	n.d. ^f	4.0	1.2	2.3	n.d.
Somalia	0.99	80.5 ^d	2.8	0.7	9.2 ^d	641.3 ^d
Sudan	0.99	18.8	3.1	0.7	6.1 ^d	249.6 ^d
Tanzania	0.92	0.4	3.4	1.1	-6.5 ^d	-130.6 ^d
Uganda	0.89	-1.6	3.1	-3.1	2.7	20.3 ^d
Southern Africa						
Lesotho	0.61	10.1	2.4	4.0	2.1	-3.0
Madagascar	0.65	-5.6	2.6	-1.5	-1.9	-12.3
Malawi	0.68	1.5	3.2	1.6	8.7	5.0
Swaziland	0.88	9.0	2.6	0.3	2.7	4.6 ^g
Zambia	0.53	-15.0 ^d	3.1	-1.8	-3.2	-21.4
Zimbabwe	0.99	47.2 ^d	3.3	-1.0	-3.3	-509.5 ^d

^a Calculated in the base period 1972-74 (av.).

^b All changes are average annual changes between 1972-74 (av.) and 1980-82 (av.).

^c The full form of equation 5 is:

$$e = \frac{dM}{M} - \frac{1}{(1-RSS)} \times \left(\frac{dN}{N} + \eta \times \frac{dY}{Y} \right) + \frac{RSS}{(1-RSS)} \times \frac{dQ}{Q}$$

^d Figures are considered particularly unreliable or are very high due to a low share of imports in consumption in the base period.

^e Imports have been adjusted for the 1972-74 drought.

^f n.d. = not defined. Kenya was a net exporter until 1979.

Source: Author's calculation based on *FAO Production Yearbooks* (various years), FAO (1978a), World Bank (1981), and World Bank (1984).

between population, income and milk production growth in Nigeria can explain only a 5.0% (i.e. 15.4% - 10.4%) increase per annum in dairy im-

ports; the remaining 10.4% must therefore be due to other influences on dairy imports, such as government policy.

CHANGES IN IMPORT PRICES AND EXCHANGE RATES

When there is no government interference, the amount of imports entering a country depends on the relationship between international prices and domestic production costs. At market equilibrium, the domestic price equals the international price, but if the government interferes with the price of imports either directly or indirectly, the domestic price will differ from the international one and import totals will change (see Figures 6 and 7 in Chapter 5). Similarly, changes in international prices affect import levels, but this assumes that no additional import quantity restrictions are simultaneously imposed.

Towards the end of the 1970s, world market prices for dairy products came increasingly under pressure from the protectionist policies of the main dairy producers, the United States and the EEC (Tangermann and Krostitz, 1982). Real world prices of dairy products began to fall during 1975/76, and within a period of 3 years (1980/81 to mid-1984) the prices for skim and whole milk powder reached the GATT minimum export price (FAO, 1985).

The stocks of skim milk powder held by the EEC and the United States at the end of the third quarter of 1983 were approximately double the annual volume of international trade in this product (GATT, 1983). No change in the position is foreseen (FAO, 1985; van Dijk et al. 1983), as the recent introduction of milk quotas has stabilised rather than reduced the EEC dairy surplus. Theoretically, depressed international prices for dairy products stimulate imports of such products, thereby exerting a constant downward pressure on domestic milk prices in sub-Saharan African countries (see also explanations to Figure 6 in Chapter 5).

The little empirical evidence that exists on dairy prices in African countries is inadequate to prove the stimulating effect of depressed international prices on dairy imports. We have therefore used ratios between the indices of international and domestic prices (Table 5), where the numerator is import price in the recent period divided by import price in the base period, and the denominator is domestic price in the recent period divided by domestic price in the base period.

A ratio of less than one means that domestic prices increased relative to international prices, providing a stimulus for increased imports. This ratio does not indicate the absolute relationship between international and domestic prices in the base period, and parity should not be assumed.

On the other hand, a ratio of unity between the indices means that the ratio of international to domestic prices in the base period is maintained in the recent period.

An analysis of these ratios for 20 sub-Saharan African countries shows that the changes in commercial dairy imports, in dairy production, or in the rate of self-sufficiency (calculated for commercial dairy imports only) did not depend on the ratio between the indices of current international and domestic dairy prices (in local currencies at official exchange rates). The import price index of all but 7 of the 27 dairy products imported into the 20 countries has fallen more, or increased less, than the domestic price index, and although this must have influenced the quantities imported, there is no statistical proof. The difficulty in finding significant correlations may also be due to the effect of tariff policies.

Another complicating factor is that import prices vary greatly among countries, even for the same commodity. For example, in 1982 the coefficient of variation of the prices of imported dry milk powder was 0.55 across 42 sub-Saharan African countries. This was calculated on the basis of the unweighted mean of dry milk prices for the 42 countries, which in 1982 was US\$ 0.20 kg⁻¹ LME with a range of US\$ 0.37 kg⁻¹ to US\$ 0.07 kg⁻¹ LME.

Figure 10 shows the deflated prices¹⁶ of dry milk for four selected countries – Gabon, Nigeria, Senegal and Somalia. Gabon was selected because of its relatively high import prices for dry milk, and Nigeria because it is the greatest importer in terms of volume. Both Senegal and Somalia are among the five largest importers by volume, but Somalia imports at relatively low prices. The great disparity in import prices, even for the same commodity, suggests discriminatory and variable dumping policies on the part of EEC and other surplus-producing exporters.

The third major influence on the price mechanism in trade is the exchange rate, which translates international prices into domestic prices. Although exchange rate policy is not a specific instrument of dairy import policy, it may have had important effects on the growth of dairy imports into sub-Saharan Africa during the 1970s.

OVERVALUED EXCHANGE RATE

A common criticism levelled at African governments is that their exchange rates are fixed above

¹⁶ Cost, insurance and freight prices deflated by the consumer price index for industrialised countries; 1980 = 100.

Table 5. Average annual changes in dairy imports, production and self-sufficiency rate, and ratio of international to domestic dairy prices, sub-Saharan Africa, 1972-74 (av.) to 1980-82 (av.).

Country	Changes (percent per year) in:			Ratio between the indices ¹ of international and domestic prices
	Commercial dairy imports	Milk production	Self-sufficiency rate	
Benin	12.2	1.1	-3.4	0.75
Burkina Faso	36.2	-1.0	-10.6	0.38
Burundi	35.0	2.7	-2.4	0.87
Cameroon	8.5	-2.4	-3.9	0.20-0.23
Kenya	n.d. ²	2.3	-2.4	1.70
Lesotho	10.1	2.1	-3.7	0.99
Madagascar	-5.6	-1.9	1.1	0.57
Malawi	1.5	8.7	1.9	1.09-0.99
Mauritania	5.5	3.7	-0.6	1.01-0.67
Niger ³	3.9	8.0	0.6	0.66-0.90
Rwanda	-3.2	0.4	0.0	0.78
Senegal	5.7	-0.7	-3.1	0.47
Somalia	80.5	9.2	-6.9	0.50
in	18.8	-4.5	-0.5	0.63
Ziland	9.0	2.7	0.9	1.45
Tanzania	0.4	-6.1	-0.7	0.92-0.94
Uganda	-1.6	2.7	0.4	0.08
Zaire	-4.2	-16.7	-22.8	1.04-1.07
Zambia	-15.0	-3.2	4.6	0.72-1.09
Zimbabwe	47.2	-3.3	-0.6	0.39

¹ The numerator index is import price in the recent period divided by import price in the base period. The denominator index is domestic price in the recent period divided by domestic price in the base period.

² n.d. = not defined.

³ Imports have been adjusted for the 1972-74 drought.

Source: Author's calculation based on *FAO Trade Yearbooks* (various years) and *FAO Production Yearbooks* (various years).

the rates that would prevail without their interference, thereby encouraging imports. If the nominal or official exchange rate (ER^{off}) is defined as the number of units of domestic currency per unit of foreign currency, then the exchange rate distortion factor (ERDF) can be calculated as a ratio of an adjusted exchange rate in year t (ER_t^{adj}) and the official exchange rate in the same period (ER_t^{off}):

$$ERDF_t = \frac{ER_t^{adj}}{ER_t^{off}} \quad (6)$$

The adjusted exchange rate is the official exchange rate in a base year adjusted by the ratio of domestic and international rates of inflation as follows:

$$ER_t^{adj} = ER_t^{off} \times \frac{ed_t}{ef_t} \quad (7)$$

where:

- ed_t = the domestic cost of living index in period t , and
- ef_t = the international cost of living index in the same period.

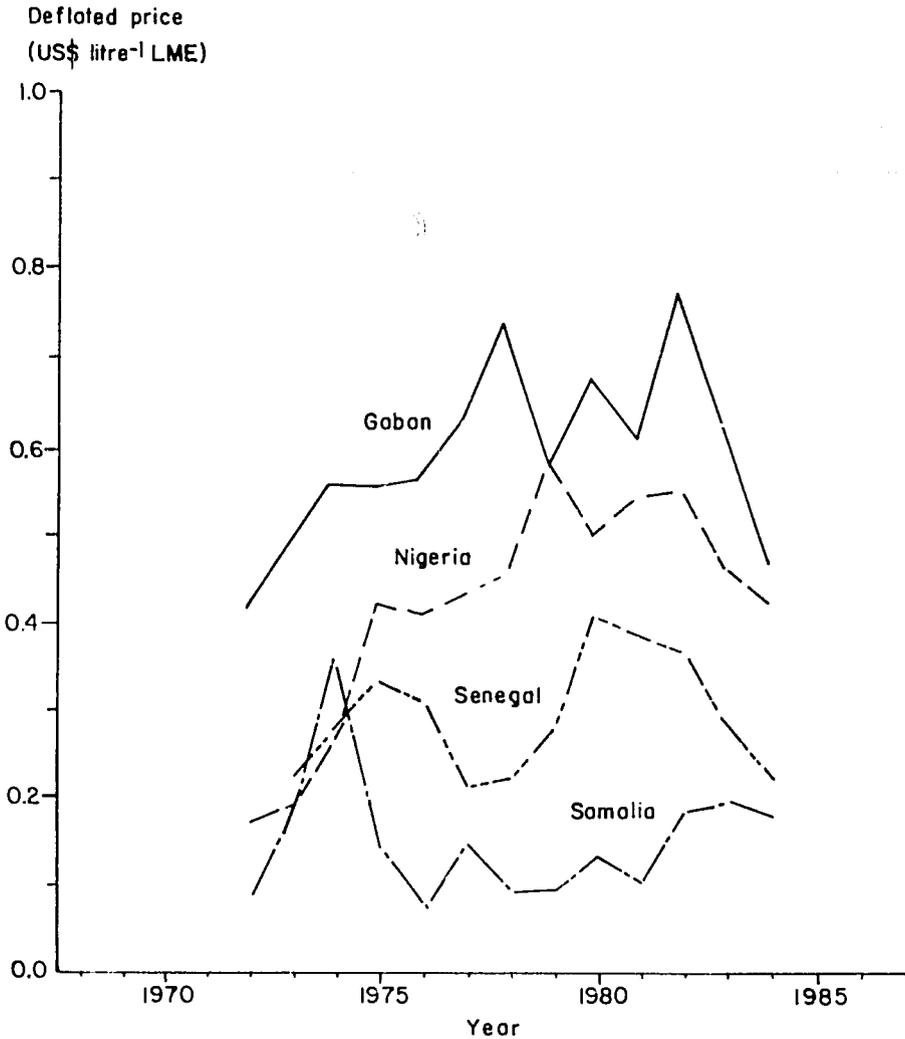
In calculating the adjusted exchange rate, the cost of living indices were re-indexed to the base year (i.e. index = 1.0 when $t = 0$, which in this case was in 1972). The adjusted exchange rate represents the real exchange rate if the official exchange rate in the base period is undistorted, that is:

$$ER_t^{adj} = ER_t^{real} \quad \text{if} \quad ER_0^{off} = ER_0^{real} \quad (8)$$

Most countries in sub-Saharan Africa have tended to overvalue their currencies, while only a few maintain floating exchange rates and perhaps none have undervalued currencies. Most overvalued currencies are likely to have been overvalued already in 1972, the base period for the present calculations.

Assuming that the initial official exchange rate (ER_0^{off}) was overvalued, the trend in the degree of overvaluation is indicated by the exchange rate distortion factor (ERDF). An ERDF greater than unity indicates that the exchange rate has become even more overvalued, while an ERDF of less than unity indicates corrections to lessen the

Figure 10. Deflated prices¹ of dry milk imports for four sub-Saharan African countries, 1972-84.



¹ Cost, insurance and freight prices deflated using the consumer price index for industrialised countries; 1980 = 100.

Source: FAO trade data tapes for 1986.

degree of overvaluation (if overvaluation existed in the base period), and an ERDF of unity indicates no change in the degree of over- (or under-) valuation relative to the base period.

The ERDFs are not comparable among countries, since the degree of exchange rate distortion in the base year is variable among countries and usually not known. However, in each case where the ERDF is above unity there is an increasing tendency for imports to be drawn in.

In many sub-Saharan African countries, failure to adjust exchange rates in response to differential rates of inflation between domestic and international currencies may have contributed to the increase in dairy imports. This hypothesis was tested using a model relating per capita dairy imports to domestic milk production per person, to

real dairy import prices and to the ERDF, thus:

$$\frac{M}{N} = a + b \frac{Q}{N} + cP_m^* + d(ERDF) \quad (9)$$

where:

M/N = volume of commercial dairy imports per person,

Q/N = domestic milk production per person, and

P_m^* = the real dairy import price expressed in US\$ kg⁻¹ LME and deflated to the base year 1980 by the IMF (1983) consumer price index for industrialised countries.

While this model is not founded on any structural theory, significant relationships between dairy imports and the ERDF would suggest that

trends in exchange rates have influenced the level of the imports. Regressions calculated separately for 24 sub-Saharan African countries show that in most of these countries, the regression coefficients for real dairy import prices during 1972-82 had the expected negative signs (Table 6). However, for 9 countries (Ghana, Madagascar, Rwanda, Sierra Leone, Sudan, Swaziland, Tanzania, Togo and Zambia), none of the coefficients was significant and the R^2 was less than 0.60.

An analysis of import elasticities (measured at the mean) in relation to changes in real import prices and the exchange rate distortion factor showed that the own-price elasticity of dairy imports for the 21 countries with the expected negative sign is -0.89 on average (unweighted). Kenya and Zimbabwe, which changed from net exporters to net importers of dairy products in the mid-1970s, had positive import price elasticities as did Madagascar, where commercial dairy imports accounted for only 5% of total dairy imports in 1982.

The expected sign for the exchange rate distortion variable is positive, i.e. the greater the trend toward overvaluation of domestic currency, the greater the imports per person. The average elasticity of the exchange rate distortion factor was 0.42 for the 21 countries with negative import price elasticities, and 1.37 for those 14 (but excluding Zimbabwe) which had positive ERDF coefficients. These results imply - if we use the average of values for only those countries whose elasticity has the expected sign - that for every percent decrease in real import prices in US\$ terms, dairy imports have gone up by about 0.89%, and for every percent increase in the exchange rate overvaluation they have further increased by about 1.37%.

Several of the regression coefficients relating per capita dairy imports and per capita milk production show an unexpected positive sign, which implies that greater domestic milk production encourages higher dairy imports. In some countries this may be explained by the poor quality of milk production data, but for Ghana, Madagascar, Zaire and Zambia, the positive coefficients are due to the fact that both milk production and dairy imports per person declined between 1972 and 1982. In Kenya, the positive coefficient for real import prices reflects both increased per capita production and increased per capita dairy imports during 1972-82.

In countries such as Somalia, Burkina Faso or Nigeria (see Chapter 7), links between domestic milk production and dairy imports are weak owing to poor transport facilities. Imports only

reach the capital and a few larger towns and may increase since urban areas are the main consumption areas, even while domestic milk production in the rural areas is also increasing but milk cannot be transported to the urban markets.

The effects of the various factors influencing dairy imports have been calculated in two different ways. Annual average rates of change in the volume of commercial dairy imports between 1972-74 (av.) and 1980-82 (av.) were first explained as the result of the combined effects of changes in human population, per capita income, domestic milk production, and a 'residual' import growth rate representing policy and other unidentified factors (see Table 4). Then, a regression relating commercial dairy imports to import prices and the exchange rate distortion factor was calculated for the same period (equation 9 and Table 6). It now remains to be seen whether the residual term for each country (Table 4) fits with the calculated effects of the two variables investigated in some detail in this chapter, namely import prices and the exchange rate distortion factor.

We can examine the fit in two ways: by examining the signs (+) of the residual and by calculating a multiple regression. There is a fit if the sign of the residual for each country agrees with the direction in which one expects the actual changes in the country's exchange rate distortion factor and import prices to have altered its import. In the cross-country regression analysis, the 'residual' (dependent variable) is expressed as a function of two independent variables, the exchange rate distortion and import prices, and the value of the coefficient of determination (R^2) shows how much of the originally unexplainable (residual) rate of change in imports over the 1972-82 period can be attributed to changes in the two independent variables.

The signs of the residuals given in Table 7 will be examined first to determine whether each country's residual change in imports (column C) is compatible (columns H and I) with the size and signs of the corresponding factors and elasticities of the exchange rate distortion (columns D and E) and import prices (columns F and G). 'Compatible with' means that the values of columns D, E, F and G explain to some extent the size and sign of the residual.

Among 22 sub-Saharan African countries for which data were available, 12 had positive import residuals (i.e. their dairy imports grew faster than can be explained simply by changes in population, income and domestic production), and of these all except four (Sudan, Togo, Gambia and Malawi) had exchange rate factors and elasticities compat-

Table 6. *Elasticities of response to changes in factors influencing dairy imports into sub-Saharan Africa, 1972-82.*

Country	R ²	Elasticities ^a of response to changes in:		
		Domestic production per person	Real import price	Exchange rate distortion factor
Burkina Faso	0.871	+0.04	-1.40**	+0.44
Cameroon	0.865 [†]	-0.39	-0.66 [†]	+0.92
Central African Republic	0.676	-1.78**	-0.96**	+1.33
Ethiopia	0.795	-1.73	-1.12**	+3.05**
Gambia	0.792	-4.17	-0.01	-0.72
Ghana	0.562 [†]	+1.21	-0.23	-0.04
Côte d'Ivoire	0.929	+0.01	-1.41***	+1.06***
Kenya	0.636	+6.06	+7.82**	-3.71
Madagascar	0.238	+0.58	+0.53	-0.14
Malawi	0.679	-0.08	-0.91***	+0.76
Mauritius	0.566	+1.36	-1.14*	+1.34
Niger	0.765	-2.17***	-1.03**	+2.02*
Nigeria	0.917	+0.73	-0.78**	+1.36**
Rwanda	0.350	+5.43	-0.01	+4.39
Senegal	0.622	+0.95	-0.76**	-0.89
Sierra Leone	0.589	+0.18	-0.78	+0.12
Somalia	0.569	+2.25	-0.21	+1.34*
Sudan	0.419	-1.74	-1.93	-3.04
Swaziland	0.251	+4.94	-0.82	+0.44
Tanzania	0.529 [†]	+0.13	-0.36	-0.61
Togo	0.438 [†]	-2.26	-0.91	-1.72
Zaire	0.753	+0.64***	-1.05**	+0.66**
Zambia	0.101	+0.43	-1.15	-3.34
Zimbabwe	0.671	-17.90**	+0.15	+35.20

^a Calculated using equation 9, with the dependent variable being volume of commercial dairy imports, expressed in kg LME per person. Elasticities were measured at the mean.

[†] = determinant of matrix is less than 0.20, indicating multicollinearity.

* = statistically significant at the 10% level.

** = statistically significant at the 5% level.

*** = statistically significant at the 1% level.

Source: Calculations based on IMF (1983), *FAO Production Yearbooks* (various years) and *FAO Trade Yearbooks* (various years)

ible with their residuals. Among the remaining 10 countries with negative residuals, all except four (Ethiopia, Rwanda, Cameroon, and Zaire) had residuals compatible with their exchange rate distortion. Altogether, 14 out of 22 countries had import residuals compatible with the exchange rate distortion.

With respect to import prices, 9 out of the 12 countries with positive residuals had import price factors and elasticities compatible with the sign of the residual, the exceptions being Togo, Nigeria and Swaziland. Among the countries with negative residuals, only 2 (Madagascar and Zimbabwe) had residuals compatible with the situation they face in respect of import prices.

Thus we can say that where imports grew faster than can be explained by changes in popu-

lation, income and domestic production, the increase was due to the effects of exchange rate overvaluation and low import prices (probably because of exporting countries' subsidies). But where the growth in dairy imports was unexpectedly low, import prices (particularly high ones) do not seem to be a plausible cause, and other reasons have to be sought.

We now turn to the use of regression analysis to assess to what extent the size and sign of the residuals (i.e. the so far unexplained rates of change in commercial imports during 1972-82) can be explained. In our cross-country analysis ($n = 22$), the residual was treated as the dependent variable and changes in the exchange rate distortion factor (ERDF) and in import prices (valued in 1980 US\$), each multiplied by their respective

Table 7. *Compatibility of the calculated effects of exchange rate distortion and changes in import prices with the unexplained growth in dairy imports, sub-Saharan Africa, 1972-74 (av.) to 1980-82 (av.).*

Country (A)	Initial import dependency ratio (B)	Residual import growth rate (C)	Exchange rate distortion		Import price		Compatibility of import residual with	
			Factor (D)	Elasticity (E)	Factor (F)	Elasticity (G)	Exchange distortion (H)	Import price change (I)
Somalia	0.01	641.3	2.14	1.34	0.24	-0.21	Y	Y
Sudan	0.01	249.6	1.29	-3.04	0.95	-1.93	N	Y
Burkina Faso	0.12	25.1	1.07	0.44	0.30	-1.40	Y	Y
Sierra Leone	0.50	20.0	1.05	0.12	0.50	-0.78	Y	Y
Niger	0.21	18.8	1.25	2.02	0.72	-1.03	Y	Y
Gambia	0.29	15.2	1.15	-0.72	0.67	-0.01	N	Y
Nigeria	0.43	10.4	1.92	1.36	1.05	-0.78	Y	N
Togo	0.50	9.2	1.12	-1.72	1.34	-0.91	N	N
Côte d'Ivoire	0.93	9.1	1.44	1.06	0.37	-1.41	Y	Y
Malawi	0.32	5.0	0.92	0.76	0.83	-0.91	N	Y
Swaziland	0.12	4.6	1.27	0.44	1.05	-0.82	Y	N
Central African Republic	0.40	4.1	1.12	1.33	0.68	-0.96	Y	Y
Senegal	0.42	-0.7	1.10	-0.89	0.69	-0.76	Y	N
Chana	0.87	-3.9	9.75	-0.04	0.58	-0.23	Y	N
Ethiopia	0.03	-6.9	1.35	3.05	0.79	-1.12	N	N
Madagascar	0.35	-12.3	1.17	-0.14	0.65	0.53	Y	Y
Tanzania	0.08	-130.6	1.53	-0.61	0.62	-0.36	Y	N
Cameroon	0.26	-17.6	1.14	0.92	0.68	-0.66	N	N
Zambia	0.47	-21.4	1.07	-3.34	0.87	-1.15	Y	N
Zaire	0.13	-122.9	1.86	0.66	0.80	-1.05	N	N
Rwanda	0.04	-108.6	1.51	4.39	0.33	-0.01	N	N
Zimbabwe	0.01	-509.5	0.91	35.20	0.22	0.15	Y	Y

Notes: Column B figures calculated as 1 minus the value of RSS shown in Table 4; column C figures drawn from the right-hand column in Table 4; exchange rate distortion factor (column D) defined in equation 6; column E figures drawn from Table 6; column F figures are e.i.f. import prices for 1980-82 calculated as a proportion of 1972-74; column G figures drawn from Table 6. The rules used to determine compatibility between import residual and exchange distortion or import price change are as follows.

- In respect of the exchange rate distortion factor, there is compatibility (marked as Y in column H) if:
 - either column D (exchange rate distortion factor) is >1 and column E is positive
 - or column D <1 and column E is negative
 - and the residual (column C) is positive.
 OR
 - either column D <1 and column E is positive
 - or column D >1 and column E is negative
 - and the residual (column C) is negative.
 Absence of compatibility is marked as N in column H.
- In respect of import prices there is compatibility (marked as Y in column I) if:
 - either column F (import price factor) is >1 and column G is positive
 - or column F <1 and column G is negative
 - and the residual (column C) is positive.
 OR
 - either column F >1 and column G is negative
 - or column F <1 and column G is positive
 - and the residual (column C) is negative.
 Absence of compatibility is marked as N in column I.

elasticities, were treated as the independent variables. A third term, an interaction between the exchange rate and import price, was also introduced¹⁷.

Analyses were carried out with one (ERDF), two (ERDF plus price) and three (ERDF, price and their interaction) independent variables. The value of R^2 for regressions with one variable was 0.26, with two it was 0.28 and with three 0.47. The coefficient for the exchange rate variable had the expected sign (i.e. positive) and was statistically significant ($P < 0.02$) in all three analyses. Its value was not affected by the inclusion of the price variable but nearly doubled when the interaction effect was added. The price coefficient had an unexpected sign (i.e. positive) and was statistically insignificant in both the analyses that included the price variable. The coefficient for the interaction effect was negative and statistically significant ($P = 0.03$). The absolute values of the coefficients have no particular meaning.

The value of R^2 was an important statistic, for it indicated, in broad terms, that in the 22 countries for which comparable data are available, between a quarter and a half (depending on the form of the equation chosen) of the hitherto unexplained changes in the rate of import growth can be attributed to changes in exchange rate distortion and import prices. The countries whose residuals the regression was least able to explain were Rwanda and Somalia, clearly showing that in these two countries other important influences were at work.

¹⁷ The actual form of the regression was:

$$Y = \text{Constant} + \beta_1 (X_1) + \beta_2 (X_2) + \beta_3 (X_3)$$

where, with reference to the columns of Table 7:

Y = column C

X_1 = (column D - 1) (column E)

X_2 = (column F - 1) (column G)

X_3 = $(X_1)(X_2)$

When the 3-variable regression was re-run excluding Rwanda and Somalia, the signs of the coefficients remained the same and their values did not change much. The coefficient of the price variable remained statistically insignificant, but the value of R^2 rose to 0.88 and the coefficients for the exchange rate distortion and interaction variables improved in statistical significance ($P < 0.01$).

The exchange rate distortion factor is clearly a 'policy variable'. The level of import prices, and the changes in it over time, are less clearly influenced by policy, although the very different prices paid at the same time and for the same product by different African governments suggests that they are not entirely 'price takers'. An attempt to incorporate the ratio between international and domestic prices, which is a policy variable, did not yield statistically significant results (see Table 5).

To summarise, the results provide evidence that, in addition to the factors normally cited as the main determinants of increased imports into sub-Saharan Africa (i.e. population and income growth), national governments have significantly influenced this increase through their own policies, specifically their interference with the exchange rate. There are, however, many other policies, some specifically directed at dairy imports, which are likely to have been of importance and whose effects depend on the combination of instruments and the details of their design and implementation¹⁸, but which cannot be described sufficiently using cross-country analysis. Some typical examples of dairy imports and dairy import policy for selected countries will be given in the next chapter.

¹⁸ Compare Chapter 5 above, and see von Massow (1984b) and Mbogoh (1984) for rough outlines of individual countries' policies.

7. SPECIFIC DAIRY IMPORT POLICIES AND THEIR EFFECTS

The dairy import policies of Nigeria and Mali have been selected for further discussion. In the past, government interference with dairy imports in Nigeria was limited to the imposition of import tariffs, which is a classical instrument of trade policy, but more recently, three other policy instruments have been applied. The following description and analysis of the country's present dairy import policy is based on the work of Nwoko (1986).

The dairy import policy in Mali is a typical example of a government pursuing multiple objectives by employing many instruments. The rationale behind such a policy and its effects have been analysed in some detail by von Massow (1985a), the major aspects being presented in the second part of this chapter together with a separate discussion of the special role of food aid in dairy development in Mali. The latter includes some results of a milk producer survey carried out around Bamako to investigate the effects of dairy imports on local milk production and the potential of using dairy food aid to stimulate it (see Koné and von Massow, 1986).

NIGERIA: USE OF CLASSICAL INSTRUMENTS OF TRADE CONTROL

Nigeria is the largest importer of dairy products in West Africa. Its human population is dense in the humid southern coastal region, but becomes sparser towards the drier north. Because of tsetse infestation, the cattle population has the opposite distribution (Jahnke, 1982, p. 114).

Dairy imports into Nigeria are almost exclusively commercial, having risen steadily since the 1940s to reach almost 800 000 t LME in 1983. Condensed milk and dried milk powder account for about 50% each of the total volume (in LME). Between 1972–74 (av.) and 1980–82 (av.) the volume of dairy imports increased by an average

of 15.4% per annum (see Table 4, Chapter 6), but their economic importance remained marginal, accounting for only 2% of the value of Nigeria's total exports in 1980–82 (av.) (von Massow, 1984a, App. 4). The rate of self-sufficiency in 1980–82 was roughly one third of the estimated total dairy consumption of 12 kg LME per person.

Approximately two thirds of domestic milk production originates from traditional producers and one third from mainly large-scale modern dairy enterprises. Ninety-seven percent of the national cattle herd consists of indigenous breeds (Nwoko, 1986, p. 14).

There are three marketing and processing channels for dairy products in Nigeria:

- traditional marketing of milk and products processed on-farm,
- collection and processing of raw milk in dairy plants, and
- distribution of dairy imports.

In all three systems relatively free competition prevails, even though government may be involved in some of the dairy plants. The real distinction between the systems lies, however, in their regional distribution and in the consumers they serve: the traditional system operates mainly in the north, serving low-income rural consumers, whereas dairy imports are sold mainly to higher-income urban consumers in the south.

In theory, dairy plants link rural milk producers to urban consumers, thereby transferring some of the urban buying power to rural areas, but this goal has not been achieved in Nigeria, because there are few processing plants in the country and their operations are limited (Nwoko, 1986, p. 136; Mbogoh, 1984).

Efforts to improve marketing and substantially increase local milk production have so far been ineffective. According to Nwoko (1986, p. 40), "The development programmes have recorded remarkable failures in harnessing local

resources to increase domestic milk production. Local milk processing has failed because of the existence of only very few milk collection centres and [because] of the preference of processors for imported raw materials. ...

Nigeria's dairy import policy

Information on Nigeria's dairy import policy is available for the period since the country's political independence in 1960, but the objectives of this policy were never precisely defined. Dairy products were considered as merely one element of the total import bill and thus subject to the general policy objectives of saving foreign exchange, generating government revenues and protecting infant industries, although the priorities assigned to these changed periodically (Nwoko, 1986, p. 56).

Over the years, four different policy instruments have been applied to dairy imports in pursuit of the stated objectives: general import licensing, import prohibition, import tariffs and foreign exchange control. The effects of the first, third and fourth instruments are compatible with the stated objectives, but import prohibition by definition does not allow for revenue generation from taxing imports.

Before 1984, import licences were either open or restricted. An open licence permitted importation of unspecified quantities from designated countries only, whereas a restricted licence also specified the quantities to be imported. Dairy products were imported under open licences and thus enjoyed a preferential import position, except fresh milk which has been the only prohibited dairy import since 1976.

Import tariffs on dairy products have not been in force constantly, or on all items, although butter and cheese imports have been taxed throughout. The rates imposed never exceeded 40% of the import value and have been lowest on condensed and evaporated milk since 1970. Revenues generated from taxation were insignificant, accounting for less than 0.1% of total government revenues and for a maximum of 1.3% of customs and excise revenues in 1987. Foreign exchange control involves a general inspection of all import bills exceeding ₦ 20 000, an advance deposit (until 1984) and foreign exchange allocation by product group.

Overall, the instruments of the Nigerian import policy have the potential to restrict severely, and even to ban, dairy imports. Depending on their design and implementation, however, they can also leave dairy imports completely unrestricted.

Effects of Nigeria's dairy import policy

The residual term calculated for Nigeria (Table 4) indicates that between 1972–74 (av.) and 1980–82 (av.), other factors have stimulated commercial dairy imports to grow by an average of 10.4% per annum more than the rate of growth implied solely by changes in population, income and domestic production (Table 7). This result does not seem to be in line with the expected effects of the policy instruments applied: import tariffs (Figure 6) and foreign exchange control (Figure 7) tend to decrease rather than stimulate imports.

Until 1984, some stimulus could have derived from the open-licence control of dairy imports, while competing products were subject to restricted licences. This assumes, however, that the consumer was willing to substitute other products for dairy goods, which seems unlikely. For the calculation of the residual term to be valid there must therefore have been other stimulations which overruled the restrictive effects of the applied policy instruments. An attempt is now made to analyse the situation.

Nwoko (1986) used two approaches in assessing the effects of the import control measures applied in Nigeria. First he considered the increasing imports of various dairy products in light of the policy measures applied, and concluded that these measures had had little, and at most temporary, effect on dairy import levels. Tariff reductions seem to have influenced these levels more than tariff increases, but this has not been proven statistically.

The second approach involved calculating log-linear regressions (Nwoko, 1986, p.31), with the quantities of individual imported dairy products and of aggregated dairy products being the dependent variables. The independent variables in the analysis were real import prices (own and cross-price), tariff rates, domestic milk production, real foreign exchange reserves, real per capita income, a time trend and a dummy variable for the Nigerian civil war. External reserves were included in the equations to measure the capacity to finance imports in any given year. The corresponding variable at the micro-level was real income (GDP) per person, which served as a proxy for household expenditure.

Domestic milk production was taken as an exogenous variable, because the changes in production could not be explained. Nwoko argues that strong market segregation may be responsible for this lack of any statistically significant correlations between domestic production and the volumes or prices of imported dairy products.

It must also be remembered that milk production data for Nigeria are particularly dubious, since they include a major jump in the time series (Nwoko, 1986, p. 18).

The results of the regressions (Nwoko, 1986, p. 35) substantiate the previous observation that, while generating some revenue, tariffs may not have been effective as a means of reducing imports. The level of external reserves has also had a very limited influence on dairy imports; the calculated elasticity for aggregate imports was +0.15 when external reserves were lagged by 1 year.

Domestic milk production showed the expected negative effect on most of the dairy products imported. The elasticity of aggregate dairy imports to domestic milk production was, however, low (-0.27) and statistically insignificant. Aggregate dairy imports reacted more strongly to changes in real import prices (index weighted over all dairy products), as is shown by the statistically significant price elasticity of -1.08.

A statistically significant correlation was also found between aggregate dairy imports and the time variable (elasticity +0.67). This reflects population growth, but may be due to consumer or processor preference changing in favour of imported dairy products or to the effect of urbanisation, manifested as an increasing reliance of consumers on imports rather than domestic milk sources. The conclusion to be drawn from Nwoko's analysis is that Nigeria's dairy import policy does not account for the large increase in imports; it has not prevented the increase, but neither has it positively stimulated imports.

To explain the growth of dairy imports into Nigeria, another regression equation was specified, using the volume of dairy imports per person as the dependent variable and import prices, the exchange rate distortion factor and domestic milk production as independent variables. This equation ($R^2 = 0.917$) shows that the two main factors responsible for the inordinate growth of dairy imports into Nigeria were real import prices (as indicated by Nwoko, 1986) and the differences between official and real exchange rates.

The increased volume (in LME) of aggregate dairy imports per person between 1972 and 1982 can be attributed mainly to a decline in real import prices and to currency overvaluation. These variables had to compensate for the small (and statistically insignificant) effect of declining domestic production per person.

The elasticities of response (measured at the mean) were -0.78 for real import prices (average unit value in US\$ kg⁻¹ LME) and 1.36 for the exchange rate distortion factor as specified in

equation 6. The price elasticity of -0.78 is not significantly different from that of -1.1 found by Nwoko (1986), although the import prices are specified in different ways and the periods covered also differ.

It may thus be said that a major part of the increase in dairy imports into Nigeria was the result of policy, but not of specific dairy import policy. The instruments applied are consistent with the stated policy objectives and with each other - they tend to restrict imports, but their effect has been overshadowed by the effects of the declining real dairy prices on the world market and of overvalued domestic currency. The latter is, of course, influenced by government policy, but not specifically by dairy policy.

Despite a policy aiming to restrict dairy imports (which, if successful, would have benefited domestic milk producers), the Nigerian Government has stimulated dairy imports by way of its exchange rate policy to the benefit of consumers, particularly the urban consumers in the south. More detailed analysis is needed to investigate the link between dairy imports and domestic milk production and the hypothesis of segregated markets, but the quality of the available data was inadequate for this to be undertaken within the present study.

MALI: PURSUIT OF MULTIPLE OBJECTIVES

Mali is a land-locked country sparsely populated by about 7 million people of whom 10-15% live in the capital Bamako. The national cattle herd has been estimated at about 5 million. According to the Ministère chargé du développement rural (1982), 41% of the animals are in the south of the country and in the Sudanian belt, another 35% are in the inland delta of the Niger river and the remainder are scattered in other pastoral or agropastoral systems (von Massow, 1985a, p. 2 et seq.).

Inter-regional marketing links for milk and dairy products are even weaker than in Nigeria. Around Bamako, for instance, there is no established milk marketing system (von Massow, 1985a, p. 3; Koné and von Massow, 1986), although the cattle population in the area numbers about 140 000 head. Domestic milk production is generally low and only in peri-urban Bamako is there a move towards specialised production.

Estimates of per capita consumption suggest that pastoral areas may have a milk surplus which, however, does not reach the market. The main milk-deficit areas are Bamako, where annual

milk consumption per person is 27–29 kg (von Massow, 1985a, p. 8), other major towns and the southernmost part of the country. Dairy imports serve primarily Bamako and other major towns. During the drought years of 1972–74, emergency foodstuffs were distributed in many parts of the country, and some dairy food aid came in as part of the 'Food for Work' project.

Commercial dairy imports increased from less than 1000 t LME in 1968 to a peak of 34 000 t LME in 1975 and have since then dropped to between 15 000 and 21 000 t LME (von Massow, 1985a, App. 4). Dairy food aid peaked in 1974 at almost 23 000 t LME or 43% of total dairy imports for that year, but since 1979 food aid has ranged between 6000 and 11 000 t LME¹⁹ per year. The rate of self-sufficiency in dairy products in 1980–82 (av.) was 0.85, or 0.79 if food aid is included. Commercial dairy imports (in value terms) constituted 3% of total exports and provided on average 3.8 kg LME per person (von Massow, 1984a, App. 4).

Dairy import policy in Mali

Although the objectives of the Malian dairy import policy²⁰ are not explicitly mentioned in the Government's 5-Year Plan for 1981–85 (Gouvernement de la République du Mali, 1981), it can be assumed from the policy instruments used that the Government is concerned about foreign exchange and revenues, and that it is also somewhat interested in consumer and producer welfare. As with other imports into Mali, dairy imports are subject to licensing and allocation of foreign exchange, and to a value added tax (VAT) which in 1984 was 11.11% (Commerce intérieur et prix, Bamako, personal communication). In addition to these measures, dairy food aid is used for milk reconstitution in dairy plants.

Any authorised importer is entitled to a foreign exchange quota and can allocate it between different products at his own discretion, as long as this is within the respective regulations. All foodstuffs are subject to an import tariff, the rates for dairy products having been fixed in 1967 at 15% of the import value (c.i.f.) for butter; at 25% for cheese; and at 10% for all other dairy products. In 1983/84, import tariffs were 40% for butter and cheese, 10% for yoghurt and 5% for liquid milk.

These import tariffs may reflect the objectives of generating funds, or of saving foreign exchange by reducing import demand, or both, or they might also have been intended to protect the domestic milk processing industry. But the country's only dairy plant, the Union laitière de Bamako (ULB) sells hardly any processed dairy products, offering instead milk and sour milk (*lait caillé*) reconstituted mainly from food aid.

Milk powder and condensed milk are not open to private trade, but come under an import monopoly²¹ given to the parastatal Société malienne d'importation et exportation (SOMIEX). A major importer of all food commodities, which it sells in its own retail shops, SOMIEX's role is to secure the continuous supply of basic consumer goods at 'reasonable' prices (SOMIEX, Bamako, personal communication). These prices are subject to government approval and are uniform throughout the country, regardless of differences in transport and distribution costs.

Both dairy products covered by the SOMIEX monopoly are still subject to import tariffs and VAT but, at FCFA 55 kg⁻¹ for milk powder and FCFA 44 kg⁻¹ for condensed milk, these rates²² are considered to be preferential. On the other hand, consumers of SOMIEX's products appear to belong to a group of people whose incomes are lower than the incomes of those who buy 'luxury' dairy products carrying higher tariffs (SOMIEX, Bamako, personal communication). Thus SOMIEX has the slightly ambivalent objectives of benefiting lower-income consumers through import subsidy, while generating funds for the national budget through import tariffs. Unfortunately, there are not enough data available to calculate the net drain or contribution to the national budget of this import monopoly.

A summary of policy measures applied to different types of dairy imports, and of the quantities imported, is given in Table 8. It is clear that the instruments of the Malian dairy import policy result in inconsistencies. Revenue generation, import control and consumer and producer welfare cannot all be achieved simultaneously (see Chapter 5, Figures 6–9) since these aims are not compatible and the success of one implies the failure of another.

¹⁹ The two extremes were in two consecutive years and may have been due to a delay in shipment. If we take their average, food aid ranged between 7500 and 9200 t LME.

²⁰ For a more detailed description of the Malian dairy import policy see von Massow (1985a, p. 13).

²¹ The monopoly includes the right to authorise private traders to import milk powder and condensed milk.

²² 1984 rates; the exchange rate in that year was FCFA 1000 = US\$ 2.296.

Table 8. Dairy products imported into Mali and the policy measures affecting them, 1982.

Type of dairy product	Quantity imported		Policy measure applied	Objective ¹
	(t LME)	(%)		
Dried and condensed milk	17 960	60.7	SOMIEX import monopoly	Import control
			Import tariff of FCFA 55 and 44 kg ⁻¹ respectively	Import control
			Retail price fixing	Consumer benefit
Luxury products ²	2 872	9.7	Import tariff (5–40% of c.i.f. value)	Revenue generation
Skim milk powder and butter oil as food aid	5 855	19.8	'Sales tax'	Revenue generation
			Dairy development projects	Producer and consumer benefit
			Retail price fixing	Consumer benefit
Project food aid	2 889	9.8	Targeted distribution	Consumer benefit
All imports	29 576	100.0	Value added tax	Revenue generation
			Import licensing	Import control
			Foreign exchange allocation	Import control

¹ The objectives are those which follow logically from the expected effects of the measures applied.

² Includes fresh milk, butter, cheese and yoghurt.

Sources: Author's compilation based on *FAO Trade Yearbooks* (various years), FAO (1984a), SOMIEX (personal communication) and various other sources in Bamako.

A conflict arises with products subject to both import monopoly and retail price fixing: restricting the quantity of imports increases consumer prices *above* free-market levels (unless the restriction is handled in a non-restrictive way and then, by definition, it is superfluous), while retail prices fixed *below* the free-market prices benefit consumers. This obvious contradiction is partly explained by the government's intention to maintain a uniform national price level regardless of substantial differences in transport costs, which implies that consumers in areas of high transport costs are subsidised by consumers in areas with low transport costs. Even then, since SOMIEX retail prices are fixed at a level that supposedly covers transport costs to Bamako, the monopoly need apply only to areas with transport costs lower than those to Bamako.

Effects of Mali's dairy import policy

The effects of government policy on dairy imports into Mali have been discussed in detail by von Massow (1985a), but it is useful to re-examine the most important findings. First, the calculation of the residual term (Chapter 6) does not provide any strong evidence about the overall effects of policy and other factors on dairy imports. With a growth of only 0.3% per annum between 1972

and 1982, commercial imports have increased slightly less than the 1% that would have been expected from increased population and incomes and decreased domestic production per person. And even when dairy imports are adjusted for the effects of the Sahelian drought (1972–74 is replaced by a trend value for 1968–82), the unexplained change in dairy imports is only +2.2 per annum (see Table 4).

More detailed analysis by product shows that in Mali, dairy imports have generally been sold below the local market prices (in FCFA kg⁻¹ LME), so that by setting the retail price the Government has been subsidising consumers. Retail prices for condensed and reconstituted milk (in FCFA kg⁻¹ LME) are also lower than the c.i.f. import prices even without deducting transport costs. If transport costs are included, the slight taxation of consumers of dry milk is converted into a subsidy (von Massow, 1985a, p. 27).

No data are available on how SOMIEX handles the import monopoly. It would appear, however, that the consumption of SOMIEX dairy products has been subject to two contradicting effects. First, if handled restrictively, a monopoly, like restrictive foreign exchange allocation (Figure 7), reduces imports and thereby consumer welfare. On the other hand, if retail prices are

subsidised, they stimulate imports and increase consumer welfare (Figure 6).

There is some evidence that SOMIEX's retail prices indeed stimulate demand, but that the quantities imported under the monopoly are not sufficient to meet that demand. Additional amounts of dry and condensed milk are imported without SOMIEX's authorisation. 'Black imports' may also result from regional differences in transport costs which in the southern and western regions are so low as to make it attractive to break the monopoly and the system of nation-wide uniform pricing.

Following the theoretical approach shown in Figure 6 (import subsidy/tariff), but using different assumptions about the own-price and cross-price elasticities of demand, von Massow (1985a, p. 34 et seq.) calculated the changes in consumer surplus. The important conclusion of this welfare calculation is that the overall changes in consumer surplus resulting from the government's dairy import policy are relatively small. If the government seriously intended to benefit the consumers of imported dairy products, it has failed to achieve its objective.

This statement may be slightly modified by considering the distributional effects of the Malian dairy import policy; the further north and east of Bamako that SOMIEX sells imported dairy products, the more these sales are subsidised, because uniform price fixing ignores differences in transport and distribution costs. Von Massow (1985a, p. 7) estimated that about 60% of SOMIEX's dairy imports are consumed in Bamako. The government's policy may thus have provided more substantial benefits to consumers through that part of the remaining 40% which is sold in areas with transport costs exceeding those incurred in reaching Bamako.

Also, despite their high nutritional value, milk and dairy products are often not considered a basic foodstuff in Mali. Grain and rice, not dairy products, tend to be the staple food of the poorest sections of the community, particularly in the urban areas and in the southern and western regions of the country where cropping rather than livestock is the basis of subsistence. This implies that the government's dairy import policy does not affect the lowest-income groups of the population.

The stated concern of many African governments that increases in food prices would cause particular hardship among the poor thus needs careful examination where the food in question is a dairy product. The Malian Government certainly does not seem to be too concerned, since it

continues to charge import tariffs on all dairy products to generate revenue.

Besides consumer welfare, the other implicit objectives of Mali's dairy import policy are revenue generation and import control. Yet despite the government's restrictive policy, unauthorised importation of dried and condensed milk is common, suggesting that this policy cannot effectively control the set targets.

So while Nigeria's policy is an example of a consistent dairy import policy overruled by other policy (i.e. exchange rate policy), in Mali, dairy import policy itself simultaneously pursues conflicting objectives, with the result that there may as well have been no policy at all.

The use of dairy food aid in Mali

The leading institution in dairy development in Mali is the Union laitière de Bamako (ULB), which has only one processing plant, located in Bamako itself. ULB was established with external assistance in 1967 and started milk processing in 1969, with a planned capacity of 10 000 litres day⁻¹. Its two main objectives were to help develop milk production in agropastoral and pastoral farming systems and to provide milk and milk products to urban consumers in sufficient quantities at low prices (see Koné, 1983).

From 1969 to 1974, raw materials for milk reconstitution were provided by the World Food Programme, and the revenues were to be used mainly for the promotion of dairy development, through a fund allocated to the Sotuba research station²³ (FAO, 1978c, p. 18).

Since 1984, the EEC has been supplying annually 600 t of skim milk powder and 200 t of butter oil as food aid. These products are sold by the government to ULB at a price of FCFA 95 kg⁻¹ for skim milk powder and FCFA 235 kg⁻¹ for butter oil. The revenues from the sale (FCFA 104 million per year) are credited to the Commission nationale d'aide aux victimes de la sécheresse in the Ministry of Interior, but the allocation of this so-called 'compensation fund' was open for renegotiation in 1986. ULB's profit in 1986 was taxed at the special rate of 33.3%, applicable to young industries; in the long run, the tax rate is expected to be 50%. Of the post-tax ULB profit, 60% is allocated to the Sotuba research station, 35% is reserved for ULB's investment fund, and

²³ The station's crossbreeding programme is designed to produce for dissemination a new standard breed of 50% Montbeliarde, 25% Zebu Maure and 25% N'Dama inheritance (INRZFH, personal communication).

5% goes to a social security fund (ULB, Bamako, personal communication).

The ULB sale price for milk was fixed in 1982 by a government directive at FCFA 110 litre⁻¹ (wholesale ex factory) and FCFA 130 litre⁻¹ (retail). Comparing ULB's sale price with the border equivalent price for reconstituted milk we see that in 1982 and 1983, the wholesale price for reconstituted milk was 76% and 73% respectively of the estimated border price equivalent (von Massow, 1985a, p. 27). Thus, even without allowing for transport costs, the ULB consumer has been subsidised.

The sale price of reconstituted milk has the second function of determining the competitive position of food aid against domestic production. ULB's sales affect only the area immediately around Bamako. Depending on season, Bamako retailers of fresh milk charge consumers between FCFA 200 and 225 litre⁻¹, which is almost double the ULB retail price (von Massow, 1985a). The reason given for the price difference is poor quality of reconstituted milk, but even so, it would appear that the Malian Government has not set an appropriate retail price for food aid sales. Yet although the consumers benefit, local production is unlikely to be affected directly, since fresh milk and ULB's reconstituted milk serve different clients i.e. the market is segregated into two consumer groups (see also Koné and von Massow, 1986).

ULB's past efforts to promote local milk production have not been very successful. Its two milk collection centres at Dialakoroba and Bankoumana (each about 60 km from Bamako) only operate in the rainy season and at far below their capacity. The prices paid to producers are the lowest in each area and producers complain about irregular services (Koné and von Massow, 1986). As a result, the share of local milk in ULB's total output is negligible (von Massow, 1985a, App. 8). Recently, ULB has started taking milk directly from the newly created dairy cooperative (Cooperative laitière de Bamako; COLAIBA), whose producer price is significantly higher at FCFA 225 litre⁻¹ than that paid at the collection centres, although it is based on the supply of a minimum quantity.

The availability of dairy food aid has allowed ULB to neglect local milk collection, and ULB has even gone so far as to import milk powder and butter oil commercially, allegedly because no milk is available from local producers. This argument does not stand close scrutiny, for the increasing deliveries of COLAIBA producers, and certainly Koné and von Massow's (1986) survey, clearly

show that the potential is there. Increased milk production only needs stimulation and appropriate market outlets.

Funds from ULB sales have also not had much positive effect on dairy development, since the Sotuba crossbreeding station has yet to produce any significant results. The amounts allocated for dairy development are only a minor fraction of the benefit of the dairy food aid, while a major part is diverted to other purposes. Of the wholesale value of any one litre of milk reconstituted from food-aid materials that is sold at FCFA 110 litre⁻¹, FCFA 49 (44.5%) goes on processing costs, FCFA 20 (18.2%) on raw materials (to the so-called compensation fund), FCFA 20.5 (18.6%) is tax (assuming a 50% tax rate), and only FCFA 12.3 is spent on dairy development at the Sotuba research station. The last amount represents only 11% of the wholesale price or 30% of pre-tax profit. Even if all ULB investment (a further FCFA 7.2 litre⁻¹) is assumed to benefit milk producers in the long run, this still means that less than 50% of the pre-tax profit goes to stimulate dairy output.

The effects and prospects of food aid

The use of food aid for dairy development in Mali was only partially successful. Although ULB succeeded in one of its roles, that of providing urban populations with milk and milk products in sufficient quantities at low prices, it may be argued whether ULB's present output, which provides Bamako residents with about 10 kg LME per person per year, can be called 'sufficient'. Moreover, given ULB's present production technology the actual wholesale price per litre is FCFA 15 less than the cost of commercially imported milk powder and butter oil, without any profit margin (von Massow, 1984a, p. 48). Thus, at a consumption of 10 kg of ULB milk annually, the average inhabitant of Bamako is subsidised by FCFA 150 per year through food aid.

In contrast, milk producers around Bamako do not seem to have gained any benefit from dairy food aid, although market segregation prevents its direct disincentive on domestic milk production through depressed consumer prices. But an indirect disincentive has occurred, reflected by ULB's marked reluctance to improve its marketing services to producers. Also, the financial support given to Sotuba has not led to any genetic improvement in the herds, since no crossbreds have as yet been disseminated (Koné and von Massow, 1986).

In the past, the Malian Government has chosen not to control ULB's activities closely and to withdraw a major part of the food aid benefit for other purposes, but there is some reason to believe that a change has taken place since 1986. ULB's effort to stimulate direct milk deliveries to the factory gate by a higher price and to set

minimum quantities, is a move in a new direction. The government also needs to reconsider the extent to which it should drain potential funds²⁴ from dairy development.

²⁴ The use of funds generated by dairy food aid is discussed by Koné and von Massow (1986).

8. SUMMARY AND CONCLUSIONS

PROBLEMS

When asked to comment on their countries' dairy imports, African government officials are often concerned about the declining degree of self-sufficiency in milk and the methods by which this trend can be arrested. The discussion often leads to the question of government action and whether dairy policy in Africa has failed or succeeded. Both the data and the methods currently applied are often believed to be inadequate to design policies that stand a chance of successful implementation. These problems have been considered in this report and it is hoped that the cross-country analysis and the specific case studies will throw light on the policy question and related problems of dairy imports into sub-Saharan Africa.

Dairy imports make up about half the total milk consumption in West and central Africa and almost 30% in sub-Saharan Africa as a whole. Dairy food aid accounts for approximately half of all dairy imports into East Africa and for just under a quarter in sub-Saharan Africa as a whole. There is, however, a great deal of variation among countries in their dairy imports, both commercial and food aid, and also in their respective economic situations against which the importance of these imports can be measured.

Most of the mainly coastal and tsetse-infested countries of West and central Africa, where dairy imports form a major part of a low milk consumption per person, are comparatively well off economically and meet at least 90% of the theoretical caloric requirements of their people. A number of other countries, however, depend on dairy imports, particularly dairy food aid, for a large percentage of their milk consumption, and many of these have a relatively poor overall economic performance. In most countries of either group, dairy imports increased throughout the 1970s and early 1980s, often at annual growth rates of 10% or more.

Since the products imported are mainly skim milk powder and/or condensed milk, dairy imports into sub-Saharan Africa may be classified as basic foodstuffs rather than luxury products. This factor and the increasing proportion of imported basic dairy products in total dairy consumption have given rise to considerable government concern about the rate of self-sufficiency in dairy products.

The objective of self-sufficiency in basic dairy foodstuffs may well be desirable politically, but it is not always or automatically an economically sensible policy. Pursuing the objective may lead to heavy economic losses and bad use of scarce resources, unless the country has a comparative advantage in milk production.

Comparative advantage may be measured in terms of the ratio between the costs of domestic production and border-equivalent prices, both the method and the necessary data being accessible to any African government wishing to use them when designing its dairy policy²⁵. The Malian and Nigerian examples showed, however, that one overall measurement is not sufficient. Differences in production systems, transport costs and consumer incomes and preferences often lead to segregated internal markets, so that the calculation of comparative advantage needs to be adjusted accordingly.

Market segregation may lead to a situation where dairy imports do not compete directly with domestic milk production, as in Mali, or only compete in some regions, as in the south of Nigeria. The desirable policy should again be based on the assessment of comparative advantage, but it would differentiate, for instance, between coastal areas, where the comparatively cheaper

²⁵ See p. 15 in Chapter 4 for theoretical reasoning behind the calculation and pp. 37–38 in Chapter 7 for a practical example.

imports meet virtually all dairy demand, and the better production potential in other parts of the country, which should be stimulated by a regional dairy development programme. And although the overall self-sufficiency rate would still not measure up to all the ambitious policy statements, the government could claim the credit for providing all consumers with the cheapest milk available, without disregarding producers' interests.

Both theory and the Malian experience have shown that the use of dairy food aid can pose particular problems. First, if dairy food aid is to be used solely for the benefit of underprivileged consumers, it should be targeted towards specific consumer groups or areas to avoid disincentive effects on local milk production. If, nevertheless, dairy food aid does compete with domestic milk supply, then its retail price should be set at the border-equivalent price or at the undistorted import price level. Second, if dairy food aid is used to stimulate domestic dairy development, it should be sold at the undistorted retail price for commercial imports or at the respective border equivalent price, so that the revenues can be used for any type of dairy project.

Although it has not been possible to analyse in detail the reasons behind the declining self-sufficiency in dairy products for countries other than Mali and Nigeria, a cross-country outline of the factors which had caused dairy imports to increase between 1972-74 (av.) and 1980-82 (av.) has been given. First, the actual growth of commercial dairy imports during the period was compared with a theoretical figure derived from changes in population, incomes and domestic milk production, and any deviation or residual between the actual and derived growth was then interpreted as the influence of other factors. Using this approach it was found that domestic prices and policy stimulated dairy imports in 19 of 32 sub-Saharan African countries, and by more than 10% per annum over a decade in almost one third of the 32 countries.

Second, an attempt was made to explain the increase in dairy imports and the changing self-sufficiency rates in terms of the changing ratios between international and domestic prices. But although international prices have decreased more or increased less than domestic prices, no statistically significant relationship could be established for most products and countries for which the relevant data are available.

POLICIES

Dairy import policies entail the use of different policy instruments, and these have been described

together with the underlying objectives in some detail. Two important conclusions emerge. First, as the different policy objectives contradict each other so do the instruments employed to pursue them. Governments should therefore endeavour to identify at least internally the trade-offs between competing objectives. Second, the impact of dairy policy depends on various policy instruments, including some not primarily directed at the dairy sector but nevertheless affecting it. Any policy analysis must therefore go beyond the narrow scope of the specific policy instruments.

The heterogeneity of individual countries' dairy policies was an obvious problem during the analysis, such that it was possible to analyse only the effects of individual policy instruments in a cross-country study, leaving the more detailed analysis of multi-instrument situations to specific country studies. And since the setting of the exchange rate supposedly influences dairy imports in many sub-Saharan African countries, the deviations between official and real exchange rates during 1972-82 were included in a regression analysis of the volume of dairy imports per person on domestic milk production per person and real dairy import prices.

The results (see Table 6) support the hypothesis that depressed international dairy prices, coupled with overvalued exchange rates, have had greater effect on increased dairy imports than specific dairy (import) policies. This conclusion certainly holds for Nigeria and for a number of other sub-Saharan African countries, including some of the largest importers of dairy products.

The Nigerian example is also interesting in terms of the implementation of dairy import policy. The stated objectives and the instruments of the country's policy are consistent, but no significant effects could be shown to result from this conjunction. This arose from an imbalance in the relative weight of different policy measures, for import tariffs of up to 40% obviously could not counterbalance the effects of low international prices and of exchange rate overvaluation.

The impact of the Nigerian dairy import policy on domestic milk production could not be established within the scope of this study, but it is hard to believe that the high proportion of dairy imports (almost 50%) in consumption did not hamper domestic milk production. The lack of empirical evidence may reflect the particularly poor quality of milk production data for Nigeria and some market segregation due to consumer preferences and transport problems, but more analysis is needed to clarify the situation.

The Malian dairy policy differs from that in Nigeria because of the complexity of its objectives and the instruments applied. Whereas Nigeria has followed a consistent – though ineffective – policy of trade control and revenue generation, Mali has pursued conflicting targets, mostly inexplicit, but reflected in actual policies. The overall result is little different from total non-intervention, except that the administrative and welfare costs of such a policy probably exceed its benefits. And while the total costs and benefits of the Malian dairy policy could not be precisely quantified, it is obvious that, in spite of government claims to the contrary, consumer benefits have been rather small.

In Mali, milk is produced in the nomadic pastoral system in the north, where livestock and their products form the backbone of subsistence, and in the mixed crop–livestock system which prevails in the south. Almost certainly, dairy imports have had no effect on milk production in the pastoral system, and only minimal or indirect effects on producers in the south. This apparently strong market segregation is explained by the inadequate infrastructure and distribution systems and by the consumers' preference for fresh milk as opposed to reconstituted liquid milk, indicated by different consumer prices for the two types of milk in Bamako.

Mali has sought to promote local milk production through the use of food aid, but although theoretically sound, the scheme has not met its goals because of three major defects. First, instead of setting the sale prices of dairy food-aid products at their border-equivalent retail prices to stimulate local milk production, the Malian Government has been subsidising consumers. Even if the disincentive effect of lower consumer prices on production was minimal due to market segregation, the revenues to be used for the benefit of producers were reduced.

Second, the revenues from the processing and sale of food aid should have been spent in acquiring the critical means of dairy development, rather than diverting a substantial part of the funds to other purposes and using the rest unproductively. Third, although the overall objective of dairy development through dairy food aid is to replace gradually the aid deliveries by domestic milk supply, ULB's price and collection policies have only recently been directed towards this end.

PROSPECTS

Policies and problems common to many countries throughout sub-Saharan Africa were identified

and analysed. And while there are no ready-made solutions which can be transferred from one country to another, the cross-country analysis shows that the methodology is similar for many countries, and that policies and their effects need not be a 'black box' to policy makers and analysts. Although inadequate, the available data can be used for some analyses which do not require complicated econometric models, but which nevertheless provide some very useful insight.

In many sub-Saharan African countries, five conclusions apply, namely that:

- General exchange rate policy may well override sector-specific policies.
- Sector-specific policies are often impeded by contradictory incentives to consumers and producers, arising from conflicting trade, food and agricultural policies.
- Dairy imports may increase without necessity hampering domestic milk production, since the markets for imports and local produce may be different.
- If food aid is used for dairy development, such policy must have not only a consistent design but also well controlled implementation, for there are serious inherent dangers.
- Dairy development or self-sufficiency in milk must never be the sole objective; there is always a point beyond which the costs of further stimulating domestic production are too great. Despite their relatively low rates of self-sufficiency, many African countries may be closer to that point than their official speeches suggest.

The study has pinpointed several worthwhile fields of further research, of which tackling the problem of improving the quality and quantity of available data would seem the most important. The highest priority undoubtedly must be given to milk production data, to furnish the necessary information on the location of the different production systems, the key distinctions between them, the constraints or limitations and whether these are of a technical or economic nature. An important part of that assessment is to establish the cost structure in the different production systems, for price differences in major cost items may themselves be a criterion distinguishing between the systems and also lead to an assessment of the economic constraints within them.

Generating such data is not a major drain on resources, as was shown by a study of the economics of supplying fresh milk to Bamako, which took two man-months of field work and two additional months of data analysis and interpretation. The potential usefulness of the

information to policy makers is substantial, since it would enable them to design economically sound policies and to target their activities accordingly. Much fruitless effort and considerable financial and welfare losses can thus be avoided.

Further research is also indicated with regard to market segregation, particularly in West and central Africa where dairy imports are prominent in total consumption. It should address such aspects as the differences between consumer groups in their preferences for specific products and related services, and in their buying power; the location of these groups and the specific distribution systems serving them; and the uses of different dairy products, e.g. in cooking or for direct consumption by children or adults.

Such information may be obtained from dairy consumption data which can be acquired selectively and with relatively little effort. The result of the analysis would be a differentiated pattern of consumer preferences, expressed in the prices of different dairy products. Using this information, governments would then be able to design a policy for domestic milk production and dairy imports that can meet a differentiated demand.

The third area where a limited amount of data gathering and analysis would substantially

improve the basis for decision making at the national level involves trade and distribution systems for dairy products. Again, the resources needed are relatively modest, although several areas of investigation may be named, including:

- Border prices for different dairy products, both in nominal and real terms, and their development over time.
- Existing distribution channels for imports and domestic supply.
- The costs and possibly the cost-effectiveness of these distribution channels, as well as a comparison of cost structures.
- Constraints limiting the collection of locally produced milk and the distribution and marketing of both dairy imports and fresh milk.

This type of basic information is essential to any government wishing to design a dairy policy with a reasonable chance of successful implementation. The relatively low costs involved are more than justified, since it enables policy makers to save resources by tackling specific problems rather than working by trial and error. If national institutions and, above all, national governments take up the challenge, then their dairy policies will be more successful and will be designed for the benefit of the country as a whole.

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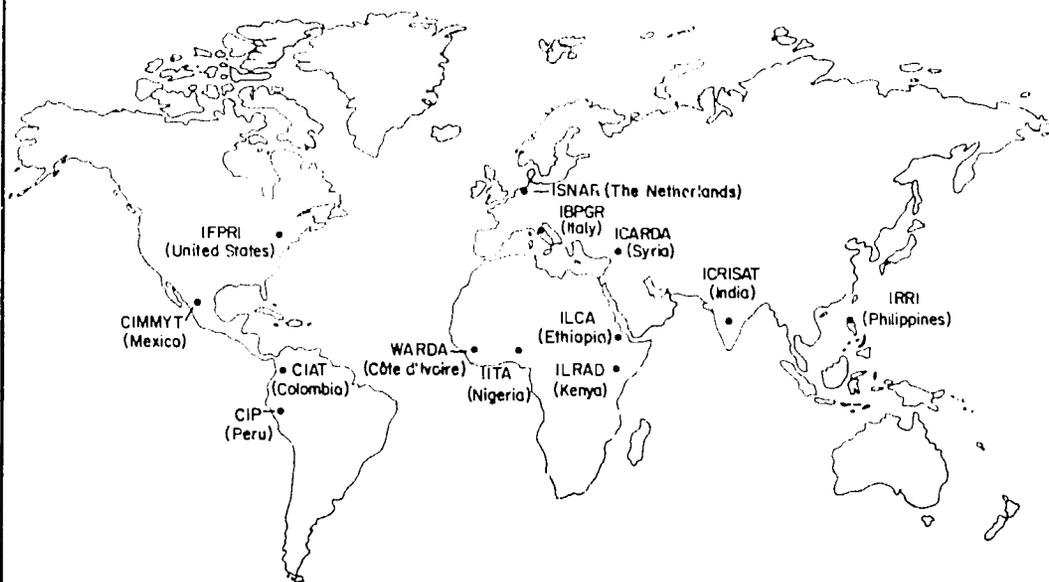
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ABBREVIATIONS

c.i.f.	cost, insurance and freight	GDP	gross domestic product
COLAIBA	Coopérative laitière de Bamako	GNP	gross national product
DNE	Direction nationale d'élevage (Mali)	INRZFH	Institut national de la recherche zootechnique, forestière et hydrobiologique (Mali)
EEC	European Economic Community (Belgium)	LME	liquid milk equivalent
FAO	Food and Agriculture Organization of the United Nations (Italy)	LPU	Livestock Policy Unit (formerly unit within ILCA)
FCFA	franc CFA: currency used in francophone West Africa	RSS	rate of self-sufficiency
GATT	General Agreement on Tariffs and Trade (Switzerland)	SOMIEX	Société malienne d'importation et exportation
		t	tonne
		VAT	value added tax

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International Livestock Centre for Africa (ILCA), Ethiopia: African livestock production

International Centre for Agricultural Research in the Dry Areas (ICARDA), Syria: farming systems, cereals, food legumes (faba bean, lentil, chickpea), and forage crops

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