



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

USDA's Economic Research Service  
has provided this report for historical  
research purposes.

Current reports are available in  
***AgEcon Search***

(<http://ageconsearch.umn.edu>)

and on <https://www.ers.usda.gov>.



United States Department of Agriculture  
Economic Research Service  
<https://www.ers.usda.gov>

A  
93.44  
AGES  
9316

d States  
rtment of  
ulture

omic  
earch  
Service

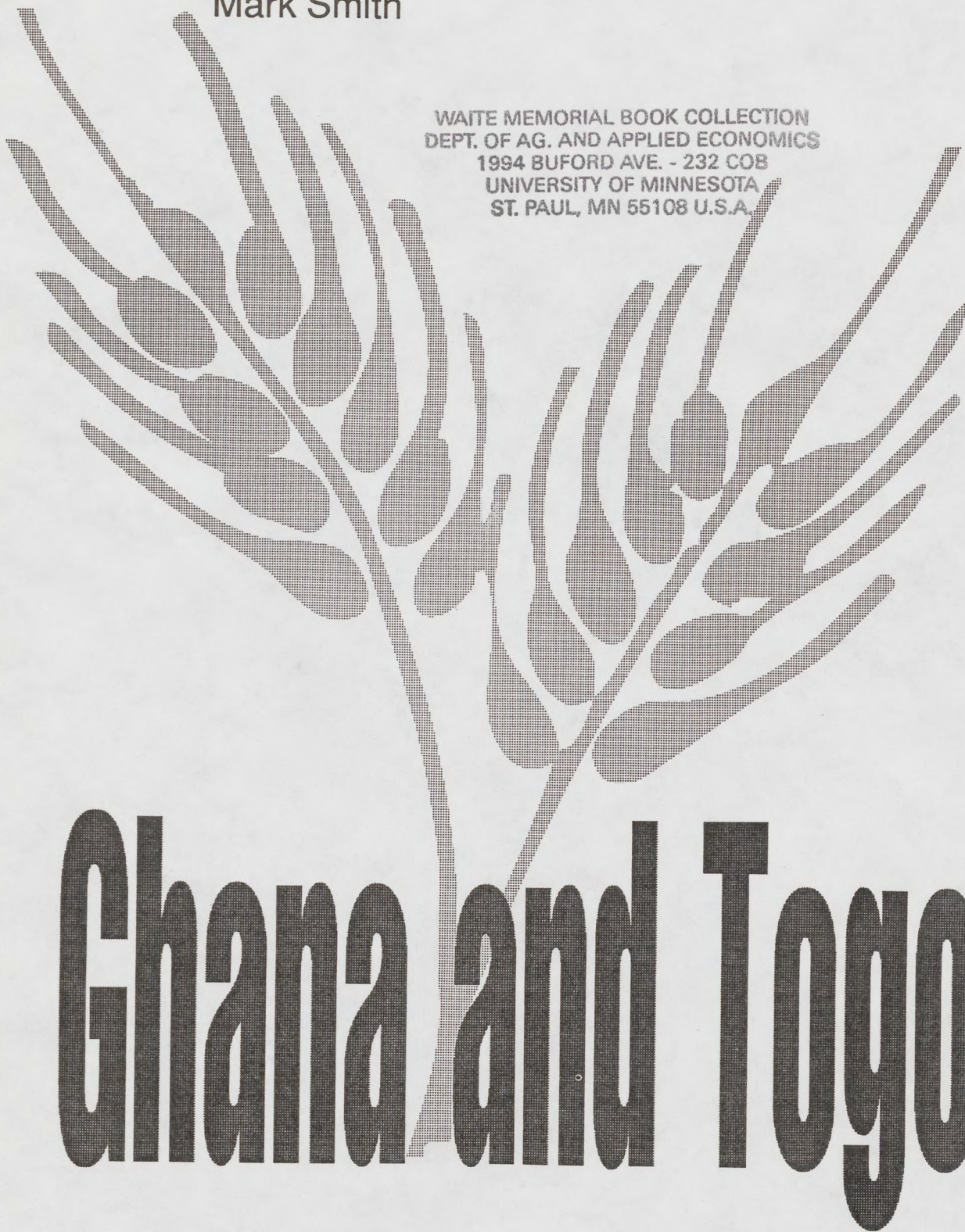
Agriculture  
and Trade  
Analysis  
Division

Commodity  
Economics  
Division

# Determinants of Wheat Import Demand

Margaret Missaien  
Mark Smith

WAITE MEMORIAL BOOK COLLECTION  
DEPT. OF AG. AND APPLIED ECONOMICS  
1994 BUFORD AVE. - 232 COB  
UNIVERSITY OF MINNESOTA  
ST. PAUL, MN 55108 U.S.A.



**Ghana and Togo: Determinants of Wheat Import Demand.** By Margaret Missiaen and Mark Smith, Agriculture and Trade Analysis Division and Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES 9316.

A  
93.44  
AGES  
9316

### **Abstract**

With different market structures in Ghana and Togo, wheat quality plays a different role in the selection of a wheat supplier by millers in these countries. Competition among suppliers is stiff in Ghana, while the mill in Togo has a monopoly. Wheat quality is an important criterion for source selection by Ghanaian millers, despite the country's poverty, and is likely to grow in importance as the economy improves and the government relinquishes its control over wheat imports. The United States would likely increase wheat exports to Ghana in a liberalized environment if the level of nonmillable material (chiefly dockage and broken and shrunken kernels) were lowered. The United States already has most of the market in Togo, thus tighter cleanliness standards would have little impact. U.S. wheat, which generally has a higher level of nonmillable material than wheat from Canada, sells at a discount compared with Canadian wheat in the West African market. Selling cleaner U.S. wheat would assist U.S. exports, but millers would also profit from greater U.S.-Canadian competition.

### **Acknowledgments**

The authors thank the personnel of the Foreign Agricultural Service, USDA, offices in Abidjan and Lagos. John Toasperm was helpful in arranging an appointment with Ed Wiese, the U.S. Wheat Associates representative in Cote d'Ivoire. Jonathan Gressel made useful suggestions about contacts for our trip. William Akiwumi devoted many hours to our visit--making appointments and accompanying us to the wheat mills in Ghana. Amen Lawson, the commercial assistant in Lome, was very helpful during our visit to Togo. Several millers, wholesalers, bakers, and Ghanaian officials gave time and information that contributed to this report. Simon Pinner and Chris Egli provided valuable insights from a trading perspective. A special note of appreciation goes to the Bakalian family, Vasken, Elizabeth, and Serge, who taught us about the art of wheat milling and its application in West Africa.

**This report was reproduced for limited distribution to the research community outside the U.S. Department of Agriculture and does not reflect an official position of the Department.**

## Preface

This report is 1 of 17 reports covering 18 wheat-importing countries prepared by the Economic Research Service (ERS) in support of a comprehensive study of cleaning U.S. wheat destined for export. Similar reports are forthcoming for corn and soybeans.

The Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA) required the Federal Grain Inspection Service (FGIS) to establish or amend grain grades and standards to include, "...economically and commercially practical levels of cleanliness." The legislation required FGIS to determine if the benefits of cleaning exceeded the costs. FGIS subsequently asked ERS to conduct the study. The comprehensive study on wheat included two major components: 1) economic-engineering studies of the cost of wheat cleaning in the United States and estimates of domestic benefits from cleaning and 2) a series of in-country interviews of buyers in major wheat-importing countries to determine the effects of cleaner U.S. wheat on sales in these markets.

The results of this work have been prepared in a three-volume set:

"Economic Implications of Cleaning Wheat in the United States" (AER-669), by B.T. Hyberg, M. Ash, W. Lin, C. Lin, L. Aldrich, and D. Pace;

"The Role of Quality in Wheat Import Decisionmaking" (AER-670), by Stephanie Mercier; and

"The Costs and Benefits of Cleaning Wheat in the United States: Overview and Implications," by William Lin and Mack Leath.

The 18-country case studies form the foundation for the results of the international component of the wheat-cleaning study. The 18 countries studied accounted for 58 percent of world wheat imports and 63 percent of U.S. wheat sales in 1991. Each report has two components: background on the wheat-marketing policies, institutions, and distribution system in the wheat-importing country and results of interviews of wheat traders, processors, and government officials. All the interviews were completed during April-September 1992, and all followed a similar format. Each interview team consisted of both a commodity specialist and a country specialist. They attended a series of seminars on grain quality issues, data collection, and interview procedures before doing their interviews.

All the interviews followed a specific set of guidelines. An advisory panel of government officials, private traders and trade association members helped develop the questions, which consisted of five topic areas:

- The most important factors in the choice of a supplier country;
- Quality factors most important to the importer's purchase decisions and the importer's perception of wheat purchased from their suppliers;
- Contract specifications the importer uses to communicate preferences;
- The level of dockage in the shipments the importer receives and the costs of removing it; and
- If U.S. wheat were cleaner, would the importer purchase more and/or be willing to pay more?

The background information on the wheat-importing country and the responses from the interviews provide a unique insight into the role of quality factors in the wheat purchase decisions of the major importers of U.S. wheat.

Alan J. Webb  
Coordinator, Country Case Studies

**Reports in the Series, "Determinants of Wheat Import Demand"**

<b>Country study</b>	<b>Authors</b>
Brazil	Emily McClain and Erin Dusch
China	Frederick Crook, William Lin and Hunter Colby
Egypt	John Parker and Shahla Shapouri
Ghana and Togo	Margaret Missiaen and Mark Smith
Indonesia	Stephen Magiera
Italy	Daniel Plunkett
Japan	Lois Caplan and Alan Webb
Morocco	Karen Ackerman
Pakistan	Rip Landes and Mark Ash
Philippines	Carol Levin and Chin-Zen Lin
Russia	Sharon Sheffield
Sri Lanka	Rip Landes and Mark Ash
South Korea	Terri Raney and Nancy Morgan
Taiwan	Sophia Huang and William Lin
Tunisia	Rebecca Lent
Venezuela	Parveen Setia and Erin Dusch
Yemen	John Parker and Demcey Johnson

# Contents

	<i>Page</i>
Summary .....	vii
Ghana .....	1
Wheat Supply and Demand Trends .....	2
Production .....	2
Consumption .....	2
Imports .....	3
Wheat Sector Policies .....	6
Consumer Policy .....	6
Import Policy .....	6
Market Structure .....	7
Millers .....	7
Wholesalers .....	7
Standards .....	7
Bakers .....	8
Factors Affecting Choice of Supplier .....	8
Quality Concerns .....	8
Market Effects of Selling Cleaner U.S. Wheat .....	9
Conclusions .....	9
Togo .....	10
Wheat Supply and Demand Trends .....	11
Production .....	11
Consumption .....	11
Imports .....	12
Wheat Sector Policies .....	14
Import Policy .....	14
Consumer Policy .....	14
Market Structure .....	14
Millers .....	14
Bakers .....	14
Factors Affecting Choice of Supplier .....	14
Quality Concerns .....	14
Market Effects of Selling Cleaner U.S. Wheat .....	15
Conclusions .....	15
Glossary .....	16

## Summary

Ghana and Togo are poor countries dependent on imports for wheat consumption. By selling wheat with a lower level of nonmillable material (chiefly dockage and broken and shrunken kernels), the United States may realize export gains over Canada. Despite poverty among Ghanaians, grain quality is an important consideration of wheat millers.

Ghana does not produce wheat; corn is the major grain produced in the country. Ghana's 16 million people consume about 8 kilograms of wheat per capita, compared with about 65 kilograms in the United States. Per capita wheat consumption has fluctuated over the last 25 years and is now comparable to levels of the early 1970's. Wheat is consumed mostly as loaves of high-raised bread. Until recently, the government controlled imports through the Ghana National Procurement Agency (GNPA). Given the need for high-protein wheat, the GNPA based its sourcing decisions on food aid available from exporters of spring wheat and relative prices. Other quality factors ranked behind these considerations.

In August 1992, the government announced that the mills could import directly (the government reserved the right to reassess this decision at a later date; however, the policy remained in effect through March 1993). This should result in savings for the mills in not having to pay the GNPA-inflated price. However, mills importing directly will not benefit from the GNPA 90-day credit with zero interest.

With recent liberalization, the millers will likely base their sourcing decisions first on trade servicing and personal relationships. Second, due to the competitive nature of the market, relative quality between Canada and the United States will influence sourcing decisions. Millers reported that the United States would likely increase exports by 30-35 percent if the level of nonmillable material were lowered, holding the price constant. Alternatively, millers in Ghana indicated that they would be willing to pay \$5 to \$15 a ton more for cleaner U.S. wheat (the lower end of the range is more likely).

Togo has a different market structure influencing the role of quality in its sourcing decisions. The Togolese wheat market is composed of a single mill that is almost half-owned by the government and protected by an import duty on flour.

Togo produces no wheat domestically. Togo's 4 million people consume close to 10 kilograms of wheat per year. Since 1966, per capita consumption has been growing irregularly at an annual rate of 6 percent. The United States would possibly increase export volume or value to Togo if U.S. wheat became cleaner. However, gains would be small. Currently, U.S. wheat is cheaper than Canadian wheat, and that is why the United States has captured most of the market. The miller in Togo indicated that he would be willing to pay \$5 to \$20 a ton more for cleaner U.S. wheat (the lower end of the range is more likely).



# Ghana and Togo

## Determinants of Wheat Import Demand

Margaret Missiaen  
Mark Smith

### Ghana<sup>1</sup>

Despite severe poverty among the Ghanaian people, grain quality is an important consideration of wheat millers. It is one of several factors affecting choice of supplier. This report discusses the Ghanaian wheat market, including an overview of the economy, and the role quality and other factors play when the government importer and millers make sourcing decisions.

Of the 125 countries ranked by the World Bank, Ghana is 98th in terms of per capita gross domestic product (GDP), at about \$390 per person. Agriculture accounts for about half of the GDP, two-thirds of the workforce, and over half of the exports. Ghana is almost self-sufficient in food, with staples being primarily root crops (cassava and yams) and corn. However, the country relies on imports for wheat, rice, fish, and beef.

At independence in 1957, Ghana had a diversified industrial base, good infrastructure, strong education system, and large financial reserves. However, neglect of the rural sector, mismanagement, and a growing public sector drained government finances. By 1982, the economy had reached a state of virtual collapse, and, in 1983, the government embarked on policy reforms.

Since the introduction of the Economic Recovery Program (ERP) in 1983, Ghana has successfully pursued a comprehensive program of financial and structural reforms, resulting in a marked improvement in the country's economic and financial situation. The ERP has been supported by International Monetary Fund (IMF) and World Bank resources, as well as significant financial assistance from other multilateral and bilateral donors. The key elements of the reform strategy are to (1) realign relative prices to encourage productive activities, promote exports, and strengthen economic incentives; (2) shift away from direct controls and intervention toward greater reliance on market forces; (3) restore fiscal and monetary discipline; (4) rehabilitate the economic and social infrastructure; and (5) implement a wide range of structural and institutional reforms designed to enhance the efficiency of the economy and encourage the growth of savings and investment. Since 1988, the ERP has been accompanied by a special program of actions to mitigate the social costs of adjustment.

During 1983-91, real GDP growth averaged more than 5 percent a year; inflation as measured by the Consumer Price Index (CPI) declined from 123 percent in 1983 to 18 percent in 1991; and the overall balance of payments position switched from a large deficit to a surplus. In 1991, the current account deficit was reduced and net capital inflow remained broadly unchanged. The improvement in the current account reflected mainly the decline in the oil import prices and strong growth in the volume

---

<sup>1</sup>This section draws heavily from unpublished World Bank reports.

of gold and timber exports, which more than offset the weakened world market prices for cocoa and gold.

External public debt increased slightly in 1991 to an estimated \$3.7 billion. However, the external debt service ratio continued to fall from a peak of 68 percent of exports in 1988 to 39 percent in 1990, and an estimated 30 percent in 1991. This decline was due in part to lower repayments to the IMF and reduced commercial debt.

The agricultural sector is in the midst of adjusting to the fundamental changes in macroeconomic policy. The changes affecting the agricultural sector include: (1) depreciation of the cedi in 1990 to about one-tenth of its 1983 value, and hence improved producer incentives for tradeables in the agricultural sector; (2) reliance on market-determined prices, with the number of administered prices reduced; (3) a more liberal import policy that allows a wide variety of agricultural inputs to be imported; and (4) a policy of withdrawal of public sector participation in commercial enterprises and marketing to allow the private sector to assume a greater role.

## **Wheat Supply and Demand Trends<sup>2</sup>**

### ***Production***

Ghana does not produce wheat; corn is the major grain produced in the country. Output of corn varies widely but has averaged about 700,000 tons in recent years. The 1991 harvest was a record 930,000 tons. Sorghum, rice, and millet are other grains produced. However, total grain production of 1.4 million metric tons in 1991 was dwarfed by root crop production of 9.8 million metric tons, mostly cassava and yams.

### ***Consumption***

Ghana's 16 million people consume about 8 kilograms of wheat per capita. This compares with about 65 kilograms per capita in the United States. Wheat is used exclusively for human consumption, with byproducts used as feed. Wheat is chiefly consumed as loaves of high-raised bread; consumption of pastries and cookies is very small. On average, wheat use is the lowest of all grains consumed in the country. Per capita corn consumption amounts to about 40 kilograms, with other grains providing 35 kilograms (sorghum and millet, 25 kilograms, and rice, 10). Root crops, including cassava and yams, are more important in the diet, providing about 25 percent and 7 percent of daily caloric intake. By comparison, corn provides about 15 percent, sorghum and millet 8 percent, rice 3 percent, and wheat less than 3 percent of daily caloric intake.

Wheat consumption occurs chiefly in urban settings. Bread dominates usage, although home baking of Christmas pastries is important as well. Bread is served to school children and is also used for gifts. Government and trade sources do not think that wheat consumers would easily shift to alternative foods or even to breads of markedly different composition (composite or soft wheat flour). While some trade sources suggest that Ghana could import and consume 250,000-300,000 tons of wheat, the U.S. agricultural attache feels that 150,000-200,000 tons is more realistic. However, millers respond that if more wheat were available, distribution points would expand and bread would reach farther into the rural areas.

Per capita wheat consumption has fluctuated during the last 25 years, but shown no discernible growth. A declining economy in the early 1980's depressed consumption to below 1966 levels.

---

<sup>2</sup>This section draws heavily from various Foreign Agricultural Service reports on Ghana from the U.S. agricultural attache in Nigeria.

However, millers and bakers believe that bread consumption is increasing, and, since 1985, a definite upward trend is evident in per capita consumption (fig. 1).

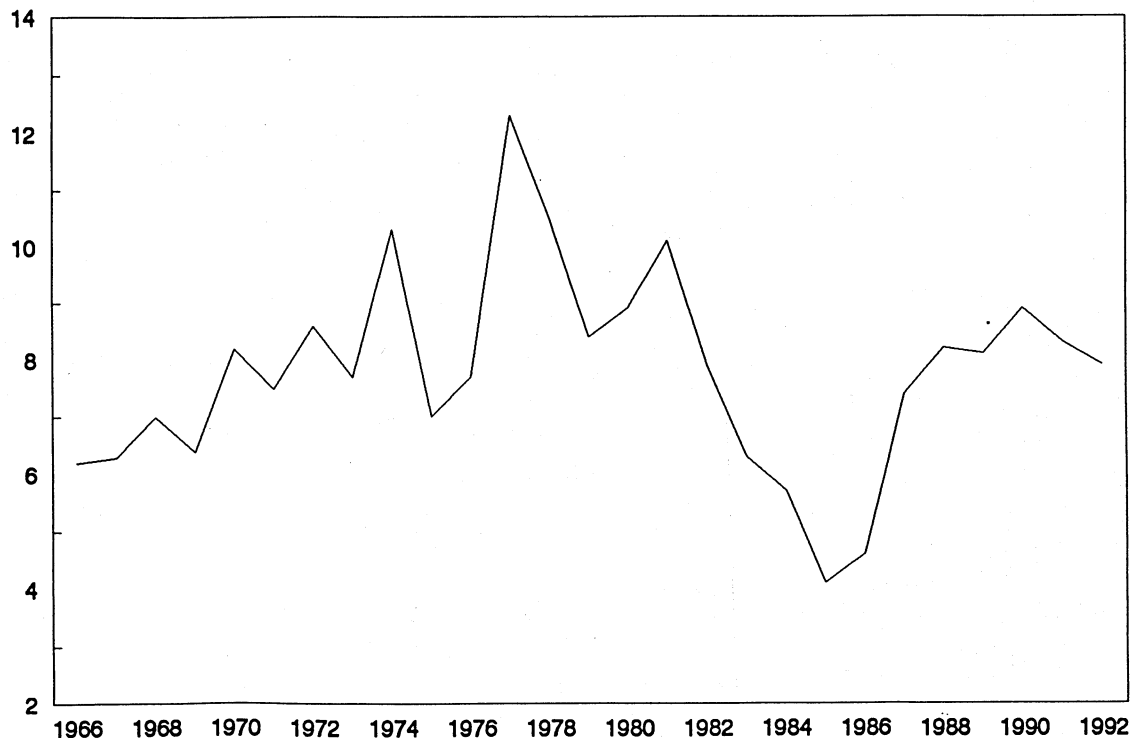
Local foods are preferred by consumers, but a wholesaler reported that people switch to bread when other food prices rise. Plantains, yams, corn, and rice are bread substitutes. Bread demand fluctuates seasonally—being highest in the lean season of May-July when locally produced commodities are in short supply. At those times, relative prices favor bread consumption. A large loaf of bread provides a meal and requires no fuel or utensils to prepare, factors especially important for the poor. For example, in July 1992, a loaf of sugar bread cost 50 cedis (about \$0.10), while the smallest tin of rice (enough for one meal) cost twice as much, not considering time and materials required for cooking. Other bread loaves, such as a 500-gram butter (or tea) bread, cost 150 cedis (about \$0.33) in one grocery store; a rare whole wheat loaf cost 200 cedis (approximately \$0.44). Consumers overwhelmingly prefer the all-white bread without bran, not only because of its lower price but because of taste as well. Another type of bread sold in the market is a 700-gram, very wide and high-raised (about 10 inches) loaf sold almost as a block.

A small mill experimented in making composite flour with 5 percent corn flour and 95 percent wheat flour. However, corn is now about twice the price of wheat and the venture has proven unprofitable.

### *Imports*

Except for wheat grown on experimental farms, Ghana imports all its wheat. Over the 1960/61-1991/92 period, wheat imports grew at an annual rate of 2.6 percent, although on a per capita basis, the rate was statistically insignificant. Because of consumer demand for the high-raised loaves, only very-high protein wheat is imported—northern/dark northern spring or Canadian western red spring wheat.

Figure 1  
Ghana: Per capita wheat and flour consumption  
Kilograms per capita



Over the 1980-91 period, wheat and flour imports averaged nearly 120,000 tons (in wheat equivalent), ranging from 77,000 tons in 1985 to 225,000 tons in 1990. Most of this was wheat. Imports in 1991/92 were about 175,000 tons, of which 153,000 tons were wheat. High carry-in stocks may dampen early 1992/93 imports, although recent liberalization of wheat imports may actually spur purchases. Changes in imports are attributable in part to fluctuations in staple crop production.

Despite its low per capita GNP, Ghana imports its wheat and flour with less exporter assistance than other, wealthier importers. Most imports are purchased commercially on cash terms. While important, the food aid share has fallen from nearly 100 percent in the drought years of the 1970's to about 20 percent in recent years (fig. 2). A strengthening economy and lower wheat prices contributed to this change. However, due to a clustering of aid shipments in January and February 1992, aid is estimated to have accounted for more than half of all wheat and flour imports in 1992. This increase is not expected to continue.

**Suppliers.** The Ghanaian wheat market is shared by Canada and the United States. Of the 110,000-ton average total wheat imports between 1985/86 and 1989/90 (the last year for which source data are available), the United States shipped approximately 41,000 tons, giving the United States an average share of nearly 40 percent; Canada held the remainder (table 1). The Canadian share is bolstered by the relatively large amounts of wheat it provides as aid. For example, food aid averaged about 10 percent of U.S. wheat exports to Ghana over the 1985/86-89/90 period. In comparison, Canada's food aid accounted for close to 30 percent of Canadian exports over the period.

Looking only at the commercial market during trade years 1985/86 through 1989/90, the United States has held an average of 45 percent. This ranged from a low of 32 percent in 1987/88 to a high of 71 percent in 1985/86. The advent of discounted sales from the United States helped gain significant

Figure 2  
Ghana: Wheat and flour imports  
1,000 tons

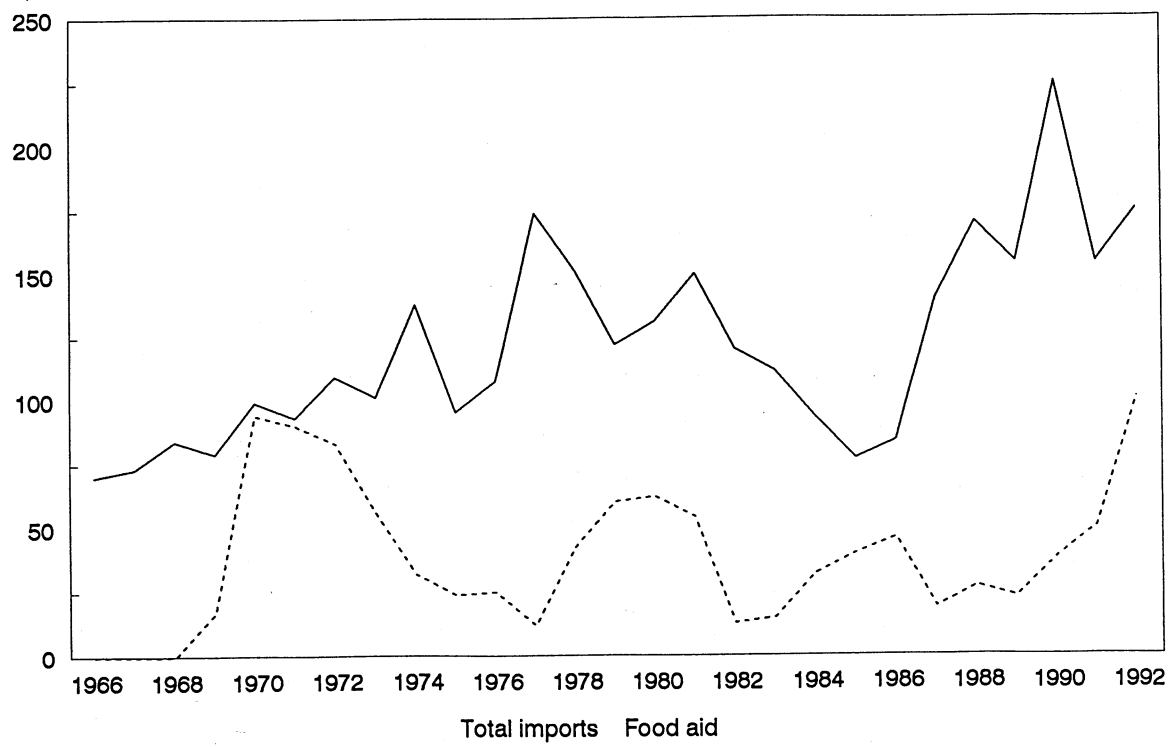


Table 1--Ghana: Wheat imports by source and type.

Year	Canada			EC			United States			Total
	Commercial	Food aid	Total	Commercial	Food aid	Total	Commercial	Food aid	Total	
	Tons									
1980/81	25,000	---	25,000	---	---	---	20,005	45,895	65,900	90,900
1981/82	44,730	---	44,730	2,920	---	2,920	4,200	---	4,200	51,850
1982/83	---	---	---	10	5,684	5,694	20,000	---	20,000	25,694
1983/84	74,454	13,000	87,454	3,643	9,997	13,640	---	---	---	103,594 1/
1984/85	19,364	17,366	36,730	5	---	5	5,800	---	5,800	42,535
1985/86	20,331	17,900	38,231	---	---	---	48,847	---	48,847	87,078
1986/87	57,500	10,000	67,500	---	---	---	34,505	---	34,505	102,005
1987/88	57,715	23,650	81,365	40	---	40	27,367	3,328	30,695	112,100
1988/89	51,450	16,000	67,450	---	---	---	50,673	4,986	55,659	123,109
1989/90	49,942	25,000	74,942	---	---	---	26,472	11,070	37,542	112,484

--- = Less than 0.5 tons.

1/ Includes 2,500 tons of wheat Spain provided as aid.

Source: International Wheat Council. Excludes flour shipments.

market share, but the Canadian response to such sales has checked growth in the U.S. share. In 1991/92, it was estimated that the United States and Canada held equal shares. As detailed below, Ghanaian import decisions are swayed by considerations other than price alone.

The European Community (EC) sold little wheat to Ghana in recent years. At times, such as between 1987/88 and 1989/90, the EC sold about 13,000-18,000 tons of flour. About 20,000 tons of EC flour were expected to be imported in 1992. Some flour also enters through Togo and Cote d'Ivoire.

**U.S. and Competitor Programs.** Since October 1986, Ghana has purchased most, if not all, of its U.S. wheat on a commercial basis under the EEP's West and Central African initiative. Data on Ghana's purchases under the program are unavailable; however, annual sales to the region under the EEP have ranged from 95,750 tons in fiscal 1987 to 366,051 tons in fiscal 1991. Bonuses paid for EEP sales ranged from \$9.52/ton in fiscal 1989 to \$54.62/ton in fiscal 1991. In 1992, 205,988 tons were sold under the initiative with an average bonus of \$34.76/ton (table 2).

With the exceptions of 1980/81 and 1989/90, imports of food aid wheat from the United States have been relatively small. In the early 1970's and again in 1979-81, Ghana imported some of its U.S. wheat under P.L. 480 Title I. Since fiscal 1988, Ghana has imported solely under Title II and then through private voluntary organizations (PVO's).<sup>3</sup> In fiscal 1992, the United States provided 29,285 tons of wheat under monetization programs sponsored by Adventist Development and Relief Agency (8,470 tons), Catholic Relief Service (15,815 tons), and TechServ (5,000 tons). Through the Ghana National Procurement Agency (GNPA), PVO's sell wheat to the mills who in turn keep a portion of the flour milled from the aid wheat. Since 1983/84, the Canadians have granted larger volumes of wheat as food aid and on a more continual basis.

<sup>3</sup>P.L. 480 Title I governs sales of commodities on concessional terms to food aid recipients; Title II applies to grants to assist targeted groups.

**Table 2—EEP wheat sales to the West and Central African countries by fiscal year**

Year	Quantity awarded	Total bonus	Average bonus
	<i>Tons</i>	<i>Dollars</i>	<i>Dollars per ton</i>
1987	95,750	3,748,793	39.15
1988	190,600	6,866,864	36.03
1989	119,250	1,135,779	9.52
1990	360,667	10,468,836	29.03
1991	366,051	19,993,943	54.62
1992	205,988	7,159,396	34.76

Neither the United States nor Canada extend Ghana credit guarantees for wheat purchases. Only in fiscal 1992 did Ghana participate under the CCC credit guarantee programs when it purchased feed grains, protein meals, rice, and vegetable oils under the GSM-102 program. This was the first time that Ghana participated in the GSM-102 program. Difficulties opening a letter of credit in Ghana complicate purchasing on credit.

### Wheat Sector Policies

#### *Consumer Policy*

There are no direct consumer subsidies on bread consumption, although recent government actions have affected bread prices favorably for consumers. The GNPA reduced the price millers had to pay for wheat from 74,642 cedis per ton in 1991 (about \$203 per ton) to 68,800 cedis per ton in 1992 (approximately \$160 per ton). Further, as the government removed itself from the flour marketing system, flour prices fell. Until July 1991, the government controlled flour distribution and pricing and prices ranged from 12,000 to 13,000 cedis per 50-kilogram bag (approximately \$33-\$35 per bag). Since then, flour prices from the mill fell to 8,200-8,500 cedis per bag (about \$18-\$19 per bag) in July 1992.<sup>4</sup>

#### *Import Policy*

Until August 1992, all wheat imported by Ghana was purchased or controlled by the GNPA. This agency is responsible for imports of a variety of commodities, though the list has been shrinking as the government liberalizes the economy. In August, the government announced that the mills would be able to import directly. (The government holds the right to cancel this policy, but it was still in effect in March 1993.) This will result in savings for the mills (in terms of not having to pay the GNPA-inflated price), but will mean that mills importing directly will not benefit from purchasing from GNPA on 90-day credit with zero interest. In July 1992, millers had to pay an import duty of 10 percent on wheat, compared with a 25-percent duty on flour imports.

Imported flour from Togo and Europe sells in Ghana and helps keep the Ghanaian flour prices down. However, French flour must be blended with U.S. or Canadian flour. Trade sources indicated that flour imports have fallen to very low levels and that imported soft European wheat flour cannot compete in quality or price. Duties on imported flour may partially account for this.

<sup>4</sup>The exchange rate was 368 cedis per dollar in 1991, and about 450 cedis per dollar in July 1992.

## **Market Structure**

### ***Millers***

Wheat imported by the GNPA was allocated to three private mills and one government-owned mill. (After August 1992, the mills were allowed to import on their own account.) The government fixed the wheat purchase price mills had to pay. The mills reimbursed the government for the wheat as it was sold.

The Takoradi mill is the largest, with a milling capacity of about 60,000 tons annually and expanding to about 120,000 tons. This is followed by the 60,000 tons Irani Bros. mill in Tema (near the capital city of Accra), Golden Spoon mill (40,000-45,000 tons expanding to 72,000 tons) in Tema, and the government-owned Tema Food Distribution Complex mill (25,000 tons). The Golden Spoon mill is a new arrival to the flour market, starting operation in about 1989. The sum of these milling capacities exceeds imports, indicating either underreporting of imports, overreporting of milling capacity, or excess milling capacity. With private imports now allowed, larger mills and those with prior experience importing (before the government became the sole importer) will have an advantage over smaller mills or those that are unfamiliar with making import decisions. This may lead to a shake-out of millers. Two of the four flour mills have requested that GNPA continue to import wheat for them.

All the mills are near ports (Tema or Takoradi). Millers hold most of the wheat stocks, although at times, such as in early 1992, imported supplies exceeded available silos so warehouses and other less suitable forms of storage had to be used.

Before earlier market reform, mills could sell only to government-licensed distributors in a marketing territory exclusive to each mill. Mills were not allowed to sell in others' territory. Now, mills are able to sell throughout the country and can sell directly to bakers or to licensed distributors. To increase market penetration, mills have set up distribution centers in various markets. They also often subsidize transport costs to their distribution centers in distant markets to enhance competitiveness. Competition would appear to be greatest around Accra in the eastern part of the country, where there are three mills. The Takoradi mill, located in the west, would be expected to have a cost advantage in that part of the country.

A wholesaler reported that, in Accra, the major metropolitan center, the Irani Bros. held 50 percent of the market in July 1992, followed by the Tema Food Complex mill with 20 percent, and Golden Spoon and Takoradi with 15 percent each.

### ***Wholesalers***

Mills may sell to wholesalers, who are relatively new since the government removed itself from the flour distribution system recently, or directly to bakers. With recent reforms, the number of wholesalers is thought to be relatively small. They must also compete with the Ghana National Trading Corporation (GNTC), but a large wholesaler indicated that the GNTC was a supplier of last resort because of lack of quality control in their flour handling.

### ***Standards***

The Ghana Standards Board sets the standards for flour that can be sold in the country. The board also sometimes tests wheat shipments, when requested by millers. However, the bakers determine the real market standards. If a mill sells a bad bag of flour, word spreads through the market and the mill's reputation and sales suffer. One bad bag of flour can wipe out an individual baker's savings, so quality and a good reputation are important for millers. However, every few months a different mill

sells a bad batch of flour, so one mill may regain customers lost earlier to a competitor when that competitor sells poor quality flour.

### ***Bakers***

There are hundreds of small bakeries in Ghana, ranging from electric ovens in a GNTC bakery, to gas-fired ovens to clay, wood-fired ovens in cities, villages, and along the roads. There is much home baking as well. Some bakers in Accra have formed the Greater Accra Bakers Association, which comprises a large number of bakers. Often bakers blend flour from two of the mills, or with imported flour to achieve the desired dough characteristics and to lessen risk in case flour from one mill is bad.

It is common in Ghana for smaller bakers to purchase the ingredients and then give them to a "dough-mixer," an establishment that adds water to the ingredients and uses mechanical mixers and kneaders to mix the dough. The dough is then transported back to the bakeries for baking. Stores and hotels purchase bread, and "bread ladies" take loaves from the bakery to market where they sell loaves on commission.

### **Factors Affecting Choice of Supplier**

Given the need for high-protein wheat, the GNPA based its sourcing decisions on (1) which wheat exporters supply food aid and (2) relative prices. All other quality aspects ranked behind these considerations. While the August 1992 decision to allow mills to import directly diminishes the role of GNPA, some of the smaller mills will rely on the GNPA for supplies.

As long as the mills are allowed to import directly, they will likely base their sourcing decisions first on trade servicing and personal relationships--the ability to rely on the exporter to provide additional services or flexibility. Most millers placed high value on servicing in case earlier shipments are needed, or in case of delays in opening a letter of credit. Second, due to the competitive nature of the market, relative quality between Canada and the United States would influence sourcing decisions.

Lower dockage means higher flour yields. A cost of high dockage levels is less wheat available for milling and further wheat lost in the cleaning process. However, the emphasis millers place on quality is true only to a point, after which price becomes important. It should be noted that U.S. sales to the Ghanaian market rose chiefly when the United States offered substantial discounts. Without EEP subsidies, the United States would lose sales and, to the extent Canadian prices rose, total Ghanaian imports would likely fall.

### ***Quality Concerns***

Because consumers chiefly prefer high-raised bread loaves, only high-protein wheat is imported. For U.S. wheat, millers prefer No. 2 spring wheat with 13.5-14.5 percent minimum protein, 12-13 percent maximum moisture, a minimum Hagberg test for falling number of 300 seconds, and a test weight of 78 kilograms per hectoliter. Protein content and moisture are most important to millers in Ghana. U.S. and Canadian wheat are seen as basically similar in terms of protein quantity, moisture, and falling number; the chief distinguishing determinant is greater non-millable material (chiefly dockage and broken and shrunken kernels) in U.S. wheat. Millers indicated that U.S. wheat has an average nonmillable material level of about 2.5 percent, compared with nil for Canadian wheat. Millers did not report problems with foreign material in U.S. wheat.

Federal Grain Inspection Service data for Ghana show that, in 1990, the most recent year for which data are available, average dockage was 0.72 percent, damaged kernels, 2.25 percent, foreign material, 0.3 percent, broken and shrunken material, 1.65 percent, bringing total defects to 4.2 percent.



Dockage and broken and shrunken kernels together were the bulk of non-millable materials reported by importers. The GNPA specified a 3-percent maximum limit in their contract specification.

A higher level of nonmillable material in U.S. wheat creates additional costs to millers, who import on a c.i.f. basis. Shipping, import duties, and taxes are paid on a gross weight basis, and trucking costs are incurred to haul dockage in wheat from the port to the mill. Disposal of nonmillable material often imposes an additional trucking cost to millers. Dust from unloading U.S. wheat is a nuisance and hindrance to mill employees. Further, the longer time required to clean U.S. wheat in the mill slows cargo unloading and incurs demurrage charges. While one miller pointed out that dirty wheat is more prone to insect infestation, no millers reported infestation problems. There is little return from the sale of bran for poultry feed either domestically or for export.

### *Market Effects of Selling Cleaner U.S. Wheat*

Most, though not all, millers in Ghana would be willing to pay a premium for cleaner U.S. wheat. One large miller discounts the price he pays for U.S. wheat by 6 percent because of the higher dockage content, lower flour yields, and higher cleaning costs for less clean wheat. If other costs associated with cleaning were included (for example, demurrage costs from longer off-loading times due to slower cleaning), the price discount might be higher. Private millers in Ghana said they would be willing to pay 6-10 percent more for cleaner U.S. wheat, or about \$5-\$15 per ton—the lower end of this range being more likely. Holding price constant, millers indicated that U.S. exporters would sell 30-35 percent more wheat (about 23,000 tons), but would not completely capture the market from Canada. These results are likely considering the quality concerns of the millers. However, it is questionable to what extent increased imports of U.S. wheat would result or a higher price for U.S. wheat would be paid given the income constraints of the country. The millers' desire for multiple sources of wheat to maintain low prices among competing suppliers is expected to continue after market liberalization. Should import liberalization continue, our findings should hold since they are based on the responses of private importers rather than the GNPA.

### **Conclusions**

Wheat quality is an important factor for selection of an importer by Ghanaian millers, despite the country's poverty. Quality is likely to grow in importance as the economy improves and as the government import monopoly relinquishes its control over wheat imports. It seems likely that the United States would increase export volume or value to Ghana in a liberalized environment if nonmillable material (dockage and broken and shrunken kernels) were reduced. However, millers do not pay for quality at all costs, and it seems likely that they will continue to purchase from competitors for reasons unrelated to quality. It is in the interest of millers to inflate the gains U.S. exporters may realize, because millers benefit from lower prices to the extent U.S.-Canadian competition is intense. If U.S. and Canadian wheat become more similar by the United States changing its grain standards, then (barring collusion between U.S. and Canadian exporters), Ghanaian importers will benefit from even greater competition between the United States and Canada.

## Togo<sup>5</sup>

Like its neighbor, Ghana, Togo is a poor country entirely dependent on imports for its wheat. However, it has an entirely different market structure which influences the role quality plays in its sourcing decisions. This report examines the Togolese wheat market and discusses the role quality and other factors play in sourcing decisions there.

Roughly 80 percent of Togo's population derives its income from agriculture, based on food crop production and the production of cash crops (cotton, coffee, and cocoa) for export. Togo's mineral production, almost entirely phosphate rock, is a major export. The Togolese economy also features an active import-export sector. With a well-developed highway network and road system, linking its capital and principal port, Lome, with neighboring countries and a well-managed banking system, Togo plays an important role as a regional trading and financial center. In spite of these advantages, Togo remains a relatively poor country, with an estimated 1990 GDP of \$410 per capita.

Beginning in late 1990, Togo began a hesitant and at times violent move toward multiparty democracy. A transition government was installed in August 1991 and charged with leading the country through a series of elections in 1992. The elections were postponed indefinitely and the struggle between the former military government and the transition leaders continued into 1993.

The labor unrest and deteriorating security situation accompanying political change hurt the economy. Real GDP growth was nil in 1990 and only about 1.5 percent in 1991, compared with growth rates of 6.2 percent in 1988 and 3.7 percent in 1989. There was little prospect for a significant improvement in the economy in 1992. Imports fell from 1990 to 1991 and stagnated in 1992.

The fragility of Togo's economic situation has been highlighted by recent economic and financial developments. Togo remains dependent upon significant levels of foreign assistance, with external grants and loans being equivalent to over 25 percent of total government expenditures. As a small open economy, Togo is particularly subject to external events and dependent on its export performance. Moreover, government receipts are strongly influenced by the behavior of a small number of primary commodities.

Togo has pursued an economic reform program since the early 1980's that is supported by the IMF and World Bank. The reforms include a reduction in the fiscal deficit, the privatization and liquidation of various state enterprises, tax and tariff reform, reform of the agricultural marketing system, the decontrol of prices and project margins, and the elimination of quantitative import restrictions. Economic reforms in neighboring countries have reduced Togo's comparative advantage as a regional trading center.

Structural adjustment policies place particular emphasis on (1) completing the disengagement of the government from commercial activities, while strengthening the public enterprises that remain in its portfolio, (2) expanding and diversifying agricultural production, (3) eliminating certain regulatory restrictions on the activity of the private sector so as to increase competitiveness, and (4) maintaining a free exchange system.

At the same time, Togo confronts major developmental challenges. Per capita income remains low, and with a relatively high population growth rate (over 3 percent per year), substantial increases in output are required each year to maintain living standards. Unemployment and underemployment are serious and growing problems. Provision of basic health and education services is constrained and

---

<sup>5</sup>This section draws heavily from unpublished World Bank reports.

demand for these services will increase over time. Despite the efforts undertaken, the rural population remains disadvantaged relative to urban dwellers in terms of income and access to basic social services.

## Wheat Supply and Demand Trends

### *Production*

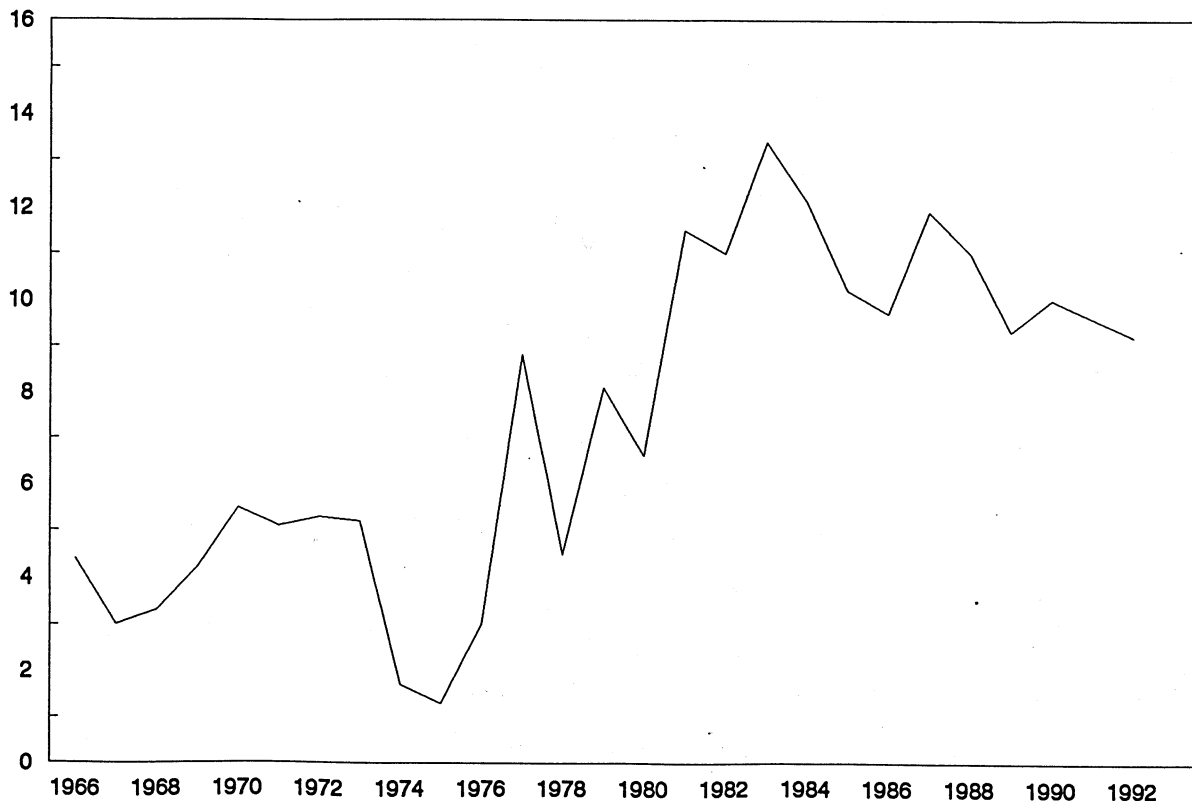
Togo produces no wheat domestically. Principal staples are corn and gari (cassava meal). Corn is the major grain produced in the country, with a 1991 crop of 243,000 metric tons.

### *Consumption*

Togo's 4 million people consume close to 10 kilograms of wheat annually. Since 1966, per capita consumption has been growing, though irregularly, at an annual rate of 6 percent (fig. 3). Bakers report increased competition from new entrants to the bakery sector. Consumption is mostly in the form of French bread; the high-raised loaf prevalent in neighboring Ghana accounts for a small share of the market. Bread is consumed mostly at breakfast; the most commonly consumed type is a 200-gram baguette. Pastry consumption, for which Canadian or U.S. wheat is used, is greater in Togo than in Ghana, as evidenced by the larger number of pastry shops in Lome than in Accra.

Two types of flour are sold: "English" and "French." English flour is milled from high-protein spring wheats from either the United States or Canada and is used for pastries. French flour is milled from either exclusively French wheat or a mixture of French and either U.S. or Canadian wheat to develop a

Figure 3  
Togo: Per capita wheat and flour consumption  
Kilograms per capita



superior "French" flour used for making bread. The two types of flour are also mixed by bakers to achieve desired dough characteristics.

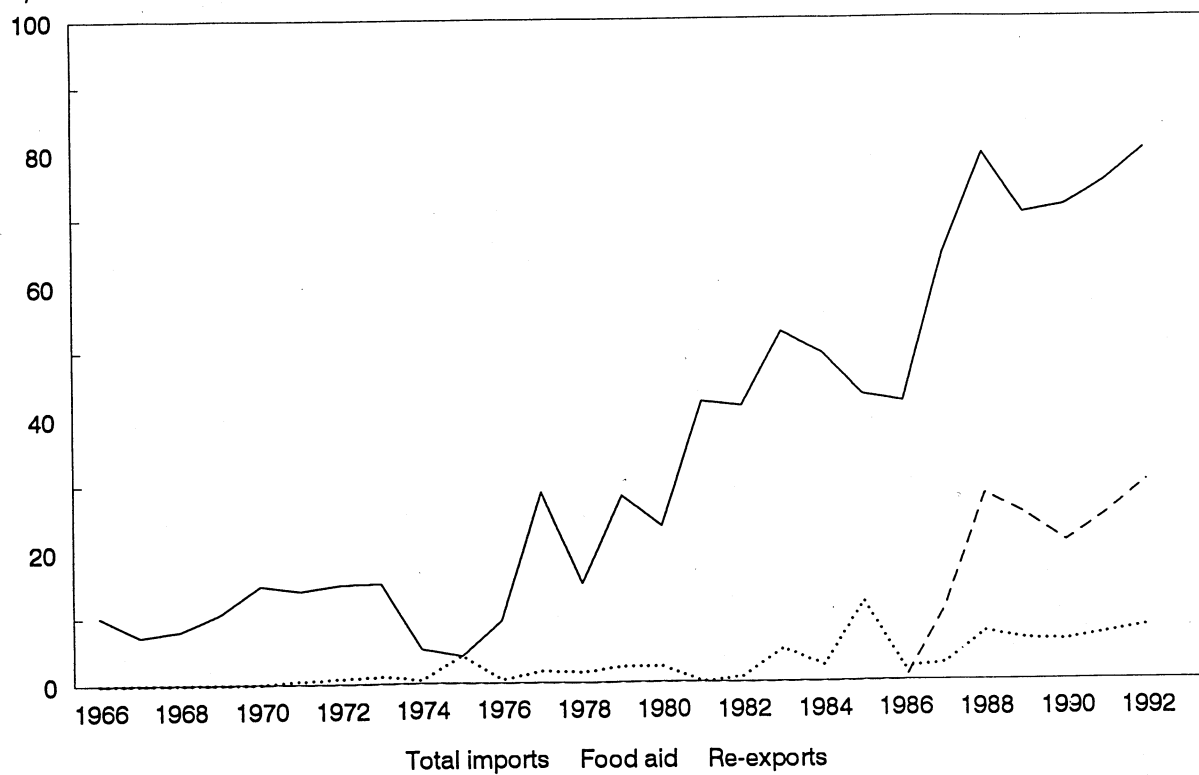
Wheat use is less than that of other grains in Togo. Per capita corn consumption is 55 kilograms per year, compared with 40 kilograms for millet and sorghum, and 10 kilograms for rice. Other crops, including cassava and yams, are also important in the diet. In terms of daily caloric consumption, corn provides almost 20 percent, followed closely by cassava (also nearly 20 percent), millet and sorghum (about 15 percent), and yams (approximately 10 percent). Wheat provides less than 5 percent. Wheat consumption fluctuates with consumption of local staples.

### Imports

Togo imports all its wheat. Since 1966, wheat and flour imports have grown at a rate of 10 percent annually. However, about 20 percent of imports may be transshipped to neighboring countries. Average imports from 1980 through 1990 were about 52,000 tons, ranging from a low of 24,000 tons in 1980 to a peak of 79,000 in 1988. Fluctuations are due to changes in production of local staples and demand swings in neighboring countries. Togo imported relatively small amounts of flour in the late 1980's, averaging about 1,300 tons annually between 1987/88 through 1989/90, the last year for which data are available.

While Togo's per capita income places it in the World Bank's "low-income" country category, Togo purchases wheat with less assistance than wealthier countries do. From 1980-90, food aid, averaging about 4,000 tons annually, accounted for only 8 percent of total imports (fig. 4). This share has been fairly steady since the mid-1970's. Food aid may be underrepresented, because some of Togo's imports are re-exported to neighboring countries.

Figure 4  
Togo: Wheat and flour imports  
1,000 tons



**Suppliers.** The commercial Togolese market is shared, in general order of magnitude, by the United States, Canada, and the EC. However, market shares have been very volatile (table 3). In 1980/81, the United States and EC shared the market with 44 and 56 percent. The EC claimed the entire market the next year, but in 1982/83, the Canadians captured almost 70 percent from the Europeans. In 1983/84, the United States regained a toehold, and in 1984/85, reclaimed almost three-quarters of the market, mostly at Canada's expense. Since then, the EC share has generally declined and averaged approximately 20 percent between 1985/86 and 1989/90. This compares with 26 percent for Canada and 54 percent for the United States. USDA data indicate that the U.S. share fell to 40 percent in 1990/91. In 1991/92, the United States held 70 percent of the market, compared with 15 percent each for Canada and France. France has been losing market share because U.S. wheat has been found to yield a better, more profitable flour for bakers.

**U.S. and Competitor Programs.** Togo imports most of its wheat from all sources commercially. Togo has been included in the U.S. Export Enhancement Program (EEP) for West and Central African countries since October 1986. Since then, all Togolese wheat imports from the United States are thought to have been assisted by the EEP.

Togo has never participated under the CCC export credit guarantee programs, and is not currently participating under the Canadian credit programs. It is unknown whether Togo purchases under European credit programs, but it seems unlikely. Obtaining a bank guarantee to participate in the credit programs is expensive, discouraging credit purchases.

According to International Wheat Council data, the United States is the sole supplier of wheat under food aid programs. In Togo's P.L. 480 Title II program for fiscal 1992, Catholic Relief Service sold 3,530 tons of wheat while Opportunity Industrial Center sold about 1,750 tons. Funds generated by these sales were used for humanitarian purposes. Togo started to participate in the Title II program in fiscal 1988 and has never purchased under Title I.

Table 3--Togo: Wheat imports by source and type.

Year	Canada		EC			United States			Total	
	Commercial	Food aid	Total	Commercial	Food aid	Total	Commercial	Food aid		Total
	Tons									
1980/81	---	---	---	4,920	---	4,920	3,900	---	3,900	8,820
1981/82	---	---	---	7,507	---	7,507	---	---	---	7,507
1982/83	18,439	---	18,439	8,138	---	8,138	---	---	---	26,577
1983/84	23,470	---	23,470	8,829	---	8,829	2,600	---	2,600	34,899
1984/85	---	6,625	6,625	4,550	3,000	7,550	13,101	---	13,101	27,276
1985/86	7,537	---	7,537	9,869	---	9,869	20,513	---	20,513	37,919
1986/87	13,760	---	13,760	12,630	---	12,630	21,204	---	21,204	47,594
1987/88	15,091	---	15,091	11,216	---	11,216	43,221	2,977	46,198	72,505
1988/89	25,906	---	25,906	17,800	---	17,800	35,497	1,527	37,024	80,730
1989/90	18,584	---	18,584	10,436	---	10,436	41,208	2,435	43,643	72,663

--- = Less than 0.5 tons.

Source: International Wheat Council. Excludes flour shipments.

## **Wheat Sector Policies**

### ***Import Policy***

To protect the milling industry in Togo, the government imposes a duty on flour imports, which partly explains the low quantity of such imports.

### ***Consumer Policy***

The government exerts strong control in the wheat sector. It sets flour prices bakers must pay as well as bread prices they may charge. In the late 1980's, the price of flour was 5,500 Communaute Financiere Africaine (CFA) francs (about \$18-\$20) for a 45-kilogram bag of English flour and 5,000 CFA (\$16-\$18) for a 50-kilogram bag of French flour. Current prices are 7,000 CFA for English flour and 6,500 CFA for French flour (about \$28 and \$26). These prices hold nationwide, implying that the Lome market subsidizes inland regions.

Since 1977, the government has set the price of all types of bread. Between 1984 and 1990, a 200-gram baguette cost 40 CFA (about \$0.13-\$0.15); the price has since been raised to 50 CFA (\$.20). One baker reported a sharp sales drop when prices were raised. While some bakers feel that bread prices are held artificially low, pastry prices are unregulated.

Taxes are reportedly 14 percent on a bag of flour and 40 percent on a loaf of bread. These taxes are included in the prices above.

## **Market Structure**

### ***Millers***

The Togolese wheat market is composed of a single mill, which is almost half owned by the government. A duty on flour imports protects the mill. Situated near the country's main port, the mill imports 80,000-150,000 metric tons annually, although some wheat is transshipped and some of the flour milled by it is exported. Togolese consumption is about 60,000-80,000 tons annually. Storage capacity at the mill is about 17,000 tons.

### ***Bakers***

There are many, mostly small-scale bakers in Togo. Unlike in Accra, Ghana, where bakers have formed a trade association, bakers in Lome are unorganized.

## **Factors Affecting Choice of Supplier**

Trade servicing and personal relationships—the ability to rely on the exporter to provide additional services or flexibility—is a prime consideration. The miller does not purchase from exporters he does not know. Price is a close secondary consideration. The miller introduced U.S. wheat to the West African market when the U.S.-Canadian price gap grew to about \$20 per metric ton. Quality likely ranks third—wheat of varying qualities is blended and appropriate additives are used to achieve desired flour characteristics.

## **Quality Concerns**

The mill prefers wheat with a maximum of 13-percent moisture (12.5 percent, ideally), a minimum of 14-percent protein (preferably 15 percent), a minimum Hagberg test of 300 seconds, test weight of 78

kilograms per hectoliter, maximum dockage of 2 percent, an alveograph "W" factor minimum of 350, and a P/L ratio of 0.49.

U.S. and Canadian wheat are seen as basically similar in terms of moisture, protein quantity, and falling number; the chief distinguishing determinant is greater nonmillable material (chiefly dockage and broken and shrunken kernels) and resulting lower test weight in U.S. wheat, compared with Canadian wheat. The miller claims that nonmillable material in U.S. wheat is about 2 percent while that in Canadian wheat is nil. Sometimes, U.S. wheat must be cleaned twice. The mill did not report problems with foreign material in U.S. wheat.

However, Federal Grain Inspection Service data for Togo show that in 1990, the most recent year for which complete data are available, average dockage was 0.66 percent, damaged kernels, 2.05 percent, foreign material 0.4 percent, and broken and shrunken material, 1.9 percent, thus bringing total defects to 4.35 percent. One 1991 shipment showed dockage of 0.66 percent, damaged kernels of 0.9 percent, foreign material 0.2 percent, and broken and shrunken material 1.3 percent, thus total defects were 2.4 percent. Dockage and broken and shrunken kernels together were the bulk of nonmillable materials reported by the miller.

Wheat from the United States also has more nonmillable material than French wheat (which contains about 1 percent), but has other characteristics that make U.S. wheat attractive. The ability of U.S. flour to yield a larger loaf than pure French flour has encouraged bakers to switch from French to U.S. flour. However, for some breads, French flour must be used, implying a minimum market share below which the French wheat will not fall.

The mill receives no revenue from screenings, an important consideration given that U.S. wheat reportedly contains so much more dockage than competitors. Dockage is a nuisance for mill employees. Bran is sold for 20-40 percent of the flour price; one quarter is for Togolese use, the rest is exported.

#### *Market Effects of Selling Cleaner U.S. Wheat*

Given the monopolistic nature of the market in Togo, quality is not a major concern, and thus has less of an effect on imports than does price. The mill pays \$5 per ton more for Canadian wheat, and by inference, should be willing to pay that much more for cleaner U.S. wheat. The miller reported that cleanliness is the only significant quality difference between U.S. and Canadian wheat. For a price gap of more than \$5 per ton though, the probability of switching sources for higher quality diminishes. Given historical purchasing decisions, it seems that \$20 per ton is the maximum premium that would be paid for cleaner U.S. wheat (the actual premium that would be paid is probably closer to \$5 than to \$20). Holding price constant, U.S. exporters may be able to capture an additional 10 percent of the Togolese market, or about 10,000 tons, from the Canadians. However, as in Ghana, the importer will continue to diversify sources and maintain U.S.-Canadian competition. He will continue to purchase a minimum level of French wheat.

#### **Conclusions**

It seems likely that the United States will increase export volume or value to Togo if U.S. wheat became cleaner. However, gains would be small. Currently, U.S. wheat, while of inferior quality, is cheaper than Canadian wheat, and this is likely why the United States has captured most of the market. The importer reported that without the EEP, the United States would likely not sell to Togo. If U.S. wheat were of similar quality to Canadian wheat, the importer would purchase slightly more from the United States, although still continue to purchase from Canada. Because the Canadian share is already so small, there is little room for further development. A market opportunity exists for U.S. western white wheat, since the importer indicated that if it were available, the importer would prefer it to French wheat.

## Glossary

**Blending:** The systematic combining of two or more lots or kinds of grains to obtain a uniform mixture to meet a desired specification.

**C & f:** Cost and freight to the designated delivery point, paid by the seller.

**C.i.f.:** Cost, insurance, and freight to the designated delivery point, paid by the seller.

**Commodity Credit Corporation (CCC):** An agency of the U.S. Department of Agriculture created in 1933 to carry out loan and storage operations as a means of supporting prices above the level that would have prevailed in a free market.

**Cu-Sum:** A set of rules established by FGIS, that exporters must follow when loading grain on ocean vessels. The rules control variability among sublots blended to meet contract grade limits.

**Damaged grain:** In U.S. grading standards, the term damage refers primarily to biological deterioration associated with discoloration. Physical damage (such as cut or broken kernels) is not included in U.S. grades but is included in the standards of some other countries.

**Defects:** Computed total amount of damaged kernels, foreign material, and shrunken and broken kernels.

**Dockage:** Nongrain material that can be readily removed by accepted screening devices.

**Durum wheat:** Very hard, high-protein wheat used in the production of semolina flour for pasta products.

**Export Credit Guarantee Program (GSM-102):** U.S. agricultural export promotion program that guarantees repayment of private, short-term credit for up to 3 years.

**Export Enhancement Program (EEP):** Program to help U.S. exporters meet competitors' prices in subsidized markets: Exporters are awarded generic certificates that are redeemable for CCC-owned commodities, enabling them to sell certain commodities to specified countries at prices below the U.S. market price.

**Extraction rate:** The fraction of the wheat kernel that is converted into flour during the milling process.

**Falling number test:** A test used to measure sprout damage in wheat.

**F.a.s.:** Free alongside ship specifies that the seller delivers goods to the port elevator or dock at a specified location and the buyer pays for loading the ship and ocean freight.

**Federal Grain Inspection Service (FGIS):** An agency of the U.S. Department of Agriculture that establishes grain standards and develops the technology to measure the factors contained in such standards. This agency also develops and publishes sampling and inspection procedures, evaluates and approves equipment, monitors inspection accuracy, and oversees mandatory export inspection of grain by agency or FGIS-licensed inspectors.

**F.o.b.:** Free on board specifies that the seller loads the ship or other conveyance at the specified delivery point with the buyer paying freight charges.



**Foreign material:** Nonwheat material of similar size and weight to wheat kernels.

**Gluten:** A tenacious, elastic protein substance found especially in wheat flour that gives cohesiveness to dough.

**Grade:** A number or letter designation assigned to grain based on an established set of criteria.

**Grade factor or grade determining factor:** Those characteristics of grain used to determine the numerical grade. The grade factor is based on quantitative limits (either maximums or minimums) placed on each factor for each grade.

**Grain grades and standards:** Specific standards of grain quality established to maintain uniformity of grains from different lots and permit the purchase of grain without the need for visual inspection and testing by the buyer.

**Hard Red Spring wheat:** Spring seeded; includes the following three subclasses: dark northern, northern, or red: This wheat is high in protein and has a vitreous endosperm, is used primarily to produce bread flour and is produced in the upper Great Plains.

**Hard Red Winter wheat:** Fall seeded; This wheat may be either dark hard, hard, or yellow hard, medium to high in protein, a vitreous endosperm, and used primarily to produce bread flour. It is produced in the lower Great Plains.

**Hard wheat:** A generic term applied to wheat with a vitreous endosperm suitable for making bread flour or semolina; yields coarse, gritty flour that is free-flowing and easily sifted; and flour consists primarily of regularly shaped particles of whole endosperm.

**Impurities:** Any nongrain material contained within a shipment that could hinder the processing of a grain or detract from its end value.

**Intrinsic value or end-use value:** Characteristics critical to the end-use of grain. These are nonvisual and can only be determined by analytical tests. For example, the intrinsic quality of wheat is determined by characteristics such as protein, ash, and gluten content.

**Moisture content:** The amount of water in grain; measured by the weight of water as a percentage of the total weight of the grain including water (wet basis) or total weight of the dry matter excluding water (dry basis).

**Nongrade determining factor:** Factors that influence the quality of grain but are not taken into account in the grading of grain. These factors must be reported as information whenever an official inspection is made.

**Nonmillable material:** All material that is not wheat, includes shrunken and broken kernels.

**Physical quality:** Grain characteristics associated with the outward appearance of the grain kernel, including kernel size, shape, color, moisture, damage, and density.

**Premiums:** Prices that exceed the base price offered for grains with higher quality characteristics than specified. Generally calculated for factors that increase the value of the grain in market channels.

**Public Law 480 (PL-480):** Common name for the Agricultural Trade Development Assistance Act of 1954, which seeks to expand foreign markets for U.S. agricultural products, combat hunger, and encourage economic development in developing countries.

**Sanitary quality:** Grain characteristics associated with cleanliness. They include the presence of foreign material that detracts from the overall value and appearance of the grain, including the presence of dust, broken grain, rodent excreta, insects, residues, fungal infection, and nonmillable matter.

**Screenings:** The material removed from grain by means of mechanical sizing devices; generally include broken grain as well as nongrain material removed on the basis of density or particle size with mechanical cleaners.

**Semolina:** A coarse separation of endosperm extracted from Durum wheat to make pasta.

**Shrunken and broken kernels:** All matter that passes through a 0.064 inch by 3/8 inch oblong-hole sieve.

**Soft wheat:** A general term describing wheat with a chalky endosperm suitable for making pastry flour; yields a very fine flour consisting of irregularly shaped fragments of endosperm cells that adhere and sift with difficulty.

**Spring wheat:** A general term for wheat that is grown in the spring and harvested in the summer or fall; It has a relatively high protein content and is used in bread flours.

**Test weight:** Weight per unit volume as measured in pounds per bushel as defined in the United States. Determined by weighing the quantity of grain required to fill a 1-quart container. The international equivalent measure is kilograms per hectoliter (conversion factor 0.77).

**Uniformity:** Conformity within and between shipments for quality attributes; such as physical, milling, and baking performances.

**Wheat middlings:** Fine particles of the bran and the wheat kernel. Normally used for livestock feed.

**White wheat:** Fall or spring seeded; it includes four subclasses: hard, soft, club, western: It is soft or hard and low in protein and is used mainly for pastry flours and oriental noodles.

**Winter wheat:** A general category describing wheats that are sown in the fall, lie dormant in the winter, and are harvested the following spring or summer.

UNITED STATES DEPARTMENT OF AGRICULTURE  
ECONOMIC RESEARCH SERVICE  
WASHINGTON, DC 20005-4788