

ILCA Research Report

Impact of livestock pricing policies on meat and milk output in selected sub-Saharan African countries

T.O. Williams

March 1993

**INTERNATIONAL LIVESTOCK CENTRE FOR AFRICA
ADDIS ABABA ETHIOPIA**

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ILCA Research Report No. 20
International Livestock Centre for Africa
Addis Ababa, Ethiopia
March 1993

ABSTRACT

Livestock pricing policies in many developing countries are often instituted without a good appreciation of the consequences of such policies for allocative efficiency, output, trade and consumption. This paper evaluates, in a comparative cross-country context, the objectives and instruments of livestock pricing policy in five sub-Saharan African countries: Côte d'Ivoire, Mali, Nigeria, Sudan and Zimbabwe during the period 1970-86. It examines the extent to which pricing policy objectives have been attained and estimates the effects of price interventions on output, consumption, trade and government revenues in order to draw out lessons for the future.

The empirical results indicate that in comparison with real border prices, a certain degree of success was achieved in stabilising real domestic producer prices in the study countries. However, consumers still appear to gain as much as producers in three of the study countries, with negative consequences for foreign exchange earnings and government revenues. The analysis reveals the importance of domestic inflation and exchange rates as key variables for livestock pricing policies and highlights the need to address the macro-economic imbalances that cause exchange-rate distortions and high domestic inflation at the same time that direct price distortions are being tackled.

KEYWORDS

/Côte d'Ivoire//Mali//Nigeria//Sudan//Zimbabwe//livestock//marketing//price policy/-/consumption//income//resource allocation//social welfare// social costs//foreign exchange/.

RESUME

Il arrive souvent que les politiques des prix des pays en développement soient instituées sans tenir compte de leurs conséquences sur l'efficacité de la distribution des ressources, ainsi que sur la production, le commerce et la consommation des produits d'origine animale. La présente étude présente une évaluation pays par pays, des objectifs et des instruments des politiques des prix des produits d'origine animale dans cinq pays de l'Afrique subsaharienne, à savoir la Côte d'Ivoire, le Mali, le Nigeria, le Soudan et le Zimbabwe entre 1970 et 1986. Elle mesure le degré de réussite des politiques des prix par rapport à leurs objectifs et détermine les effets des interventions sur les prix sur la production, la consommation, et le commerce des produits d'origine animale, de même que sur les recettes publiques de l'Etat en vue d'en tirer les enseignements qui s'imposent.

Il ressort des résultats empiriques de l'étude que par rapport aux prix frontière réels, les pays concernés ont dans une certaine mesure réussi à stabiliser leurs prix intérieurs réels au producteur. Ces résultats révèlent également depuis le début des années 80, un renoncement progressif de ces pays à leur politique de taxation des producteurs. Toutefois, dans trois des pays considérés, les consommateurs semblent profiter autant que les producteurs des politiques officielles des prix, avec des conséquences négatives sur les recettes en devises et les recettes fiscales de l'Etat. L'analyse entreprise dans l'étude révèle l'importance de l'inflation intérieure et des taux de change en tant que variables clés des politiques des prix des produits d'origine animale et met l'accent sur la nécessité pour l'Etat de corriger les déséquilibres macro-économiques responsables des distorsions des taux de change et de l'exacerbation de l'inflation intérieure au moment même où il entreprend de corriger les distorsions directes des prix.

MOTS CLES

/Côte d'Ivoire//Mali//Nigeria//Soudan//Zimbabwe//bétail//commercialisation//politiques des prix//consommation//revenu//répartition des ressources//bien-être social//coûts sociaux//devises/.

ISBN 92-9053-263-7

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ACKNOWLEDGEMENTS

I wish to acknowledge the substantial help I received from a number of people in carrying out this research work. In the study countries, the following people shared their knowledge of the livestock subsector without reservation and helped in the task of data collection: Kamagate Mamadou and Mody Barry (Côte d'Ivoire); Dr Fernard Traore, Abou Doumbia and Tapsirou Maiga (Mali); Uka Amogu and Wole Ajayi (Nigeria); Dr Osman Bashary, Professor Babiker E. Musa and Dr Y. El Naim (Sudan); Tobias Takavarasha and Felix Masanzu (Zimbabwe). To all of them I offer my sincere thanks.

I also wish to express my gratitude to Stephen Sandford for initiating this research and for providing useful insights at various stages of the study. His criticisms and insistence on clarity have helped to remove a number of ambiguities from the original draft and contributed to an improvement of the final paper. Pradeep Itty read parts of the paper and I am grateful to him for pointing out certain errors in the original draft. Thanks are also due to Professor Lawrence D. Smith and Dr Allan Low for their thoughtful and objective reviews of a draft of this paper. Almaz Zewdie, Tschainesh Zewdu and Woinsnet Mckonnen typed successive versions of the paper with accuracy and patience, while Senait Seyoum and Alenayehu Konde provided invaluable editorial assistance.

A major part of this work was conducted while the author was a Visiting Fellow at the International Livestock Centre for Africa (ILCA). The fellowship and part of the field work were funded by the Rockefeller Foundation under its Social Science Research Fellowship Programme in Agriculture. The support provided by the Foundation is hereby gratefully acknowledged.

Finally, the views expressed here are those of the author. No one but the author should be blamed for the remaining errors and deficiencies of the paper.

1. INTRODUCTION

Among the ways in which governments intervene in the livestock subsector, the most prevalent, and arguably the most important, is interference with prices. Price intervention policies are often implemented with the aim of achieving certain broad objectives which, in developing countries, include output expansion, government revenue generation, improvement of income distribution, stabilisation and inflation control. In pursuing these objectives, governments possess a wide variety of policy instruments which can be manipulated directly with the intention of achieving the desired objectives. For example, they can establish price controls or price supports to benefit consumers and producers, respectively, or they can impose import duties and export taxes to raise government revenue. In addition to direct measures, indirect forms of government intervention including exchange rate adjustments can also influence the production, consumption and trade of livestock products.

In reality, sub-Saharan African (SSA) countries have pursued a wide variety of pricing policies, differing in the choice of instruments as well as in their objectives.¹ The effects of these policies on production incentives have also been varied. The multiplicity of objectives and their instruments suggests that in some cases conflicts will arise between the desired objectives and the policies pursued to achieve them. The likelihood of such conflicts is heightened when, as often happens, the different ministries of these countries are interested in different objectives. The ministry of agriculture, for instance, may advocate higher farm prices to encourage output expansion while the finance ministry may be interested in interventions that raise

revenues. In this situation, one of the contributions of price policy research will be to quantify the effects of different policy options in order to permit an informed discussion which can lead to better decision making and an improved incentive system.

The broad objective of this study is to review, analyse and present evidence concerning the effects of livestock pricing policies on production incentives in a sample of SSA countries. The specific objectives are to:

- provide a comparative picture of objectives and policy instruments used by selected SSA countries with respect to the livestock sub-sector
- estimate the effects of direct and indirect price interventions on incentives, livestock output, consumption, trade and government revenue.

In what follows, the experiences of six SSA countries are profiled. These countries, namely Côte d'Ivoire, Ethiopia, Mali, Nigeria, Sudan and Zimbabwe, were selected on the basis of their livestock population, production, trade and consumption. Data were collected through interviews with policy makers and livestock marketing officials and from a wide range of primary and secondary published documents.

To introduce the subsequent discussion, Chapter 2 examines the growth and performance of the livestock subsector in the study countries. It demonstrates the diversity of situations and experiences with respect to production, consumption, export and import of livestock products.

Chapter 3 considers the multiple objectives of price policies in the selected countries and analyses

1. For this study, sub-Saharan African (SSA) countries are taken to include only those 39 countries listed in *ILCA's strategy and long-term plan* document (see ILCA, 1987a).

the principal instruments employed to influence producer and consumer prices. The discussion highlights similarities and the diversity in objectives and policies dealing with the livestock subsector and also examines the compatibility of policy goals with their instruments.

Chapter 4 assesses the impact of government intervention on price incentives. The final chapter discusses the effect of intervention on the welfare of producers and consumers and on foreign trade and government revenue. It concludes by highlighting the main findings of the study.

2. LIVESTOCK PRODUCTION, CONSUMPTION AND TRADE

This chapter examines the main features of the livestock subsector in the selected countries by assessing trends in production, trade and consumption of certain livestock products. The discussion is confined to cattle, sheep and goats (the three ruminant species presently included in ILCAs research agenda) and to the food products derived from them (i.e. meat and milk). The policy implications of the observed trends are briefly discussed to set the context for the discussion of pricing policy that follows.

THE PRODUCTION STRUCTURE

Although there are many similarities in the livestock production systems of SSA, there are also important

variations. Such variations reflect differences in climate, availability of grazing land and incidence of diseases such as trypanosomiasis. In the countries selected for this study, pastoral systems account for the bulk of ruminant livestock production, except in Zimbabwe where cattle ranching and mixed crop-livestock production systems are very important.

Aggregate meat production and related data for the selected countries are shown in Table 1. The selected countries together account for almost half the total meat production (by weight) in SSA.² Per capita meat production varies, from about 8.5 kg per person in Nigeria to 25.3 kg per person in Sudan, reflecting substantial differences in population and pastoral resources among the countries considered.

Table 1. *Meat production, human population and per capita gross national product in the selected countries, 1985.*

Country	Total meat production ¹ ('000 t)	Human population mid-1985 (millions)	Per capita meat production (kg)	Per capita GNP (US\$)
Côte d'Ivoire	127	10.1	12.6	660
Ethiopia	556	42.3	13.1	110
Mali	134	7.5	17.9	150
Nigeria	846	99.7	8.5	800
Sudan	553	21.9	25.3	300
Zimbabwe	110	8.4	13.1	680
Total, selected countries	2326	189.9	12.3	
SSA	4875	418.0	11.7	400

1. Relates to meat from different livestock species slaughtered within national boundaries, regardless of their origin (FAO, 1986a).

Sources: FAO (1986a) for total meat production data; World Bank (1987) for human population and GNP figures.

2. The corresponding figure for milk is also about 50% (see Table 2).

Beef accounts for 41% (by weight) of total meat production in the selected countries. It is followed in importance by goat meat (12%) and mutton (11%). Domestic milk production is also important, but Sudan alone accounts for over 50% of total milk production in these countries (Table 2). When products are weighted by equivalent border

production of goat meat, lamb and mutton though this declined by 1983-85. For the selected periods, total meat production per capita increased modestly in two countries, remained about constant in one and declined in three.

Per capita milk production also varied from country to country over the 12-year period 1971-73

Table 2. *Production of livestock products in the selected countries, 1983-85.*¹

Country	Production ('000 t)			
	Beef and veal	Mutton and lamb	Goat meat	Cow milk ²
Côte d'Ivoire	42	6	6	15
Ethiopia	215	86	65	600
Mali	49	20	21	106
Nigeria	239	44	134	348
Sudan	309	92	39	1735
Zimbabwe	72	1	5	196
Total, selected countries	926	249	270	3000
Sub-Saharan Africa	2037	379	484	6125

1. Annual 1983-85 average.

2. Total production of whole fresh cow milk.

Source: FAO (1986a) and FAO (1987) for 1983 figures.

prices,³ the value of beef is the highest, followed by milk, mutton and goat meat, in that order.

Aggregate meat shares, however, conceal important country variations in production. The share of beef in total meat output varies among countries from 29 to 64%. For goat meat the share is 4 to 16% and for mutton and lamb, 1 to 18%. The share of beef is high and about equal in Sudan and Zimbabwe despite enormous differences in production systems. The goat meat share is high in Nigeria and Mali but very low in Zimbabwe and Côte d'Ivoire.

Trends in meat and milk production

Per capita meat production levels are shown in Table 3. In spite of the limitations of the production data from which these estimates are derived, the ratios do provide an indication of relative change over time. Per capita beef production declined over the period 1971-73 to 1983-85 in all the selected countries, except Sudan. During the 1971-73 to 1977-79 period, only two countries, Mali and Sudan, showed a slight increase in per capita

to 1983-85 (Table 4). In one country (Sudan), there was a substantial increase in production, while per capita milk production either declined or remained constant in the remaining countries. The underlying causes of these different production performances are varied, but may include natural disasters (e.g. acute recurring drought) that reduce feed availability, access to external markets and government economic policies. The effects of government economic policies on production incentives are examined in detail in Chapter 4.

GENERAL AND PER CAPITA CONSUMPTION STRUCTURE

Table 5 shows the level of meat consumption in the study countries. Total per capita meat consumption in 1983-85 varied from about 9 to 25 kg reflecting differences in meat prices, income, population and agricultural resources among countries.

Except for Mali in recent years, beef is the principal meat consumed in the study countries. Beef accounts for between 54 and 64% of total meat consumption in Zimbabwe, between 48 and 59% in

3. Border equivalent prices are world prices adjusted for transport and marketing costs. For a country, border prices represent opportunity costs at which goods can be exported or imported. See Appendix 1 for a description of how they are derived for the study countries.

Table 3. *Annual average production of meat by country, selected periods.*

Country	Production (kg per capita)								
	Beef			Sheep and goat meat			All meat		
	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85
Côte d'Ivoire	7.6	4.5	4.3	1.8	1.4	1.2	16.4	13.5	12.8
Ethiopia	8.0	6.8	5.1	5.2	4.3	3.6	18.6	16.5	13.2
Mali	7.4	6.4	7.3	4.6	6.7	6.0	17.9	18.8	18.4
Nigeria	3.1	2.7	2.5	2.0	1.9	1.8	8.2	8.2	8.5
Sudan	9.5	11.2	14.5	5.1	6.7	6.2	19.3	22.4	24.6
Zimbabwe	18.8	14.9	9.5	1.4	1.0	0.6	25.1	20.7	14.8
SSA	5.8	5.6	4.8	2.2	2.3	2.1	12.3	12.3	11.5

Sources: Meat production data from FAO (1987; 1989); human population data from World Bank Atlas (various years) and FAO (1989).

Table 4. *Annual average production of cow milk by country, selected periods.*

Country	Production (kg per capita)		
	1971-73	1977-79	1983-85
Côte d'Ivoire	1.4	1.3	1.5
Ethiopia	20.8	18.6	14.4
Mali	18.7	13.8	13.8
Nigeria	4.5	4.1	3.6
Sudan	47.6	58.2	81.5
Zimbabwe	24.6	21.3	23.6
SSA	16.4	15.9	15.2

Source: Meat production data from FAO (1987; 1989); human population data from *World Bank atlas* (various years) and FAO (1989).

Table 5. *Annual average apparent consumption of meat¹ by country, selected periods.²*

Country	Consumption (kg per capita)								
	Beef			Sheep and goat meat			All meat		
	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85
Côte d'Ivoire	7.5	7.0	5.5	1.7	1.6	1.3	15.9	15.9	14.5
Ethiopia	7.1	6.8	5.6	5.1	4.4	4.0	17.4	16.4	14.5
Mali	6.7	6.3	4.5	4.2	6.4	5.6	16.4	18.0	15.4
Nigeria	3.3	3.3	2.5	2.1	2.2	1.9	8.7	9.6	9.1
Sudan	10.3	11.1	14.7	5.7	6.7	6.3	21.3	22.6	25.1
Zimbabwe	11.8	6.9	6.6	1.7	1.2	0.7	18.3	12.7	11.4
SSA	6.7	6.6	5.2	2.6	2.5	2.2	14.9	15.2	12.2

1. Apparent consumption of meat, expressed in terms of carcass weight, is obtained from data on slaughtered production and trade in beef, sheep and goat meat (FAO, 1985).

2. Figures for 1971-73 and 1977-79 are annual averages based on per capita consumption data from FAO (1985); 1983-85 averages are from ILCA (1987b).

Sources: FAO (1985); ILCA (1987b).

Sudan, and between 27 and 47% in the remaining countries.

Although sheep and goat meat are widely consumed, their relative importance varies among countries. In 1983-85, the share of sheep and goat meat in total meat consumption was 36% in Mali compared with 6% in Zimbabwe. Overall, the meat products considered here together account for more than 50% of the total meat consumed in the study countries.

Per capita milk consumption also differs greatly among countries, from about 8 kg liquid milk equivalent (LME) in Nigeria to more than 80 kg in Sudan in 1983-85 (Table 6). The wide variation in milk consumption is partly explained by differences

in the 1980s in Sudan, consumption declined in Nigeria and Côte d'Ivoire over the same period. In all other countries, per capita consumption of milk was lower in 1983-85 than in 1971-73.

The annual growth rates of total domestic production and consumption of the livestock products considered here appear in Table 7. While growth rates such as those cited in Table 7 are only rough estimates, it would appear that increases in consumption have exceeded domestic production increases by a substantial amount, particularly for milk. The growing gap between domestic production and consumption is further confirmed by the net trade data presented in the next section.

Table 6. Annual average apparent consumption of milk¹ by country, selected periods.

Country	Milk consumption (kg LME per capita)		
	1971-73	1977-79	1983-85
Côte d'Ivoire	11.0	16.6	14.6
Ethiopia	21.1	19.4	17.1
Mali	20.7	17.2	17.2
Nigeria	8.0	11.4	7.8
Sudan	48.6	60.2	85.8
Zimbabwe	26.2	21.6	25.8
SSA	18.9	20.7	20.2

1. Apparent consumption is defined as cow milk production plus net imports of fresh, dried and condensed milk expressed in liquid milk equivalents (LME). No attempt was made to deduct milk fed to calves from the cow milk production figures.

Sources: FAO (1987; 1989); FAO trade yearbook (various issues); ILCA (1987b), and World Bank Atlas (various years).

in dietary habits. As indicated later on in this chapter, the percentage of total milk consumed that is imported varies from about 5 to 89%, and imports have been rising rapidly in recent years.

Trends in meat and milk consumption

Table 5 shows that between 1971-73 and 1983-85 per capita beef consumption fell in five countries and increased only in one. Per capita sheep and goat meat consumption which had risen significantly in Mali and to a lesser extent in Sudan in the 1970s, rose very little in the early 1980s in these two countries. In the remaining countries per capita consumption fell. The share of sheep and goat meat in total meat consumption increased significantly in Mali, but fell in all the other countries.

Per capita consumption of milk rose in the 1970s in Côte d'Ivoire, Nigeria and Sudan (Table 6). While the growth was maintained into the early

PATTERNS OF INTERNATIONAL TRADE IN MEAT AND MILK

The diversity of trade activities in meat and milk in the selected countries is illustrated by the data presented in Tables 8, 9 and 10 for beef, sheep and goat meat and milk, respectively. Live animals make up the bulk of meat exports which are directed mostly towards neighbouring African countries. Ethiopia and Sudan export live animals to the Middle East. Zimbabwe is the only country that exports beef to the EEC under the Lomé convention.

With respect to beef, four out of the six countries were net exporters between 1971-73 and 1983-85 (Table 8). Export volumes, however, declined in three and increased only in one. The remaining two countries – Côte d'Ivoire and Nigeria – have been net importers. The level of imports in the former has been nearly constant over the past 15 years, but imports rose significantly in the latter.

Table 7. *Estimated annual growth rates of total domestic production and consumption of livestock products by country, 1971-85.*

Product	Country	Production		Consumption	
			Percentage		
Beef	Côte d'Ivoire	1.09 ^a		2.45	
	Ethiopia	0.30		0.90	
	Mali	1.93		-0.35 ^a	
	Nigeria	2.71		2.71	
	Sudan	6.05		5.49	
	Zimbabwe	-2.57		0.30 ^a	
Sheep and goat meat	Côte d'Ivoire	1.98		2.62	
	Ethiopia	1.23		1.23	
	Mali	5.44		6.15	
	Nigeria	3.28		3.14	
	Sudan	3.61		4.01	
	Zimbabwe	-6.24		-5.40	
Cow milk	Côte d'Ivoire	5.46		8.59	
	Ethiopia	1.05		2.43	
	Mali	1.71 ^a		1.93	
	Nigeria	1.83		4.01	
	Sudan	7.38		7.70	
	Zimbabwe	2.50		2.69	

Note: The annual growth rate has been estimated as a log linear trend by ordinary least squares regression.

a. The regression coefficient used to estimate the growth rate was not significant at the 5% level.

Sources: FAO (1987); *FAO trade yearbook* (various issues); ILCA (1987b).

Table 8. *Average annual trade in beef by country, selected periods.*¹

Country	Beef trade ('000 t)								
	Exports			Imports			Net exports or imports (-)		
	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85
Côte d'Ivoire	0.0	0.1	0.1	36.5	41.8	37.9	-36.5	-41.7	-37.8
Ethiopia	17.3	2.4	3.7	0.1	0.0	0.2	17.2	2.4	3.5
Mali	21.9	15.7	45.5	1.1	0.3	0.6	20.8	15.4	44.9
Nigeria	0.1	0.3	0.0	34.5	57.9	53.0	-34.4	-57.6	-53.0
Sudan	7.8	2.1	3.4	0.7	0.3	0.4	7.1	1.8	3.0
Zimbabwe	44.6	60.8	21.8	0.0	0.1	0.0	44.6	60.7	21.8
SSA	254.4	212.7	153.0	164.3	196.6	270.4	90.1	16.1	-117.4

1. Trade data for 1971-73 and 1977-79 are from FAO (1985) and include meat and live animals in terms of carcass weight. To obtain figures for 1983-85, trade data on fresh bovine and canned meat (ILCA, 1987b; FAO, 1989) were added to the meat equivalent of live cattle traded. The latter was calculated using FAO (1986a) carcass weights as conversion factors.

Sources: FAO (1985; 1986a; 1989); *FAO trade yearbook* (1985); ILCA (1987b).

Table 9 shows that Sudan, Mali and Ethiopia have been net exporters of sheep and goat meat. Over the period considered, exports from Mali more than doubled and rose appreciably in Sudan, while Côte d'Ivoire and Nigeria were again net importers.

Trade in goat meat, lamb and mutton was insignificant in Zimbabwe.

Trade in milk consists mostly of dried, condensed and evaporated milk imports. As suggested earlier, milk production in the study

Table 9. Average annual trade in sheep and goat meat by country, selected periods.¹

Country	Sheep and goat meat trade ('000 t)								
	Exports			Imports			Net exports or imports (-)		
	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85
Côte d'Ivoire	0.0	0.0	0.0	4.5	5.2	3.8	-4.5	-5.2	-3.8
Ethiopia	0.6	0.2	0.4	0.0	0.0	0.0	0.6	0.2	0.4
Mali	2.1	2.8	5.2	0.0	0.0	0.0	2.1	2.8	5.2
Nigeria	0.0	0.0	0.0	3.3	3.5	3.1	-3.3	-3.5	-3.1
Sudan	3.8	5.4	7.1	0.0	0.0	0.1	3.8	5.4	7.0
Zimbabwe	0.0	0.3	0.0	0.0	0.4	0.0	0.0	-0.1	0.0
SSA	43.2	60.2	37.5	16.0	15.6	17.8	27.2	44.6	19.7

1. Trade data for 1971-73 and 1977-79 are from FAO (1985); 1983-85 figures were obtained by adding up trade data for fresh sheep meat (ILCA, 1987b) and the meat equivalent of live sheep and goats traded (in terms of carcass weight).

Source: FAO (1985; 1986a; 1989); FAO trade yearbook (1985); ILCA (1987b).

Table 10. Average annual trade in milk by country, selected periods.¹

Country	Milk trade ('000 t of LME)								
	Exports			Imports			Net exports or imports (-)		
	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85	1971-73	1977-79	1983-85
Côte d'Ivoire	2.5	1.2	1.2	55.4	121.7	129.5	-52.9	-120.5	-128.3
Ethiopia	0.1	0.1	0.0	6.4	26.4	114.0	-6.3	-26.3	-114.0
Mali	0.0	0.0	0.0	10.4	22.2	24.4	-10.4	-22.2	-24.4
Nigeria	0.0	0.0	0.0	224.5	588.3	371.8	-224.5	-588.3	-371.8
Sudan	0.0	0.0	0.0	16.8	34.5	93.0	-16.8	-34.5	-93.0
Zimbabwe	0.3	2.3	0.7	9.7	4.5	18.7	-9.4	-2.2	-18.0
SSA	38.5	29.2	3.7	751.2	1580.2	2014.0	-712.6	-1551.0	-2010.4

1. Trade data on milk include fresh, dried, condensed and evaporated milk and are expressed in terms of liquid milk equivalent (LME) using FAO (1978) conversion factors, i.e. 1 kg fresh milk = 1 kg LME; 1 kg dried milk = 7.6 kg LME and 1 kg condensed/evaporated milk = 2 kg LME.

Source: FAO trade yearbook (various issues).

countries has been growing more slowly than demand. The result has been a substantial increase in imports (Table 10). In liquid milk equivalent (LME) terms, milk imports to the study countries increased by 10% a year between 1971-73 and 1983-85. The rapid growth in imports has been stimulated by the availability of subsidised skimmed milk powder from developed countries which has been increasingly used as food aid. Côte d'Ivoire and Nigeria import more than 50% of the milk products they consume, Mali imports about 15% while the remaining three countries import between 5 and 10%.

POLICY IMPLICATIONS

Although the output, consumption and trade trends presented above need to be interpreted with caution, their underlying message is clear:

production of meat and milk in the study countries over the last 15 years has risen only slightly or has declined. The gap between production and consumption, which was very narrow at the beginning of the period, has widened significantly. As a result, there has been a growing tendency to import to meet demand, particularly for milk.

Domestic production has been unable to satisfy demand due to a variety of constraints, including environmental and technological problems. However, the incentive policies pursued by most governments have also contributed significantly (Schultz, 1978; World Bank, 1981; World Bank, 1983). Often the effects of these policies have run counter to the producers' interests, though such was not the intention. For example, policies that place ceilings on meat and milk prices at the producer and retail levels or impose export taxes have been blamed for inhibiting growth in

production while subsidising domestic consumption.

The realisation of expanded and sustainable meat and milk production has also not been made easy by the numerous goals pursued within the livestock subsector and the lack of agreement on trade-offs between policies. For example, rural dairy production is labour-intensive and the employment effects from its expansion can be substantial. For rural producers with relatively modest incomes, it can be reasonably argued on equity grounds that governments should consider protecting them from

concessionary imports; whereas livestock policy goals, if they are formulated to provide “cheap” milk to urban consumers may lead to an altogether different set of policy recommendations.

Thus, understanding the interrelationships and conflicts between objectives and policies is a critical step towards designing and implementing more effective incentive regimes. The multiple objectives of pricing policies and the trade-offs inherent in the pursuance of such objectives are examined in detail in the next chapter.

3. OBJECTIVES AND INSTRUMENTS OF LIVESTOCK PRICING POLICIES

In almost every country, developed and developing alike, governments intervene in agricultural markets.⁴ In particular, all African states formulate and implement policies which affect agricultural and food prices. The reasons for government intervention in price determination are many and varied.

This chapter begins with a description of the process of price formation in a free market in order to provide a benchmark against which subsequent discussions of government intervention in pricing policy can be viewed. It then reviews the multiple objectives of livestock price policies in the selected countries and analyses the main instruments employed to influence both producer and consumer prices. It examines the conflicts that often arise among the different policy objectives and assesses the appropriateness of some of the instruments in use. It concludes with a discussion of the arguments that have been advanced to rationalise government intervention in pricing policies.

PRICE FORMATION IN A FREE MARKET

The process of price formation and the level of prices in a free market can be used as the norm by which market behaviour and prices obtained under government intervention can be evaluated. In this respect, it is useful to consider first, a situation where a commodity market in a given country is isolated

from the world market and, second, a situation where free trade is possible. Given the characteristics of the study countries, it is also helpful to distinguish between the product for which a country is a potential importer (say, milk) and that for which a country is a potential exporter (say, beef).

In Figure 1a, the supply curve S_d shows the quantity of milk supplied per time period at different prices by producers in country 1. The demand curve D_d shows the quantity of milk demanded per time period at different prices by consumers in the same country. Since in this example the market for milk is isolated from the rest of the world, the market-clearing equilibrium is achieved with quantity Q_o sold at price P_o .

In Figure 1b, the supply curve S_w represents the total quantity of milk supplied to the world market per time period at different prices by all other countries. D_w represents the quantity demanded from the world market by all other countries. Market-clearing equilibrium is established in the world market with Q_w traded at price P_w .

If the barriers that previously prevented trade with international markets are now removed, the outcome is quite different from the earlier result without international trade. Milk can now be traded at the border of country 1 at price P_w , the world price,⁵ which is below the domestic market-clearing

4. A distinction can be made between interventions due to market failures and interventions arising from other motives. The former set of interventions can be justified on theoretical grounds, but the general body of literature on the price policies of developing countries takes a very negative view of the latter. It is the latter set of interventions that are considered in this chapter.
5. It is assumed here that since the production and consumption of milk in country 1 is very small in comparison to the quantity traded internationally, the effect on the world price of country 1's market becoming integrated with the rest of the world trading system is negligible. This is sometimes referred to as the "small country" assumption. The same assumption holds for the second case described in Figure 2.

price, P_o . Domestic demand increases from Q_o to Q_d and domestic supply falls from Q_o to Q_s . The gap, $Q_d - Q_s$, is now imported from the world market at price P_w .

Figure 2 illustrates the second market situation where a country is a potential exporter of beef. When the domestic market is isolated from the world market, Q_o of beef is sold at price P_o . With free trade between country 2 and the rest of the world, domestic consumption decreases to Q_c , domestic production increases to Q_p , and a quantity equal to $Q_p - Q_c$ is exported to the world market at price P_w .

Figures 1 and 2 also show the welfare gains/losses resulting from trade. Figure 1a indicates that by importing milk at P_w , consumers in country 1 are better off in two ways: they can buy their original quantity of milk Q_o at the lower price P_w , and they can increase the amount consumed to Q_d . Their welfare gain is the area $abfc$, which is sometimes referred to as the increase in consumer surplus. This increase in consumer surplus is the amount of money consumers would have been willing to pay to consume the additional quantity $Q_d - Q_o$ but do not need to pay because they can purchase all the milk they want at P_w . This gain in consumer welfare is obtained partially at the expense of domestic producers. In the absence of trade, total producer revenue is equal to $abjg$; total producer cost is bjh . The producer surplus or income is equal to the difference, $abhg$. With the fall in price to P_w , producer incomes fall by the amount $abcd$. This is a loss in producer welfare which accrues to consumers because of the fall in price.

It is obvious from Figure 1a that consumers have gained more than producers have lost. Consumers could reimburse producers for their losses and would still be net gainers by area bfd . This triangle represents the gains from trade.

Similarly, in Figure 2 the welfare gains from free trade in beef compared to the situation where country 2's market is isolated from the world market, are represented by the area of the triangle bcf . This is the excess of the gain in producer surplus, $abcfd$ over the loss in consumer surplus, $abfd$.

These results thus indicate that trade can provide a net gain in economic surplus for countries 1 and 2. Although not shown here, it can also be demonstrated that with free trade a country can maximise the welfare gains from trade. However, several important points are hidden in the apparently simple analyses presented above.

First, the world price P_w , is usually quoted in foreign currency (e.g. US dollars). To make P_w

comparable to the domestic price, P_o , a conversion at some exchange rate is required. The rate that is used obviously has a significant effect on how P_w compares with P_o .

Second, as shown above, the opportunity to trade internationally creates several adjustments in the domestic commodity market. For one thing, it changes the price facing domestic producers and consumers of the commodity in question. This has important implications for income distribution and resource allocation and, perhaps more importantly, for other commodities and the entire economy.

Third, international commodity markets are notoriously unstable and fragmented. For livestock products, this instability arises partly as a result of climatic and biological conditions and partly due to inadequate information and knowledge about current and expected economic opportunities. The result, often, is wide fluctuations in world prices which, in turn, can cause large fluctuations in the incomes of farmers or, in the case of exporting countries, in foreign exchange earnings.

These fluctuations can go beyond what a government is willing to accept and hence may attempt to institute some measure of price stabilisation.

The points raised above, while by no means exhaustive, do provide a basis for understanding why governments have rarely been prepared to allow free international trade and accept the prices that ensue from it. While government pricing interventions may arise out of a misunderstanding of the relationship between trade and social welfare, often the departure from free trade arises because a government wants to achieve objectives that may pertain to safeguarding public welfare or raising government revenue. The next section examines some of these objectives.

OBJECTIVES OF LIVESTOCK PRICING POLICIES

Although there are many different objectives behind livestock pricing policies pursued in the study countries, they can be summarised under six headings, viz: food self-sufficiency, export promotion, stabilisation and inflation control, government revenue generation, improved nutrition and employment creation. The specific livestock development objectives pursued in each of the selected countries are shown in Table 11. While the objectives are, to a certain extent, mutually reinforcing, in a number of cases there can be conflict between them.

Table 11. Major livestock policy goals in the study countries, 1975–85.

Goal	Country					
	Côte d'Ivoire	Ethiopia	Mali	Nigeria	Sudan	Zimbabwe
Self-sufficiency	X	X	X	X	X	X
Export promotion		X	X		X	X
Stabilisation and inflation control	X		X	X	X	X
Government revenue generation	X	X	X	X	X	X
Improved nutrition				X		X
Employment creation		X		X		X

The following notes sketch the main features of the objectives listed summarily above.

The self-sufficiency objective

Of all the stated objectives, the basically consumer-oriented objective of attaining meat and milk self-sufficiency ranked as the most common.⁶ As Table 11 indicates, this objective is sought after by all the study countries. This is not surprising given the nutritional importance of meat and milk in the diet and the political risks associated with shortages of these products. Equally important is the desire to reduce dependence on imports in the face of foreign exchange shortages and unpredictable world prices.

Ideally, the self-sufficiency objective could be achieved by following a producer-oriented price policy. This was the approach followed by the Republic of Korea in the 1960s and particularly since 1970 with respect to rice. By raising the real producer price of rice and implementing other price-related incentive measures, Korea was able to achieve self-sufficiency in rice in 1977 while the yield of rice per hectare outstripped that of Japan and the United States (Paukert, 1988).

While similar policies could, in principle, be applied to the livestock subsector, this has not usually been the practice in SSA where priority has been given instead to cheap food policies that have benefited consumers more than producers. As can

be seen in Chapter 4, even in those instances where producer prices have risen, restrictive trade and exchange rate policies have been partly responsible for those increases.

More importantly, judging by the production and consumption trends presented in the previous chapter, self-sufficiency in meat and milk has not been achieved for any considerable length of time in most of the study countries. In fact, the self-sufficiency ratios⁷ of meat and more so of milk have tended to decline over the last 10 years, although there are considerable fluctuations in the ratios among countries and between consecutive years.

Thus, while the Korean example and other similar cases indicate that appropriate pricing policies can move a country toward the goal of self-sufficiency, inappropriate policies, on the other hand, can lead to outcomes that are exactly opposite to those intended or at least stated. It is important to note here that most of the study countries, undoubtedly, possess considerable animal resources. However, there are virtually no detailed analyses of the comparative advantage that each country has in the production of particular livestock products. Such studies dealing with issues concerning international markets, appropriate border price policies and foreign exchange management, can give policy makers an idea of the feasibility or desirability of achieving self-sufficiency

6. Self-sufficiency was an important goal in the study countries from the early 1970s to the early 1980s. Government documents now refer to the goal of improved food security in livestock projects. The two terms are often used interchangeably, but they are not synonymous. Food self-sufficiency aims at meeting all the staple food needs of a country from domestic production. It is a narrower concept than food security which aims at ensuring access for all at all times to a level of food sufficient for an active and healthy life (World Bank, 1986a). The two key components of food security are food availability (through domestic production and/or trade) and food access (through home production or purchase).

7. Defined as the ratio of domestic production to total consumption.

by providing a unified framework for assessing the advantages that a country has in the production of meat and/or milk.

The export promotion objective

This objective stems from the desire of most governments to improve the contribution of the livestock subsector to net foreign exchange earnings. It is another frequently expressed production objective of livestock products pricing policy. As Table 11 indicates, it is important in four of the six selected countries.

Generally, the rate of growth of exports will depend on the stimulus from export markets and on the incentives provided by domestic price and trade policies. However, even with a strong external stimulus, domestic price policies may still impede the growth of exports in several ways. First, it is obvious that exports of livestock and their products will increase only if growth of production exceeds growth of domestic consumption. This might require producer prices to rise to border price levels to spur production and restrict consumption. But if prices are controlled at both the producer and consumer levels, this may discourage production and encourage consumption — the opposite of the desired effect of promoting export.

Secondly, the manner in which the state intervenes in export marketing can have a profound impact on the level of exports. In most SSA countries, export marketing is under tight government control, when not a state monopoly.⁸ These intervention agencies have been used in the past as instruments of taxation with often negative consequences for exports.

In addition, inappropriate exchange rate policies can have deleterious effects on the development of the livestock export sector. Indeed, it has been argued that part of SSA's decline in agricultural exports stems from lack of international competitiveness as a result of overvalued exchange rates, export taxation etc (FAO, 1986b; Oyejide, 1986). The relative importance of these direct and indirect price control policies in promoting or inhibiting the growth of livestock output, including exports, in the study countries is examined empirically in Chapter 5.

The inflation control and market stabilisation objectives

Livestock production is inherently unstable given its dependence on climatic and other environmental conditions. This instability is a major source of price fluctuations for livestock products. The stabilisation objective can take two forms: price and income. With respect to the former, the aim is to minimise price fluctuations with a view to shield both consumers and producers from the full impact of erratic nominal price variations. The income stabilisation objective, on the other hand, is basically producer-oriented. For instance, Nigeria's agricultural policy document states that one of the policy objectives of the livestock subsector is to improve and stabilise rural income emanating from livestock production and processing (Nigeria, 1988). The aim here is to reduce the fluctuations in prices which may lead to an undesired change in real incomes of producers.

Virtually all the countries studied included price stabilisation objectives in their agricultural policies. A common mechanism for reducing abnormal fluctuations in agricultural prices is for a government agency to act as buyer and seller of last resort, entering the market to purchase supplies when prices are very low and selling later when diminishing supplies drive up prices. However, this kind of measure has not been applied to the livestock sector of the study countries mainly because of the perishability of the products, relying instead, on consumer price controls in countries pursuing this objective (e.g. Côte d'Ivoire, Mali, Sudan and Zimbabwe). At the same time, pricing policies aimed at reducing year-to-year fluctuations have been pursued, particularly in Zimbabwe, to protect producers against losses caused by the vagaries of weather and price fluctuations in the world market.

At this point, it is perhaps useful to distinguish between seasonal and erratic (i.e. atypical) price variations. Seasonal price variations of a regular type serve a useful purpose by reconciling demand with seasonally changing supply and production costs. Conversely, erratic price variations create uncertainty for producers which may retard specialisation and lead to faulty production decisions. Also, low-income consumers are particularly vulnerable to sudden price surges. Thus, attempts to eliminate seasonal price fluctuations

8. Among the livestock exporting countries considered in this study, government parastatals intervene directly in export marketing by purchasing and exporting livestock and animal products in Ethiopia and Zimbabwe, while the parastatals provide only regulatory and service functions in Mali and Sudan.

altogether by relying, for example, on consumer price controls often destroys the incentive for private sector inter-temporal arbitrage and increases the need for further government intervention. A policy aimed at reducing erratic price variations, on the other hand, can help lessen the uncertainty about future prices. This can encourage private dealers to engage in inter-temporal arbitrage, for example, by buying animals in areas of feed shortage and moving them to areas with more fodder or processing facilities to overcome problems of perishability. These practices will also benefit consumers ultimately. However, this requires making the distinction between seasonal and erratic price variation, which is rarely done.

Another pertinent point is that some economists have argued that what is of crucial importance to producers is stabilising their income, *not* stabilising the prices of their produce (Stiglitz, 1987). Their argument is that if price and quantity are negatively correlated, stabilising prices may actually exacerbate the fluctuations in income. There is some validity in this argument, particularly with respect to beef production, since other studies have established that the short-run slaughter response is almost always in a direction opposite to the current change in domestic producer price (Rodriguez, 1985; Jarvis, 1986).

Turning to the inflation control objective, the underlying motive is that it is necessary to keep down producer prices in order to make exports competitive and to constrain consumer price increases which could put upward pressure on wage levels and the prices of manufactured goods. However, a fact that is often ignored is that price policy alone cannot be used to keep inflation in check. The experiences of some of the countries studied indicate that price controls will fail to curb, and may even exacerbate, inflation. This happens when the fixed prices for meat and milk and other consumer goods are too low in relation to existing supply and demand. Scarcity of goods sold at controlled prices rapidly develops, and a parallel market is created with prices higher than would exist in the absence of price controls. Producers faced with unattractive prices shun or reduce their supplies to the official marketing agencies and sell instead on the parallel market. As a result, the proportion of goods sold at the controlled prices falls, while the proportion of parallel market sales grows, with an inflationary effect. Sudan and Zimbabwe have lately experienced this problem with regard to milk and meat, respectively.

The government revenue raising objective

Another objective of pricing policy is to raise revenue for government development tasks. The principal source of government revenue is, of course, taxation. Trade taxes (e.g. import tariffs and export taxes) are commonly used in all the study countries. In Mali, for example, the World Bank (1975) estimated that export taxes together with other levies and fees (e.g. butchers' and cattle dealers' licences, slaughtering fees etc) contributed about 6% of total public revenues (amounting to FCFA 11 612 million) in 1970–72. Apart from generating revenue, trade taxes also have an important influence on the prices received and paid by producers and consumers: export taxes on livestock products tend to lower domestic prices, while import tariffs tend to raise domestic prices.

In addition, pricing policy has often been pressed into service to raise government revenue because most developing countries lack an adequate administrative base for imposing direct taxes. The main instrument for this is the marketing board that purchases livestock products at low prices and either resells them domestically or exports them, at higher prices. The difference, which constitutes the government's profit from livestock price policy, can be a significant addition to government revenue.

The Livestock and Meat Corporation (LMC) of Ethiopia and the Cold Storage Commission (CSC) in Zimbabwe were partly set up for this purpose. Unfortunately, over the last few years, the governments of Ethiopia and Zimbabwe have had to subsidise these agencies instead of deriving revenue from them. In the case of the CSC, the problem arises partly because it has the responsibility of purchasing beef for domestic as well as export marketing. Until 1983, Zimbabwe pursued a cheap beef for consumers policy. CSC's export earnings were used to subsidise and lower the consumer price of beef. Thus, the Government of Zimbabwe was indirectly taxing producers while subsidising consumers. Even then the export earnings of the CSC could have added to government revenue, but the government chose instead to use the funds to reduce the cost of keeping consumer beef prices low.

The improved nutrition objective

This objective plays a prominent part in the justification of pricing policies in two of the study countries (Table 11). Its aim is to increase the level of household consumption of animal proteins

—superficially, a highly praiseworthy objective. Its implementation is, however, problematic.

Ideally, for this objective to be achieved, producer prices need to be high enough to provide producers adequate incentives to expand output while keeping consumer prices low enough, or at least designed in such a way as to enable the poorer classes to benefit more than the wealthier ones. But a marked increase in the prices of meat and milk to encourage production can have a significant impact in threatening the standard of living of urban workers, leading to demands for higher wages and creating inflationary pressures in the economy. Moreover, attempts to increase food prices suddenly, as in Sudan in early 1985, have frequently been the immediate reasons for strikes and riots. However, attempts to suppress consumer price increases through subsidies can put an enormous strain on government budgets, leading to increased government borrowing and a possible expansion in the money supply that in itself can be inflationary. Zimbabwe, for example, experienced problems emanating from escalating consumer subsidies in the 1970s and early 1980s.

More importantly, the use of consumer subsidies means favouring the urban sector (rich and poor) at the expense of the rural population since such schemes are easier to administer in cities than in inaccessible rural areas. Also, if consumer prices are reduced by paying producers low prices, urbanites (rich and poor) again benefit at the expense of rural dwellers and this may discourage expansion of output. Thus this objective, meritorious at first sight, can be very negative from the point of view increasing production and the equitable distribution of benefits, if adequate care is not taken in its implementation. In terms of concrete achievement, available evidence presented elsewhere (Williams, 1989) indicates that not much progress has been made toward the attainment of this objective, for example, in Nigeria. The situation is not largely different in Zimbabwe, the other country pursuing this objective.

The employment creation objective

The idea underlying this objective is to use pricing policy to provide rural employment through expanded livestock production, processing and marketing. The labour intensive nature of some aspects of livestock production (e.g. dairy production) suggests that the direct and indirect employment effects of expansion can be substantial. Such rural employment opportunities can help to

stem the tide of rural to urban migration and ease the pressure on social amenities in the cities. Further, since average rural incomes are often several times lower than average urban incomes, it is not surprising that governments concerned with long-term agricultural development are willing to consider using pricing policy to encourage more labour intensive livestock production systems.

High producer prices that will provide the incentive for expanding production through adoption of innovative approaches constitute a necessary condition for the attainment of the employment creation objective. As can be seen from the next chapter, real livestock producer prices increased slightly over the past decade in two of the countries pursuing this objective. Nevertheless, evidence of an upward trend in real producer prices does not resolve the question of whether these prices rose enough to encourage the kind of investment needed to create additional employment opportunities. Besides, other technical production problems and economic policies pursued in some of these countries have worked to offset whatever incentive was forthcoming from the rising producer prices. For example, in Nigeria beginning in the 1970s the government established a number of dairy processing plants near the major urban centres. The milk for processing was to come from associated government dairy farms and from local collection. However, the inadequate purchase prices offered by the plants made local milk collection difficult. The plants' production activities started relying on reconstituting imported powdered milk which was cheaper than locally produced milk because of depressed international prices and appreciation of the real exchange rate of the Naira during this period. Thus, both internal and external factors have militated against the attainment of the employment objective. The picture just painted for Nigeria is not altogether atypical of the situation in the other countries attempting to implement this objective.

INSTRUMENTS OF LIVESTOCK PRODUCTS PRICING POLICIES

Before examining the conflict inherent in attempting to implement the aforementioned objectives, it will be useful to review briefly the instruments through which livestock pricing policies are applied. Although there are a variety of intervention tools for influencing livestock product prices, the main instruments in use in the study countries are summarised in Table 12.

Table 12. *Major instruments of livestock products pricing policies in the study countries, 1975-85.*

Instrument	Country					
	Côte d'Ivoire	Ethiopia	Mali	Nigeria	Sudan	Zimbabwe
Controlled producer prices		X				X
Controlled consumer prices	X		X		X	X
Input subsidies	X			X		
Consumer price subsidies						X
Import tariffs	X		X	X	X	X
Import licences	X		X	X	X	X
Foreign exchange allocations			X	X	X	X
Export taxes		X	X		X	
Export licences		X			X	

As the table clearly shows, no single instrument is ever used alone in a country. Frequently, a number of instruments are used concurrently. Understanding the interrelationships between instruments is of crucial importance in designing effective price policies. In what follows, the pricing instruments listed summarily in Table 12 are discussed under four major headings: price controls; price subsidies; import measures and export measures.

Price controls

Controlled or administered producer prices are used by governments in some of the countries studied to implement purchase price policies for basic food and exportable commodities. A complementary instrument, in the form of a marketing board, is usually employed in conjunction with price controls. Despite the great difference in the countries' situations, the basic approach is to establish fixed or minimum producer prices for the commodities under consideration, with a parastatal purchasing part of the total output. In determining the level at which to fix producer prices, various considerations including technical, economic and political factors are often taken into account. An example of this basic model is provided by the producer price policy of Zimbabwe with regard to beef and milk.

The parastatals responsible for the purchase and marketing of these two commodities are the Cold Storage Commission (CSC) and the Dairy Marketing Board (DMB), both under the control of the Agricultural Marketing Authority (AMA). The producer price-fixing process begins when the AMA

conducts initial hearings with farmers' associations on the cost of production incurred within alternative commercial farming systems. Based on the submissions of the farmers' associations and on the trading accounts received from the CSC and DMB, the AMA makes recommendations on producer prices to the Ministry of Agriculture. The latter also holds meetings with farmers' associations to get their views on pricing issues. On the basis of these meetings, the ministry's own cost estimate of production, and on the AMA's recommendations, the Minister of Agriculture in consultation with the appropriate senior officials then decides on the appropriate producer prices to recommend to the Ministerial Economic Co-ordinating Committee (MECC), which is composed of the ministers of the relevant ministries. After considering AMA's proposals, MECC makes recommendations to the cabinet where the final decision on producer prices is taken. The producer prices arrived at in this fashion are then implemented by the CSC and DMB in their purchases of beef and milk from livestock producers.

There are variations to this process of producer price fixing in terms of the relative weight given to economic and political considerations. However, some aspects of this basic approach can be found in Ethiopia and, to a limited extent, in Sudan especially with regard to milk produced by the government-sponsored Kuku Cooperative Dairy Production Scheme and in the cattle ranching and fattening operations of Société de développement des productions animales (SODEPRA) in northern Côte d'Ivoire.

Having decided on producer prices to be paid by parastatals, governments may again intervene by stipulating the prices at which their agencies must sell their products on the domestic market. In cases where the agencies' domestic selling prices (set by government) are inadequate to cover their handling costs and the costs of purchasing products at the government-guaranteed producer prices, subsidy payments may be needed. For example, in Zimbabwe in 1984 and 1986, the CSC needed 8.5 million and 6.0 million Zimbabwean dollars, respectively, because of trading deficits incurred as a result of government control of both purchase and wholesale selling prices (CSC, unpublished data).

At the other end of the spectrum, consumer prices set by official decree are also prevalent in most of the study countries (Table 12). This instrument is normally intended to check price rises in order to hold down increases in the cost of living and to make livestock products available to low-income consumers at affordable prices. The consumer prices set in this manner are, therefore, ceiling prices. Frequently, a subsidy is involved as indicated, for example, by a Zimbabwean government policy document which noted that "for a number of decades past governments pursued a policy aimed at keeping the prices of basic foodstuffs, i.e. maize meal, meat ..., as low as possible, whilst at the same time set producer prices at a level high enough to guarantee that consumer demand was met. Such a policy involved direct government intervention through the payment of subsidies to bridge the difference between official procurement prices and official selling prices since any increase in producer prices, if allowed to be passed on to the final consumer, would place an unacceptable burden on the majority of the population at the lower income level" (Zimbabwe Gov't, 1988).

While rationing appears to be an important complement to consumer price controls as it limits demand to the amount of goods available at the fixed price, it is not commonly used in the study countries. Thus, in the absence of rationing, consumer price control tends to be either ignored or, when enforced (at considerable financial cost to the government), give rise to a parallel market with much higher prices to consumers.

Furthermore, past experience in some of the study countries has emphasised the frequent tendency for price control regimes to be unduly rigid, raising difficulties when changes are required as happened, for example, in Sudan in 1985. Also, consumer price controls can hinder the flow of good

quality animals to domestic markets, especially during periods of limited supply, because butchers may hold back on purchases due to doubts about their ability to operate at reasonable profit margins. The net effect is to reduce beef supply in those areas where price control is enforced. However, price controls are increasingly recognised as the wrong instrument for providing cheap food to urban consumers and for carrying the main burden of anti-inflationary policies. For these reasons, as well as prodding by the World Bank and the International Monetary Fund, decontrolling of prices is now taking place in virtually all of the study countries applying this instrument.

Input and consumer price subsidies

Input subsidies are an integral part of livestock price policy in two of the study countries (Table 12). The motive behind input subsidisation is to provide incentives to producers, not by raising the price of their products, but, rather, by lowering their costs of production. Measures, which may include subsidies for credit, concentrate feeding, veterinary services, transportation and reduced import duties, are frequently designed to bring about increased livestock production by encouraging producers to use modern technical packages. In Côte d'Ivoire, for example, SODEPRA provides subsidised feeds, drugs and veterinary services to livestock producers in the northern part of the country.

In Nigeria, immediately after independence, regional governments helped finance the introduction and distribution of concentrate feeds to pastoralists. Also during the oil boom, i.e. 1975–1983, the federal government made credit available to livestock producers at concessionary rates to promote the use of new inputs. In addition, the government has been encouraging commercial banks to lend to livestock producers by absorbing some of the risks involved through the Agricultural Credit Guarantee Scheme. This scheme, established in 1978, guarantees loans made by commercial banks to the agricultural sector and thus serves to lower the price of credit for those seeking capital to invest in food and livestock production. Loan guarantee statistics showed that between 1978 and 1986, total guaranteed loans amounted to 316.9 million Naira out of which 173.9 million, or about 55%, went to livestock production.

Moreover, the Nigerian Government has sought, albeit unsuccessfully, to cheapen the price of land for livestock and other agricultural production projects. The government's land decree

of March 1978 reserves for the state governments, rural land not under active exploitation. The prime objective of the decree is to make it easier for the state governments to acquire land for public purposes, including the establishment of large-scale grazing reserves and ranching schemes. Unfortunately, as argued elsewhere, these input price reducing measures have not been totally effective in raising the level of livestock production in Nigeria (Williams, 1989). For the most part, these instruments have been manipulated to benefit the large-scale commercial livestock producers at the expense of the small-scale pastoralists who account for the bulk of livestock production in the country.

In contrast to input subsidies intended primarily for producers, consumer price subsidies represent a real effort to keep down the prices of food including livestock products consumed by most of the populace. The cost of this policy is borne either by agricultural producers in the form of low purchase prices or, more often, by the government. Once implemented, consumer subsidies are difficult to withdraw or to reduce substantially. However, because governments naturally attempt to limit this cost in one way or another, there are a number of differing subsidy instruments.

The most general, i.e. untargeted subsidy, consists of subsidising the consumer prices of a few selected items, usually beef and milk, with no restriction on the quantity bought and open to everyone. Although this could benefit all income classes to the extent of their purchases of the subsidised commodities, more often than not, the urban population benefits most on account of its higher incomes and political clout. Such an untargeted subsidy frequently runs counter to the goal of equity, and may actually increase inequality. At the same time and because of the extent of consumer coverage, it is an extremely costly policy putting a huge burden on government budgets. This policy instrument of consumer price subsidy is used in Zimbabwe, particularly with respect to beef, and less explicitly in those countries (e.g. Sudan and Mali) where governments attempt to enforce consumer price controls.

Another instrument that is also implicitly used in Zimbabwe is targeted subsidies which attempt to direct consumer subsidies to certain designated groups, for whom low-priced food is essential, while containing budgetary costs. The containment of

budgetary costs is pursued indirectly through geographical targeting and self-targeting. Geographical targeting is based on locating retail shops in areas inhabited mainly by low-income groups. For example, the CSC in Zimbabwe has established a number of tru-stores (i.e. retail outlets) in high population density areas to provide consumers with low-quality beef at affordable (i.e. effectively subsidised) prices.⁹

The self-targeting approach, which relies mainly on the fact that different income groups have different food consumption habits, has also been advocated in Zimbabwe as a way of reducing the budgetary costs to the government of beef and milk subsidies. Its justification lies in the fact that low-grade beef and milk consumers dominate the domestic beef and milk demand in Zimbabwe. For example, a government policy document estimates that demand for low and high quality beef stands at 92 and 8%, respectively, of total domestic demand. The same document goes on to state that "our domestic market is dominated by low-income consumers and is extremely sensitive to price changes" (Zimbabwe Gov't, 1988). Similarly, sterilised milk, with a longer shelf life, is more popular in the rural areas than fresh milk. Thus, subsidies are concentrated on low-quality beef and sterilised milk consumed predominantly by the poor, rather than high-grade beef and fresh milk consumed relatively more by the middle- and upper-income classes.

Import duties and quantitative import restrictions

Import tariffs are one of the traditional and most widely used instruments for raising the prices of imports and are used in virtually all the countries studied. They can be manipulated to give local producers whatever degree of protection is desired by insulating domestic prices from international price fluctuations and from the effects of imports subsidised at their source. This is precisely what the government of Côte d'Ivoire has done to stem the downward pressure on domestic cattle and beef prices arising from imports of highly subsidised beef from the European Community (EC). Since 1983, the Ivoirien government has imposed import duties of approximately 25% on beef imports from the EC to lessen the negative impact of such imports on domestic beef prices.

9. By 1988, five tru-stores had been opened in Harare and seven in Bulawayo. The CSC is considering opening up more of such stores in the future (Zimbabwe Gov't, 1988).

Import duties are also frequently used to generate revenue and discourage the consumption of certain products. In Nigeria, for example, the 1961 federal government's budget statement provided the justification for subsequent use of this instrument for raising revenue by claiming that tariff increases were imposed upon goods consumed by the better-off classes of the community. The statement added that "no one could reasonably maintain that imported meat, butter ..., constitute indispensable or significant items in the family budget of the low income groups which form the bulk of our population" (Nigerian Gov't, 1987).

Thus, tariff increases were imposed to serve as an indirect consumption tax and to raise revenue for the government. Between 1977 and 1986 imported livestock products attracted custom duties ranging from 10-30% of the c.i.f. value of the imported products.

Moreover, quantitative import restrictions, effected through import licences, foreign exchange allocations, physical quota limits on imports and outright bans constitute another quick-acting and powerful livestock policy instrument that is widely used in some of the study countries to protect domestic producers against competition from cheaper import supplies. These measures are also used to serve other ends. For instance, a 1988 Nigerian Government policy document maintained that "to serve as an incentive for increased production, government's ban on the importation of beef and other meats will remain in force" (Nigerian Gov't, 1988). However, a more powerful reason for imposing these measures, and one that is rarely made explicit, is the windfall gains that often accrue to those with rights to import licences and quotas. In the case of Nigeria, it is now well understood that prior to the introduction of the foreign exchange market in 1986, those responsible for trade restrictions together with those who had access to import licences and foreign exchange allocations were able to gain from the rents implied by the price differential between domestic and world prices. Thus, a reasonable inference is that rent-seeking is at least partly responsible for the implementation of these import-restrictive measures in some of the study countries.

Export taxes, licences, quotas and bans

These export-restricting instruments are widely used in the livestock exporting countries included in this study, to lower domestic prices and frequently to prevent local prices from rising to international levels when the latter lie above the former. They are also used to ensure that domestic consumption demands are met before any export. Thus in July 1986, the Government of Sudan imposed a ban on livestock exports in order to satisfy domestic consumption. Prior to that time and beginning in the late 1970s, there was a 5% export tax on small ruminants and their meat products, while export duties of 20 and 15% were imposed on cattle and beef, respectively.¹⁰ In addition to these taxes, a would-be exporter, amongst other things, must obtain an export licence, pay an initial export registration fee and subsequently an annual export registration renewal fee and must also set aside 30% of the quantity intended for export for the domestic market. The official taxes and fees paid for exporting cattle originating from Nyala in western Sudan in 1983/84 are itemised in Table 13.

The specific nature of the taxes and other fees imposed on the export of livestock and meat products in Sudan is not unique to this country. They are common in some of the other exporting countries studied, including Ethiopia and Mali.¹¹ While variable taxes and levies, as temporary measures, can improve domestic price stability, a long-term sustained use of these price control instruments inevitably negates the incentive to producers and carries the danger of introducing significant price distortions to the disadvantage of the livestock subsector in the long-run.

Having briefly discussed the objectives and instruments of livestock pricing policies in the study countries, the issue of economic and political trade-offs between the different objectives and the difficulties often encountered in achieving desired objectives through the chosen policy instruments are examined in the next section.

CONFLICTS BETWEEN OBJECTIVES AND PRICING INSTRUMENTS USED

The review of livestock price policy objectives in the previous section emphasised one central point — the multiplicity of objectives, both in the context of individual countries as well as for all the study

10. The export duties on cattle and beef consist of a 15 and 10% export tax based on the free-on-board (f.o.b.) value of exports and a 5% development tax on each product based on the free-alongside-ship (f.a.s.) value of exports.

11. For a detailed account of the official levies on the export of livestock in Mali see Delgado (1980: p. 378).

Table 13. Official taxes and fees required for exporting cattle in Sudan, 1983/84.^a

Item	(Sudanese pound/head)
Export registration fee ^b	11.70
Export tax	81.92
Development tax	27.31
Clearance and seaport charges	8.00
Health fees at the port	4.00
Export service fees paid to LMMC	6.00
Bank fees for foreign exchange transactions	4.20
Omdurman market fees (including vaccination and quarantine)	6.68
Nyala market fees (including health and local taxes)	6.08
Total^c	155.89

In 1983/84, 1 Sudanese pound = US\$ 0.769.

a. Cattle originating from Nyala in western Sudan.

b. Actual registration fee amortised and pro-rated over the number of animals exported.

c. Total levies may vary slightly between different producing areas due to differences in local market charges.

Sources: Sudan Gov't (1986); LMMC (1984).

countries as a group, with a consequent scope for conflict and contradiction.

In the first instance, the possibility of conflict between price policy objectives is indicated by the fact that, in five out of the six countries studied, the national policy included as objectives both the provision of producer price incentives and the stabilisation or lowering of consumer prices. The dilemma here is how to ensure cheap food, including meat and milk, for consumers without depressing producer prices to the extent that incentives for increased production and marketable surplus are jeopardised. Moreover, most governments want to safeguard the nutritional welfare of urban dwellers and poorer income groups, while at the same time trying to avoid the disruptive effects that rising and unstable livestock product prices can have on the cost of living and consequently on wage levels. In principle, with an appropriate set of pricing instruments, it should be possible to reconcile these conflicting objectives, but this is rarely achieved.

This brings us to the second important point which is that, even when an apparently non-conflicting set of objectives (e.g. export promotion and employment creation) is chosen, attempting to implement them all through a single pricing instrument may create conflicts and inconsistencies. For example, if higher producer prices are used to pursue the aforementioned

objectives, this may encourage increased production, employment and may even result in exportable surplus. However, if producer prices are too high, domestic demand may drop and exports may become uncompetitive thus dampening the growth of output with a possible decline in employment.

A somewhat different issue is the extent to which the choice of a pricing instrument is dictated by a primary concern for livestock policy objectives, rather than for macro-economic objectives largely external to the livestock subsector. For instance, a key macro-economic variable for the livestock subsector is the exchange rate. As can be seen in the next chapter, until recently virtually all the study countries maintained an overvalued exchange rate that adversely affected the livestock subsector by shifting the terms of trade against exports and in favour of imports and non-tradeables. Governments often responded to the resulting trade imbalances by placing stiff tariffs or quotas on imports; and yet these same measures have been frequently justified on the grounds that they will bring about the realisation of food self-sufficiency.

Similarly, there is a potential conflict between achieving domestic livestock production objectives through the price mechanism and maintaining external trade balance. The tradeable nature of livestock products and production inputs implies

that the choice of a particular set of pricing intervention instruments (e.g. import tariffs/quotas, export taxes/subsidies and exchange rates) can have a considerable impact on both the performance and fortunes of the subsector, the overall balance of payments and the growth of the national economies. The point is simply that when pricing instruments are used to achieve, say, macro-economic objectives, they may have an indirect ill effect on livestock policy objectives as they were not implemented with the latter in mind, resulting in inconsistencies between macro-economic objectives and livestock policy objectives.

These problems are further compounded when pricing decisions affecting the same commodities or inputs are made by a variety of government departments. For example, as indicated in the previous section, it is not uncommon to find the producer prices of meat and milk being determined by a ministry of agriculture, while a ministry of trade and commerce is responsible for fixing consumer prices. At the same time, interest rates for credit schemes and the foreign exchange rate that affects the domestic price of exports and imported livestock products, are usually set by the ministry of finance or the central bank. Frequently, definite positions based on different criteria are assumed by the different government departments before co-ordination of their pricing decisions is taken. In some cases, such co-ordination is inadequate or non-existent. As a result, there can be confusion regarding objectives and approaches and the pricing instruments may be used in ways different from those originally intended.

Altogether these problems raise doubts as to the degree of effective control that governments have in using the price mechanism to achieve some of their declared livestock policy objectives. It is fairly obvious that several of the goals discussed in the previous section are conflicting, yet governments in most cases still pursue them. The question is raised: Why do governments persist in pursuing these goals through price intervention policies? This is examined in the next section.

REASONS FOR GOVERNMENT PRICING INTERVENTION POLICIES

Although there now exists a wide variety of arguments on why governments intervene in agricultural pricing, two strands of the debate are relevant to this study. On the one hand, some economists like Stiglitz (1987) have argued that to understand the nature of government interventions

in agricultural markets, one must approach the problem from the perspective of the second best. The main problem is that most developing countries do not have the administrative capacity to implement an effective and equitable income tax system. As a result, the marginal social cost for implementing an income tax system may be unduly high. According to Stiglitz, failure to recognise this fact, i.e. the lack of a first-best solution to revenue generation, has given rise to much of the controversy over state intervention. Thus, naive views advocating non-interference and free markets, or even the more sophisticated view based on optimal tax theory that government should not impose trade taxes, become untenable once it is recognised that government has limited instruments for collecting revenue (implying that some distortionary taxation is necessary) and redistributing income (so that one way of improving the welfare of the poor may be through taxes on commodities consumed by the rich, with revenue so generated used to subsidise the poor).

On the other hand, those in the public choice tradition like Robert Bates (1981) argue that misguided price intervention policies pursued by governments in Africa are the result of short-sighted decisions made by rulers on the basis of political self-interest. For Bates, the impartiality of the state cannot be taken for granted. Rather, the elite controlling state power often pursues policies designed to maintain itself in power. He argues that policies which appear incomprehensible and irrational make perfect sense when viewed from this angle. Thus, price intervention policies which exploit the rural sector in many African countries can be understood once it is recognised that farmers and pastoralists make poor coalition partners because of their limited political power and resources extracted from them are used to benefit the elite directly or strengthen its power by appeasing the better organised and more powerful urban population. Similarly, Ghai and Smith (1987) argue that government control over the agricultural marketing system (through marketing boards, import licences and foreign exchange allocations) brings with it control over substantial resource flows that governments may use for their own purposes or allow different groups or individuals to enjoy as a way of dispensing political patronage.

Undoubtedly, the various perspectives of this debate on government intervention are valuable and need to be carefully scrutinised. Nonetheless, the wide variety of policies pursued by governments in the study countries and their different outcomes

suggests that the relative importance of these explanations will differ from country to country. The evidence presented in this chapter on the objectives and instruments of livestock price policies shows the

relevance of these different perspectives in explaining the behaviour of governments in the study countries.

Figure 1. Supply and demand framework for price formation: Case 1.

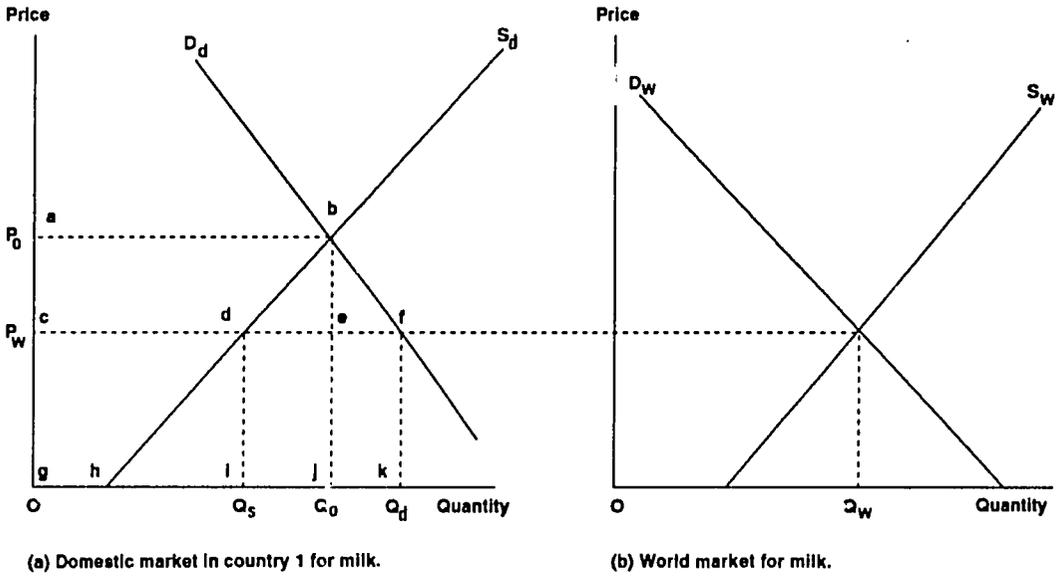
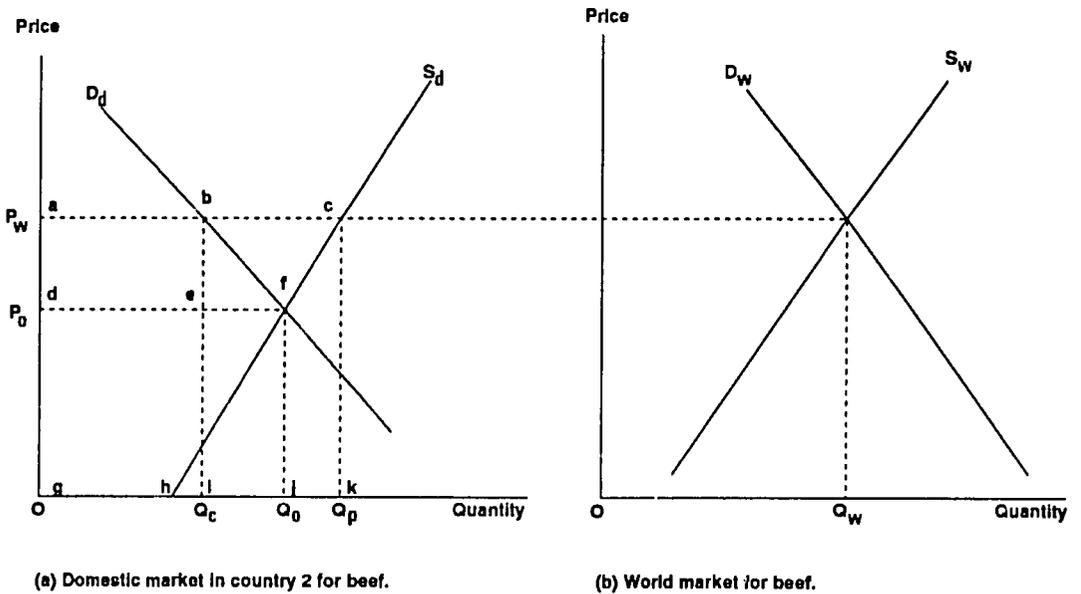


Figure 2. Supply and demand framework for price formation: Case 2.



4. THE EFFECT OF PRICE INTERVENTION POLICIES ON LIVESTOCK PRODUCERS AND CONSUMERS

Having examined the goals of livestock pricing policies and the main mechanisms through which prices are influenced in the study countries, attention is turned in this chapter to an analysis of the official price data on livestock products. The price data are analysed with a view to determine how successful governments have been in meeting some of their stated pricing policy objectives and to measure the impact of price intervention policies on production incentives and consumer prices. The methodology used for the analysis is set out in Appendix 1. The sources and limitations of the data used and the constraints which they impose on the interpretation of the results are also discussed in Appendix 1.

In what follows, we first examine empirical evidence on the real producer prices and the real border equivalent producer prices of livestock products. Next, variations in the two prices over time are analysed and nominal protection coefficients (NPCs) are estimated to establish the relative degree of implicit taxation or subsidisation of producers. The trend in real consumer prices is then examined and NPCs are also estimated for consumers. The chapter concludes by drawing out the implications of the results for livestock production incentives and for government effectiveness in influencing prices to achieve their objectives.

THE REAL PRODUCER PRICE OF LIVESTOCK PRODUCTS

Real producer prices, obtained by deflating farm-gate prices by the consumer price index (CPI), provide a direct, albeit incomplete, measure of incentives provided to livestock producers when technology and prices for inputs are held constant.¹²

The incentives are transmitted through the cost of consumer goods as measured by the CPI and will generate income and work/leisure substitution effects as a result of changes in the real returns to labour.¹³ Viewed in this light, the incentive (disincentive) effect arises when the prices received by the producer exhibit a significant upward (downward) trend relative to the cost-of-living index as measured by the CPI. This means that producers receive an incentive when nominal producer prices rise faster than inflation and a disincentive when domestic inflation exceeds the rise in nominal producer prices and thus erodes the purchasing power of producers' income. In countries where producer prices are fixed, real producer prices will rise when official prices are raised much faster than inflation, possibly through liberalisation of marketing and pricing policies. Conversely, infrequent or insufficient adjustments to officially fixed nominal prices coupled with high domestic inflation will bring about declining real producer prices.

12. For a discussion of the rationale and limitations of using the CPI as a deflator of producer prices, see Appendix 1.

13. In principle, it is possible to distinguish between three related kinds of price incentives to producers, viz: incentives to encourage the substitution of work for leisure with the ultimate aim of increasing the output of a commodity; incentives to promote the production of a domestic commodity over other competing domestic products; and incentives to stimulate the domestic production of a commodity in order to reduce the volume of competing imports. The discussion in this section is limited only to the first kind of incentives since competing domestic products and imports are not explicitly considered here. However, the incentive system in a country may encompass all three kinds.

The estimated rates of growth of real domestic producer prices in the study countries between the early 1970s and mid-1980s are shown in Table 14. Some caution is required in comparing results across countries and commodities. This is because for one of the study countries, Mali, a CPI does not exist. Instead, the food price index (FPI) has been used to deflate producer prices. Moreover, while similar time periods were used for beef and mutton, a slightly different time period was used for milk due to the non-availability of data for one year in one of the study countries.

Table 14. Annual percentage growth^a of real domestic and border equivalent producer prices in the study countries, 1970-86^b

Product and country	Compound annual percentage rate of growth	
	1970-72 to 1984-86	
	Real domestic producer price	Border equivalent producer price in real domestic terms
Beef		
Côte d'Ivoire	-1.3	-3.9 ns
Mali	-3.9	-5.3
Nigeria	0.2 ns	-4.6
Sudan	5.8	-6.5
Zimbabwe	-0.2 ns	-0.7 ns
Mutton		
Côte d'Ivoire	3.3	-2.5
Nigeria	-0.7 ns	-6.7
Sudan	6.4	-1.6 ns
Cow's milk^b		
Mali	2.4 ns	-2.9
Sudan	1.3 ns	-7.4
Zimbabwe	4.0	-1.6 ns

ns = not statistically significant at the 0.1 level.

a. The annual growth rates have been estimated as log-linear trends by ordinary least-squares regression.

b. For milk, growth rates were estimated for the period 1971/73-1984/86.

Source: Estimated from data collected from the study countries by the author

Nonetheless, the table indicates that there were four statistically significant cases of increases and two statistically significant cases of decreases in

the real domestic producer prices of the commodities surveyed. If the signs of the non-significant coefficients are examined, the table shows that on balance there was a general picture of upward movement in real producer prices. The pattern, however, varies among commodities even within the same country. For example, in Côte d'Ivoire the producer price for beef fell, while it increased for mutton over the same period.

Real border equivalent producer prices (RBEPs) were also estimated for the study countries in order to assess the opportunities available to producers through international trade and to provide a basis for comparison with real domestic producer prices.¹⁴ For each commodity, the RBEP was estimated by converting a world representative price into local currency using the official exchange rate and then deflating by the domestic rate of inflation. The estimate thus obtained provides an indication of the real value of the border price in domestic terms and will vary from one country to the other depending on the rates of exchange and domestic inflation.

The rates of growth of real border equivalent producer prices are shown in Table 14. In principle, the lower the rate of inflation and/or the higher the rate of devaluation of the exchange rate, the greater will be the tendency for the RBEP to rise in local currency terms. Conversely, countries with a high rate of inflation and a relatively constant exchange rate, i.e. countries allowing their currencies to become overvalued will show a rapidly declining RBEP. Table 14 underscores this latter point for all the study countries. As the table shows, RBEPs fell in real domestic terms in all the countries studied. If this result is taken together with the fact that the real domestic producer price rose in some countries and fell less rapidly than the RBEP in others (see also Figures 3 and 4), the implication is that the ratio of domestic producer price to BEPP will, at least, show a moderate increase in most of the study countries. This point is largely confirmed as we shall see later on in this chapter.

Price variation

At this juncture, it is useful to examine a slightly different issue relating to the degree of price variability in the study countries. As discussed in

14. In general, the use of border prices as the point of reference in price policy analysis does not imply that international prices are necessarily fair or equitable, but simply that such prices are a measure of the alternatives available to a country under free trade. Thus, they provide a guide for the use of that country's resources (Johnson, 1978). See Appendix 1 for a discussion of the method used to derive BEPPs.

Chapter 3, one policy objective that is frequently mentioned by most governments is price stabilisation. Table 15 gives an indication of how successful the study countries have been in minimising year-to-year variations in producer prices. Judging by the coefficient of variation, except for mutton in Côte d'Ivoire and milk in Mali, real domestic producer prices have fluctuated less than RBEPPs over the entire period covered. This finding is also partly confirmed by Figures 3, 4 and 5. When the entire period covered is divided into two subperiods, the above result remains largely unchanged. With respect to beef in Côte d'Ivoire, Mali, Sudan and Zimbabwe, in the period 1970-78, the coefficient of variation in RBEPP was at least four times as high as the coefficient of variation in real domestic producer prices (see Appendix 2). Further, if the variation in real domestic producer

prices is considered alone, the results indicate that for beef in Côte d'Ivoire, Nigeria and Zimbabwe and for mutton in Côte d'Ivoire and Nigeria, the variation in domestic producer prices was higher in the period 1970-78 than it was in the period 1979-86. However, the opposite seems to be the case for beef and milk in Mali and for beef, mutton and milk in Sudan (see Appendix 2). For Sudan, part of the explanation for the higher coefficient of variation in real domestic producer prices in the period 1979-86 (compared with 1970-78) lies in the successive devaluations of the Sudanese pound which started around 1979 and continued for much of the 1980s. The devaluations which were necessitated by structural imbalances within the economy led to wide fluctuations in food prices, including the prices of livestock products.

Overall, the results suggest that in comparison with RBEPPs, a certain degree of success was achieved in the study countries in minimising the year-to-year fluctuations in real domestic producer prices over the period considered. Interestingly, it also indicates a point made earlier on in Chapter 3 about the unstable nature of world commodity markets. It shows, for beef in particular, just how unstable the beef industry would be in the study countries if it were exposed to unrestricted world prices.

Table 15. *Variability in real domestic and border equivalent producer prices, 1970-86.*

Product and country	Real producer price	Border equivalent producer price in real domestic terms
	CV	CV
Beef		
Côte d'Ivoire	10.7	42.8
Mali	19.5	45.8
Nigeria	23.4	25.1
Sudan	39.3	67.3
Zimbabwe	11.9	48.1
Mutton		
Côte d'Ivoire	16.2	15.5
Nigeria	22.4	29.8
Sudan	34.3	36.0
Cow's milk¹		
Mali	34.7	23.3
Sudan	18.5	33.5
Zimbabwe	17.3	18.8

1. For milk, the period considered was 1971-86.

Notes: (1) CV = Coefficient of variation

(2) Nominal and real producer prices for the products and periods covered in this table are given in Appendix 4, Tables 1 to 12.

Source: Estimated from data collected from the study.

IMPLICIT TAXATION (OR SUBSIDISATION) OF LIVESTOCK PRODUCERS

As noted under the discussion of real producer price trends, it appears that a certain amount of incentive has been provided to livestock producers through the rise in real producer prices of some of the commodities surveyed. Real price trends, however, provide only a partial picture of the complex interaction of sector and macro-economic policies on production incentives. To provide a better measure of the effect of price policy interventions on production incentives, the nominal protection coefficient (NPC) — which is defined as the ratio of the domestic producer price to the border equivalent price — can be used to assess both the level of taxation against (or subsidisation of) livestock production and the scope for increasing incentives.¹⁵ By comparing domestic producer prices to the maximum that could be offered to producers through international trade (i.e. border price less domestic marketing costs), the NPC

15. See Appendix 1 for the full derivation of the NPC.

provides an indication of the taxation (or subsidisation) rate for producers and thus, a measure of the distortion of production incentives.¹⁶ An NPC equal to one would indicate that at the official exchange rate the producer is obtaining the equivalent of the world price and, in this sense, is neither being taxed nor subsidised. A coefficient greater than one would suggest subsidisation, while a coefficient of less than one would indicate that governments are taxing producers of the commodity in question. Given the latter situation, there exists the scope for increasing price incentives by raising the domestic producer price to the same level as the border equivalent price.

In Table 16, the estimated NPCs¹⁷ for the producers of beef, mutton and milk are presented.¹⁸ The results indicate that, except for beef in Côte d'Ivoire, policy measures in the study countries have implicitly subsidised livestock producers over the period covered. When the NPCs for beef and mutton are compared, the latter appear higher than the former mainly as a result of higher domestic mutton prices in the study countries.

In explaining inter-country differences in the NPCs, it is useful to distinguish between importing and exporting countries. For the livestock products considered in Table 16, Côte d'Ivoire and Nigeria are net importers. In the case of milk, all the countries considered in Panel B of the table can be classified as net importers for most of the period covered. In these circumstances, we would expect the domestic price for these products to rise in relation to the border price because of the increasing need to import to meet the domestic deficit. This indeed occurred to some extent in most of the importing countries, with beef in Côte d'Ivoire being the only major exception.¹⁹ If this fact is taken together with the decline in the real border equivalent producer price in these countries, we

would expect the ratio of producer price to border price to rise over time for beef, mutton and milk in the importing countries. This expectation is largely confirmed by the results in Table 16. Figure 6 also

Table 16. *Average nominal protection coefficients for livestock producers in the study countries, selected periods.*¹

Panel A. Beef and mutton			
Product and country	Period		
	1970-72	1977-79	1984-86
Beef			
Côte d'Ivoire	0.99	2.24	0.97
Mali	1.33	2.68	1.08
Nigeria	1.52	2.59	2.27
Sudan	1.18	4.33	3.01
Zimbabwe	2.46	1.80	1.20
Mutton			
Côte d'Ivoire	0.97	1.64	1.50
Nigeria	2.35	3.50	4.12
Sudan	2.39	3.64	4.51
Panel B. Milk			
Product and country	Period		
	1971-73	1977-79	1984-86
Milk			
Mali	0.36	0.61	1.21
Sudan	0.51	0.60	1.32
Zimbabwe	0.58	0.81	1.04

1. NPCs were estimated using official exchange rates.

Source: Estimated from data collected from the study countries by the author.

16. While the NPC represents a simple and straight forward measure of price incentives (or disincentives), it suffers from the disadvantage that only the product price is considered, and not the prices of inputs. More complex measures such as the Effective Protection Coefficient (EPC) and Effective Subsidy Coefficient (ESC) which take the prices of inputs into consideration require data on farm budgets which were not available in most of the study countries. In any case, given the low level of purchased inputs in ruminant livestock production in the majority of the countries studied, it is most likely that the NPC will closely approximate these other measures.

17. A major problem in estimating NPCs relates to the choice of an appropriate world market price to use as a reference price since a number of different world price series exist. A description of the world price series used for this study is provided in Appendix 1.

18. Since the NPCs presented in Table 16 were estimated using official exchange rates, it is to be expected that this will lead to a significant upward bias in the NPCs of those countries with overvalued exchange rates.

19. Although the rise in the real producer price in some of the importing countries was statistically insignificant (as shown in Table 14), the sign of the coefficients suggest an upward trend. For mutton in Nigeria, the fall in the real producer price was small and statistically non-significant.

shows the gradual rise in the NPCs for milk producers in Mali, Sudan and Zimbabwe.

In Mali, which is a livestock exporting country, the real border equivalent producer price for beef fell markedly between 1974 and 1975 and remained at a depressed level until about 1981 (see Figure 3). The real domestic producer price also fell but not as rapidly, thus leading to a rise in the NPC over the period covered.

In Sudan, another livestock exporting country, the lucrative export market provided by the oil rich Gulf states and the frequent devaluations of the Sudanese pound from 1979 onwards indirectly led to a rise in the real producer price of meat products. At the same time that the real domestic producer price was rising, the real border equivalent price was declining. The result was a substantial rise in the NPCs of beef and mutton over the period considered.

With respect to Zimbabwe, a beef exporting country, the fall in the NPC for beef, particularly between 1984–86, was caused by a rise in the real border equivalent price coupled with a moderate fall in the real domestic producer price (see Figure 3). The rise in the border price was in large part due to Zimbabwe's realistic exchange rate policy during this period. Although the nominal producer price increased between 1984–86, domestic inflation increased much faster leading to a fall in the real producer price. The overall effect of the divergent directions of these two prices was a decline in the NPC for beef.

For each commodity considered above, the underlying causes of annual changes in the NPCs may be analysed by a simple decomposition. A cursory glance at the equation used to derive the NPC (see Appendix 1) will show that three variables (the nominal producer price, the exchange rate and the border price) determine the value of the NPC. Following Jaeger and Humphreys (1988), the NPC is decomposed using a difference equation which for small changes approximates the total derivative of the NPC's three components or sources of change (see Appendix 3). Examining these changes in conjunction with trends in real price changes can help explain the underlying pattern of changing production incentives. The NPCs for mutton and milk in Côte d'Ivoire and Mali, respectively, have been decomposed in the above fashion and the observed changes are explained below.

We examine first the NPC for mutton in Côte d'Ivoire which is shown in Figure 7 (Panel A). As the graph indicates, the NPC fell below one between 1971 and 1974, but rose to 1.84 in 1979 before

falling to 1.38 in 1982. By 1986, it rose again to 1.79. In general, there was a move away from taxation towards subsidisation of mutton producers during this period. The decomposed annual change in the NPC is shown in Panel B (Figure 7). In this figure, each set of 3 bars represents the decomposed annual change in the NPC due to the 3 principal components. The three, taken together, should roughly approximate the actual change in the NPC from the previous year (Panel A). The decomposition indicates that in all years, with the exception of 1984 and 1985, changes in nominal producer prices have helped raise the NPC, with larger magnitudes in 1976 and 1978 (see also Panel C). Rising international prices lowered the NPC between 1971–73 and 1979–80. Lowering of the NPC between 1980–82 and 1983–84 was primarily a result of nominal devaluations which have the effect of making international prices appear higher in domestic currency terms. At the same time that border prices were going up, rising inflation caused the real producer price to drop (Panel C of Figure 7), thus contributing to the fall in the NPC in those years.

In the case of milk in Mali, the decomposition of the NPC shows that nominal producer prices remained unchanged between 1971–72 and 1973–75 with the result that changes in the NPC in those years were entirely due to changes in exchange rate and international price (Figure 8, Panel B). The changes in the latter two variables were quite small and consequently the changes in the NPC were minimal. Between 1983 and 1984, a large nominal producer price increase helped raise the NPC above the NPC values of the early 1970s. As Panel C indicates, there was also an upward trend in the real producer price around this period.

Overall, what these decompositions have clearly shown is that the scope for governments in the study countries to raise incentives for livestock producers depends on a number of factors including policies affecting the formation of nominal producer prices, macro-economic policies influencing the rate of inflation and the exchange rate and international livestock products prices. While governments can act directly to influence the first three factors, only indirect action may be possible in the case of international prices. For the two Francophone countries included in the study, the room for manoeuvre on exchange rate management is even limited given the fact that their currencies are tied to the French franc.

The Consumer Price of Livestock Products

One prime objective of governments in the study countries is to keep the consumer price of livestock products down in order to restrain rises in the cost of living. The data in Table 17 indicate that, with the exception of milk, governments have not been entirely successful in this respect. Although there was a statistically significant fall in the retail price of beef in Zimbabwe, for meat products in general there was a rise in retail prices. The rise in Sudan was particularly high. Given the fact that in some

Table 17. *Annual percentage growth of real consumer prices in the study countries, 1970-86.*

Product and country	Percentage growth rate
	1970/72-1984/86
Beef	
Côte d'Ivoire	1.9
Mali	1.4 ns
Nigeria	0.8 ns
Sudan	7.2
Zimbabwe	-3.9
Mutton	
Côte d'Ivoire	-0.3 ns
Mali	2.5
Nigeria	0.5 ns
Sudan	7.7
Milk¹	
Mali	-7.5
Nigeria	-4.4
Sudan	-4.9
Zimbabwe	-2.9

ns = not statistically significant at the 0.1 level.

The annual growth rates have been estimated as log-linear trends by ordinary least-squares regression.

1. For milk, growth rates were estimated for the period 1972-74 to 1984-86. The milk considered here is reconstituted milk in the case of Mali; condensed and evaporated milk in the case of Nigeria, and fresh milk in the case of Sudan and Zimbabwe.

Source: Estimated from data collected from the study countries by the author.

countries official rather than market prices were used, and because meat shortages at times led to the development of parallel markets with meat being sold at prices higher than the official ones, the rise in meat prices could have been higher than the figures in Table 17 suggest. Table 18 also shows that retail prices have not been particularly stable over the period covered. Judging by the coefficient of

Table 18. *Variability in real consumer prices in the study countries, 1970-86.*

Product and country	Coefficient of variation
Beef	
Côte d'Ivoire	9.8
Mali	16.9
Nigeria	20.8
Sudan	35.9
Zimbabwe	23.1
Mutton	
Côte d'Ivoire	12.9
Mali	18.3
Nigeria	12.7
Sudan	36.4
Milk¹	
Mali	36.5
Nigeria	35.9
Sudan	28.9
Zimbabwe	11.8

1. The period considered for milk was 1972-86. The different types of milk considered in this table are similar to those in Table 17 (see note under Table 17).

Source: Estimated from data collected from the study countries by the author.

variation, the fluctuations in retail prices almost parallel those of producer prices. In order to establish the extent of subsidisation (or taxation) of consumers, NPCs were also estimated for consumers and the results are presented in Table 19. In the case of consumers, an NPC of less than one implies implicit subsidisation, while a coefficient greater than one means implicit taxation. For meat products, the results in Table 19 show that in the period between the early and late 1970s, there was a gradual shift away from subsidisation to taxation of consumers. Implicit taxation of consumers continued till the mid-1980s in most countries, the only exception being with regard to beef in Côte d'Ivoire and Zimbabwe. This result is in agreement with the trends in meat retail prices reported in Table 17. Throughout the period covered, milk consumers were subsidised in Mali, but were implicitly taxed in the remaining countries (see Figure 9). These results thus show that in the majority of cases, the objective of keeping retail prices down for the benefit of consumers has not been fully realised. The only caveat is that the NPCs shown here may overstate the actual level of consumer taxation since the official exchange rate was used to estimate them.

Table 19. Average nominal protection coefficients (NPCs) for consumers in the study countries, selected periods.¹

Panel A. Beef and Mutton			
Product and country	Period		
	1970-72	1977-79	1984-86
Beef			
Côte d'Ivoire	0.56	1.06	0.74
Mali	0.79	1.84	1.12
Nigeria	0.82	1.28	1.26
Sudan	0.51	1.06	1.40
Zimbabwe	0.98	1.18	0.59
Mutton			
Côte d'Ivoire	0.98	0.87	1.11
Mali	0.54	0.87	0.79
Nigeria	0.83	0.95	1.15
Sudan	0.80	0.95	2.02

Panel B. Milk			
Product and country	Period		
	1972-73	1977-79	1984-86
Milk			
Mali	0.78	0.72	0.59
Nigeria	1.11	2.53	3.27
Sudan	1.16	0.97	1.45
Zimbabwe	0.88	1.16	1.06

1. NPCs were estimated using the official exchange rates.

Source: Estimated from data collected from the study countries by the author.

Figure 3. Comparison of real domestic and border equivalent producer prices for beef in the study countries, 1970–86.

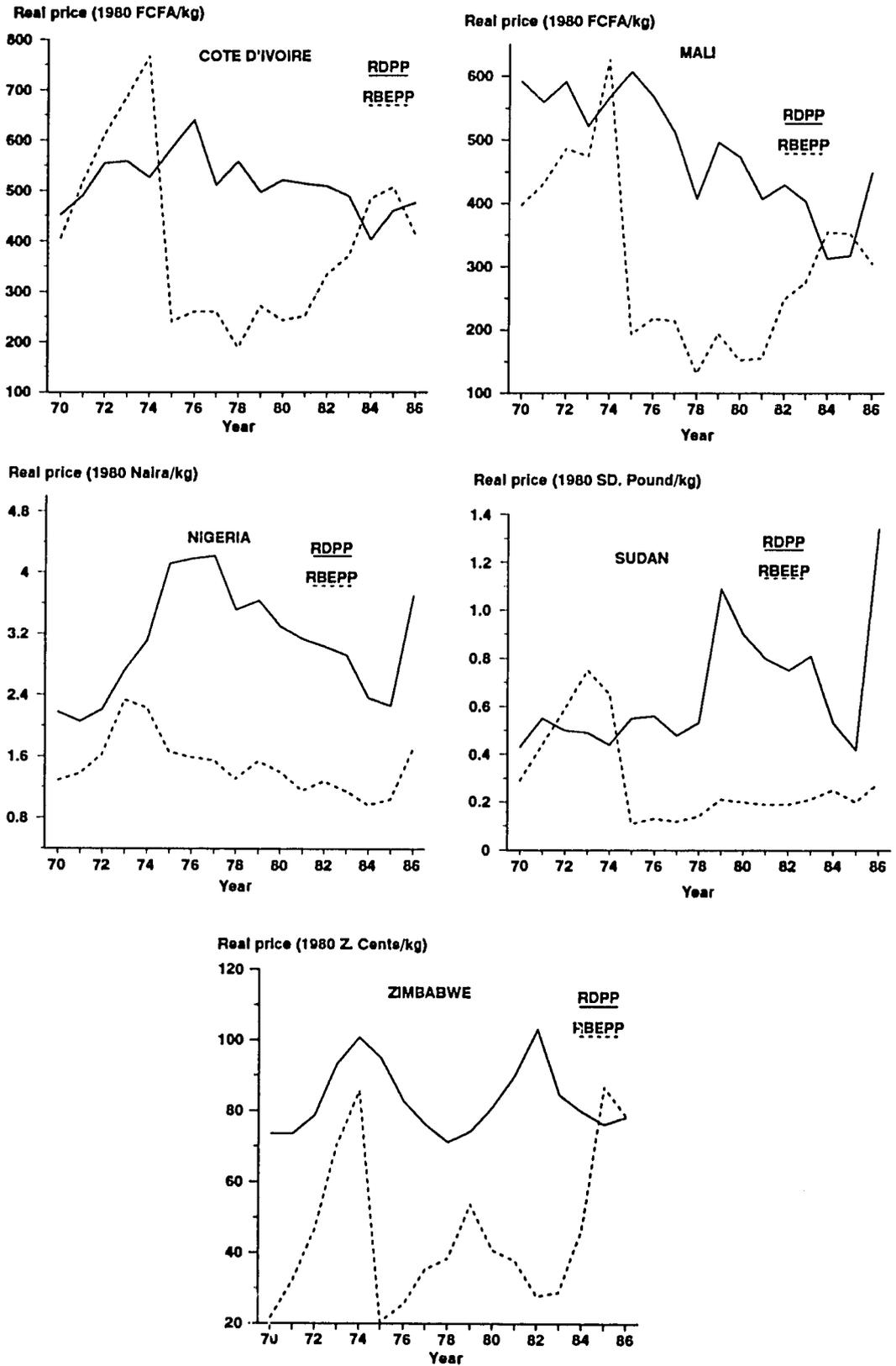


Figure 4. Comparison of real domestic and border equivalent producer prices for mutton in the study countries, 1970–86.

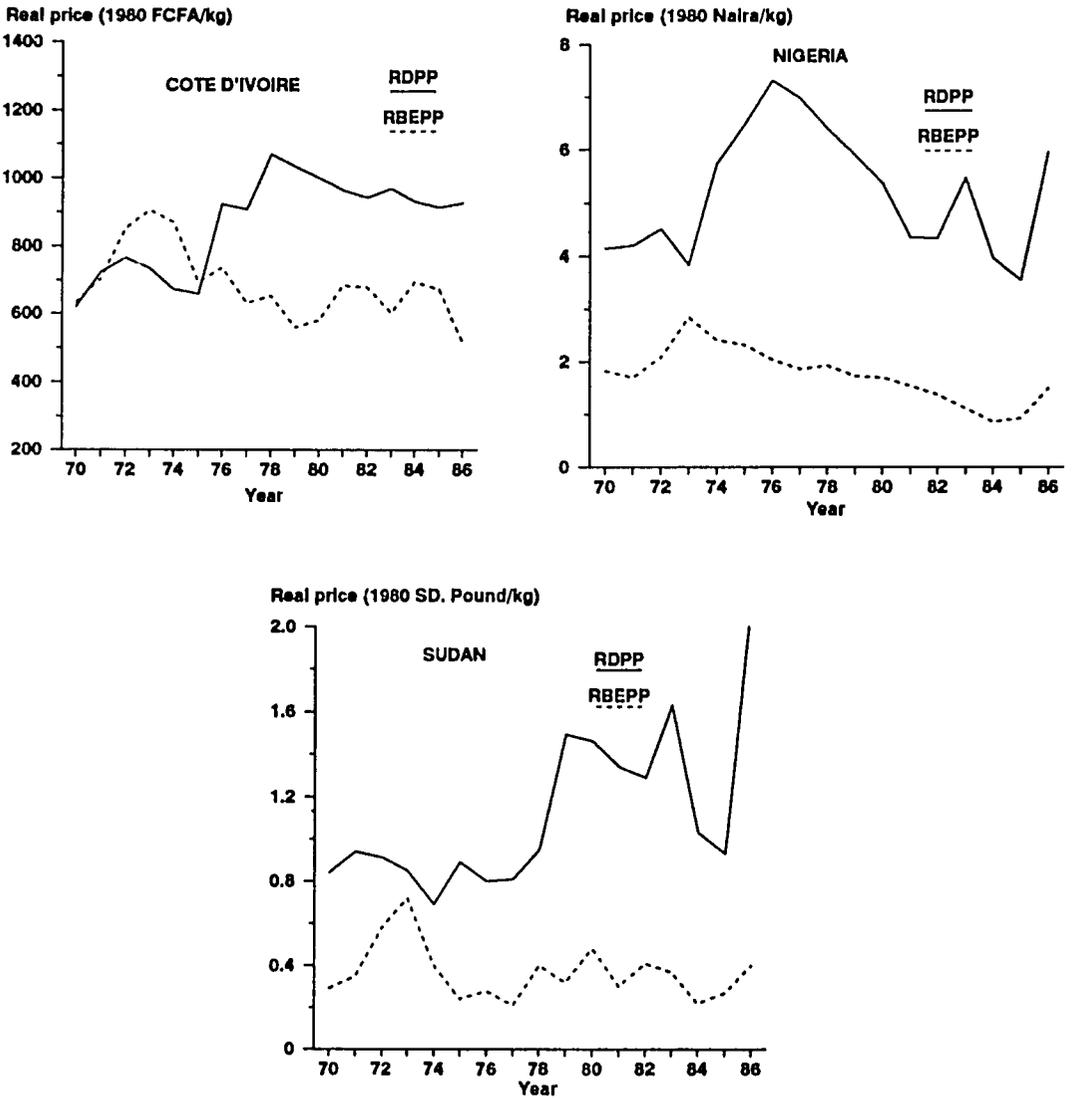


Figure 5. Comparison of real domestic and border equivalent producer prices for milk in the study countries, 1970–86.

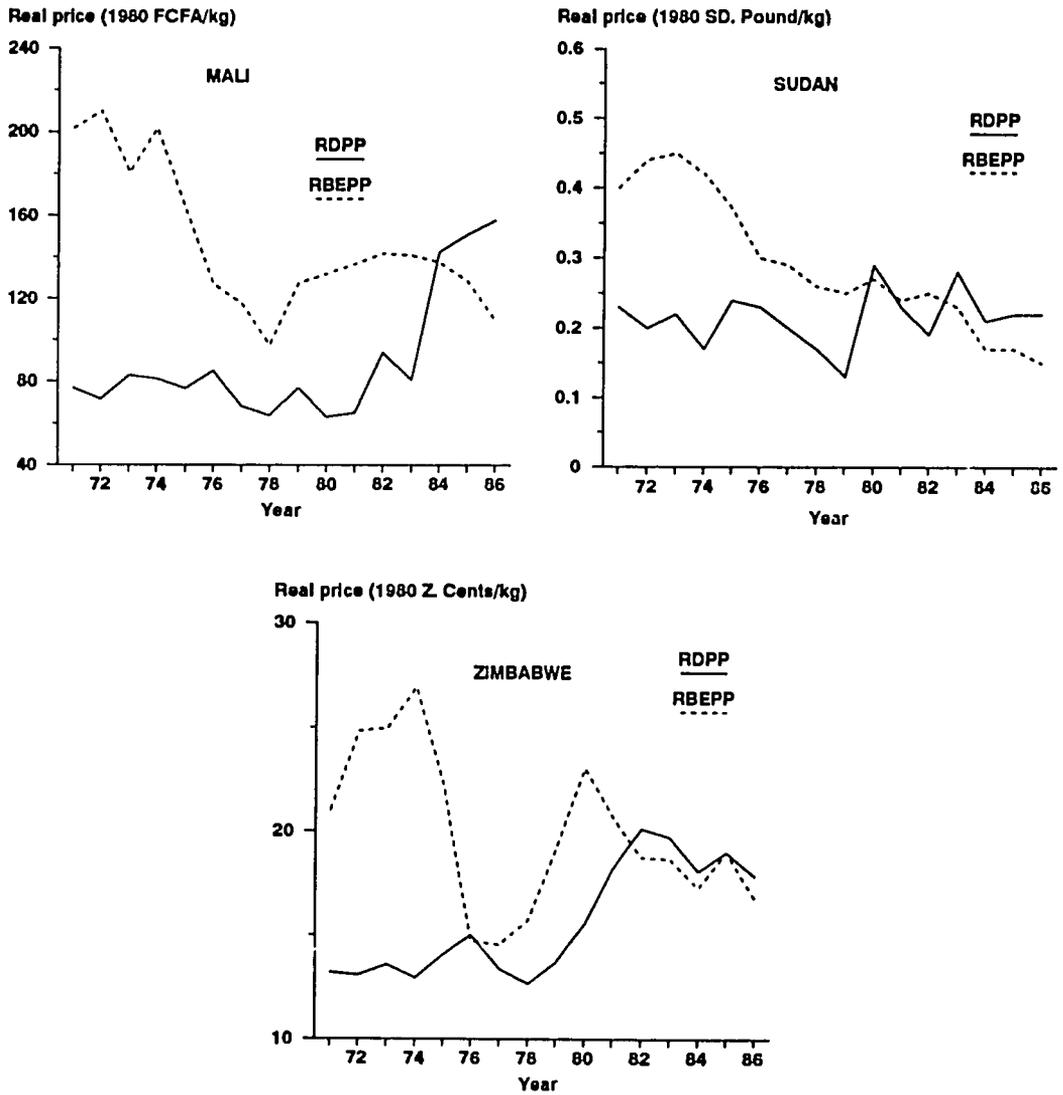


Figure 6. Nominal protection coefficients for milk producers in some of the study countries, 1971–86.

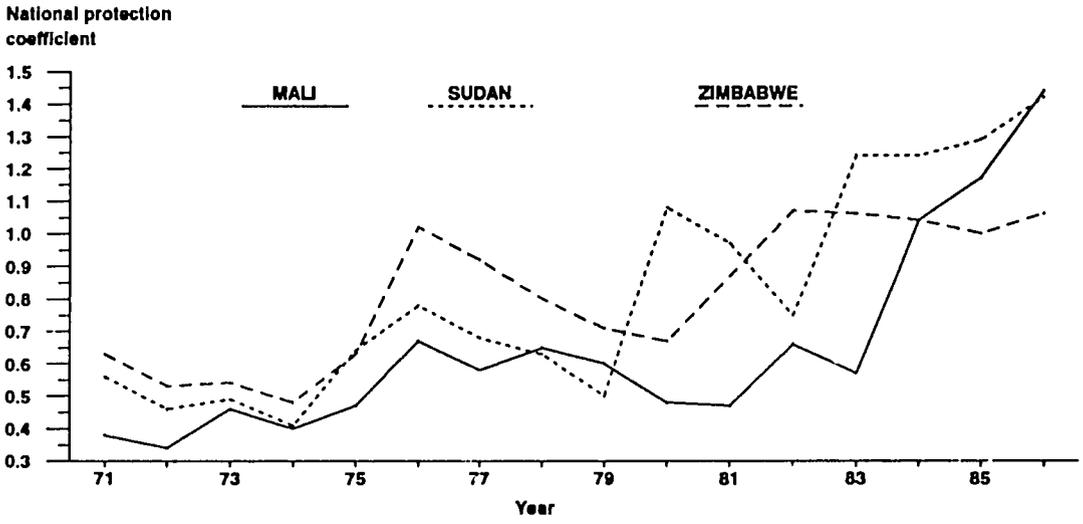
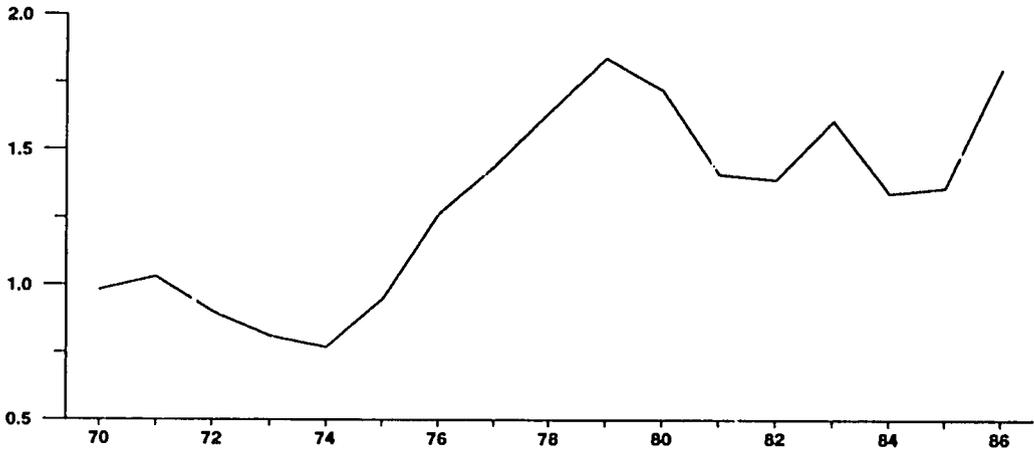


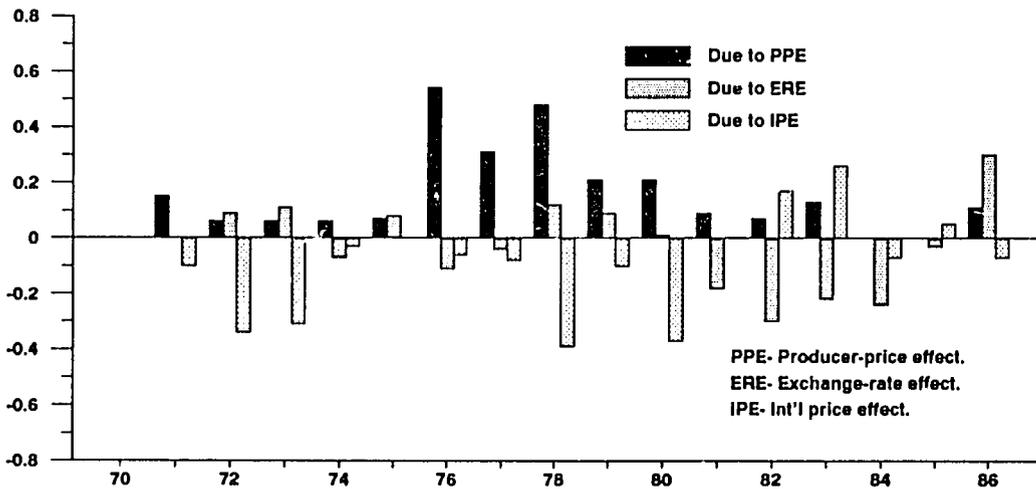
Figure 7. Annual changes in price incentives to mutton producers in Côte d'Ivoire, 1970-86.

Panel A. NPC, 1970-86

Nominal protection coefficient



Panel B. Decomposition of annual changes in NPC 1970-86.



Panel C. Real producer price, 1970-86.

Real price (1980 FCFA/kg)

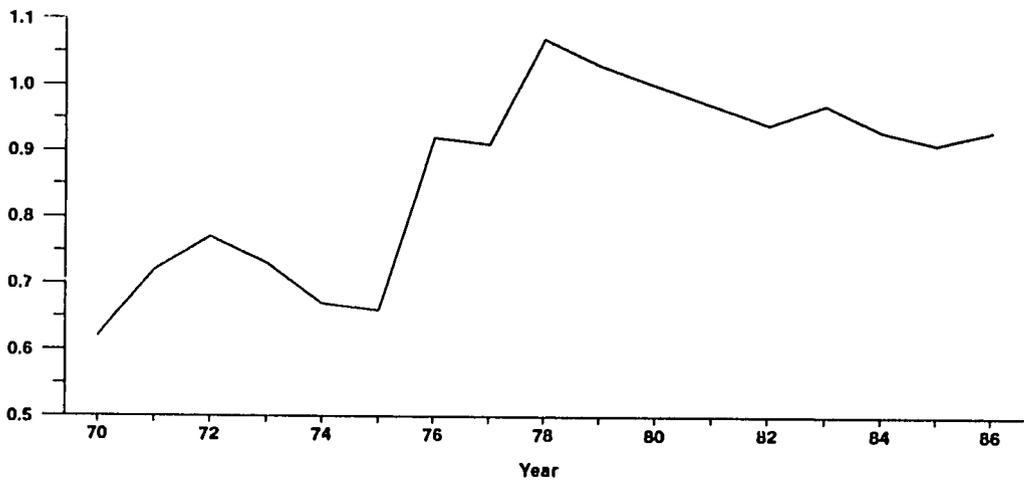
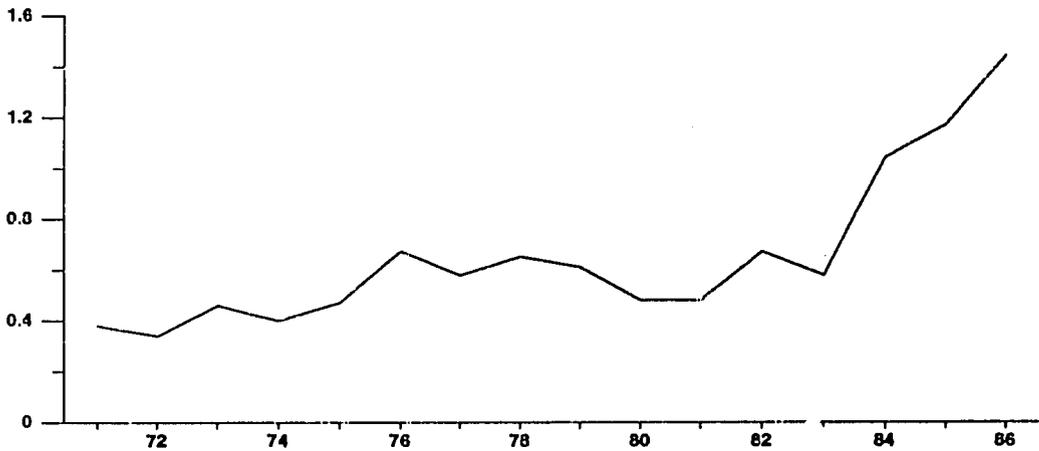


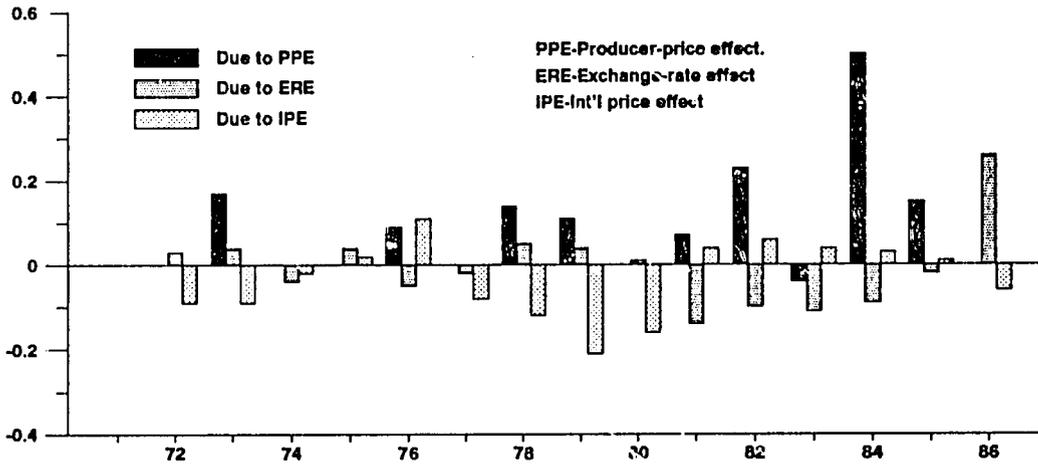
Figure 8. Annual changes in price incentives to milk producers in Mali, 1971-86.

Panel A. NPC, 1971-86

Nominal protection coefficient



Panel B. Decomposition of annual changes in NPC, 1971-86



Panel C. Real producer price, 1971-86

Real price (1980 FCFA/kg)

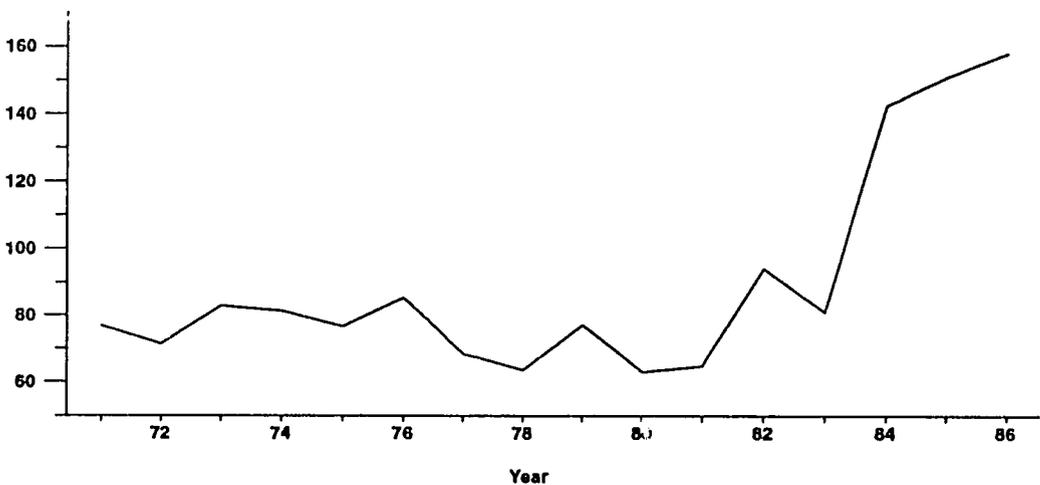
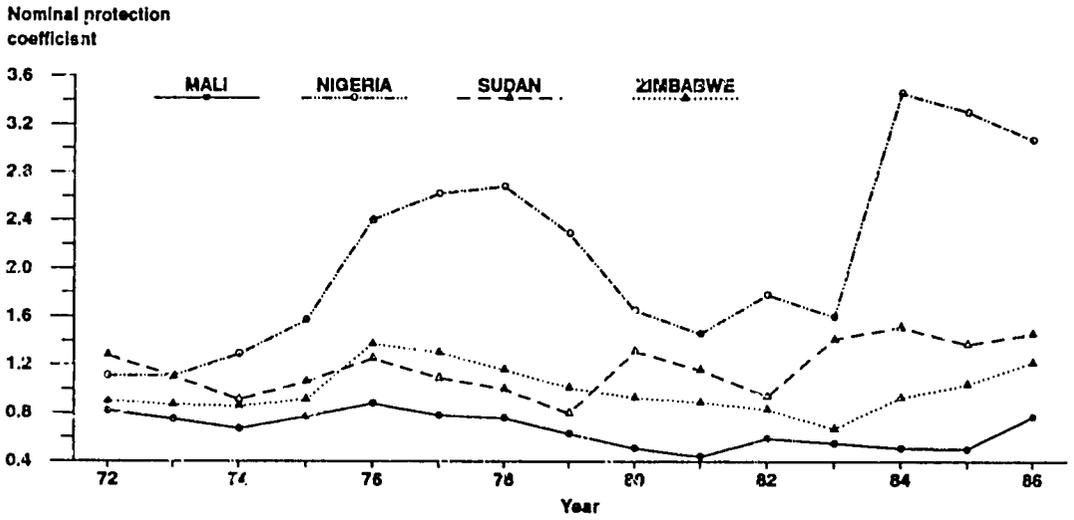


Figure 9. Nominal protection coefficients (NPCs) for milk consumers in some of the study countries, 1972-86.



5. REAL AND MONETARY EFFECTS OF LIVESTOCK PRICE INTERVENTION POLICIES

One major task of policy analysis is to measure the effects of alternative policies in ways that are useful for decision-making. This chapter quantifies the costs and benefits resulting from price intervention policies in the study countries. Specifically, changes in production and consumption brought about by price distortions are estimated for three distinct periods between 1970 and 1986. Changes in the welfare of producers and consumers, as well as in the foreign exchange bill and government revenues are also estimated and compared with other key economic variables. The chapter begins with a description of the theoretical model on which the analysis is based and then continues by detailing the data sources. Results of the study are presented next, followed by some concluding thoughts.

METHODOLOGY

The results presented in this chapter are derived using the standard partial equilibrium framework based on the Marshallian concept of economic surplus (see Currie et al, 1971; Lutz and Scandizzo, 1980; Bale and Lutz, 1981). In this approach, current policy interventions such as tariffs, export taxes, quotas and subsidies are analysed in relation to a policy without any distortions. The method permits the estimation of the real (i.e. volume) and monetary gains that could be obtained if the major commodity markets in a country were fully and simultaneously liberalised. Each commodity market is considered separately and the estimates of gains and losses in each market are aggregated country by country. This single market approach implicitly ignores linkages between commodity markets and this represents a major limitation of the method used here. Nonetheless, the assessment of efficiency and welfare effects using the partial equilibrium

framework may provide reasonably good first approximations of the order of magnitude of the impact of distortions caused by livestock policy interventions (see Lutz and Saadat, 1988).

Graphical representation of the partial equilibrium model is presented in Figure 10 using the case of an export tax as an example of a distortionary policy. SS' represents the domestic supply function and DD' the domestic demand schedule. To keep the analysis simple no distinction is made between producer and consumer price. The export tax is $P_w - P_d$. As a result of this distortion, producers only obtain a price P_d as compared to P_w . They produce Q_d instead of Q_w and incur a producers' welfare loss of ACDH. However, consumers benefit from the lower price; they increase consumption from C_w to C_d and obtain a consumers' surplus gain of ABGH. Under this policy, exports fall from $Q_w - C_w$ to $Q_d - C_d$ and foreign exchange earnings for the country drop from $P_w(Q_w - C_w)$ to $P_w(Q_d - C_d)$ while the government obtains export tax revenues of BCEF.

This basic analytical structure of the partial equilibrium model can also be represented by a set of equations as shown below. The formulae allow for differentiation between producer and consumer prices:

$$\begin{aligned} \text{Change in production,} \\ dQ_i = E_{si}dP_iQ_i/P_i \end{aligned} \quad (1)$$

$$\begin{aligned} \text{Change in consumption,} \\ dC_i = E_{di}dP_iC_i/P_i \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Net social loss in production,} \\ \text{NSL}_p = 1/2 dQ_i dP_i \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Net social loss in consumption,} \\ \text{NSL}_c = 1/2 dC_i dP_i \end{aligned} \quad (4)$$

$$\begin{aligned} \text{Welfare gain of producers,} \\ G_p = dP_iQ_i - \text{NSL}_p \end{aligned} \quad (5)$$

Welfare gain of consumers,
 $G_c = dP_i C_i - NSL_c$ (6)

Change in foreign exchange earnings,
 $dF = P_{wi} (dQ_i - dC_i)$ (7)

Change in government revenue,
 $dR_g = dP_i (Q_i - D_i)$ (8)

where:

E_{si} = own-price supply elasticity of commodity i ,

E_{di} = own-price demand elasticity of commodity i ,

dP_i = impact of distortion on price,

Q_i = domestic production of commodity i ,

P_i = domestic producer (or consumer) price of commodity i ,

C_i = domestic consumption of commodity i , and

P_{wi} = border equivalent producer (or consumer) price of commodity i .

Equations 1 and 2 measure the changes in production and consumption as a result of a price distortion. Equations 3 to 6 quantify the typical efficiency and welfare changes associated with price policy interventions. Equations 3 and 4 represent the net efficiency losses in production and consumption to society as a whole.²⁰ In evaluating these equations, if domestic prices move toward border equivalent prices (i.e. a shift toward free trade), then NSL_p and NSL_c are benefits (gains) to society. If, as in the case of the imposition of an export or import duty, the trend is away from free trade, then the values reflect costs (losses) to society. Equations 5 and 6 measure the welfare changes or the extent of monetary gains and losses of producers and consumers. They give an indication of the "redistribution" of income, between producers and consumers, caused by the instituted price policies. Equation 7 measures the change in the foreign exchange bill due to government intervention in the pricing of the commodity in question. It is the difference between the actual bill and what it would have been without intervention. Equation 8 is interpreted analogously.

The welfare gains and losses expressed in equations 3 to 7 can be related to the corresponding areas in Figure 10 as follows:

Eq. 3 = CDE; Eq. 4 = BFG; Eq. 5 = ACDH (loss); Eq. 6 = ABGH;

Eq. 7 = $C_w C_d FG + Q_d Q_w DE$ (loss); and Eq. 8 = BCEF.

DATA SOURCES

Apart from the summary measures of distortion, i.e. the nominal protection coefficients presented in the previous chapter, other basic parameters required for the evaluation of welfare effects are the elasticities of supply and demand. Although a few studies have attempted to estimate demand and supply elasticities for livestock products in sub-Saharan Africa, serious methodological and data problems tend to make the reported estimates to be numerous and diverse (see Rodriguez, 1984 and 1987; Khalifa and Simpson, 1972; Olayide and Oni, 1969 and 1972; Doran et al, 1979). Because elasticity estimates can differ widely, a range of plausible elasticities has been assumed for the analysis reported here. The elasticity ranges assumed were largely based on a careful review of the empirical estimates provided in the sources cited above and also in Braverman et al (1985) and Askari and Cummings (1976: Table B1, pp. 405-407). In all cases, long-term supply elasticities were assumed to range from 0.3 to 1.0 for beef, from 0.5 to 1.25 for mutton and 0.6 to 1.50 for milk.²¹ Long-term demand elasticities were from -0.5 to -1.05 for beef, -0.6 to -1.25 for mutton and -0.66 to -1.2 for milk.

The other basic data used for the calculations are presented in Table 20 and parts of Tables 21, 22 and 23. Three periods 1970-72, 1977-79 and 1984-85 were chosen in order to show changes resulting from price intervention policies over time. Thus, the data and the empirical results presented later on represent the average annual values for the periods specified.

RESULTS

Tables 21, 22 and 23 present the gross effects of price distortions on real variables. A summary of gross monetary effects by country, obtained by aggregating the estimate of gains and losses for all the commodities considered in each country, is

20. NSL_p and NSL_c are, in theory, net efficiency (i.e. economic) losses in production and consumption, respectively.

However, the literature generally refers to them as net social losses. Therefore, in order to avoid confusion the terminology normally used in the literature is retained here.

21. Available evidence from some of the studies cited above suggests a negative price elasticity of supply for beef in the short run. In the long run, all studies agree that the price elasticity of supply is positive. In the analysis reported here positive supply elasticities are used. However, it should be noted that if negative supply elasticities are assumed, the results may be different from those reported here.

shown in Table 24. In these base results, no attempt has been made to correct for the effects of exchange rate distortions. However, in order to separate the effects of currency overvaluation from that of specific tariffs or equivalent interventions, nominal protection coefficients were re-estimated using adjusted exchange rates²². The recalculated NPCs were then used to estimate the net real and monetary effects of price distortions for the period 1984–86 only. These net estimates (i.e. net of exchange rate distortions) are presented and compared with gross estimates in Tables 26 and 27.

In general, the results depend on the magnitude of the price distortions as measured by the gross (or net) nominal protection coefficients, the responsiveness of supply and demand as measured by the supply and demand elasticities and on the absolute levels of demand and supply of the commodities in question.

As Tables 21–23 show, the gross real effects of the price distortions are often sizeable. This is evident in the case of beef in Zimbabwe and milk in Mali. These two cases will be used to explain the results reported in Table 23 for 1984–86.

The discussion in Chapter 3 and the NPCs presented in Table 20 indicate that in the period 1984–86, the Zimbabwean government pursued beef pricing policies that implicitly subsidised producers and consumers. The magnitude of impact of these price interventions on production, consumption, human welfare and trade depends on the elasticities of supply and demand. If we use the low supply and demand elasticities given in Table 20, we see that the pricing policies pursued in Zimbabwe, in 1984–86, which gave positive protection to producers, increased beef output by 3400 t (Table 23). However, the implicit subsidy to consumers at the same time increased consumption by 17 500 t, eventually reducing exports by 14 100 t.

The case of milk in Mali is quite similar. The milk pricing policies pursued in 1984–86 also implicitly subsidised both producers and consumers. Using the low elasticities, we see that milk production increased by 10 100 t, but consumption also increased by 58 000 t. Thus, compared with a situation not influenced by price distortions, imports increased by 47 900 t. Since, in reality, total imports during this period amounted to about 32 000 t, a

policy of non-intervention in pricing decisions would have made Mali more than self-sufficient in milk production. However, the level of milk imports into Mali due to price policy interventions was less in 1984–86 than in 1972–73 (47 900 t vs 103 100 t; see Table 21). This suggests some improvement in milk pricing policies between the two periods considered here.

With respect to the gross monetary effects of price distortions, the total net social losses in production (i.e. losses in production efficiency that society as a whole has to bear) aggregated for the commodities studied in each country, ranged from US\$ 0.3 million for Zimbabwe to US\$ 141.5 million for Nigeria in 1984–86, using the low elasticity assumption (Table 24, panel A, column 2). The total net social losses in consumption (i.e. economic losses that society has to bear due to consumption changes caused by price intervention) ranged from US\$ 5.8 million in Zimbabwe to about US\$ 660 million in Nigeria (Table 24, panel A, column 3). Compared to the efficiency-type losses, the welfare-type gains (losses) for producers and consumers were larger. For example, using the low elasticity assumption, the welfare gains to producers in 1984–86 were from seven times (Côte d'Ivoire, Nigeria and Sudan) to 40 times (Zimbabwe) as large as the net social losses in production during the same period (compare columns 2 and 4 in panel A, Table 24). On the face of it, this suggests a gradual shift away from discrimination against producers. On the other hand, consumers appeared to have gained even more than producers from pricing policy interventions in Côte d'Ivoire, Mali and Zimbabwe during the same period (compare Columns 4 and 5 in Table 24). In these three countries, foreign exchange earnings appeared to have been negatively affected by the particular policies pursued. For most of the period covered, Nigeria and Sudan obtained net revenues from the interventions, whereas the policies of the other three countries were such that the government incurred a deficit. This implies that taxes, if any, were more than fully offset by subsidies.

Aggregating the gross monetary effects of intervention conceals one important point: that for commodities with negative protection (e.g. beef in Côte d'Ivoire in 1984–86), the (monetary) welfare losses to producers will always be much larger than

22. The adjusted exchange rates are meant to correct for distortions in the official exchange rates. In each case, the extent of overvaluation of the official exchange rate was estimated using the differential inflation rate between domestic prices (approximated by the consumer price index) and foreign prices (based on the consumer price index of the United States of America). The base period for the adjustment reported here was 1970.

the efficiency losses.²³ Thus, on both welfare (i.e. equity) and efficiency grounds, there are cogent reasons in advocating for a move away from negative protection of livestock commodities.

Comparison of the gross monetary effects of price distortions with some key economic indicators (Table 25) shows that producers' monetary gains in relation to agricultural GDP vary from 0.1% in Côte d'Ivoire to 17.4% in Sudan in 1984–86. The changes in government revenues due to pricing policy interventions compared to official development assistance (ODA) were relatively small for those countries which receive large foreign aid flows (e.g. Sudan and Mali) and very large for Nigeria which obtains little aid. The changes in foreign exchange earnings in relation to ODA were quite large for all the countries studied. The above comparisons and the ratios obtained appear to justify continued attention to pricing policies, along with other macro-economic policies, in order to ensure a more efficient incentive system for livestock production in the study countries.

Thus far, the analysis has been conducted without adjusting for exchange rate distortions. However, it is widely known that for part of the period covered in this study, governments in all the study countries intervened in the foreign exchange markets either directly, through exchange rate restrictions (as in Nigeria, Sudan and Zimbabwe), or indirectly through import tariffs and licences (as in Côte d'Ivoire, Mali, Nigeria, Sudan and Zimbabwe), with the result that their currencies were typically overvalued. Currency overvaluation acts like a tax on exports and like a subsidy on imports. These distortions are in addition to those created by direct pricing policy instruments such as import duties and export taxes. Therefore, as previously explained, an attempt was made to correct for exchange rate distortions by using adjusted exchange rates (instead of official exchange rates) to convert border prices into domestic currencies. The adjusted exchange rate as estimated here is the official exchange rate in a base year adjusted by the ratio of domestic to international rates of inflation (see footnote 22, page 41). The estimated adjusted exchange rates are presented together with the official exchange rates in Table 28 of Appendix 4.

Based on the adjustments and relative to the base year (1970), it appeared that the official exchange rate in all the study countries, except

Zimbabwe, was overvalued in 1984–86. By contrast, the official exchange rate was undervalued in Zimbabwe during the same period.

In principle, if the official exchange rate is overvalued (undervalued), the use of an adjusted exchange rate in computing NPCs would make the latter smaller (higher) in absolute terms. Thus, if we consider the NPC for a producer, the use of an adjusted exchange rate in place of an overvalued exchange rate would reveal a larger negative distortion against commodities with initial negative protection or a reduced positive distortion for goods with initial positive rates of protection. The magnitude of the changes in NPCs would depend on the degree of currency overvaluation. The results obtained by using revised NPCs, based on adjusted exchange rates, are presented in Tables 26 and 27 where they are also compared with the results obtained using official exchange rates.

Before looking at the results, a few comments are in order at this point. First, the method used to adjust the exchange rates assumes that they were in equilibrium (i.e. neither over- or undervalued) in the base year, 1970. If this assumption does not hold, the adjusted exchange rates will not fully reflect the extent of distortions in official exchange rates, but will still give an indication of the level of distortions relative to whatever the situation was in the base year. Second, in theory, the adjustment of exchange rates should also have significant impact on domestic prices and, possibly, on the elasticities of demand and supply of the commodities under consideration. However, these other effects were not considered in the analysis reported here. Despite this limitation, the results obtained are quite interesting.

In Table 26, the gross estimates were obtained by using NPCs calculated with official exchange rates, while the net estimates were derived by using revised NPCs based on adjusted exchange rates. A comparison of the gross and net volume figures indicates that, for those countries with overvalued exchange rates in 1984–86 (e.g. Mali, Nigeria, Sudan and Côte d'Ivoire), there would be greater reductions in exports and/or greater increases in imports if adjusted (i.e. undistorted) exchange rates were used in the analysis in place of the official exchange rates. Thus for a beef exporting country like Sudan, Table 26 shows that exports of beef would be 19 200 tonnes lower if NPCs based on adjusted exchange rates were used. Similarly, for a

23. Relevant figures in Table 20 can be used to solve the equations specified earlier in this chapter to verify this assertion.

beef importing country like Côte d'Ivoire, imports of beef would be 1400 t higher.

Although these results may appear counter-intuitive at first, they are entirely consistent with the estimated NPCs and the pattern of overvaluation of currencies in the study countries between 1984 and 1986. The results obtained for beef in Côte d'Ivoire can be used to throw more light on the data shown in Table 26.

The NPCs estimated for beef producers, using the official exchange rate, showed a negative protection for beef production in Côte d'Ivoire between 1984 and 1986. As explained above, the use of an adjusted exchange rate in place of the official, overvalued, exchange rate would reveal a larger negative protection for beef. The net effect would be a reduction in production, as shown in Table 26. At the same time, beef consumers were being implicitly subsidised. However, the use of an overvalued exchange rate masks the magnitude of the implicit subsidy to consumers. The use of an adjusted exchange rate reveals that the subsidy, and hence the consumption that it engenders, is much higher. Since the change in imports is obtained as the difference between the change in production and consumption, the net effect is a higher level of imports. The reduction in beef exports for a country such as Sudan can be explained similarly. The estimates in Table 26 thus indicate the kind of masked distortions (or wrong market signals) that an overvalued exchange rate can create.

With respect to the net monetary effects (Table 27), the use of revised NPCs further exposes the hidden distortionary effect of overvalued exchange rates for producers, consumers and governments alike. Mali and Nigeria represent two prime examples of how an overpriced exchange rate adversely affects producers and governments, while benefiting consumers. For Mali, a comparison of the gross and net monetary estimates show that for the period 1984–86 producer welfare effects switched from being positive to negative (i.e. producers suffered monetary losses), losses in foreign exchange earnings were three times higher, while the increase in benefits to consumers was about twice as high as in the base case. At the same time in Nigeria, welfare gains to producers and government revenues became significantly reduced, foreign exchange earnings switched from being positive to negative, while consumer welfare losses became substantially reduced compared to the base case.

Overall, what these results suggest is that, for example, in a country with average NPCs for

producers of 0.7 and an exchange rate which is overvalued by 25%, a narrow focus on removing direct price distortions will be inadequate. The imbalances that cause exchange rate distortions will need to be addressed at the same time that reforms of direct livestock pricing policy are being pursued.

CONCLUDING REMARKS

This study has tried to examine the objectives and instruments of livestock pricing policies in a selected sample of SSA countries. A major objective of the study has been to provide a cross-country comparison of the effects of livestock pricing policies on production incentives, producers' and consumers' welfare and government revenues. Based on the findings of this study, it appears that since the early 1980s there has been a reduction in the level of price discrimination against livestock producers in the study countries. This reduction in taxation has come about through the institution of a variety of direct and indirect policy measures and represents an improvement over the situation in the 1970s.

However, there still exists scope for improving price incentives in the study countries. Ordinarily, some of the measures already instituted such as liberalisation of agricultural marketing and currency devaluation should help raise real price incentives. But these measures will have the desired effect only to the extent that they are not offset by increased domestic inflation. If governments are able, through appropriate fiscal and monetary policies, to reduce inflation, this can serve to support and strengthen the other more direct measures aimed at improving real price incentives. This implies that macro-economic policies and specific sectoral measures designed to raise price incentives need to be closely co-ordinated if they are to provide maximum benefit to livestock producers.

While the focus of this study has been entirely on the effect of livestock pricing policies on output, it is fair to acknowledge that there are also structural impediments to increased livestock production in sub-Saharan Africa. These include climatic and disease problems, inadequate infrastructure and research and extension services. Lack of attention to these other factors will weaken whatever improvement is achieved in the area of pricing policy. Thus, simultaneously with pricing reforms, investment in research and infrastructure will have to be made in order to achieve sustainable livestock production in the study countries and elsewhere in sub-Saharan Africa.

Figure 10. *Effects of export tax or equivalent intervention.*

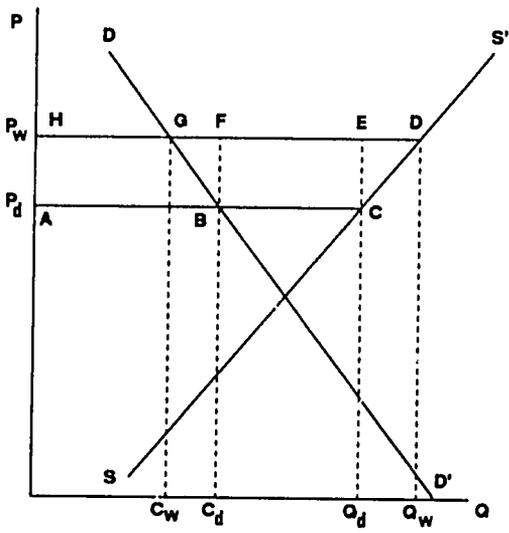


Table 20. *Data for the calculation of gross real and monetary effects of price distortions.*¹

Country/ commodity	Border equivalent producer price (US\$/t)			NPC for producers			Border equivalent consumer price (US\$/t)			NPC for consumers			Supply elasticity		Demand elasticity	
	1970-72	1977-79	1984-86	1970-72	1977-79	1984-86	1970-72	1977-79	1984-86	1970-72	1977-79	1984-86	Low	High	Low	High
Côte d'Ivoire																
Beef	613	815	1532	0.99	2.24	0.97	1223	2177	3125	0.56	1.06	0.74	0.3	1.0	-0.5	-1.05
Mutton	873	2056	2044	0.97	1.64	1.50	1192	2956	2931	0.98	0.87	1.11	0.5	1.25	-0.6	-1.25
Mali																
Beef	507	602	1221	1.33	2.68	1.08	681	939	1422	0.79	1.84	1.12	0.3	1.0	-0.5	-1.05
Mutton	-	-	-	-	-	-	1045	2579	2616	0.54	0.87	0.79	-	-	-0.6	-1.25
Milk	320	389	452	0.36	0.61	1.22	381	456	516	0.78	0.72	0.59	0.6	1.5	-0.66	-1.2
Nigeria																
Beef	555	1863	2869	1.52	2.59	2.27	1244	3997	6113	0.82	1.28	1.26	0.3	1.0	-0.5	-1.05
Mutton	719	2333	2546	2.35	3.50	4.12	1225	4423	6016	0.83	0.95	1.15	0.5	1.25	-0.6	-1.25
Milk	-	-	-	-	-	-	752	823	2038	1.10	2.53	3.27	-	-	-0.66	-1.2
Sudan																
Beef	278	262	473	1.18	4.33	3.01	986	1652	2250	0.51	1.06	1.40	0.3	1.0	-0.5	-1.05
Mutton	258	514	571	2.39	3.64	4.51	1053	2629	2393	0.80	0.95	2.02	0.5	1.25	-0.6	-1.25
Milk	316	443	320	0.51	0.60	1.32	373	520	377	1.16	0.97	1.45	0.6	1.50	-0.66	-1.20
Zimbabwe																
Beef	244	544	952	2.46	1.80	1.20	675	1171	1583	0.98	1.18	0.59	0.3	1.0	-0.5	-1.05
Milk	209	210	242	0.58	0.81	1.03	257	279	314	0.88	1.16	1.06	0.6	1.5	-0.66	-1.20

1. For milk the periods considered were 1972/73, 1977/79 and 1984/86. Nominal protection coefficients (NPCs) were estimated using the official exchange rates.

Source: Border equivalent prices and NPCs were calculated based on data in Appendix 4.

Table 21. *Gross effects of price distortions on production, consumption and trade of livestock products, 1970-72^a*

Country/ Commodity	Livestock products ('000 t)								
	Actual production	Actual consumption	Actual exports or imports(-)	Estimated change in production		Estimated change in consumption		Estimated change in exports	
				Low	High	Low	High	Low	High
Côte d'Ivoire									
Beef	41.9	78.7	-36.7	-0.1	-0.4	30.9	64.9	-31.0	-65.3
Mutton	4.5	6.6	-2.1	-0.1	-0.2	0.1	0.2	-0.2	-0.3
Mali									
Beef	43.2	21.0	22.2	3.2	10.7	2.8	5.9	0.4	4.9
Mutton	16.2	15.2	1.0	n.e.	n.e.	7.8	16.2	n.e.	n.e.
Milk	92.7	105.6	-12.9	-83.4	-208.6	19.7	35.8	-103.1	-244.4
Nigeria									
Beef	200.6	233.8	-33.2	20.6	68.7	25.7	53.9	-5.1	14.8
Mutton	28.2	28.9	-0.7	8.1	20.3	3.5	7.4	4.6	12.9
Milk	275.3	488.1	-212.8	n.e.	n.e.	-32.0	-58.2	n.e.	n.e.
Sudan									
Beef	150.2	146.5	3.7	6.9	22.9	70.3	147.7	-63.5	-124.8
Mutton	53.4	51.4	1.9	15.5	38.8	7.7	16.1	7.8	22.7
Milk	797.0	812.4	-15.4	-529.2	-1323.0	-74.3	-135.1	-454.9	-1187.9
Zimbabwe									
Beef	91.0	49.2	41.8	16.2	54.0	0.5	1.0	15.7	53.0
Milk	145.9	146.6	-0.7	-75.8	-189.5	13.3	24.1	-89.1	-213.7

a. Gross effects include changes due to direct price distortions and distortions arising from the use of the official exchange rate when it is over- or undervalued. For milk the period considered was 1972/73. The 'low' and 'high' refer to the low and high elasticity assumptions and do not necessarily correspond to the absolute levels of the real effects. 'Low' and 'high' in the remaining tables should be interpreted analogously.

Notes: (1) n.e. means not estimated; (2) Negative values under the column representing estimated change in exports imply imports.

Source: Production: FAO (1989); consumption was derived as the difference between production (col. 1) and exports (col. 3); exports/imports: FAO (1988); changes in production, consumption and exports were calculated using equations in the text and data in Table 20 and first three columns of this table.

Table 22. *Gross effects of price distortions on production, consumption and trade of livestock products, 1977-79.*

Country/ Commodity	Livestock products ('000 t)								
	Actual production	Actual consumption	Actual exports or imports(-)	Estimated change in production		Estimated change in consumption		Estimated change in exports	
				Low	High	Low	High	Low	High
Côte d'Ivoire									
Beef	34.7	76.9	-42.2	5.8	19.2	-2.2	-4.6	7.9	23.8
Mutton	5.2	7.5	-2.3	1.0	2.6	0.7	1.4	0.4	1.2
Mali									
Beef	41.0	22.6	18.4	7.7	25.7	-5.2	-10.8	12.9	36.5
Mutton	22.7	21.6	1.1	n.e.	n.e.	1.9	4.0	n.e.	n.e.
Milk	88.2	106.4	-18.2	-33.9	-84.9	27.4	49.8	-61.3	-134.7
Nigeria									
Beef	218.2	273.4	-55.2	40.2	133.9	-29.9	-62.8	70.1	196.7
Mutton	36.3	37.0	-0.7	13.0	32.4	1.2	2.4	11.8	30.0
Milk	329.6	865.3	-535.7	n.e.	n.e.	-345.4	-627.9	n.e.	n.e.
Sudan									
Beef	193.6	191.9	1.7	44.7	148.8	-5.4	-11.4	50.1	160.2
Mutton	75.8	72.3	3.6	27.5	68.8	2.3	4.7	25.2	64.0
Milk	1011.7	1035.5	-23.8	-400.1	-1000.3	21.7	39.5	-421.8	-1039.8
Zimbabwe									
Beef	103.6	46.2	57.5	13.8	46.0	-3.5	-7.4	17.3	53.4
Milk	147.6	144.7	2.9	-20.8	-52.1	-13.3	-24.1	-7.6	-28.0

Notes: (1) n.e. = not estimated; (2) Negative values under the column representing estimated change in exports imply imports.

Source: Production: FAO (1989); consumption was derived as the difference between production (col. 1) and exports (col. 3); exports/imports: FAO (1988); changes in production, consumption and exports were calculated using equations in the text and data in Table 20 and first three columns of this table.

Table 23. *Gross effects of price distortions on production, consumption and trade of livestock products, 1984-86.*

Country/ Commodity	Actual production	Actual consumption	Actual exports or imports(-)	Livestock products ('000 t)					
				Estimated change in production		Estimated change in consumption		Estimated change in exports	
				Low	High	Low	High	Low	High
Côte d'Ivoire									
Beef	42.5	85.5	-43.0	-0.4	-1.3	15.0	31.5	-15.4	-32.8
Mutton	6.2	8.0	-1.8	1.0	2.6	-0.5	-1.0	1.5	3.6
Mali									
Beef	57.6	21.4	36.2	1.3	4.3	-1.1	-2.4	2.4	6.7
Mutton	19.6	17.2	2.4	n.e.	n.e.	2.7	5.7	n.e.	n.e.
Milk	94.1	126.0	-31.9	10.1	25.3	58.0	105.4	-47.9	-80.1
Nigeria									
Beef	245.4	283.2	-42.9	41.2	137.3	-29.7	-62.4	70.9	199.7
Mutton	44.2	45.1	-0.9	16.7	41.8	-3.5	-7.3	20.3	49.2
Milk	348.3	600.2	-251.9	n.e.	n.e.	-275.0	-500.0	n.e.	n.e.
Sudan									
Beef	221.0	219.1	1.9	44.3	147.6	-31.3	-65.7	75.6	213.4
Mutton	98.6	93.1	5.5	38.4	95.7	-	-58.7	66.6	154.6
Milk	1734.3	1837.8	-103.5	249.6	624.1	-377.0	-685.4	626.6	1309.5
Zimbabwe									
Beef	67.5	50.4	17.2	3.4	11.2	17.5	36.8	-14.1	-25.5
Milk	203.6	215.4	-11.8	3.9	9.8	-8.1	-14.8	12.0	24.5

Notes: (1) n.e. = not estimated; (2) Negative values under the column representing estimated change in exports imply imports.

Source: Production: FAO(1989); consumption was derived as the difference between production (col.1) and exports (col. 3); exports/imports: FAO (1988); changes in production, consumption and exports were calculated using equations in the text and data in Table 20 and first three columns of this table.

Table 24. *Summary of gross monetary effects of price distortions by country, 1984-86.*

Country	Monetary effects (US\$ million)					
	Net social loss in production	Net social loss in consumption	Welfare gain to producers	Welfare gain to consumers	Change in foreign exchange earnings	Change in gov't revenue
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A						
Côte d'Ivoire	0.5	6.2	3.8	60.7	-44.0	-71.2
Mali	0.6	7.0	14.4	25.5	-38.5	-47.5
Nigeria	141.5	661.3	1103.5	-3936.4	924.1	2030.1
Sudan	72.1	80.5	511.0	-817.3	402.7	153.6
Zimbabwe	0.3	5.8	14.1	22.8	-27.4	-43.1
Panel B						
Côte d'Ivoire	1.4	13.0	3.0	53.9	-92.3	-71.2
Mali	1.5	13.0	13.5	19.6	-72.2	-47.5
Nigeria	416.2	1209.4	828.8	-4484.5	1945.1	2030.1
Sudan	197.9	159.5	385.2	-896.2	871.1	153.6
Zimbabwe	1.1	12.1	13.4	16.5	-61.9	-43.1

Notes: 1. Monetary estimates were derived by aggregating the estimate of gains and losses for all the commodities considered in each country. The estimates reported here were obtained by using NPCs estimated at the official exchange rates.

2. Panels A and B refer to the low and high elasticity assumptions, respectively.

Table 25. *Comparison of gross monetary effects of price distortions with some key economic indicators, 1984-86.^a*

Country	Agricultural GDP (US\$ million)	Producer gain/ agricultural GDP (%)	Official development assistance (ODA) (US\$ million)	Change in government revenue/ODA (%)	Change in foreign exchange earnings/ODA (%)
Côte d'Ivoire	2129.2	0.1	146.3	-48.7	-63.1
Mali	608.6	2.2	357.3	-13.3	-20.2
Nigeria	22 358.2	3.7	41.7	4868.4	4664.5
Sudan	2212.4	17.4	898.3	17.1	97.0
Zimbabwe	591.2	2.3	253.3	-17.0	-24.4

a. Monetary estimates used here are those obtained using the high elasticity assumption (see Table 24).

Source: Agriculture, GDP and official development assistance from the *World development report* of the World Bank (various issues).

Table 26. Comparison of gross and net effects of price distortions on production, consumption and trade of livestock products, 1984-86.

Country	Livestock products ('000 t)					
	Estimated change in production		Estimated change in consumption		Estimated change in export/imports (-)	
	Gross	Net	Gross	Net	Gross	Net
Côte d'Ivoire						
Beef	-0.4	-1.0	15.0	15.8	-15.4	-16.8
Mutton	1.0	0.9	-0.5	-0.4	1.5	1.3
Mali						
Beef	1.3	-9.3	-1.1	12.1	2.4	-21.4
Mutton	n.e.	n.e.	2.7	7.8	n.e.	n.e.
Milk	10.1	0.6	58.0	82.8	-47.9	-82.2
Nigeria						
Beef	41.2	6.7	-29.7	48.0	70.9	-41.3
Mutton	16.7	8.9	-3.5	11.6	20.3	-2.7
Milk	n.e.	n.e.	-275.0	-217.7	n.e.	n.e.
Sudan						
Beef	44.3	35.9	-31.3	-20.5	75.6	56.4
Mutton	38.4	33.2	-28.2	-25.2	66.6	58.4
Milk	249.6	166.6	-377.0	-294.0	626.6	460.6
Zimbabwe						
Beef	3.4	10.2	17.5	2.2	-14.1	8.0
Milk	3.9	29.6	-8.1	-31.1	12.0	60.7

Notes: 1. Gross estimates were obtained by using NPCs estimated at official exchange rates, while net estimates were obtained by using revised NPCs based on adjusted exchange rates.
 2. The estimates reported here were obtained using the low elasticity assumption.
 3. n.e. = not estimated.

Table 27. Comparison of gross and net monetary effects of price distortions by country, 1984-86.

Country	Monetary effects (US\$ million)											
	Net social loss in production		Net social loss in consumption		Welfare gain to producers		Welfare gain to consumers		Change in foreign exchange earnings		Change in government revenue	
	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net
Côte d'Ivoire	0.5	0.5	6.2	6.7	3.8	0.5	60.7	63.0	-44.0	-47.5	-71.2	-70.7
Mali	0.6	2.3	7.0	21.0	14.4	-30.8	25.5	52.9	-38.5	-98.8	-47.5	-45.5
Nigeria	141.5	8.1	661.3	183.9	1103.5	121.2	-3936.4	-692.1	924.1	-20.8	2030.1	378.8
Sudan	72.1	41.1	80.5	44.6	511.0	348.9	-817.3	-529.0	402.7	296.4	153.6	94.4
Zimbabwe	0.3	5.2	5.8	1.7	14.1	64.2	22.8	-17.7	-27.4	29.6	-43.1	-53.4

Notes: 1. Gross estimates were obtained by using NPCs estimated at official exchange rates, while net estimates were obtained by using revised NPCs based on adjusted exchange rates.
 2. The estimates reported here were obtained using the low elasticity assumption.

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APPENDICES

APPENDIX 1

PRICE DATA SOURCES, LIMITATIONS AND ESTIMATION METHODS

DATA SOURCES

The time-series data on official and market prices that were used for the analysis presented in Chapter 4 were collected from the study countries during 1988. Each study country, apart from Ethiopia, was visited for two weeks to confer with policy makers and scientists familiar with the livestock subsector and to obtain copies of existing documents and studies relating to the sector. These documents, amongst other things, provided the data used in estimating transport and processing costs in those instances where these costs were not directly provided by marketing agencies of the study countries. The data collected during field visits were also supplemented with published statistics on world prices, sea freight rates, exchange rates and consumer price indices from a variety of sources including the FAO Monthly Bulletin of Statistics, ILO (1981 and 1988), IMF (1987) and World Bank (1986b).

DATA LIMITATIONS

Although attempts were made to improve upon the data used for the analysis, there are still various limitations in them. In the first instance, the producer price series available in some countries refer to intermediate market (i.e. market between rural and urban centres), rather than farm-gate prices. In such cases, various deductions may be required to arrive at actual farm-gate prices. These deductions relating to transport and marketing charges were made in those instances where there was sufficient information to do so. However, in other cases, rather than make deductions on the basis of inadequate information, no attempt was made to adjust the intermediate market prices.

Secondly, the consumer prices used for the analysis refer to retail prices in the capital cities. Rural retail prices have been largely ignored and in any case were mostly unavailable. In some cases, official retail prices were used where actual market prices were unavailable. The use of official retail prices may, however, give a misleading picture as to the actual changes in the market prices of the products considered. Overall, these limitations call for caution in interpreting the results reported in the study.

BORDER EQUIVALENT PRICES

Border equivalent prices, or world prices adjusted for transport, marketing and processing costs, were estimated to serve as yardsticks and to indicate the extent to which domestic prices have been distorted by government intervention. For an imported commodity, the border price was computed by taking the appropriate international price and adding sea freight and insurance charges to obtain the c.i.f. price which was then converted into local currency at the official exchange rate. To this price, handling, transport and marketing charges from the border to the domestic market were added to arrive at the equivalent market price for the imported commodity.

From the latter, transport, processing and marketing charges from the farm to the market were deducted to obtain the border equivalent producer price at the farm gate. Algebraically, the border equivalent producer price at the farm gate for an imported commodity is thus:

$$P_b = (P_w + T_w) + T_d - C_d$$

where:

P_b is the border equivalent producer price at the farm gate;

P_w is the world price;

T_w represents ocean freight and insurance charges;

$(P_w + T_w)$ represents the c.i.f. price which was converted to local currency at the official exchange rate;

T_d represents handling, transport and marketing charges from port to the domestic market;

C_d represents transport, processing and marketing charges from farm gate to domestic market.

For an export commodity, the border equivalent producer price at the farm gate was derived in a slightly different way. In this case, ocean freight and insurance charges were deducted from the world price to give the f.o.b. border price. From the latter, transport, processing and marketing charges from the farm to the domestic market were deducted and the value of by-products added to arrive at the border equivalent producer price. In symbols:

$$P_b = P_w - T_w - T_d - C_d + V_b$$

where:

V_b is the value of by-products.

In all cases, the reference market was assumed to be the largest city — usually the capital city.

However, the case of Mali deserves special mention. Although Mali was classified as an exporter, the border equivalent price for Malian producers was not estimated as explained above. The land-locked nature of the country and the fact that Mali's traditional export market had always been Côte d'Ivoire necessitated a different approach. Thus, for beef and mutton in Mali, the border equivalent price was estimated by using c.i.f. price in Abidjan port rather than P_w as the starting point of the analysis — the assumption being that Abidjan is the place where beef from Mali will have to compete with imported beef.

Also at this point, it is worthwhile to briefly examine the world market prices used in this study as reference prices. Due to the existence of a number of widely differing world price series for livestock products, it is difficult to find a single price series that will be adequate for all purposes, i.e. that will take into account the specificity of meat grades as well as the diversity that exists between different types of exporters on the one hand and between importers and exporters on the other. Nevertheless,

to provide a common basis for comparison between countries, for each product considered in the study (e.g. beef) the same world price was used for all the study countries. This approach suffers from the shortcoming of not properly accounting for the regional trade flows among neighbouring countries (this was taken into consideration in the case of Mali as discussed above), but the approach is justified in the sense that it provides a common basis for comparison among all the study countries and better reflects the extent of distortion of domestic prices.

Thus for beef, Argentinian f.o.b. prices for frozen boneless beef were used. These were converted into carcass weight equivalent prices for the estimation of border equivalent producer prices. For mutton, London wholesale prices for New Zealand frozen whole carcass were used. Both prices were taken from the IMF Financial Statistical Yearbook. The world price for reconstituted milk was obtained as a composite of the prices of skim milk powder and butteroil. Both prices were taken from various issues of the FAO Commodity Review and Food Outlook.

THE ESTIMATION OF REAL PRICES

Throughout Chapter 4, real prices have been computed by using the consumer price index (CPI) to deflate actual producer and consumer prices. The CPI was used as a deflator of nominal producer prices in order to estimate the producers' real purchasing power and its incentive (or disincentive) effect on livestock production. For the same set of prices the producer price index (PPI) could have been used, instead of the CPI, to give an idea of the net return to livestock production vis-a-vis other agricultural production activities. However, the CPI was the only readily available and most consistent price series in all the countries studied. The analysis was, therefore, confined to the use of the CPI alone.

The CPI published in the IMF International Financial Statistics Yearbook was used for each country, except Mali. In the case of Mali, a CPI did not exist prior to 1988. The ILO Yearbook of Labour Statistics, however, contains a food price index (FPI) for Mali and this was used to deflate nominal prices in that country.

Real border prices were computed by deflating nominal border prices (obtained as explained above) by the CPI or the FPI in the Malian case.

THE NOMINAL PROTECTION COEFFICIENT

The nominal protection coefficient (NPC) measures the extent to which domestic prices diverge from border equivalent prices. For producer prices, it was estimated as follows:

$$\text{NPC} = P_d/P_b$$

where:

P_d is the domestic producer price; and
 P_b is the border equivalent producer price
computed as explained above.

APPENDIX 2

VARIABILITY IN REAL DOMESTIC AND BORDER EQUIVALENT PRODUCER PRICES

Product and country	Real domestic producer price	Border equivalent producer price in real domestic terms	Product and country	Real domestic producer price	Border equivalent producer price in real domestic terms
Panel A: 1970-1978			Panel B: 1979-1986		
	CV	CV		CV	CV
Beef			Beef		
Côte d'Ivoire	10.1	49.2	Côte d'Ivoire	7.8	28.6
Mali	11.2	47.8	Mali	16.3	32.1
Nigeria	28.5	22.8	Nigeria	17.2	19.7
Sudan	9.5	71.4	Sudan	35.2	14.8
Zimbabwe	13.1	53.8	Zimbabwe	11.2	43.8
Mutton			Mutton		
Côte d'Ivoire	18.9	14.4	Côte d'Ivoire	4.2	10.8
Nigeria	23.8	17.1	Nigeria	18.9	25.2
Sudan	9.5	43.4	Sudan	26.3	24.4
Cow milk¹			Cow milk		
Mali	9.9	26.7	Mali	38.3	7.8
Sudan	13.1	20.1	Sudan	22.7	21.1
Zimbabwe	5.5	24.3	Zimbabwe	12.2	10.3

CV = Coefficient of variation.

1. For milk, the period considered was 1971-78.

Source: Estimated from data collected from the study countries.

APPENDIX 3

DECOMPOSITION OF THE NPC

The annual change in the nominal protection coefficient (NPC) can be decomposed into its component parts using a difference equation (Jaeger and Humphreys, 1988). If we start with the basic NPC equation, i.e.

$$NPC_t = P_t^d / (E_t P_t^w),$$

where P_t^d is the domestic producer price for a given commodity,

E_t is the official exchange rate, and P_t^w is the border equivalent price for the commodity, all for period t . The total derivative for the above is :

$$dNPC = (1/EP^w)dP^d - (P^d/(E^2P^w))dE - (P^d/(EP^{w2}))dP^w,$$

which for small changes is approximated with first differences by:

$$\begin{aligned} NPC_{t+1} - NPC_t &= (P_{t+1}^d - P_t^d) / (E_t P_t^w) \\ &\quad - (E_{t+1} - E_t) P_t^d / (P_t^w E_t^2) \\ &\quad - (P_{t+1}^w - P_t^w) P_t^d / (E_t P_t^{w2}). \end{aligned}$$

APPENDIX 4

TABLES ON NOMINAL AND REAL PRODUCER, CONSUMER AND BORDER EQUIVALENT PRICES IN FIVE OF THE STUDY COUNTRIES, 1970–86

Table 1. *Nominal producer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg cw	Mali ² FCFA/kg cw	Nigeria ³ Naira/kg cw	Sudan ⁴ Pound/kg cw	Zimbabwe ⁵ Cents/kg cw
1970	146	155	0.52	0.09	35.66
1971	156	176	0.57	0.12	36.76
1972	177	201	0.63	0.12	40.38
1973	198	229	0.82	0.14	49.35
1974	219	254	1.05	0.15	56.82
1975	271	288	1.86	0.24	58.96
1976	332	291	2.30	0.25	57.00
1977	338	328	2.82	0.24	57.91
1978	417	348	2.86	0.32	57.26
1979	433	407	3.30	0.87	70.46
1980	520	473	3.30	0.90	81.11
1981	558	456	3.78	1.00	102.08
1982	594	483	3.95	1.18	129.19
1983	604	509	4.68	1.67	130.42
1984	520	444	5.31	1.46	147.98
1985	604	486	5.36	1.66	153.30
1986	667	658	8.82	6.57	179.83

cw = carcass weight.

Sources: 1. Côte d'Ivoire/République Française (1983); Côte d'Ivoire/FAO (1984).

2. Office Malien du Bétail et de la viande(OMBEVI), *Statistiques du bétail et de la viande* (various issues).

3. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).

4. Sudan Gov't (1985); LMMC (Livestock and Meat Marketing Corporation, Sudan) (unpublished data).

5. AMA (1980; 1986).

Table 2. *Real producer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg cw	Mali ² FCFA/kg cw	Nigeria ³ Naira/kg cw	Sudan ⁴ Pound/kg cw	Zimbabwe ⁵ Cents/kg cw
1970	452.15	591.66	2.18	0.43	73.68
1971	490.57	558.97	2.06	0.55	73.67
1972	554.69	591.70	2.22	0.50	78.71
1973	558.69	521.87	2.73	0.49	93.29
1974	526.57	567.22	3.11	0.44	100.74
1975	584.68	606.95	4.12	0.55	94.94
1976	639.08	568.17	4.18	0.56	82.73
1977	510.73	511.70	4.22	0.48	76.20
1978	557.56	407.49	3.51	0.53	71.31
1979	496.50	496.95	3.63	1.09	74.25
1980	520.00	473.00	3.30	0.90	81.11
1981	512.73	406.60	3.13	0.80	90.18
1982	508.52	420.51	3.04	0.75	103.19
1983	488.36	403.89	2.92	0.81	84.63
1984	403.13	312.68	2.37	0.53	79.90
1985	459.77	316.62	2.27	0.42	76.31
1986	476.05	448.84	3.70	1.34	78.29

Note: The consumer price indices used to deflate actual prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.
cw = carcass weight.

Sources: ILO (1981; 1988); IMF (1987).

1. Côte d'Ivoire/République Française (1983); Côte d'Ivoire /FAO (1984).
2. Office Malien du bétail et de la viande (OMBEVI), *Statistiques du bétail et de la viande* (various issues).
3. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).
4. Sudan (1985) and Livestock and Meat Marketing Corporation (unpublished data).
5. AMA (1980; 1986).

Table 3. *Border equivalent producer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg cw	Mali FCFA/kg cw	Nigeria Naira/kg cw	Sudan Pound/kg cw	Zimbabwe Cents/kg cw
1970	131.27	103.88	0.31	0.06	10.51
1971	164.68	135.96	0.38	0.09	15.97
1972	194.74	165.21	0.46	0.14	23.84
1973	243.13	208.47	0.70	0.21	37.31
1974	319.05	280.38	0.76	0.23	48.31
1975	111.59	91.64	0.75	0.05	12.75
1976	134.95	111.46	0.88	0.06	17.54
1977	172.56	137.42	1.03	0.06	26.82
1978	141.57	112.09	1.06	0.08	30.71
1979	236.66	159.27	1.40	0.17	51.03
1980	242.38	151.80	1.39	0.20	40.76
1981	273.45	173.84	1.40	0.23	42.72
1982	390.38	285.17	1.66	0.29	34.78
1983	459.56	346.78	1.84	0.43	44.57
1984	623.92	503.14	2.18	0.68	85.92
1985	665.94	540.27	2.45	0.79	174.22
1986	576.54	447.64	4.05	1.38	180.71

Note: Border prices have been converted at official exchange rates.
cw = carcass weight.

Sources: World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 4. *Real border equivalent producer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg cw	Mali FCFA/kg cw	Nigeria Naira/kg cw	Sudan Pound/kg cw	Zimbabwe Cents/kg cw
1970	406.53	397.55	1.29	0.29	21.71
1971	517.86	431.07	1.38	0.44	32.00
1972	610.28	486.34	1.62	0.59	46.47
1973	686.03	474.87	2.34	0.75	70.53
1974	767.13	625.71	2.24	0.65	85.66
1975	240.76	193.13	1.66	0.11	20.53
1976	259.77	217.40	1.59	0.13	25.46
1977	260.74	214.38	1.55	0.12	35.20
1978	189.29	131.25	1.31	0.16	38.24
1979	271.37	194.47	1.54	0.21	53.77
1980	242.38	151.80	1.40	0.20	40.76
1981	251.26	154.94	1.16	0.19	37.74
1982	334.20	248.41	1.28	0.19	27.78
1983	371.57	275.00	1.15	0.21	28.92
1984	483.70	354.32	0.97	0.25	46.39
1985	506.92	352.20	1.04	0.20	86.72
1986	411.49	305.35	1.70	0.28	78.67

- Notes: 1. Border prices have been converted at official exchange rates.
 2. The consumer price indices used to deflate nominal border prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.
 cw = carcass weight.

Sources: ILO (1981; 1988); World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 5. *Nominal producer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg cw	Nigeria ² Naira/kg cw	Sudan ³ Pound/kg cw
1970	200	1.05	0.18
1971	230	1.16	0.20
1972	244	1.28	0.22
1973	260	1.15	0.23
1974	280	1.94	0.24
1975	305	2.93	0.38
1976	480	4.03	0.35
1977	600	4.67	0.41
1978	800	5.20	0.58
1979	900	5.36	1.19
1980	1000	5.36	1.46
1981	1050	5.25	1.67
1982	1100	5.64	2.01
1983	1200	8.77	3.34
1984	1200	8.88	2.83
1985	1200	8.36	3.73
1986	1300	14.19	10.49

cw = carcass weight.

- Sources: 1. Côte d'Ivoire/République Française (1983); Côte d'Ivoire/FAO (1987).
 2. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).
 3. Sudan Gov't (1985); LMMC (Livestock and Meat Marketing Corporation) (unpublished data).

Table 6. *Real producer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg cw	Nigeria ² Naira/kg cw	Sudan ³ Pound/kg cw
1970	619.39	4.41	0.84
1971	723.27	4.20	0.94
1972	764.65	4.51	0.91
1973	733.63	3.83	0.85
1974	673.24	5.74	0.69
1975	658.04	6.49	0.89
1976	923.96	7.32	0.80
1977	906.62	6.98	0.81
1978	1069.66	6.39	0.95
1979	1031.99	5.89	1.49
1980	1000.00	5.36	1.46
1981	964.81	4.35	1.34
1982	941.70	4.33	1.29
1983	970.25	5.47	1.63
1984	930.30	3.97	1.03
1985	913.45	3.54	0.93
1986	927.84	5.95	2.13

Note: The consumer price indices used to deflate actual prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.
cw = carcass weight.

Sources: ILO (1981; 1988); IMF (1987).

1. Côte d'Ivoire/République Française (1983); Côte d'Ivoire/FAO (1987).

2. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).

3. Sudan Gov't (1985) and LMCC (Livestock and Meat Marketing Corporation) (unpublished data).

Table 7. *Border equivalent producer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg cw	Nigeria Naira/kg cw	Sudan Pound/kg cw
1970	204.22	0.43	0.06
1971	223.54	0.47	0.07
1972	271.66	0.59	0.14
1973	320.84	0.80	0.20
1974	361.79	0.82	0.14
1975	521.49	1.05	0.10
1976	382.26	1.12	0.12
1977	418.26	1.25	0.11
1978	488.18	1.56	0.24
1979	488.35	1.57	0.25
1980	581.57	1.70	0.48
1981	743.55	1.86	0.37
1982	791.39	1.78	0.64
1983	745.54	1.78	0.76
1984	894.54	1.93	0.59
1985	884.28	2.19	1.09
1986	723.49	3.58	1.96

Note: Border prices have been converted at official exchange rates.

cw = carcass weight.

Sources: World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 8. *Real border equivalent producer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg cw	Nigeria Naira/kg cw	Sudan Pound/kg cw
1970	632.46	1.82	0.29
1971	702.96	1.70	0.35
1972	851.33	2.09	0.58
1973	905.30	2.85	0.72
1974	869.90	2.41	0.40
1975	693.61	2.32	0.24
1976	735.82	2.03	0.28
1977	632.00	1.86	0.21
1978	652.73	1.92	0.40
1979	559.97	1.73	0.32
1980	581.57	1.70	0.48
1981	683.22	1.54	0.30
1982	677.50	1.37	0.41
1983	602.80	1.11	0.37
1984	693.50	0.86	0.22
1985	673.12	0.93	0.27
1986	516.37	1.50	0.40

- Notes: 1. Border prices have been converted at official exchange rates.
 2. The consumer price indices used to deflate nominal border prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.
 3. cw = carcass weight.

Sources: World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 9. *Nominal producer prices for milk in the study countries, 1971–86.*

Year	Mali ¹ FCFA/kg	Sudan ² Pound/kg	Zimbabwe ³ Cent/kg
1971	24.27	0.05	6.58
1972	24.27	0.05	6.71
1973	36.41	0.06	7.18
1974	36.41	0.06	7.31
1975	36.41	0.10	8.72
1976	43.69	0.10	10.33
1977	43.69	0.10	10.16
1978	54.37	0.10	10.16
1979	63.11	0.10	12.96
1980	63.11	0.29	15.54
1981	72.82	0.29	20.55
1982	108.01	0.29	25.22
1983	101.94	0.58	30.38
1984	201.94	0.58	33.43
1985	231.07	0.87	38.12
1986	231.07	1.07	40.96

- Sources: 1. Union laitière de Bamako, Mali (unpublished data).
 2. Animal Production Corp. and Kuku Dairy Production Cooperative, Sudan (unpublished data).
 3. AMA (1980; 1986).

Table 10. *Real producer prices for milk in the study countries, 1971–86.*

Year	Mali ¹ FCFA/kg	Sudan ² Pound/kg	Zimbabwe ³ Cent/kg
1971	76.95	0.23	13.19
1972	71.44	0.20	13.08
1973	82.94	0.22	13.57
1974	81.25	0.17	12.96
1975	76.73	0.24	14.04
1976	85.22	0.23	14.99
1977	68.16	0.20	13.37
1978	63.66	0.17	12.65
1979	77.06	0.13	13.66
1980	63.11	0.29	15.54
1981	64.90	0.23	18.15
1982	94.06	0.19	20.14
1983	80.84	0.28	19.71
1984	142.21	0.21	18.05
1985	150.63	0.22	18.97
1986	157.62	0.22	17.83

Note: The consumer price indices used to deflate actual prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.

Sources: ILO (1981; 1988); IMF (1987).

1. Union laitière de Bamako, Mali (unpublished data).

2. Animal Production Corp. and Kuku Dairy Production Cooperative, Sudan (unpublished data).

3. AMA (1980; 1986).

Table 11. *Border equivalent producer prices for milk in the study countries, 1971–86.*

Year	Mali FCFA/kg	Sudan Pound/kg	Zimbabwe Cents/kg
1971	63.63	0.08	10.48
1972	71.29	0.10	12.74
1973	79.20	0.12	13.20
1974	90.40	0.15	15.19
1975	77.02	0.16	13.85
1976	65.17	0.13	10.15
1977	75.31	0.15	11.03
1978	83.42	0.16	12.63
1979	104.33	0.20	18.13
1980	131.63	0.27	23.05
1981	153.33	0.30	23.48
1982	162.52	0.39	23.47
1983	177.44	0.47	28.77
1984	194.85	0.47	31.99
1985	197.27	0.68	38.14
1986	160.71	0.75	38.55

Note: Border prices have been converted at official exchange rates.

Sources: FAO (1982); *FAO food outlook* (various issues); World Bank (1986b), and data collected from the study countries.

Table 12. *Real border equivalent producer prices for milk in the study countries, 1971–86.*

Year	Mali FCFA/kg	Sudan Pound/kg	Zimbabwe Cents/kg
1971	201.74	0.40	21.00
1972	209.86	0.44	24.83
1973	180.41	0.45	24.95
1974	201.74	0.42	26.93
1975	162.32	0.37	22.30
1976	127.11	0.30	14.73
1977	117.49	0.29	14.51
1978	97.68	0.26	15.73
1979	127.32	0.25	19.10
1980	131.63	0.27	23.05
1981	136.66	0.24	20.74
1982	141.57	0.25	18.75
1983	140.71	0.23	18.67
1984	137.22	0.17	17.27
1985	128.60	0.17	18.98
1986	109.62	0.15	16.78

- Note: 1. Border prices have been converted at official exchange rates.
 2. The consumer price indices used to deflate nominal border prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.

Sources: ILO (1981; 1988); FAO (1982); *FAO food outlook* (various issues); World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 13. *Nominal consumer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg	Mali ² FCFA/kg	Nigeria ³ Naira/kg	Sudan ⁴ Pound/kg	Zimbabwe ⁵ Cents/kg
1970	177	138	0.66	0.17	44.00
1971	178	138	0.71	0.17	44.00
1972	190	138	0.75	0.17	44.00
1973	215	138	0.74	0.26	65.00
1974	247	156	1.18	0.30	73.00
1975	307	300	2.03	0.50	79.00
1976	345	300	2.76	0.46	87.00
1977	441	325	2.84	0.59	90.00
1978	539	400	3.14	0.30	95.00
1979	550	425	3.58	1.26	80.00
1980	650	500	3.76	1.66	86.00
1981	800	550	3.97	2.28	114.00
1982	900	575	4.71	2.57	114.00
1983	900	600	5.61	3.60	125.00
1984	900	600	6.70	4.7	125.00
1985	950	650	6.60	5.29	132.00
1986	950	687	9.50	10.08	151.00

- Sources: 1. Côte d'Ivoire /République Française (1983) and Société pour le développement des productions animales (unpublished data).
 2. Office Malien du bétail et de la viande, *Statistiques du bétail et de la viande* (various issues).
 3. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).
 4. Livestock and Meat Marketing Corporation, Sudan (unpublished data).
 5. Agricultural Marketing Authority, Zimbabwe (unpublished data).

Table 14. *Real consumer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg	Mali ² FCFA/kg	Nigeria ³ Naira/kg	Sudan ⁴ Pound/kg	Zimbabwe ⁵ Cents/kg
1970	548.16	526.21	2.77	0.82	90.91
1971	559.75	435.95	2.57	0.81	88.18
1972	595.42	404.77	2.64	0.71	85.77
1973	606.66	313.21	2.47	0.95	122.87
1974	593.89	334.75	3.49	0.87	129.43
1975	662.35	632.24	4.50	1.17	127.21
1976	664.10	585.14	5.01	1.06	126.27
1977	666.36	507.02	4.25	1.16	118.42
1978	720.68	468.38	3.86	0.49	118.31
1979	630.66	518.93	3.94	1.58	84.30
1980	650.00	500.00	3.76	1.66	86.00
1981	735.09	490.20	3.29	1.83	100.71
1982	770.48	500.87	3.62	1.64	91.05
1983	727.68	475.81	3.50	1.76	81.12
1984	697.73	422.53	2.99	1.52	67.49
1985	723.15	423.73	2.79	1.33	65.70
1986	678.04	468.62	3.98	2.05	65.74

Note: The consumer price indices used to deflate actual prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.

Sources: ILO (1981; 1988); IMF (1987).

1. Côte d'Ivoire /République Française (1983) and Société pour le développement des productions animales (unpublished data).
2. Office malien du bétail et de la viande, *Statistiques du bétail et de la viande* (various issues).
3. Nigerian Livestock Information Service and Federal Livestock Department (FLD) (unpublished data).
4. Livestock and Meat Marketing Corporation, Sudan (unpublished data).
5. Agricultural Marketing Authority, Zimbabwe (unpublished data).

Table 15. *Border equivalent consumer prices for beef in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg	Mali FCFA/kg	Nigeria Naira/kg	Sudan Pound/kg	Zimbabwe Cents/kg
1970	281.92	137.02	0.73	0.28	36.11
1971	327.42	181.43	0.86	0.33	45.99
1972	371.00	225.93	0.99	0.42	57.69
1973	451.78	273.03	1.33	0.55	79.61
1974	575.82	341.01	1.60	0.65	97.39
1975	295.34	117.47	1.59	0.36	44.08
1976	344.77	139.00	1.97	0.38	51.97
1977	442.83	191.66	2.21	0.48	65.69
1978	427.22	183.87	2.33	0.53	70.94
1979	602.24	259.60	2.95	0.92	96.51
1980	650.95	275.13	2.99	1.16	97.10
1981	715.36	268.87	3.04	1.09	97.98
1982	902.15	381.01	3.62	1.88	93.80
1983	1017.69	447.65	4.11	2.52	118.57
1984	1253.57	580.21	4.88	2.79	173.18
1985	1314.83	609.92	5.21	4.81	242.11
1986	1225.35	541.93	8.23	6.26	308.96

Note: Border prices have been converted at official exchange rates.

Sources: World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 16. *Nominal consumer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg	Mali ² FCFA/kg	Nigeria ³ Naira/kg	Sudan ⁴ Pound/kg
1970	275	150	0.65	0.29
1971	300	150	0.70	0.29
1972	360	150	0.74	0.29
1973	360	150	0.75	0.38
1974	360	250	0.98	0.41
1975	400	325	1.63	0.70
1976	400	375	2.00	0.63
1977	500	425	2.39	0.79
1978	600	500	2.55	0.43
1979	650	600	2.91	1.74
1980	700	700	3.17	2.75
1981	900	750	3.49	3.33
1982	1100	775	3.97	4.03
1983	1100	800	5.08	5.67
1984	1300	755	5.65	6.57
1985	1300	785	6.59	8.34
1986	1350	940	8.11	14.73

Sources: 1. Côte d'Ivoire /République Française (1983); Société pour le développement des productions animales, Côte d'Ivoire (unpublished data).

2. Office malien du bétail et de la viande: *Statistiques du bétail et de la viande* (various issues).

3. Nigerian Livestock Information Service and Federal Livestock Department (unpublished data).

4. Livestock and Meat Marketing Corporation, Sudan (unpublished data).

Table 17. *Real consumer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire ¹ FCFA/kg	Mali ² FCFA/kg	Nigeria ³ Naira/kg	Sudan ⁴ Pound/kg
1970	851.66	574.05	2.73	1.40
1971	943.40	475.59	2.53	1.38
1972	1128.17	441.57	2.61	1.22
1973	1015.80	341.69	2.50	1.39
1974	865.59	557.91	2.90	1.18
1975	863.00	684.93	3.61	1.63
1976	769.97	731.42	3.63	1.44
1977	755.51	663.03	3.57	1.55
1978	802.25	585.48	3.13	0.71
1979	745.33	732.60	3.20	2.18
1980	700.00	700.00	3.17	2.75
1981	826.98	668.45	2.89	2.67
1982	941.70	675.09	3.05	2.57
1983	889.39	634.42	3.17	2.77
1984	1007.83	531.69	2.52	2.40
1985	989.57	511.73	2.79	2.09
1986	963.53	641.20	3.40	2.99

Note: The consumer price indices used to deflate actual prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.

Sources: ILO (1981; 1988); IMF (1987).

1. Côte d'Ivoire/République Française (1983); Société pour le développement des productions animales, Côte d'Ivoire (unpublished data).

2. Office Malien du bétail et de la viande: *Statistiques du bétail et de la viande* (various issues).

3. Nigerian Livestock Information Service and Federal Livestock Department (unpublished data).

4. Livestock and Meat Marketing Corporation, Sudan (unpublished data).

Table 18. *Border equivalent consumer prices for mutton in the study countries, 1970–86.*

Year	Côte d'Ivoire FCFA/kg	Mali FCFA/kg	Nigeria Naira/kg	Sudan Pound/kg
1970	290.45	241.23	0.76	0.32
1971	308.47	271.57	0.82	0.34
1972	356.89	324.48	0.96	0.44
1973	415.50	391.82	1.23	0.54
1974	472.86	431.71	1.31	0.58
1975	445.30	394.44	1.86	0.65
1976	521.01	460.21	2.12	0.68
1977	595.04	515.16	2.44	0.76
1978	687.95	623.51	2.84	1.02
1979	721.29	610.92	3.02	1.27
1980	848.68	734.25	3.28	1.75
1981	1034.23	916.43	3.60	1.86
1982	1103.39	965.72	3.76	2.69
1983	1075.89	939.20	4.32	3.03
1984	1239.09	1117.41	4.76	3.33
1985	1235.17	1128.76	5.49	4.96
1986	1097.72	950.33	7.63	6.13

Note: Border prices have been converted at official exchange rates.

Sources: World Bank (1986b); IMF (1987), and data collected from the study countries.

Table 19. *Nominal consumer prices for milk in the study countries, 1972–86.*

Year	Mali ¹ FCFA/kg	Nigeria ² Naira/kg	Sudan ³ Pound/kg	Zimbabwe ⁴ Cents/kg
1972	70	0.51	0.15	14.08
1973	70	0.59	0.15	14.08
1974	70	0.67	0.15	15.83
1975	70	0.94	0.19	15.83
1976	70	0.96	0.19	19.35
1977	70	1.10	0.19	20.00
1978	75	1.34	0.19	20.00
1979	75	1.42	0.19	23.33
1980	75	1.34	0.44	26.67
1981	75	1.21	0.44	26.67
1982	110	1.48	0.44	26.67
1983	110	1.18	0.78	26.67
1984	110	5.88	0.87	40.00
1985	110	6.00	1.07	50.00
1986	148	7.64	1.26	60.00

Sources: 1. Union laitière de Bamako, Mali (personal communication).

2. Nigerian Gov't (1987), Federal Livestock Department (personal communication).

3. Animal Production Corporation, Sudan (personal communication).

4. AMA (Agricultural Marketing Authority) (1986); Dairy Marketing Board: *Report and accounts* (various issues).

Table 20. *Real consumer prices for milk in the study countries, 1972-86.*

Year	Mali ¹ FCFA/kg	Nigeria ² Naira/kg	Sudan ³ Pound/kg	Zimbabwe ⁴ Cents/kg
1972	206.06	1.80	0.63	27.45
1973	159.45	1.97	0.55	26.62
1974	156.21	1.98	0.43	28.07
1975	147.52	2.08	0.44	25.49
1976	136.53	1.74	0.44	28.08
1977	109.20	1.64	0.37	26.32
1978	87.82	1.65	0.31	24.91
1979	91.57	1.56	0.24	24.58
1980	75.00	1.34	0.44	26.67
1981	66.84	1.00	0.35	23.56
1982	95.82	1.14	0.28	21.30
1983	87.23	0.74	0.38	17.31
1984	77.46	2.63	0.32	21.60
1985	71.71	2.54	0.27	24.89
1986	100.95	3.20	0.26	26.12

Note: The consumer price indices used to deflate nominal prices have 1980 as the base year, thus all prices in the table are in terms of 1980 values.

Sources: ILO (1981; 1988); IMF (1987).

1. Union laitière de Bamako, Mali (personal communication).
2. Nigerian Gov't (1987); Federal Livestock Department (personal communication).
3. Animal Production Corporation, Sudan (personal communication).
4. AMA (Agricultural Marketing Authority) (1986); Dairy Marketing Board: *Report and accounts* (various issues).

Table 21. *Border equivalent consumer prices for milk in the study countries, 1972-86.*

Year	Mali FCFA/kg	Nigeria Naira/kg	Sudan Pound/kg	Zimbabwe Cents/kg
1972	85.69	0.46	0.12	15.68
1973	93.56	0.53	0.14	16.21
1974	104.79	0.52	0.17	18.40
1975	91.36	0.60	0.18	17.39
1976	79.55	0.40	0.15	14.09
1977	89.70	0.42	0.17	15.37
1978	98.78	0.50	0.19	17.24
1979	119.84	0.62	0.24	23.00
1980	147.14	0.81	0.34	28.61
1981	168.98	0.83	0.38	29.96
1982	185.31	0.83	0.47	32.27
1983	200.35	0.74	0.55	39.66
1984	217.90	1.70	0.58	43.22
1985	220.35	1.82	0.78	48.05
1986	191.14	2.49	0.86	49.23

Note: Border prices have been converted at official exchange rates.

Sources: FAO (1982); *FAO food outlook* (various issues); World Bank (1986b), and data collected from the study countries.

Table 22. *Nominal protection coefficients for beef producers in the study countries, 1970–86.*

Year	Côte d'Ivoire	Mali	Nigeria	Sudan	Zimbabwe
1970	1.11	1.49	1.69	1.44	3.39
1971	0.95	1.30	1.49	1.25	2.30
1972	0.91	1.22	1.37	0.86	1.69
1973	0.81	1.10	1.17	0.66	1.32
1974	0.69	0.91	1.39	0.68	1.18
1975	2.43	3.14	2.48	4.94	4.62
1976	2.46	2.61	2.62	4.45	3.25
1977	1.96	2.39	2.73	3.87	2.16
1978	2.95	3.10	2.69	3.88	1.86
1979	1.83	2.56	2.35	5.25	1.38
1980	2.15	3.11	2.36	4.49	1.99
1981	2.04	2.62	2.70	4.27	2.39
1982	1.52	1.69	2.37	4.04	3.71
1983	1.31	1.47	2.54	3.84	2.93
1984	0.83	0.88	2.44	2.16	1.72
1985	0.91	0.90	2.19	2.10	0.88
1986	1.16	1.47	2.18	4.78	0.99

Source: Estimated from data collected from the study countries by the author.

Table 23. *Nominal protection coefficients for mutton producers in the study countries, 1970–86.*

Year	Côte d'Ivoire	Nigeria	Sudan
1970	0.98	2.42	2.92
1971	1.03	2.47	2.71
1972	0.90	2.16	1.55
1973	0.81	1.34	1.18
1974	0.77	2.38	1.73
1975	0.95	2.80	3.69
1976	1.26	3.60	2.83
1977	1.43	3.75	3.84
1978	1.64	3.33	2.38
1979	1.84	3.42	4.70
1980	1.72	3.16	3.07
1981	1.41	2.83	4.48
1982	1.39	3.17	3.15
1983	1.61	4.92	4.39
1984	1.34	4.60	4.77
1985	1.36	3.81	3.41
1986	1.80	3.97	5.35

Source: Estimated from data collected from the study countries by the author.

Table 24. Nominal protection coefficients for milk producers in the study countries, 1971–86.

Year	Mali	Sudan	Zimbabwe
1971	0.38	0.56	0.63
1972	0.34	0.46	0.53
1973	0.46	0.49	0.54
1974	0.40	0.41	0.48
1975	0.47	0.64	0.63
1976	0.67	0.78	1.02
1977	0.53	0.68	0.92
1978	0.65	0.63	0.80
1979	0.60	0.50	0.71
1980	0.48	1.08	0.67
1981	0.47	0.97	0.87
1982	0.66	0.75	1.07
1983	0.57	1.24	1.06
1984	1.04	1.24	1.04
1985	1.17	1.29	1.00
1986	1.44	1.42	1.06

Source: Estimated from data collected from the study countries by the author.

Table 25. Nominal protection coefficients for beef consumers in the study countries, 1970–86.

Year	Côte d'Ivoire	Mali	Nigeria	Sudan	Zimbabwe
1970	0.63	1.00	0.90	0.61	1.22
1971	0.54	0.76	0.82	0.52	0.96
1972	0.51	0.61	0.75	0.41	0.76
1973	0.48	0.50	0.56	0.47	0.82
1974	0.43	0.44	0.74	0.46	0.75
1975	1.04	2.55	1.28	1.40	1.79
1976	1.00	2.16	1.40	1.23	1.67
1977	1.00	1.70	1.29	1.24	1.37
1978	1.26	2.17	1.35	0.57	1.34
1979	0.91	1.64	1.21	1.37	0.83
1980	1.00	1.82	1.26	1.43	0.89
1981	1.12	2.05	1.30	2.09	1.16
1982	1.00	1.51	1.30	1.37	1.22
1983	0.88	1.34	1.36	1.43	1.05
1984	0.72	1.03	1.37	1.49	0.72
1985	0.72	1.07	1.27	1.10	0.55
1986	0.77	1.27	1.15	1.61	0.49

Source: Estimated from data collected from the study countries by the author.

Table 26. Nominal protection coefficients for mutton consumers in the study countries, 1970–86.

Year	Côte d'Ivoire	Mali	Nigeria	Sudan
1970	0.95	0.62	0.86	0.90
1971	0.97	0.55	0.85	0.85
1972	1.01	0.46	0.77	0.66
1973	0.87	0.38	0.61	0.70
1974	0.76	0.58	0.75	0.71
1975	0.90	0.82	0.88	1.08
1976	0.77	0.81	0.94	0.93
1977	0.84	0.82	0.98	1.04
1978	0.87	0.80	0.90	0.42
1979	0.90	0.98	0.96	1.37
1980	0.82	0.95	0.97	1.57
1981	0.87	0.82	0.97	1.80
1982	1.00	0.80	1.06	1.50
1983	1.02	0.85	1.18	1.87
1984	1.05	0.68	1.19	1.97
1985	1.05	0.70	1.20	1.68
1986	1.23	0.99	1.05	2.40

Source: Estimated from data collected from the study countries by the author.

Table 27. Nominal protection coefficients for milk consumers in the study countries, 1972–86.

Year	Mali	Nigeria	Sudan	Zimbabwe
1972	0.82	1.11	1.25	0.90
1973	0.75	1.11	1.07	0.87
1974	0.67	1.29	0.88	0.86
1975	0.77	1.57	1.06	0.91
1976	0.88	2.40	1.27	1.37
1977	0.78	2.62	1.12	1.30
1978	0.76	2.68	1.00	1.16
1979	0.63	2.29	0.79	1.01
1980	0.51	1.65	1.29	0.93
1981	0.44	1.46	1.16	0.89
1982	0.59	1.78	0.94	0.83
1983	0.55	1.59	1.42	0.67
1984	0.50	3.46	1.50	0.93
1985	0.50	3.30	1.37	1.04
1986	0.77	3.07	1.47	1.22

Note: The milk considered here is evaporated and condensed milk in the case of Nigeria, while for the rest of the countries it is reconstituted milk.

Source: Estimated from data collected from the study countries by the author.

Table 28. *Official and adjusted exchange rates in the study countries, 1970-86.*

Year	Côte d'Ivoire		Mali		Nigeria		Sudan		Zimbabwe	
	OER	AER	OER	AER	OER	AER	OER	AER	OER	AER
	\$/FCFA 1000		\$/FCFA 1000		\$/N 1		\$/PD1		\$/Z\$1	
1970	3.60	3.60	3.60	3.60	1.40	1.40	2.87	2.87	1.40	1.40
1971	3.61	3.81	3.61	3.11	1.40	1.26	2.87	2.95	1.40	1.42
1972	3.97	3.93	3.97	2.98	1.52	1.27	2.87	2.69	1.52	1.42
1973	4.51	3.75	4.51	2.45	1.52	1.27	2.87	2.48	1.71	1.47
1974	4.16	3.55	4.16	2.67	1.59	1.25	2.87	2.18	1.70	1.53
1975	4.67	3.48	4.67	2.75	1.63	1.02	2.87	1.92	1.76	1.51
1976	4.19	3.28	4.19	2.69	1.60	0.89	2.87	2.00	1.60	1.44
1977	4.07	2.74	4.07	2.29	1.55	0.78	2.87	1.82	1.59	1.39
1978	4.44	2.61	4.44	1.85	1.58	0.69	2.66	1.64	1.48	1.42
1979	4.70	2.49	4.70	2.15	1.66	0.69	2.35	1.39	1.47	1.34
1980	4.74	2.47	4.74	2.00	1.83	0.71	2.00	1.26	1.56	1.44
1981	3.70	2.50	3.70	1.96	1.63	0.65	1.87	1.12	1.45	1.40
1982	3.06	2.47	3.06	2.04	1.49	0.64	1.07	0.94	1.32	1.34
1983	2.64	2.41	2.64	1.91	1.38	0.53	0.77	0.75	0.99	1.13
1984	2.30	2.41	2.30	1.77	1.31	0.40	0.77	0.58	0.80	0.98
1985	2.25	2.45	2.25	1.70	1.12	0.39	0.44	0.41	0.62	0.93
1986	2.89	2.34	2.89	1.81	0.74	0.39	0.40	0.34	0.60	0.83

Note: OER = Official exchange rate; AER = Adjusted exchange rate.

Sources: Official exchange rates from IMF (1987); adjusted exchange rates were estimated by the author.

Table 29. *Consumer price indices in the study countries, 1970-86.^a*

Year	Côte d'Ivoire	Mali	Nigeria	Sudan	Zimbabwe
1970	32.29	26.13	23.81	20.70	48.40
1971	31.80	31.54	27.65	21.00	49.90
1972	31.91	33.97	28.40	23.80	51.30
1973	35.44	43.90	30.01	27.40	52.90
1974	41.59	44.81	33.77	34.60	56.40
1975	46.35	47.45	45.12	42.90	62.10
1976	51.95	51.27	55.07	43.60	68.90
1977	66.18	64.10	66.88	51.00	76.00
1978	74.79	85.40	81.40	60.80	80.30
1979	87.21	81.90	90.93	79.80	94.90
1980	100.00	100.00	100.00	100.00	100.00
1981	108.83	112.20	120.81	124.60	113.20
1982	116.81	114.80	130.11	156.60	125.20
1983	123.68	126.10	160.31	204.50	154.10
1984	128.99	142.00	223.77	274.30	185.20
1985	131.37	153.40	236.13	398.80	200.90
1986	140.11	146.60	238.65	492.00	229.70

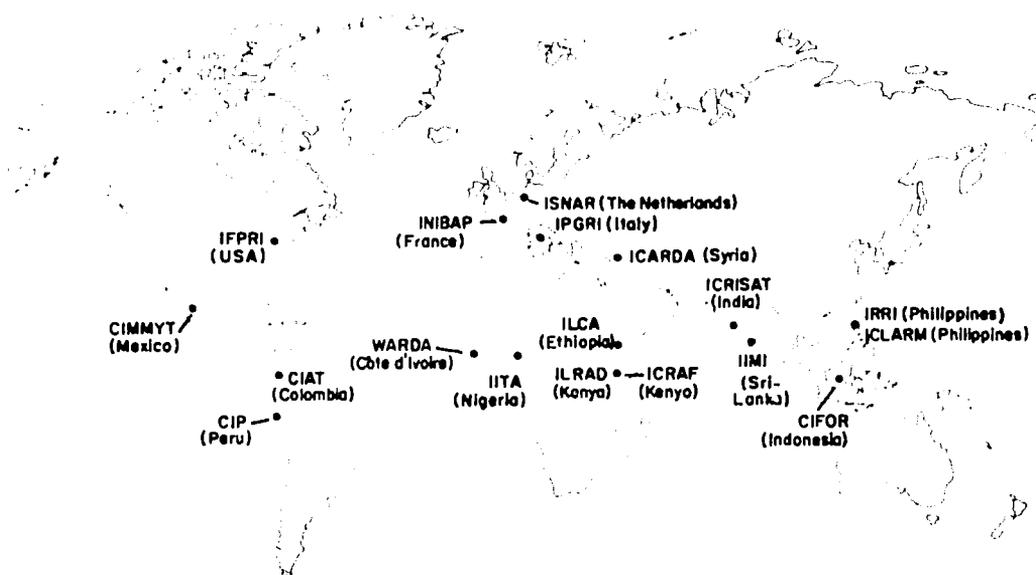
1980 = 100.

^a Food price index in the case of Mali.

Sources: ILO (1981; 1988); IMF (1987).

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

The International Livestock Centre for Africa (ILCA) is one of the 18 international agricultural research centres funded by the Consultative Group on International Agricultural Research (CGIAR). The 18 centres, located mainly within the tropics, have been set up by the CGIAR over the past two decades to provide long-term support for agricultural development in the Third World. The names, locations and research responsibilities are as follows:



Centre for International Forestry Research (CIFOR), Indonesia: forestry research

Centro Internacional de Agricultura Tropical (CIAT), Colombia: cassava, field beans, rice and tropical pastures

Centro Internacional de la Papa (CIP), Peru: potato and sweet potato

Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), Mexico: maize, wheat and triticale

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

International Centre for Living Aquatic Resources Management (ICLARM), Philippines: aquatic resource production

International Centre for Research in Agroforestry (ICRAF), Kenya: agroforestry systems

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India: chickpea, pigeon pea, pearl millet, sorghum, groundnut, and farming systems

International Food Policy Research Institute (IFPRI), USA: analysis of world food problems

International Institute of Tropical Agriculture (IITA), Nigeria: farming systems, maize, rice, roots and tubers (sweet potatoes, cassava, yams), and food legumes (cowpea, lima bean, soyabean)

International Irrigation Management Institute (IIMI), Sri Lanka: irrigated agriculture

International Laboratory for Research on Animal Diseases (ILRAD), Kenya: trypanosomiasis and theileriosis of cattle

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

International Network for the Improvement of Banana and Plantain (INIBAP), France: banana and plantain

International Plant Genetic Resources Institute (IPGRI), Italy: plant genetic resources

International Rice Research Institute (IRRI), Philippines: rice

International Service for National Agricultural Research (ISNAR), The Netherlands: strengthening and developing national agricultural research systems

West Africa Rice Development Association (WARDA), Côte d'Ivoire: rice