

SOUTHERN AFRICA: FOOD SECURITY POLICY OPTIONS

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REFLECTIONS ON TWO DECADES OF RESEARCH ON
SORGHUM-BASED FARMING SYSTEMS IN NORTHERN
NIGERIA AND BOTSWANA

D.W. Norman, H. Sigwele, and D. Baker

235

SECTION 4: ACCESS TO FOOD ✓

THE ROLE OF THE GOVERNMENT OF BOTSWANA IN
INCREASING RURAL AND URBAN ACCESS TO FOOD
K. F. Mokobi and S. Asefa

257

THE ROLE OF NONFARM ACTIVITIES IN THE RURAL
ECONOMY

P. Kilby and C. Liedholm

275

SECTION 5: COMMUNAL MAIZE PRODUCTION, STORAGE,
AND MARKETING IN ZIMBABWE: IMPLICATIONS FOR
POLICY MAKERS

THE GROWTH OF SMALLHOLDER MAIZE PRO-
DUCTION IN ZIMBABWE (1979-1985):
IMPLICATIONS FOR FOOD SECURITY

D. D. Rohrbach

307

POLICY IMPLICATIONS OF HOUSEHOLD GRAIN
MARKETING AND STORAGE DECISIONS IN ZIMBABWE

J. L. Stanning

329

SECTION 6: WHEAT PRODUCTION AND IMPORTS IN
THE SADCC REGION: WHAT ARE THE TRADE OFFS?

THE POLITICAL ECONOMY OF WHEAT CON-
SUMPTION AND PRODUCTION WITH SPECIAL
REFERENCE TO SUB-SAHARAN AFRICA

D. Byerlee and M. L. Morris

361

WATER-USE EFFICIENCY ON COMMERCIAL
WHEAT FARMS IN ZIMBABWE

S. Tembo and A. Senzanje

389

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THE POLITICAL ECONOMY OF WHEAT CONSUMPTION AND PRODUCTION WITH SPECIAL REFERENCE TO SUB-SAHARAN AFRICA

D. Byerlee and M. L. Morris¹

INTRODUCTION

Over the past 25 years, one of the most dramatic changes in dietary patterns in developing countries has been the increasing role of wheat as a staple food. Wheat consumption has risen rapidly both in countries where wheat is a traditional staple (e.g., in the Middle East and North Africa) and in countries where wheat is an "introduced" food, especially in the tropical countries lying between 23°S and 23°N latitude (Table 1). In most cases, increased wheat consumption has been made possible by rapid increases in imports; over 80% of increased wheat consumption over the past two decades in these two groups of countries has been supplied from wheat imports (Table 1). Only in the large mixed-cereal economies of India, China, and Mexico that experienced the Green Revolution in wheat production has increased wheat consumption been largely supplied from domestic sources.

Wheat imports to developing countries doubled during the 1970s and now account for two-thirds of world wheat trade. Even in the 1980s when wheat imports to most developing countries have levelled off or declined, wheat imports to tropical countries have continued to increase, especially in Sub-Saharan Africa (Figure 1).

While the phenomenon of rising wheat consumption made possible by imports is widespread and has similar underlying causes (Byerlee, 1987), the focus in this paper is on wheat on the tropical countries lying between 23°N and 23°S. To a remarkable extent, these latitudes define the areas of the world where wheat is not grown commercially (except for a few isolated high-altitude regions), including most of Sub-Saharan Africa, Southeast Asia, and Central America, as well as the Andean zone of Latin America. Countries within this tropical belt fall into two groups: the rice-based economies of Southeast Asia; and the tropical countries of Sub-Saharan Africa and Latin America where maize, sorghum, millet, and roots and tubers are the traditional staple foods. Both groups of countries face a fundamen-

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Table 1. Wheat consumption and imports in the developing countries, 1961-65 to 1981-85.

	Consumption per capita (kg/year)		Total wheat imports (mill mt) 1981-1985	% increased consumption imported 1961-1985	% self-sufficient in wheat 1961-1985
	1961-1985	1981-1985			
Countries where wheat is a traditional staple	114	140	29	85	77
Large mixed-cereal economies ^b	34	77	12	0	92
Tropical nations where wheat is not a traditional staple ^c	16	26	21	83	19

^aNorth Africa, Middle East, and Argentina, Chile, and Uruguay. ^bChina, India, and Mexico. ^cCountries between 23 S and 23 N latitude.

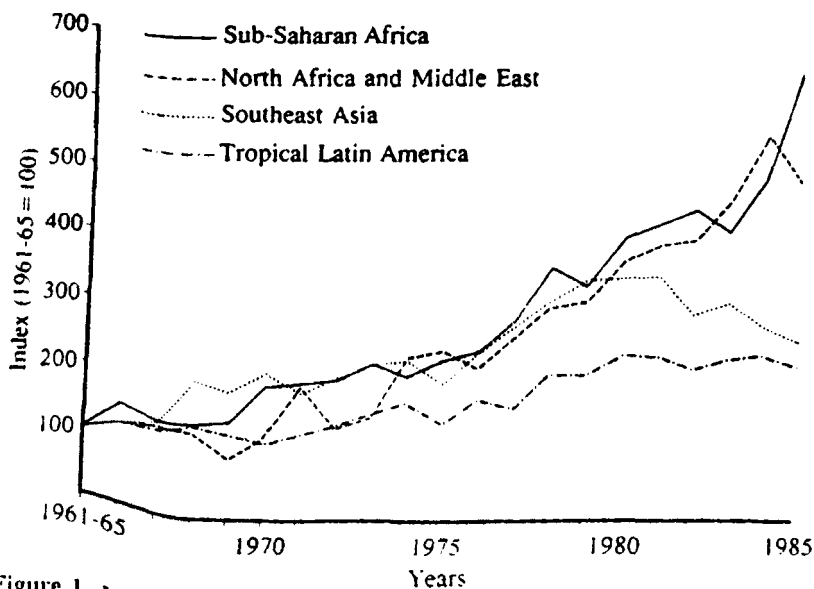


Figure 1. Indices of Wheat Imports in Selected Developing-Country Regions (1961-65 to 1985)

tal conflict between rising wheat consumption, over 80% of which is imported, and the limited potential for domestic production.

These countries have a combined population of about one billion people, consuming an average of 25 kg/capita of wheat annually. However, this aggregate consumption figure conceals considerable regional variability in consumption levels. In tropical Latin America, wheat has already become a staple food for a large proportion of the population, with consumption averaging about 50 kg/capita per year (Table 2). Average consumption in Sub-Saharan Africa is only 15 kg/capita, but with per capita income averaging less than one-third that of tropical Latin America, the potential for continued increases in wheat consumption is obvious.

The rapid growth in wheat imports and consumption raises a set of difficult questions for African policy makers. Will Sub-Saharan Africa follow the example set by tropical Latin America, with wheat over time becoming the main staple substituting for coarse grains, roots, and tubers? What are the political and economic implications of such a change in dietary patterns? What policies and strategies can African countries adopt now to slow these trends? To what extent might domestic wheat production reduce dependency on food imports and at the same time contribute to economic efficiency and food security objectives?

In addressing these questions, we first describe major changes in wheat production and consumption in tropical countries where wheat is not a traditional staple, with particular reference to Sub-Saharan Africa. We then provide a general framework for analyzing changing dietary patterns with respect to wheat. This framework is applied to a cross-sectional analysis of

Table 2. Summary of trends in wheat consumption in the tropics, 1961-1985.

	Per capita wheat consumption	
	Average (kg/year)	Growth (%/year) ^a
Tropical Africa	15	3.3
Tropical Asia	17	3.5
Tropical Latin America	50	1.7
Average - all tropical countries	26	2.4

^a1961-65 to 1983-85

wheat consumption in tropical countries. This leads to a discussion of the various policy and socioeconomic factors promoting increased wheat consumption in Sub-Saharan Africa. Finally we review economic and policy issues relating to wheat consumption and production in Sub-Saharan Africa that need to be addressed if the region is to reduce its dependency on imported wheat.

OVERVIEW OF TRENDS IN WHEAT IN TROPICAL COUNTRIES WITH PARTICULAR REFERENCE TO SUB-SAHARAN AFRICA

Wheat in the tropical countries

In 1981-85, 45 of the countries lying between 23°N and 23°S (of which 15 are in Africa) each consumed over 100,000 mt of wheat annually. Only 11 of these produced over 100,000 mt of wheat, mostly in highland areas (Table 3). Except for this small group of wheat producers, the rest were highly dependent on imports, which comprised over 80% of all wheat consumed.

Per capita consumption of wheat in the tropical countries varies from less than 5 kg/year in Thailand, Malawi, and Malagasy to over 100 kg/year in Cuba. Consumption is much higher in the Latin American countries (averaging 50 kg/year) than in the Asian and African countries (averaging about 16 kg/year) (Table 2). In the Latin American tropics, wheat now accounts for over one-quarter of staple food calories, compared to less than 10% in Asia and Africa. However, consumption is expanding much faster in the latter

Table 3. Wheat production and imports in tropical countries, 1981-85.

	Popu- lation (mill over	No. of countries consuming over 100,000 mt	No. of countries producing (mill mt) 100,000 mt	Total wheat production (mill mt)	Total wheat imports (%)	Consump- tion im- ported
Sub-Saharan Africa	438	16	7	1.6	5.0	76
Tropical Asia	339	14	1	0.2	5.7	96
Tropical L.America	270	15	3	3.2	10.4	76
Total	1,045	45	11	5.0	21.1	81

Source: FAO Tapes.

group; at current growth rates, per capita consumption of wheat in tropical Africa and Asia is doubling every 20 (Table 2).

Wheat in Sub-Saharan Africa

During each of the last two decades, wheat consumption in Sub-Saharan Africa increased at a rate of over 8% annually, or 3.3% per capita (Table 4). The fastest growth occurred in West Africa, where per capita consumption increased by over 6% annually. Nigeria led the way with an extremely high annual growth rate of over 12%. In contrast with West Africa, by the early 1960s wheat consumption was already more established in Eastern and Southern Africa, and significant quantities of wheat were being produced locally. During the last two decades consumption in this region grew more slowly (Table 4). In a number of countries, especially in Southern Africa (Malawi, Zambia, Tanzania, Lesotho, Mozambique) per capita consumption actually fell during the decade 1971-75 to 1981-85 (see Appendix A for country statistics).

Perhaps the most revealing statistic of all is that wheat consumption has been increasing rapidly in Africa, even as per capita food consumption has been falling. While per capita cereal consumption in Africa decreased by about 10% during the last two decades, the share of wheat among all cereals consumed increased from about 5% to over 10%. Hence, increased wheat consumption has come about entirely from substitution for other staple foods. Table 5 shows that food calories supplied by wheat have substituted largely for sorghum, millet, and roots and tubers. Rice in West Africa and maize in East Africa have also increased their share of food calories. However, it is not clear how long this latter trend will continue. The experience of the tropical Latin American countries would suggest that as incomes rise, wheat and rice eventually substitute for maize in the hierarchy of food preferences.

While per capita wheat consumption in Africa has increased rapidly, per capita wheat production has fallen. Wheat is a significant crop (over 25,000 ha) in only five African countries, of which only two, Tanzania and Zimbabwe, increased wheat production faster than consumption from 1960 to 1980--and even Tanzania and Zimbabwe have once again increased their import dependency during the 1980s. In view of this disappointing production performance, over 90% of the increase in African wheat consumption during the last two decades was supplied by imports. Wheat self-sufficiency has dropped sharply, especially in Eastern Africa, and currently nearly 80% of wheat consumed throughout the continent is imported (Table 4).

These broad statistics conceal considerable diversity between individual countries concerning the role of wheat in food consumption. Appendix A provides country statistics on wheat consumption, production, and imports. The most dramatic increases in wheat consumption have occurred in the

Table 4. Wheat consumption and imports by region, Sub-Saharan Africa, 1961-1985.

	Wheat Consumption Per Capita		Growth Rate Consumption Per Capita		Percent Self-Sufficiency in Wheat	
	1961-65 (kg/year)	1981-85 (kg/year)	1961-65 to 1971-75 (%/year)	1971-75 to 1981-85 (%/year)	1961-65	1981-85
Sahel	3.6	9.3	3.4	6.1	8	2
Coastal West Africa	3.6	13.4	7.0	6.2	7	2
Central Africa	4.8	9.8	4.4	2.7	3	4
Eastern Africa	13.2	19.2	1.2	2.5	76	44
Southern Africa	10.9	17.5	4.7	0.1	30	26
Total	8.0	15.7	3.3	3.3	51	24

Source: FAO Tapes.

Table 5. Changes in daily food calories per capita obtained from different staples in Africa and tropical Latin America, 1961-65 to 1975-77.

Region	Wheat	Rice	Maize	Other cereals	Roots and tubers	All staples
AFRICA						
Eastern and Southern	26	11	48	-58	-21	6
Western	39	30	11	-95	-5	17
TROPICAL LATIN AMERICA						
Mexico and Central America	59	24	-24	-5	-23	54
Andean Countries	23	71	-42	-18	-6	28

Source: FAO Tapes

Ivory Coast, Nigeria, Mauritania, Sudan, and Somalia; where consumption increased by over 10 kg/capita/year in the past two decades. Only Sudan is a significant wheat producer. On the other hand, there are a number of countries, such as Madagascar, Malawi, and Rwanda, where wheat consumption is still very low (< 5 kg/capita) and rising slowly.

A FRAMEWORK FOR ANALYSING THE DYNAMICS OF WHEAT CONSUMPTION AND IMPORTS

Figure 2 is a schematic representation of the complex of factors underlying the dynamics of wheat consumption and imports in the developing world. Both domestic and international actors influence wheat consumption. On the domestic side, the main actors are: (a) producers; (b) consumers; and (c) local grain transport, storage, and processing industries. The main international actors are private and public agencies involved in the world wheat trade. In some cases, such as in grain shipment and processing, international and domestic actors may be closely linked.

"Natural" market forces operating on both the demand and supply sides tend to promote wheat consumption. With increasing incomes, consumer preferences generally favour wheat, especially in countries where wheat is not a traditional staple and consumers are seeking to diversify diets. The world supply of wheat and world market prices also favour consumption of wheat products, because rapid technological change in major wheat-producing countries (e.g., the United States, India, and China) has increased pressure for disposal of surpluses at concessionary prices.

A central thesis of this paper is that governments in both importing and exporting countries are key actors whose interventions in wheat markets consistently reinforce market phenomena and rapidly accelerate the substitution of wheat products for traditional staples. Government interventions on the domestic side are shown toward the right-hand side of Figure 2. These include: (a) interventions in production of wheat and competing food staples; (b) investments, taxes and subsidies, and controls on the marketing and processing of wheat, both domestic and imported; (c) explicit consumer subsidies on wheat products; and (d) influences on consumers' preferences through market promotion and development. Government interventions in international markets are shown toward the left-hand side of Figure 2. Governments of both importing and exporting countries influence the price of imported wheat, for example through: (a) trade and exchange rate policies, (b) subsidies and credit facilities for wheat exports, (c) the provision of food aid (largely wheat), and (d) marketing and promotion policies by private and public agencies of exporting countries.

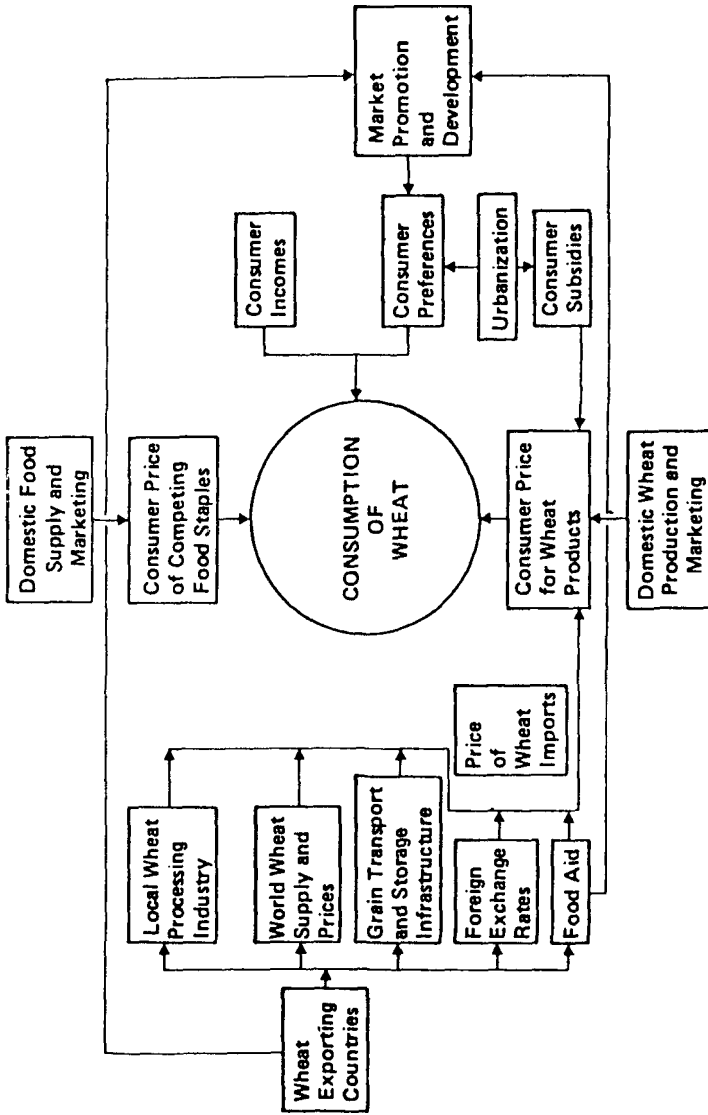


Figure 2. Major influences on wheat consumption and imports in the Third World

Finally, it is hypothesized that a number of influential private sector interest groups are also important in biasing policy interventions toward wheat consumption and imports. These interest groups include middle-income urban consumers (who often are able to influence food policy decisions), the wheat-processing sector (which exercises considerable market power in protecting its vested interests), and exporting interests in developed countries, such as grain exporters or milling and shipping industries (which frequently have strong commercial linkages with processors in importing countries). In addition, interest groups in exporting countries also succeed in distorting the policies of these countries toward wheat exports to the developing world. To a large extent, all of these interest groups reinforce each other in promoting wheat consumption.

CROSS-COUNTRY ANALYSIS OF WHEAT CONSUMPTION IN THE TROPICS

The main hypotheses of the above framework are supported by regression analysis of factors explaining cross-sectional variation in per capita wheat consumption in 40 tropical countries (20 of them in Sub-Saharan Africa) that import at least two-thirds of their wheat. Two equations were estimated to explain: 1) total wheat consumption (including food aid), and 2) wheat consumption based on commercial imports alone (excluding food aid). The regression results are shown in Table 6. The relatively high R^2 s (0.81 and 0.78, respectively) indicate that the model explains a high proportion of the variation in per capita wheat consumption among this group of countries.

The strongest determinants of total per capita wheat consumption in the sample are per capita income and urbanization. (Unfortunately, the high correlation ($r = 0.83$) between these 2 variables does not allow their separate inclusion in the regression analysis.) Increasing income and/or urbanization has a strong effect on wheat consumption, with the income elasticity of demand estimated at 0.7. However, the negative coefficient on the quadratic term for per capita income indicates that consumption stabilizes at about 50 kg per capita at an income of about US\$3,000 per capita (roughly the income level of Singapore and Venezuela). Wheat consumption is also negatively and significantly related to the consumer price of bread (Table 6). The estimated price elasticity of demand of -0.6 suggests that consumer price policy is an important factor explaining variation in wheat consumption in the sample.

Two variables represent the effects of food aid. Current food aid (which is significantly and negatively correlated with GNP) increases total wheat consumption by the amount of food aid, as indicated by a coefficient of close to unity for food aid in equation 1. Surprisingly, there appears to be no substitution effect of food aid for commercial wheat imports (equation 2).

Equally interesting is the positive effect of wheat imported in the past as food aid ("cumulative food aid" in Table 6) on current commercial imports of wheat. A major objective of food aid donors has been to establish markets for wheat products in countries where wheat is not a traditional food by changing consumer preferences; this strategy has apparently been successful. Other influences may also explain the positive relationship between past food aid and current imports. Food aid seems to have been a forerunner of bread subsidies in a number of countries. A significant negative correlation between cumulative food aid and current bread prices ($r = -.46$) supports this hypothesis. Overall, the coefficient estimated for cumulative food aid indicates that for every 10 mt of food aid received from 1955-75, approximately 1 ton of additional wheat was added to commercial imports annually in 1979-81.

Wheat imports are negatively related to domestic cereal production, which in this group of countries does not include wheat. However, the elasticity of wheat imports with respect to domestic cereal production is relatively low at 0.3, indicating that domestic staples such as maize and sorghum are not strong substitutes for wheat.

Finally, there is little difference between the factors influencing commercial wheat imports and total wheat imports. As expected, commercial imports are slightly more elastic with respect to prices and incomes (Table 7).

POLITICAL ECONOMY OF WHEAT CONSUMPTION

The cross-sectional analysis highlights the importance of urbanization and incomes, consumer prices, and food aid in influencing wheat consumption in tropical countries. We now examine each of these in more detail, with particular reference to Sub-Saharan Africa.

Incomes, urbanization and food preferences

The income elasticity of demand for wheat across Africa generally ranges from 0.5 to 1.0, which is higher than for any other cereal staple. Wheat consumption in Sub-Saharan Africa was initially an urban phenomenon (Kilby, 1964; Young, 1972; Mwangi, 1982; Franklin *et al.*, 1982). Today, in most countries the consumption of wheat in urban areas is still at least double that of rural areas. Figure 3 demonstrates that this differential between rural and urban areas declines as national per capita wheat consumption increases. In general, wheat is initially consumed by middle to high income groups, usually as bread; typically, the richest 25% of households have a per capita consumption of wheat twice that of the poorest 25% of households.

Table 6. Estimated coefficients from regression analysis of wheat consumption in tropical countries (based on cross-sectional data).

	Per Capita Total Wheat Consumption (1979-81) (kg/year)	Per Capita Commercial Wheat Consumption (1979-81) (kg/year)
<u>INDEPENDENT VARIABLES</u>	<u>EQUATION 1</u>	<u>EQUATION 2</u>
GNP/capita (\$US 1980)	.027 (.0053)**	.027 (.0052)**
GNP/capita (\$US 1980)	-.462x10 (.118x10 ⁻⁵)**	-.463x10 (.117x10 ⁻⁵)**
Cereal production/capita (kg/year) (1979-81)	-.058 (.020)**	-.058 (.020)**
Current wheat food aid/capita (kg/year) (1979-81)	.861 (.414)*	.001 (.003)
Cumulative wheat food aid/capita (kg/year) (1955-75)	.091 (.036)**	.090 (.036)**
Price of bread (US cents/kg) (1979-81)	-.178 (.052)**	-.178 (.051)**
Constant	25.22	25.19
n	39	39
R ²	.81	.78
t-values given in brackets:	** significant at 5% level. * significant at 1% level.	

Table 7. Cross-country income and price elasticities of demand for wheat products^a.

	Income elasticity of demand	Price elasticity of demand
Total wheat consumption including food aid	.67	-.55
Total wheat consumption based on commercial imports	.75	-.63

^aComputed from equations presented in Table 6. Elasticities estimated at the mean level of each variable.

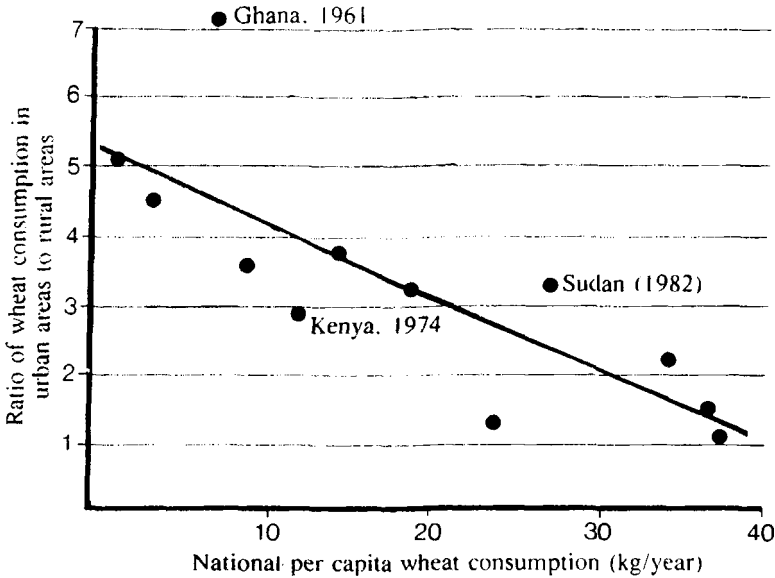


Figure 3. Relationship between the ratio of urban to rural per capita wheat consumption and national per capita wheat consumption in tropical countries

These figures highlight the tendency for wheat to substitute for other food staples as incomes increase and as urbanization proceeds. There is considerable evidence that wheat is preferred as a convenience food. In urban areas, consumers switch to processed foods which require less preparation and help reduce the cost of cooking fuel (Mwangi, 1982; Reardon, 1987). There is also some evidence that women's participation in the urban labour force increases bread consumption (Franklin *et al.*, 1982; Alderman, 1986; Reardon, 1987).

Urban food supplies and wheat imports

A number of factors operating on the supply side also encourage wheat consumption in urban areas. In view of strong consumer preferences for wheat products, lagging domestic production of staple foods, and poor infrastructure for transporting and marketing domestically produced food in urban areas, there has been a natural tendency to import wheat to feed urban consumers, especially in countries where large cities are located on the coast (e.g., Nigeria, Senegal, Ivory Coast). This is evident in the relatively low year-to-year variability in wheat imports by most countries; wheat imports have increased steadily, with little relationship to domestic cereal production (Byerlee, 1987).

Although the use of wheat imports to feed urban consumers is often initiated as a "temporary" measure, the practice can easily become entrenched, especially once wheat marketing, storage, and processing infrastructure has been developed. Because these investments are usually oriented toward port facilities and located in large coastal cities, they cannot readily be utilized to market domestically produced food. In addition, the wheat-processing industry is highly wheat specific and cannot easily be converted to processing local cereals, either because processing facilities are located at a substantial distance from the domestic wheat-growing region or, more commonly, because wheat is not produced locally. Indeed, the wheat-processing industry is often a powerful interest group able to influence grain procurement strategies. The processing sector in developing countries has grown very rapidly in Africa in the last 10-20 years as the proportion of wheat flour in international wheat trade has declined.

While grain is cheaper than flour to transport, there is little evidence that it is an efficient use of resources to establish a capital and foreign exchange intensive local milling industry in countries where wheat is not produced. The milling industry usually receives high tariff protection from imported flour and, in many cases, operates at a high margin relative to mills in developed countries (Byerlee, 1987). More importantly, once established, the industry has a vested interest in continuing wheat imports, even if local production of cereals other than wheat offers the opportunity for import substitution.

Bread prices

A major factor in increasing wheat consumption in Africa has been widespread government intervention in food marketing. A number of countries directly intervene to subsidize bread to urban consumers. At least eight Sub-Saharan African countries for which data were available subsidized bread in 1980, with the largest subsidies occurring in Mauritania and Sudan (Byerlee, 1983).

Trade and exchange rate policies also often favour low wheat prices to consumers, relative to the prices of competing staples. Because imported wheat is often regarded as an industrial input to the milling industry, explicit or implicit tariffs for wheat are typically kept low. Meanwhile, other staple foods are protected, either by tariffs (in the case of cereals) or by high international transport costs (for roots and tubers). At the same time, many countries in Sub-Saharan Africa maintain overvalued exchange rates, which reduce the cost of wheat imports, relative to domestically-produced staples.

The effect of these policy interventions on prices of wheat products have been threefold. First, the absolute price of wheat products to consumers is often low. Figure 4 shows the distribution of bread prices in Sub-Saharan countries in relation to a "world" price based on imported wheat. Second, and more importantly, the price of wheat products is often low in relation to competing food staples. Based on world market prices, the ratio of the consumer prices of wheat flour to maize should be close to 2.0. In many countries of Sub-Saharan Africa and Latin America where coarse grains are an important staple (e.g., Cote D'Ivoire, Ghana, Nigeria, Egypt, Sudan, Ecuador, and Brazil), wheat flour based on imported wheat was cheaper than the locally produced coarse grain staple in 1980-81 (Table 8). No country for which data were available was found to have high wheat-flour prices, relative to coarse grains prices (a ratio of 2:1 or above). Third, real consumer prices of wheat products have fallen. Policy interventions in favour of wheat have resulted in a significant decline in the real consumer prices for wheat products, both absolutely and relatively, in one-third of African countries (Figure 5). Declining real prices of wheat products may explain half or more of the rapid increase in per capita wheat consumption in many countries during the 1970s. Although there is strong evidence of bias in consumer pricing policy toward wheat, the consequences of this bias and the reasons for its existence have not been sufficiently analyzed. Several factors appear to converge in favour of low bread prices. The fact that wheat is readily available in world markets and usually passes through a small number of mills makes it relatively easy for governments in importing countries to control prices. Perhaps more importantly, urban populations, particularly middle and upper-income groups who consume much of the imported wheat, are an important political power base capable of influencing retail price policy. In almost all African countries, wheat subsidies have been captured largely by urban populations, generally the middle and upper-income urban groups.

Food aid

Food aid has exerted a major influence on wheat consumption patterns in Africa, which is hardly surprising given that over 60% of cereal food aid is provided in the form of wheat or wheat flour. Food aid to Sub-Saharan Africa has grown rapidly. In the early 1960s, only 1% of all cereal food aid was destined to Africa. This percentage rose to 11% in 1970 and currently stands around 20%. Food aid accounts for one-third of all wheat imports to Sub-Saharan Africa, nearly one-half if Nigeria (the largest commercial importer) is excluded. Currently 13 African countries receive more than one-half of their wheat as food aid, the bulk of them located in the Sahel and East Africa (Table 9). Several of these countries have a long history of

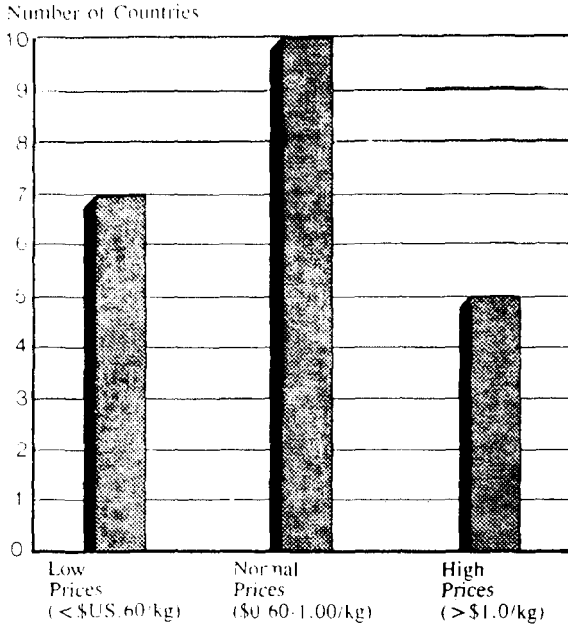


Figure 4. Distribution of Bread Price-Sub Saharan Africa, 1980

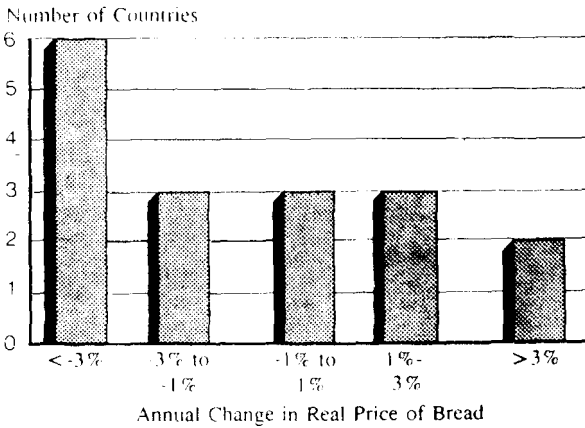


Figure 5. Annual Change - Real Price of Bread, 1971-81

Table 8. Retail wheat flour and maize grain prices for selected countries in Africa and Tropical Latin America.

	Wheat flour ^a (US cents /kg)	Maize grain ^a (US cents /kg)	Wheat: maize price ratio	Comments
AFRICA				
Ghana	131	255	0.5	Overvalued exchange rate
Cote D'Ivoire	31	36	0.9	Subsidy on flour
Kenya	33	24	1.4	
Lesotho	43	26	1.7	
Nigeria	58	52	1.1	Overvalued exchange rate
Zimbabwe	31	22	1.4	Subsidy on wheat, maize
LATIN AMERICA				
Bolivia	18	28	0.6	Subsidy on flour
Costa Rica	36	23	1.6	
Dom. Republic	40	40	1.0	
Guatemala	45	21	2.1	Subsidy on maize
Ecuador	26	62	0.4	Subsidy on flour
Haiti	59	26	2.3	
Honduras	48	23	2.1	

^aConverted at the official exchange rate.

Source: CIMMYT Economics Programme Survey.

Table 9. Wheat food aid trends, Sub-Saharan Africa.

	Wheat food aid (1981-83) (mill mt)	Wheat food aid as % of total wheat imports		Countries receiving half or more wheat imports as food aid
		1971-75 (%)	1981-83 (%)	
Sahel	0.17	41	43	Cape Verde, Chad, Mauritania
Coastal West Africa	0.05	11	3	
Central Africa	0.09	66	32	
Eastern Africa	0.85	65	74	Sudan, Ethiopia, Kenya, Rwanda, Somalia, Uganda, Tanzania
Southern Africa	0.20	5	36	Mozambique, Malagasy, Zambia
Total Africa	1.37	17	33	

Source: FAO, Food Aid Statistics (various issues).

receiving wheat as food aid and are among the countries with the highest per capita wheat consumption. The effects of food aid are complex. For short-run food emergencies, food aid is, of course, necessary. However, reliance on food aid, especially wheat, as a regular source of imports has a number of implications:

- o Depending on government pricing strategy in food aid disposal, food aid may lower the consumer price of wheat products, encouraging wheat consumption and discouraging the production of local staples.
- o Food aid exposes consumers to wheat products and is often associated with overt market promotion activities by interest groups in exporting countries.
- o Food aid helps establish a local wheat-processing industry.

The experience of the Andean region during the period 1950-75 should be studied by African policy makers. In the Andean region, these factors combined to bring about a decline in wheat production, rapid increases in wheat consumption, and a heavy reliance on imports (currently over 90% of wheat is imported, most of it commercially) (Valdarama, 1978; Dudley and Sandilands, 1975).

One way for Sub-Saharan Africa to avoid these undesirable side effects of food aid is to accept a greater proportion of food aid in the form of local cereals, especially maize. If food aid is received as wheat, it should be sold at consumer prices that reflect world prices, except in emergency situations. The proceeds of these sales can then be used to support the development of domestic agricultural production, as has been done in Brazil (Hall, 1980).

IMPLICATIONS FOR WHEAT POLICY

Many African policymakers view with alarm the continuing rapid increases in wheat consumption and imports. Responses have varied from country-to-country, and from one time period to another within countries. For example Nigeria, the largest wheat importer in Sub-Saharan Africa, sanctioned wheat consumption in the 1970s by embarking on an ambitious scheme to produce wheat domestically. In 1986 it reversed its policy and became the first African country to ban wheat imports.

Wheat consumption is bound to increase in most countries, since there is a natural tendency to diversify diets as consumer incomes grow. However, in many cases the policies of governments, food aid donors, and exporting countries have reinforced and greatly accelerated the trend. These policies have encouraged a marketing, storage, and investment infrastructure geared to imported wheat that makes it very difficult to reverse the trend toward wheat imports to supply urban consumers. With African urban areas growing at a rate of about 5% annually, the likelihood that wheat imports will con-

tinue to increase rapidly is very real. However, a number of policy options should be considered to reduce dependency on wheat imports. We divide these between those that discourage wheat consumption and those that promote wheat production.

Consumption policies

Food pricing policy.

Undoubtedly, the most effective way to reduce wheat consumption and imports in countries that maintain low consumer prices is to raise bread prices. There is ample evidence that wheat consumption is quite sensitive to prices. Removal of consumer subsidies and, in some cases, imposition of a tariff on wheat imports to compensate for overvalued exchange rates are the obvious policy instruments for adjusting bread prices. The objective should be to restore incentives to consume domestically-produced food staples. As a general guideline, the ratio of the price of bread-to-rice and coarse grains (maize, sorghum, and millet) should be about 1.5 and 3.0, respectively.

Senegal is an example of a country where bread subsidies were sharply reduced in the 1970s. As a result, the ratio of the price of bread-to-millet increased from about 1.5 in 1969-71 to 3.0 in 1979-81. The consequences of this policy adjustment were clear: Senegal is one of only three countries in West Africa where per capita wheat consumption fell during the 1970s.

While bread prices clearly are politically sensitive, policy makers and politicians must recognize that the longer a decision to raise prices is delayed, the more difficult it becomes to correct the imbalance. Thailand has maintained high bread prices through import tariffs, depressing per capita wheat consumption to under 5 kg/year and making it still relatively easy to regulate bread prices. In comparison, Sudan has maintained low bread prices through subsidies, raising per capita bread consumption to over 80 kg/year in Khartoum. The Sudanese government is now finding it very difficult to manipulate bread prices, since bread has become the major food staple for a politically powerful section of the population.

Finally, it should be pointed out that in many tropical countries, low bread prices have produced few benefits to the poor. Rather, the middle and upper-income groups which are the main bread consumers have captured the benefit of these policies; while the farmer, especially the small farmer who produces local staples such as maize, has been the main loser.

Policies affecting the wheat-processing sector

An integrated wheat strategy should carefully rationalize investments in wheat processing, especially large-scale capital and foreign exchange intensive milling and baking plants. Typically, little justification exists for

establishing a domestic wheat-milling industry, given the need to use scarce capital efficiently and to promote employment. Removal of tariff barriers to flour imports can effectively arrest the growth of a domestic-milling industry until local wheat production can be established. Importing wheat as flour maintains much greater flexibility in future food policy decisions and also reduces the power of one of the strongest voices in the food policy debate, that of the millers. In addition, tariff protection and tax incentives have been shown to promote the establishment in urban areas of capital intensive modern bakeries which are less efficient than small-scale, labour intensive bakeries, once adjustments are made for overvalued exchange rates, tariffs, and credit policy (Chuta, 1981). Most countries today produce white flour, milled at an extraction rate of 70-75%. Legally mandated higher extraction rates, which produce off-white flour, would allow savings in wheat imports.

Import policy and food aid

Cereal imports to Africa have consisted mostly of wheat and, to a lesser extent, rice. Maize imports, especially to West Africa, have been largely destined for feeding livestock. Yet maize is usually the cheapest cereal in world markets and is a staple food in most tropical countries, especially for the poor. If consumer prices were set to reflect import prices, maize would have considerable potential as a food import². Likewise, more food aid can be provided in the form of local staples. Donors are already moving in this direction. A good-example is provided by the barter trade conducted by some SADCC countries. For example, Zimbabwe has provided surplus maize to Mozambique to meet a donor's food aid commitment, and in return receiving wheat from the donor. Despite the large amount of wheat received as food aid, Africa has actually received less than some other regions of the world. Only a little over one-half of cereal food aid destined to Sub-Saharan Africa is wheat, compared to about 75% for all developing regions.

Convenience foods based on local food staples

Bread-making technology in the developing world has been largely imported from the industrialized countries. While relatively little research has been conducted on preparing local foods to meet the taste preferences and convenience needs of urban consumers. Recently, food technologists have initiated considerable research on composite flours, which mix wheat flour with maize, millet, sorghum, or cassava flour for bread making (Mwangi, 1982;

²Some difficulties arise because most African countries consume white maize, while yellow maize dominates world markets.

Gomez, Mutambenengwe, and Moyo, 1987). While composite flours appears to be technically feasible, in most countries the greatest obstacle to widespread use, is that pricing policy favours wheat flour over local flours and provides no incentives to use mixtures.

Meanwhile, private and public agencies in wheat-exporting countries have conducted vigorous market promotion programs for wheat products. Governments in importing countries should channel these efforts toward the national interest, perhaps by requiring that exporters undertake research and promotion activities that balance wheat with local food staples. Recently, several countries--including Nigeria, Burkina Fasso, and Sudan--have shown serious interest in composite flour programs, bringing composite flours closer to commercial reality.

Wheat production policies

Only a small proportion of Sub-Saharan Africa is classified as suitable for wheat production. Most of the area that is suitable lies in Ethiopia, Kenya, and Tanzania where wheat production is well established. Zimbabwe and Sudan are also significant wheat producers. In all of these countries except Ethiopia, wheat is a nontraditional crop, and the area planted to wheat is relatively small. In addition to these established producers, a number of countries are attempting to establish a domestic wheat industry (e.g. Zambia, Mali, Nigeria, Madagascar, Cameroon), sometimes with very large investment costs. Many other countries have wheat research programs to evaluate the potential for domestic production.

The environments in which these wheat schemes are being established vary widely throughout Africa, with distinct problems as summarized in Table 10. Hence, it is very difficult to generalize about the potential for wheat production in Africa. In some cases biological factors (e.g., the lack of disease resistant or heat tolerant varieties) constitute the major constraint to local production, while in others economic factors are more important. Here we highlight some economic issues related to domestic wheat production with implications for efficiency, food security, and equity.

Efficiency of domestic wheat production

The comparative advantage framework is useful for assessing the efficiency of domestic wheat production. Parameters such as the domestic resource cost ratio measure the domestic cost of saving foreign exchange through substituting for wheat imports against alternative investments. Experience from several recent studies (Byerlee and Longmire, 1986; Morris, 1987; Longmire, 1987) suggests that a number of factors will be important in influencing the comparative advantage of domestic wheat production.

Table 10. Major wheat production environments and production issues in Sub-Saharan Africa.

Climatic Environment	Example	Major Wheat Production Issues	
		Biological	Economic
High elevation rainfed (over 1,500 m altitude)	Kenya Tanzania Malawi Rwanda	Appropriate genotypes available, but stripe rust a major problem.	Competing use of land for other temperate crop and/or livestock enterprises.
Mid-to low-elevation rainfed (using stored moisture or growing season rainfall)	Madagascar Zambia	Serious disease problems (e.g., <i>Helinthosporium</i>).	Some competition from staple crops such as maize and sorghum.
Mid-to high-elevation irrigated	Zimbabwe	None	High cost of irrigation and competing use of scarce water.
Low-elevation irrigated	Sudan Nigeria	Heat tolerance and earliness.	High cost of irrigation and competing use of scarce water.

- o *Cost of irrigation infrastructure.* In many parts of Africa, investment in irrigation schemes is both costly and foreign exchange intensive. Although reasonably high yields can be obtained for irrigated wheat in the cool-dry season, it is unlikely to be efficient to build large-scale irrigation schemes specifically to produce wheat, as was attempted in Nigeria (Andrae and Beckman, 1985). Even small-scale irrigation schemes have failed to generate satisfactory returns (De Rafols, 1982), unless wheat can be grown as a second crop.
- o *The presence of competing enterprises.* If wheat is grown on fallow land as a second crop in a multiple-cropping pattern (e.g., in Madagascar), it may be profitable at quite low-yield levels. However, if wheat competes with export crops (e.g., cotton in Sudan) or other enterprises requiring temperate conditions (e.g., dairying in Kenya), much higher yields are required to make it profitable.
- o *The technology used in wheat production.* Use of capital intensive technologies such as tractors and combines reduces the foreign-

exchange savings of domestic-wheat production (and also its comparative advantage if less capital-intensive alternatives exist). Many of the wheat production schemes in Africa (Tanzania, Sudan, Nigeria, Kenya, Zimbabwe) are capital intensive.

- o *The location of wheat consumption and production in relation to the port.* The economic profitability of wheat in many countries is critically dependent on transportation costs from the producing region to the consumption center. For example, in 1979 it was estimated that transport costs for wheat from the north of Nigeria to Lagos were about US\$65/mt at the real exchange rate. Assuming a CIF price of wheat of about US\$200/mt, the cost of imported wheat in the north would have been about US\$265/mt (200 + 65), while the value in the north of domestically produced wheat destined for Lagos would have been about US\$135/mt (200-65). Given these wide transport margins, it may have been profitable to produce wheat for local consumption in the north, but quite unprofitable to substitute domestic wheat for wheat imports in Lagos. In some countries, this issue is further complicated by the location of processing facilities near the coast. If wheat is to be produced in the interior for local consumption, there is a need to establish small-scale wheat mills in the producing zone.

Food security

It is sometimes argued that even if wheat is not an efficient crop, it should be grown anyway to reduce dependence on imports and to insulate the domestic food supply from world price fluctuations. We think that the food security argument is not very convincing, except in some of the land-locked countries of Southern Africa where political factors potentially influence the ability to import wheat. Wheat in much of Africa is a marginal crop; as such, wheat production is subject to substantial year-to-year fluctuations due to high temperatures, scarcity of irrigation water, or disease. Moreover, yields are often highly sensitive to farmers' management, especially with regard to date of planting in areas with a very short cool season (e.g., northern Nigeria). Hence, wheat production in Africa tends to be quite variable, as evidenced by coefficients of variation (CV) around trend of 45% for Sudan, 30% for Tanzania, 30% for Zimbabwe, and 21% in Kenya during the period 1961-85³. These figures compare with a CV around trend of 10% for production in major wheat-producing countries such as India and Turkey, and with a CV around trend of 20% for the import price of wheat over the

³Similarly, in Brazil the CV of wheat production around trend is 34%.

same period. Thus, the world wheat market is relatively stable in comparison with domestic wheat supply in Africa, and insulation of domestic markets is likely to increase, rather than decrease supply variability.

Equity

In certain areas, it may be possible to justify domestic wheat production on the basis of equity considerations. However, since wheat consumption tends to be concentrated in middle to upper-income households, this argument holds only if wheat is produced by small, relatively poor farmers. In the largest wheat producing countries in Africa (e.g., Kenya, Tanzania, Sudan and Zimbabwe), wheat is produced mostly on large-scale commercial farms, both private and public. That wheat is usually not a crop for peasant farmers has become evident when land reform programs have been implemented (for example in Kenya); the small farmers who have benefited from land reform have tended to shift to producing of the local subsistence crop--usually maize--and wheat production has generally declined. Efforts are currently underway in several African countries to develop small-scale wheat production technology (see Longmire and Lugogo, 1987). Yet, it is difficult to be optimistic about the scope for small-scale wheat production, except perhaps in Ethiopia. One of the few tropical countries in Latin America that has established a successful small-scale wheat production program is Guatemala, whose experience should be analyzed further.

CONCLUSIONS

The fact that wheat consumption has increased in Africa over the past two decades from a very small base is not particularly surprising. Several elements of this change do cause concern: 1) the very rapid rate of increase in wheat consumption in many countries, and 2) the rapid rate of increase in wheat consumption at a time when per capita consumption of food has been falling. The ongoing substitution of wheat products for traditional food staples has a close parallel in the tropical countries of Latin America with similar traditional staples (maize, roots, and tubers). In addition, many of the same policy influences that were present in tropical Latin America in an earlier era are now apparent in many African countries--bread subsidies, food aid, export promotion programs, and protection of a local wheat-processing industry (Carbonell and Rothmann, 1977). Unless these phenomena are dealt with, wheat is likely to become a staple food for urban populations in many African countries, as has occurred throughout tropical Latin America (Gray, 1982).

In recent years, the very serious economic and foreign exchange crisis has focused considerable attention on the question of wheat imports to

Africa. Despite widespread recognition that increasing reliance on imported wheat to meet short-run consumption needs is likely to lead to problems in the long-run, wheat imports to Africa have increased more rapidly than to any other region. Sub-Saharan Africa is the only region in the world that has experienced a continuous increase in wheat imports during the 1980s. On the other hand, the recent decision by Nigeria to ban imports will lead to a sharp decline in overall imports to Africa in 1987, even if Nigeria's policy is only partially implemented.

Increased wheat consumption in Africa has been largely based on imported wheat, a phenomenon which is likely to continue into the future. Even in countries with relatively high levels of domestic wheat production, such as Kenya and Zimbabwe, the gap between production and consumption is widening, and self-sufficiency has declined in recent years. In many other countries, most notably Nigeria, heavy investments have been made in production schemes, with few tangible results. Economic factors suggest that wheat in Africa is most viable in areas where it can be grown as a second or third crop, using small-scale technology. Production schemes should be oriented toward local consumption, rather than toward import substitution in coastal cities. Agricultural research to produce varieties with better heat tolerance and disease resistance will slowly expand the frontiers for efficient wheat production in Africa, but technological changes alone are unlikely to enable production to keep pace with present rate of growth in consumption.

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SOUTHERN AFRICA: FOOD SECURITY POLICY OPTIONS 387

Appendix A.1. Wheat consumption, self-sufficiency and aid for selected countries* in Sub-Saharan Africa.

	Wheat Consumption			Growth Rate		Percent Self-Sufficiency		Percent imports received as food aid	
	Total 1981- 1985 (000mt)	Per capita 1961- 1965 (kg)	Per capita 1981- 1985 (kg)	Per capita 1961-65- 1971-75- (%)	Per capita 1971-75- 1981-85 (%)	1961- 1965 (%)	1981- 1985 (%)	1971- 1975 (%)	1981- 1985 (%)
Burkino Faso	28	1.8	4.2	8.2	0.7	0	0	28	30
Chad	31	1.8	6.4	9.7	3.4	40	15	65	97
Mali	59	2.4	7.8	9.1	3.0	24	3	69	25
Mauritania	138	12.0	77.6	5.6	14.0	1	0	77	66
Niger	45	1.0	7.8	4.5	17.7	25	5	290	16
Senegal	122	12.2	19.9	6.0	-1.0	0	0	8	29
<u>SAHEL</u>	446	4.1	13.2	9.5	7.6	7	2	41	43
Benin	46	2.1	12.0	7.5	10.9	0	0	40	9
Cameroon	95	4.1	10.1	8.6	0.7	0	1	1	0
Ghana	116	8.3	9.1	1.7	-0.7	0	0	52	24
Guinea	55	6.4	9.5	-3.1	7.4	0	0	74	24
Iv. Coast	183	8.5	20.1	4.8	4.0	0	0	3	0
Liberia	17	4.3	8.3	3.3	3.5	0	0	10	5
Nigeria	1,272	1.9	14.3	12.4	8.8	20	3	0	0
S. Leone	29	6.9	8.4	4.5	-2.5	0	0	7	21
Togo	42	3.4	14.9	3.2	12.4	0	0	14	6
<u>WEST COAST</u>	1,860	3.6	13.4	7.3	6.5	7	2	11	3
C.Afr. Rep.	20	3.3	8.1	4.1	5.2	0	0	3	12
Congo	73	15.0	44.1	5.2	5.9	0	0	5	0
Zaire	195	4.3	6.9	3.6	1.3	4	7	7	47
<u>CENTRAL</u>	334	4.8	9.8	4.5	2.8	3	4	6	33
Burundi	26	3.0	5.8	4.3	2.5	73	32	27	36
Ethiopia	1,169	25.0	28.2	-1.8	3.1	98	63	81	86
Kenya	334	8.6	17.6	5.0	2.3	161	67	4	106
Madagascar	43	4.2	4.6	0.1	0.8	0	1	7	54
Mauntius	84	53.3	82.9	4.0	0.5	0	0	28	20
Rwanda	16	0.5	2.7	15.6	3.0	72	16	110	80
Somalia	161	6.6	36.7	7.3	10.7	0	1	63	67
Sudan	699	12.6	34.3	6.3	4.1	24	22	24	83
Tanzania	144	5.6	6.9	5.8	-3.6	35	53	35	65
Uganda	22	3.4	1.5	-0.9	-6.9	0	42	0	56
<u>EASTERN</u>	2,743	13.2	19.2	1.2	2.6	78	44	29.7	74
Angola	183	11.5	22.0	5.0	1.6	32	5	1	18
Botswana	31	13.3	29.6	4.2	4.0	6	3	0	5
Lesotho	73	63.3	50.3	1.9	-4.1	93	23	8	22
Malawi	28	2.4	4.3	6.9	-0.7	3	3	1	6
Mozambique	142	7.2	10.8	4.6	-0.6	19	5	16	67
Zambia	117	6.7	18.8	13.1	-2.1	2	13	2	47
Zimbabwe	218	18.5	26.6	2.5	1.1	3	78	0	42
<u>SOUTHERN</u>	822	10.9	17.5	4.8	0.1	31	27	5	36
<u>ALL SUB-SAHARAN AFRICA</u>	6,206	8.0	15.7	3.4	3.3	52	24	17	33

*Includes all countries with population > 1 million.

Appendix A.2. Wheat production, data and growth rates for selected countries* in Sub-Saharan Africa

	Production Data			Annual Growth Rates		
	(Average 1981-85)			(1961-65 to 1981-85)		
	Area (000ha)	Yield (mt/ha)	Production (000t)	Area (%)	Yield (%)	Production (%)
<i>Sahel</i>	10	8.3	9	3.8	-1.9	1.7
Nigeria	14	2.5	34	1.7	1.7	3.4
<i>West Coast</i>	15	2.4	35	2.0	1.5	3.5
Zaire	14	0.9	13	7.9	0.1	8.1
<i>Central</i>	14	0.9	13	7.9	0.1	8.1
Burundi	10	0.8	8	-0.2	1.4	1.1
Ethiopia	651	1.1	735	-1.6	2.3	0.7
Kenya	112	2.0	222	0.4	2.6	3.0
Sudan	131	1.2	155	8.2	-0.5	7.6
Tanzania	58	1.3	76	5.2	1.3	6.5
<i>Eastern</i>	976	1.2	1,210	-0.4	2.3	1.9
Angola	16	0.6	10	-0.4	-2.7	-3.1
Lesotho	23	0.7	17	-5.3	-0.5	-5.8
Zimbabwe	31	5.4	169	18.4	4.7	24.0
<i>Southern</i>	80	2.8	222	-1.1	6.0	4.8
Total	1,095	1.4	1,489	-0.4	2.7	2.3

*Includes all countries with 1981-85 average wheat area > 10,000 ha.



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