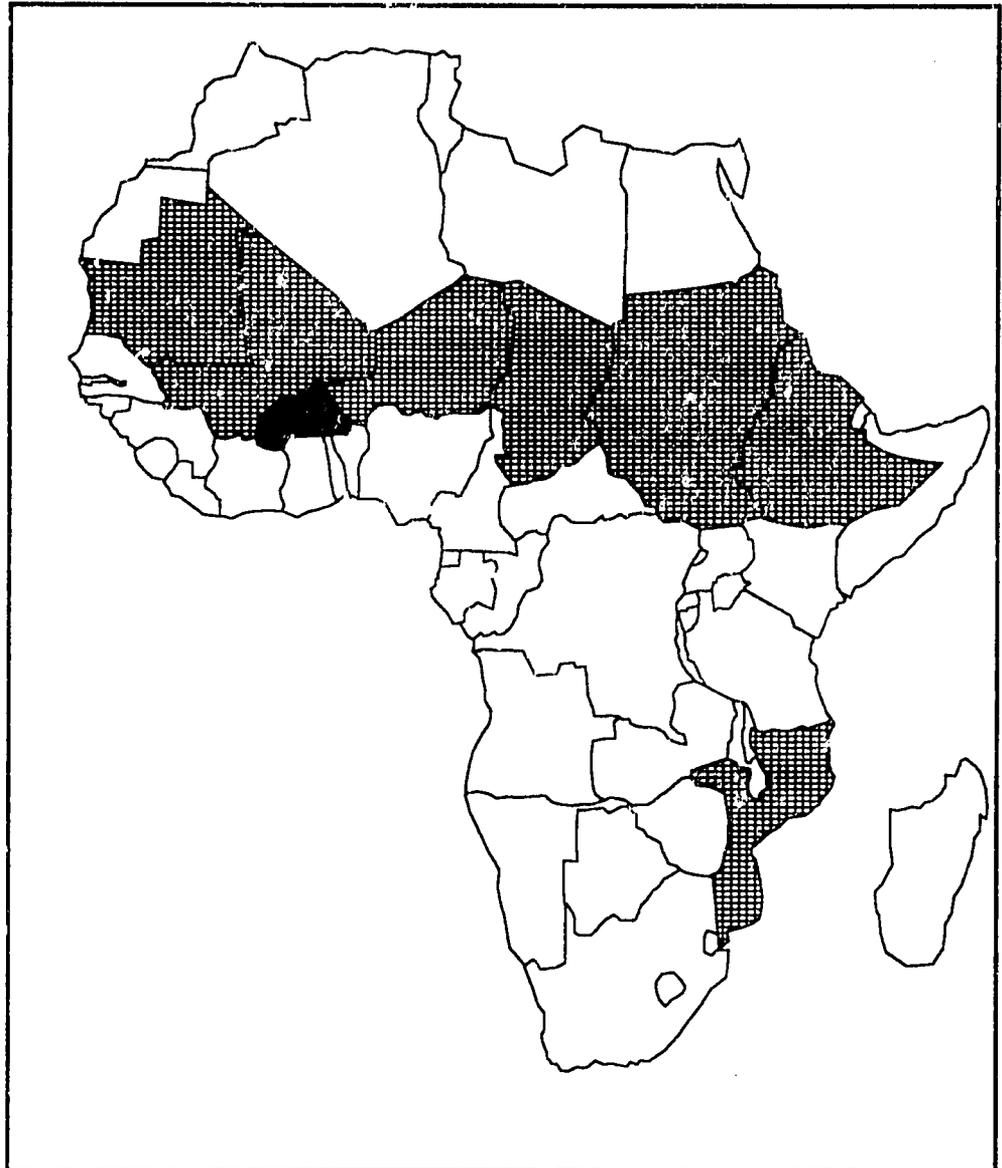


Report Number 3

December 1986

FEWS Country Report

BURKINA



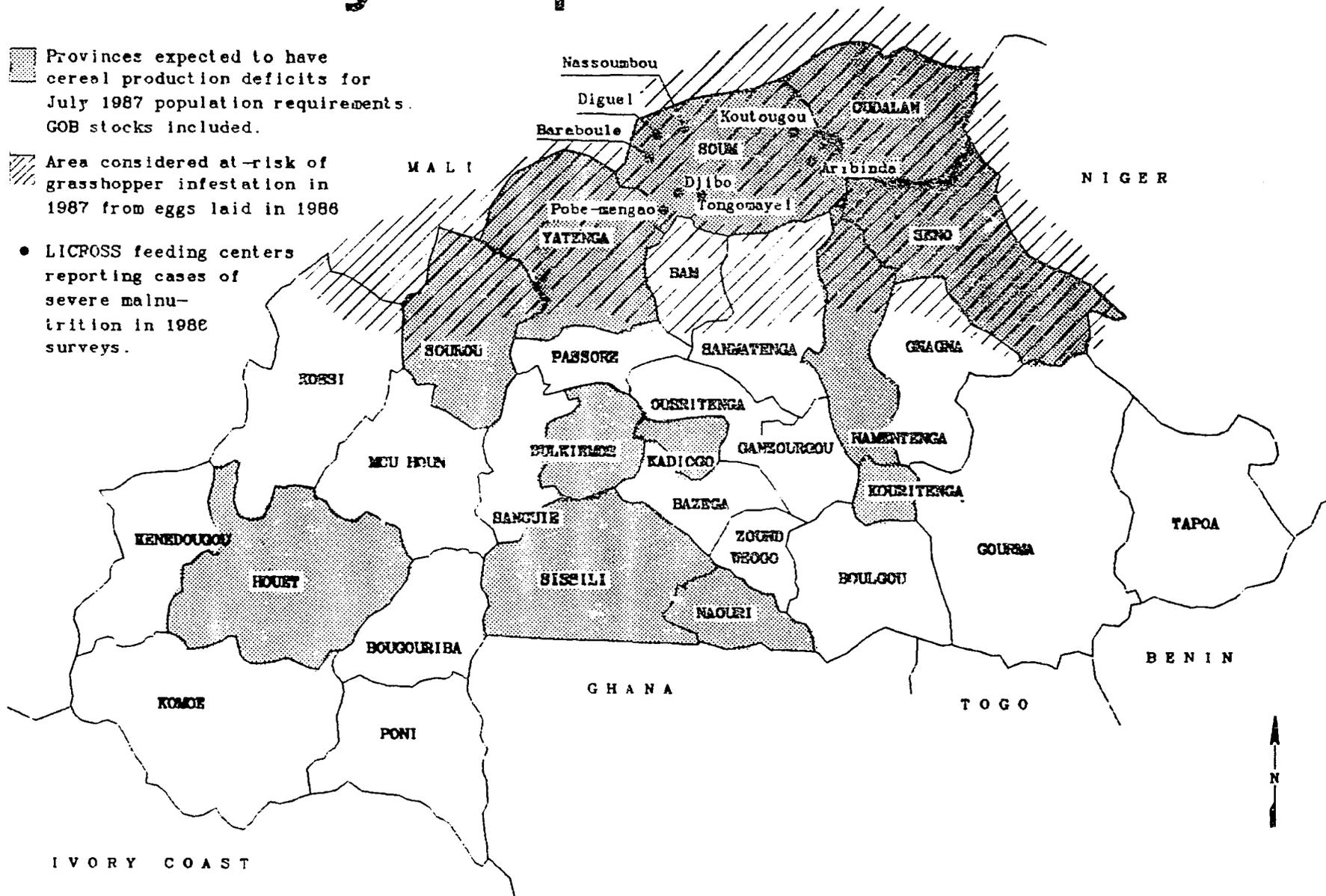
Africa Bureau
U.S. Agency
for International
Development

Summary Map

■ Provinces expected to have cereal production deficits for July 1987 population requirements. GOB stocks included.

▨ Area considered at risk of grasshopper infestation in 1987 from eggs laid in 1986

● LICROSS feeding centers reporting cases of severe malnutrition in 1986 surveys.



BURKINA

A Harvest of Plenty

Prepared for the
Africa Bureau of the
U.S. Agency for
International Development

Prepared by
Price, Williams & Associates, Inc.
December 1986

Contents

Page

i	Introduction
1	Summary
1	Crop Pests
2	1986 Harvest
5	Cereal Requirements
8	Malnutrition

List of Figures

Page

3	Table 1	Annual Cereal Production
4	Map 2	Estimated Cereal Production
6	Table 2	Estimated Food Supply
7	Map 3	Projected Surplus and Deficits
9	Map 4	Percent Cereal Requirements
10	Table 3	LICROSS Nutrition Survey
12	Chart 1	CRS Nutrition Survey
12	Map 5	CRS Nutrition Centers By Province
13	Appendix I	1986 Production, Sorghum Equivalents
14	Appendix II	1986 Production, By Crop
15	Appendix III	Estimated Cereal Requirements
16	Appendix IV	Estimated Cereal Surplus and Deficits

INTRODUCTION

This is the third of a series of monthly reports issued by the Famine Early Warning System (FEWS) on Burkina. It is designed to provide decisionmakers with current information and analysis on existing and potential nutrition emergency situations. Each situation identified is described in terms of geographical extent and the number of people involved, or at-risk, and the proximate causes insofar as they have been discerned.

Use of the term "at-risk" to identify vulnerable populations is problematical since no generally agreed upon definition exists. Yet it is necessary to identify or "target" populations in-need or "at-risk" in order to determine appropriate forms and levels of intervention. Thus for the present, until a better usage can be found, FEWS reports will employ the term "at-risk" to mean...

...those persons lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis, i.e., a progressive deterioration in their health or nutritional condition below the status quo and who, as a result, require specific intervention to avoid a life-threatening situation.

Perhaps of most importance to decisionmakers, the process underlying the deteriorating situation is highlighted by the FEWS effort, hopefully with enough specificity and forewarning to permit alternative intervention strategies to be examined and implemented. Food assistance strategies are key to famine avoidance. However, other types of intervention can be of major importance both in the short-term and in the long run, including medical, transport, storage, economic development policy change, etc.

Where possible, food needs estimates are included in the FEWS reports. It is important to understand, however, that no direct relation exists between numbers of persons at-risk and the quantity of food assistance needed. This is because famines are the culmination of slow-onset disaster processes which can be complex in the extreme.

The food needs of individual populations at-risk depend upon when in the disaster process identification is made and the extent of its cumulative impact on the individuals concerned. Further, the amount of food assistance required, whether from internal or external sources, depends upon a host of considerations. Thus the food needs estimates presented periodically in FEWS reports should not be interpreted to mean food aid needs, e.g., as under PL480 or other donor programs.

Acknowledgment is given to the FEWS Public Health Advisory team in Burkina for the timely and detailed data which are used in the analysis and discussion of crop pests, nutrition, food production and estimated food requirements contained in this report.

FEWS is operated by AID's Office of Technical Resources in the Bureau for Africa in cooperation with numerous USG and other organizations.

SUMMARY

The emergency grasshopper spraying program in Burkina ended in November, with a total of 232,973 ha treated through a combination of aerial and ground spraying. Agricultural losses from grasshoppers are expected to be less than one percent of Burkina's 1986 harvest. In November, an outbreak of raghuva caterpillars in the northern provinces threatened the millet harvest. Treatment against the scourge was unsuccessful, and localized losses in production are expected. The projected national production of cereals for the 1986 crop year is excellent, due primarily to sizable increases in estimated crop areas since the FEWS November Report. Based on crop yields and areas estimated by the Government of Burkina (GOB), the 1986 harvest should exceed the 1985 harvest by 19 percent. The estimated gross production, in sorghum equivalent cereals, is 1,899,000 mt. The net production of 1,602,100 mt, however, is 19,300 mt less than Burkina's population requires. Regional surpluses and deficits are still expected within Burkina, with deficits expected in southern and northern provinces, and surpluses expected in southwestern and southeastern provinces. Results from two nutritional surveys of children in Soum Province indicate high levels of malnutrition as recently as August of 1986.

Key Issues

- o The 1986 harvest is expected to be an increase of 19 percent over 1985. With 97,000 mt remaining in GOB reserves from the 1985 harvest, and a projected 1986 surplus of 486,400 mt, Burkina will likely face logistical problems in the storage of regional surpluses for redistribution to deficit areas.

December Indicators

- o The annual cereal harvest is normally completed in December, and final results of the 1986 agricultural campaign should soon become available.
- o The International League of Red Cross plans to discontinue a feeding program in Soum Province in December, as the harvest is expected to make alternative sources of food available.

CROP PESTS

On November 1, Burkina's 1986 emergency grasshopper spraying operations ended. Although 200,000 ha were originally targeted for treatment in early September, a total of 232,973 ha were eventually treated by airplane and ground teams. Approximately 212,080 hectares, roughly twice the area originally targeted for aerial spraying, were treated by airplanes around the Dori, Djibo and Ouahigouya areas. Ground teams covered 20,900 ha which is 21 percent of the 100,000 ha originally targeted for ground treatment. The increase in coverage

by airplane, however, offset the shortfall in area covered by ground teams. The GOB Ministry of Agriculture estimates that agricultural losses due to grasshopper damage will be less than 1 percent (18,990 mt) of overall gross cereal production. According to the UNFAO and donor countries which supported the 1986 grasshopper campaign in Burkina, the cost of the control effort was approximately \$8.40 per hectare.

The threat posed to Burkina's 1987 crops by grasshopper eggs laid this year is cause for concern (Map 1). The GOB estimates nearly 300,000 ha are at-risk of grasshopper infestation, whereas the USAID Mission estimates 466,000 ha, nearly twice the 1986 affected area, could face serious infestation. Information obtained from density surveys conducted in 1986 will provide the basis for identifying areas which must be monitored in 1987.

According to a two-phase GOB Ministry of Agriculture plan for 1987, 150,000 ha are to be treated at the beginning of the agricultural season in April, and 300,000 ha are to be treated near the end of the 1987 agricultural year. During the April campaign, farmers and ground teams will treat 50,000 ha using dusting bags and vehicle-mounted sprayers, while three helicopters provide density surveys and aerial treatment for an additional 100,000 ha. In late September or early October, according to the GOB plan, ground crews will treat 25,000 ha and aircraft will treat an additional 275,000 ha. This second phase of the campaign calls for three small spray airplanes and two helicopters to be utilized for spraying and field survey operations.

The 1986 millet crop suffered from an outbreak of raghuva caterpillars in late October and early November. The zone of infestation reportedly stretched from Yatenga Province in the northwest to Seno Province in the northeast, and included areas within Sanmatenga Province. According to field reports, treatment with unspecified resources proved to be ineffective. Although no estimates are available, localized losses in production are expected in the affected provinces.

1986 HARVEST

The first official 1986 GOB Ministry of Agriculture crop production estimates were released in mid-October, and are presented in this report. The USAID Mission in Ouagadougou has adopted these production estimates for use in the analysis of 1987 food aid for Burkina. According to the GOB figures, Burkina will reap a bountiful 1,899,000 metric tons of sorghum equivalent cereals in 1986. This estimate is 235,400 mt (14%)

greater than the estimate in the FEWS November Report. Approximately 9 percent of this increase is attributed to increases in the GOB estimate of crop areas under cultivation, and the remainder is attributable to changes in estimated crop yields (Appendix I). According to the current GOB estimate of gross production, the total 1986 tonnage for all cereals should exceed the 1985 harvest by approximately 19 percent, and the 1984 harvest by 73 percent (Table 2). Due to reductions in crop areas, rice production is expected to decrease from 1985, with only 55 percent of last year's harvest expected in 1986.

Table 1 B. Burkina Annual Cereal Production.
(Thousands of Metric Tons, Gross Production)

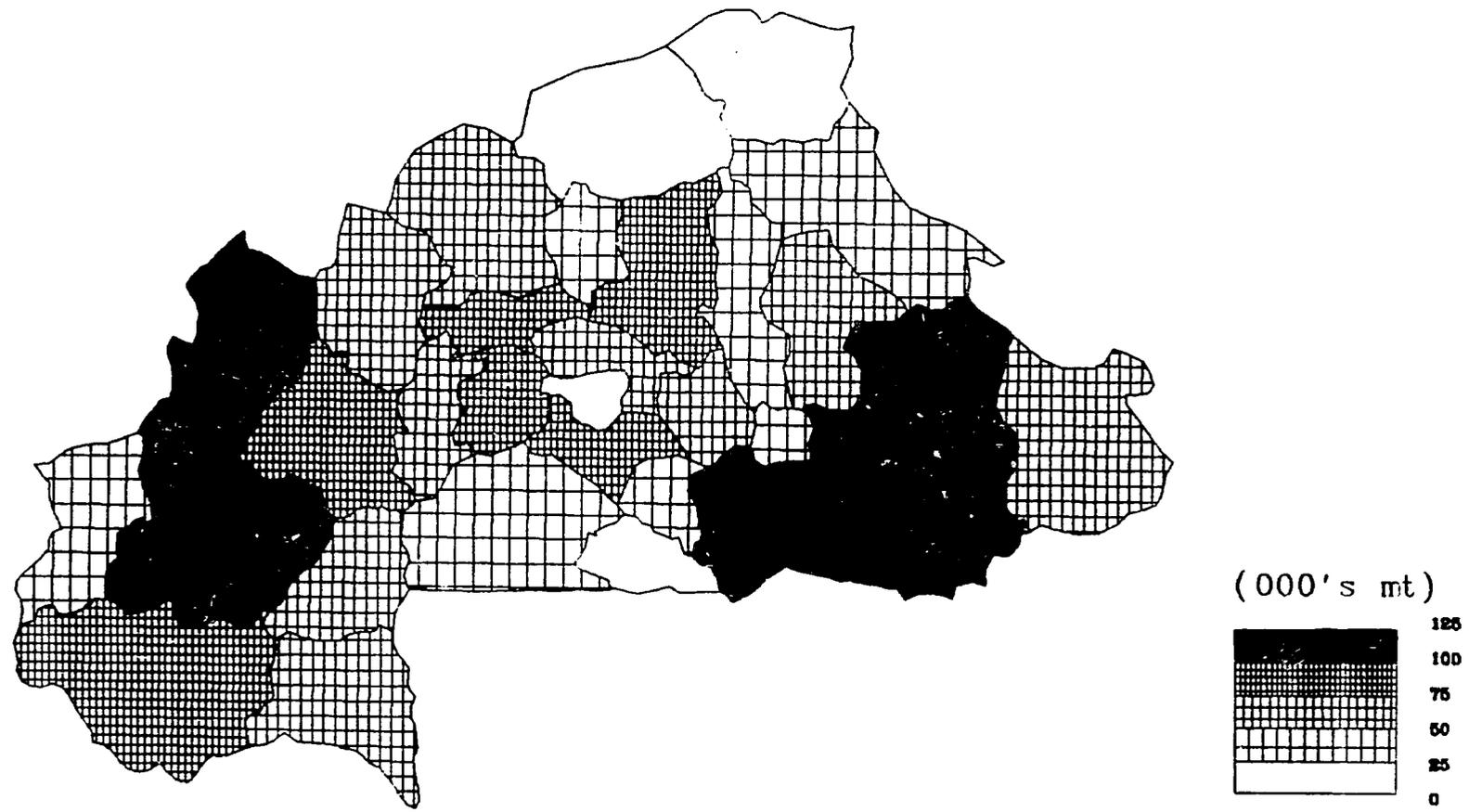
Crop	1984	1985	Est. 1986	% Of 1984	% Of 1985
Sorghum	597.9	796.5	1,011.5	169.2	127.0
Millet	416.8	586.6	687.5	165.0	117.2
Maize	62.2	142.6	159.7	256.8	112.0
Rice	16.1	50.9	28.4	176.4	55.8
Total	1,093.0	1,576.6	1,887.1	172.7	119.7

Source: "Report on the Situation of the 1986-1987 Agricultural Campaign as of September 30", GOB Ministry Of Agriculture.

Compared with the FEWS November Report, production estimates have significantly increased in the provinces of Kouritenga (+276%), Ganzourgou (+181%), Passore (+153%), Namentenga (+145%), Tapoa (+137%), Zoundwego (+55%), and Sissili (+52%), due primarily to sizable increases in the estimated areas under cultivation. Decreases in harvests are expected in Naouri (-42%), Gnagna (-22%), Houet (-15%), Sourou (-13%), and Bulkiemde (-10%), as a result of reductions in both yield estimates and crop areas. Of the 30 provinces in Burkina, 26 are expected to exceed the 1985 sorghum equivalent harvest (Appendix I).

The highest cereal production is expected in the southwestern provinces which comprise the Hauts-Bassins and Volta-Noire regions of Burkina where good soils and rainfall contribute to high yields. In this area, the provinces of Houet, Kossi, Komoe, and Mou Houn are expected to produce harvests exceeding 75,000 mt (Map 2). In the southeastern region of Burkina, the provinces of Gourma and Boulgou are expected to produce over 100,000 mt of cereals due to high yields and large areas under cultivation (Appendix II). According to the GOB estimates, harvests of less than 25,000 mt are expected

Estimated 1986/1987 Crop Production Sorghum Equivalents



FEWS/PWA, December 1986

in the provinces of Naouri, Kadiogo, Soum, and Oudalan. The extreme northern provinces of Soum, Seno, and Oudalan, according to the GOB estimates, should expect larger millet harvests than 1985, but due to low yields in the arid climate, the harvest will not be large. Kadiogo Province, which contains the urban population of Ouagadougou, does not have large cereal crop areas. Conversely, the surrounding central Burkina provinces of Passore, Bulkiemde, and Bazega are expected to have sizable harvests due to a combination of average yields and large crop areas. The south-central border province of Naouri does not have large areas under cereal cultivation, but good yields are expected in the province.

CEREAL REQUIREMENTS

Burkina will require approximately 1,621,500 mt of cereals to feed an estimated July 1987 population of 8,445,122 people through 1987 (Appendix III). This requirement assumes an average national cereal consumption of 192 kg per person per year, as estimated by the USAID Mission in Ouagadougou. Consumption of cereals probably varies within Burkina depending upon regional variations in traditional diets, as well as the availability (or lack thereof) of alternative food sources. However, data on per capita cereal consumption are not currently available at the province level.

The estimated gross 1986 cereal production of 1,899,000 mt, when adjusted for waste and milling losses (16%), should result in a net production of 1,602,100 mt of sorghum equivalent cereals. The net production, without accounting for stocks and commercial imports, is approximately 19,300 mt less than the population's cereal requirement. Although Burkina is likely to produce 19 percent more cereals than in 1985, the net harvest is still 1.2 percent less than the population's cereal requirements (Appendix IV).

In November, the National Cereal Marketing Board (OFNACER) estimated there were 96,100 mt of cereal reserves in the form of both stabilization and security stocks. In addition to OFNACER stocks, there are an estimated 340,000 mt of private, donor, and on-farm cereal stocks in the country (Table 3). In Burkina, donor stocks are comprised of World Food Program (WFP) and Catholic Relief Services (CRS) reserves. With planned commercial imports of 50,000 mt, and additional expected donor imports of 19,700 mt, the total cereal surplus is likely to be approximately 486,400 mt for the crop year 1986 (See also Appendix IV).

The estimate for gross 1986 cereal production does not account for potential crop damage from pests such as

grasshoppers. The GOB estimates that one percent of the 1986 gross crop production may have been lost to grasshoppers which, assuming the GOB crop production estimate is correct, would be equivalent to 18,990 mt of cereals. Additional localized millet losses may result from the raghuva caterpillar outbreak in the northern provinces.

Table 2 Estimated Food Supply In Metric Tons

Estimated Net Production (Sorghum Equivalent)		1,602,100
Stocks		
GOB	96,100	
Private	30,000	
Donor	10,000	
On-Farm	300,000	
Subtotal		436,100
Imports		
GOB Wheat	30,000	
GOB Rice	20,000	
Private Donor	19,700	
Subtotal		69,700
Total Estimated Supply		2,107,900
Total Estimated Needs		1,621,500
Estimated Cereal Surplus		486,400

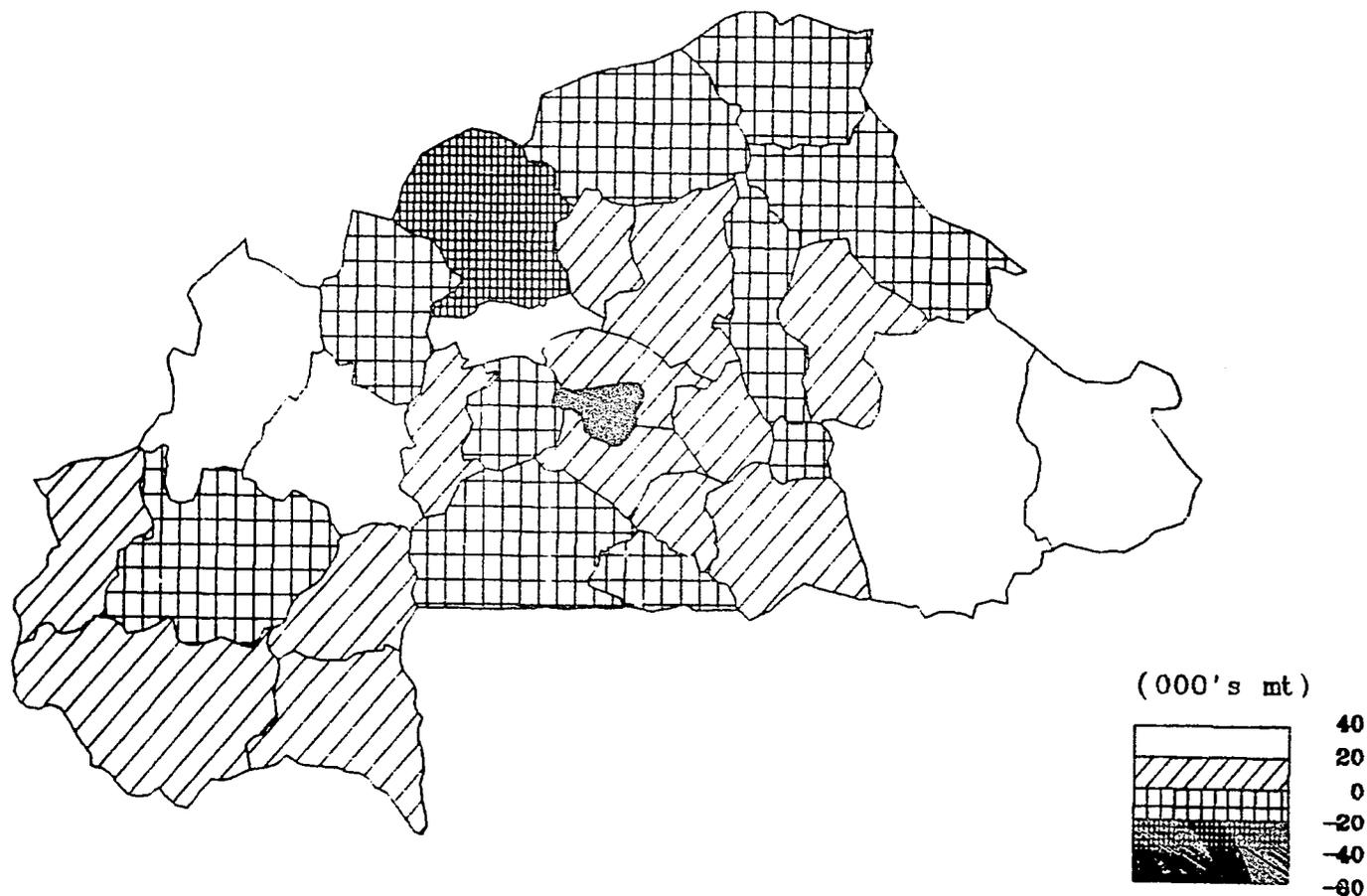
Sources: Production from GOB Ministry of Agriculture.
Stock estimates from USAID and GOB/OFNACER.

If official OFNACER stocks are added to the estimated 1986 cereal production, the 1986/1987 cereal balance will be a surplus of 76,800 mt (Appendix IV). But, there are expected to be sizable provincial deficits of cereals due to anticipated production not meeting estimated demand and inadequate GOB cereal stocks in provinces with projected production deficits (Map 3). According to current forecasts, 12 provinces will experience cereal deficits in 1986.

Kadiogo Province faces the highest cereal production deficit (-58,300 mt) owing to the agriculturally unproductive urban population in the capital of Ouagadougou. Yatenga (-36,500 mt) and Soum (-19,900 mt) are also projected to be major deficit producing provinces due to estimated production not supplying population requirements. Yatenga ranks eleventh out of 30 provinces in the size of expected harvest, but the sizeable population creates a deficit situation. Perhaps more significantly,

Estimated 1986/1987 Cereal Surplus & Deficit

Sorghum Equivalents, GOB Stocks Included



FEWS/PWA, December 1988

Houet Province ranks first in the size of its expected harvest, yet it is not expected to harvest enough cereals to meet the needs of its population.

If the projected food deficit is expressed as a percentage of a province's cereal requirements, Kadiogo Province has the most severe deficit, with 58.3 percent less than is required by its population (Map 4). Other provinces with deficits greater than 15 percent of cereal requirements include Oudalan (-52.7%), Soum (-50.4%), Yatenga (-34.3%), Seno (-19.5%), Sissili (-18.1%) and Namentenga (-17.6%). These deficit provinces should be considered as targets for the redistribution of food from provinces expecting large surplus harvests, such as Tapoa (65.8%), Gourma (61.3%), Mou Houn (47.3%), and Passore (46.6%). The surplus and deficit pictures presented in Maps 3 and 4 reflect estimated 1986 production and OFNACER cereal stocks by province. The distribution of the estimated private, donor and on-farm stocks is not available. As a result, these maps reflect a partial picture of the projected cereal surplus and deficit by province, since nearly 340,800 mt of stocks are not accounted for in these maps. Other factors not accounted for include regional variations in cereal consumption, alternative sources of food, and redistribution of cereals as a result of regional trade.

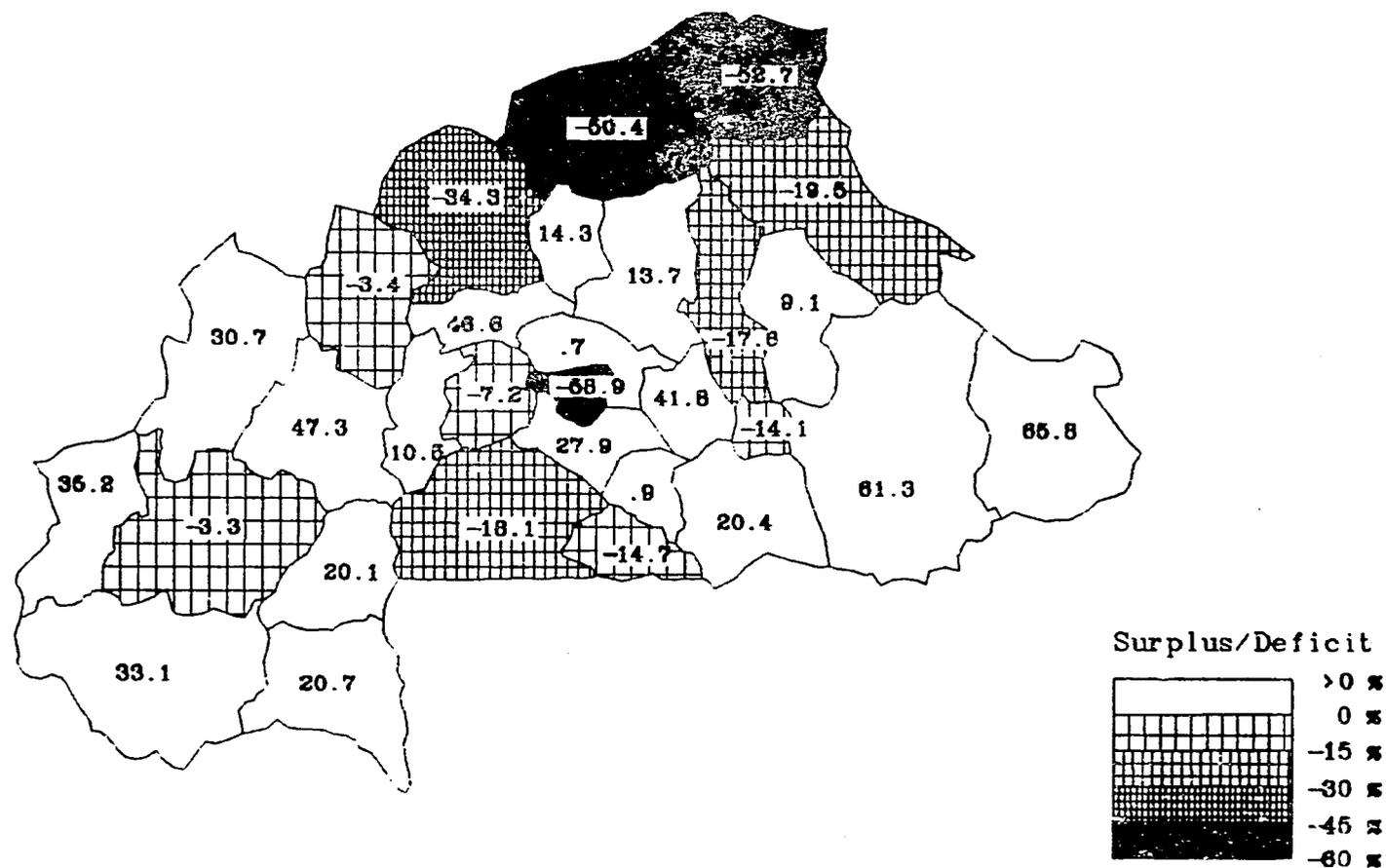
MALNUTRITION

Since July 1985, the International League of Red Cross and Red Crescent Societies (LICROSS) has managed an emergency feeding program in Soum Province. Between June and August 1986, a monthly average of 31,000 dry rations were distributed. In September approximately 75,000 rations were distributed. This sizable increase in demand for rations from the preceding monthly averages might be attributed to the food shortages which normally occur prior to the annual harvest. Seasonal food shortages are often pronounced in the arid climate of Burkina's extreme northern provinces, where harvests are usually insufficient to meet population requirements. The LICROSS distribution of dry rations is scheduled to end in December. Given the rather poor 1986 harvest forecast for Burkina's northern provinces, a 1987 feeding program in Soum Province may still be necessary.

In March 1986, LICROSS opened 51 Centers of Recuperation and Nutritional Education (CREN) throughout Soum. Until the centers were closed in late July and early August, nearly 6,000 children and adults were treated for malnutrition. As part of the 1986 emergency feeding program, LICROSS conducted two nutritional surveys of children in Soum Province. The first survey, conducted

Estimated 1986/1987 Cereal Surplus & Deficit

Expressed As A Percent Of Food Requirements
GOB Stocks Included



FEWS/PWA, December 1986

between March and June prior to the feeding program, included people from villages designated by the Agricultural Service to be experiencing cereal deficits. However, several villages with self-proclaimed cereal deficits also volunteered for the feeding program. A second survey, conducted between August and September when the feeding program was underway, included all villages in Soum Province. Therefore, the two surveys did not sample the same populations. In both surveys, the weight and height of all children under 115 centimeters were recorded. The weight-to-height ratio of each child was compared to a weight/height chart based on the Harvard Standard, in order to determine the severity of malnutrition.

Preliminary LICROSS survey results are presented in Table 3 for villages included in both surveys (see also, Map 1). Results from the first survey of the Djibo Subsector were later adjusted in order to conform to standards used in other departments, and should be considered as estimates. Children with less than 80% of weight-to-height ratios are generally considered to be severely malnourished. In most Sahelian countries this level of malnutrition usually affects less than 10 percent of rural children. Results from the LICROSS surveys in Soum Province indicate child malnutrition rates which are among the highest reported for sedentary, non-refugee populations in Africa. LICROSS personnel speculate that continued high rates of malnutrition in the Arabinda Subsector may be due to a delay in implementing a feeding program within the department.

**Table 3 LICROSS Nutrition Surveys, Soum Province, 1986.
Percent of Children with Less Than 80 Percent
Weight-to-Height Ratio.**

	March-June	August-Sept.
Arabinda Subsector		
Arabinda	21	23
Koutougou	34	16
Tongomayei	22	19
Djibo Subsector		
Diguel	22	6
Djibo	23	13
Baraboule	19	12
Nassoumbou	21	11
Pobe-Mengao	15	7

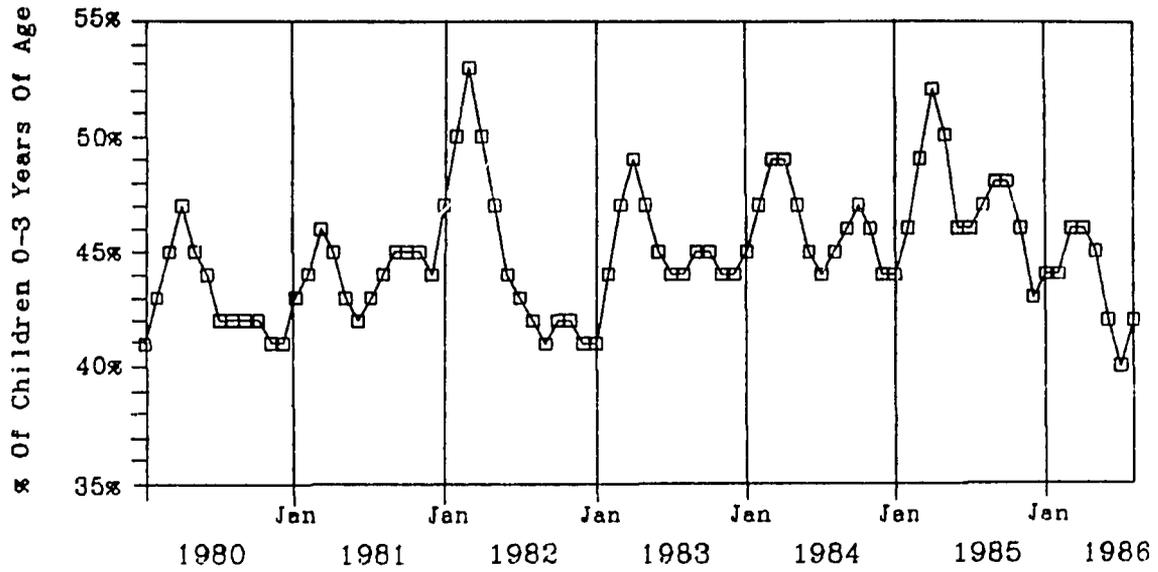
Source: FEWS/Burkina October 1986 Report.

Catholic Relief Services (CRS) also administers a food and nutrition program in Burkina. Centers operated by CRS monitor child growth, demonstrate food preparation, provide educational sessions, and distribute food to mothers and infants less than three years of age. Between July and September 1986, CRS operated 172 centers in 23 provinces, serving an average of 72,769 children per month (Map 5).

Since 1980, CRS has recorded weight and age data for children between 0 and 3 years of age at all CRS centers in Burkina. The data are not necessarily representative of Burkina since samples were not collected randomly throughout Burkina. Mothers and their children voluntarily request assistance of the CRS programs. A higher incidence of child malnutrition might be recorded at CRS centers than would be found in a random sample, since the more severely affected cases would tend to seek assistance. The data, however, are useful for viewing the temporal nature of trends in child malnutrition as recorded at the CRS centers.

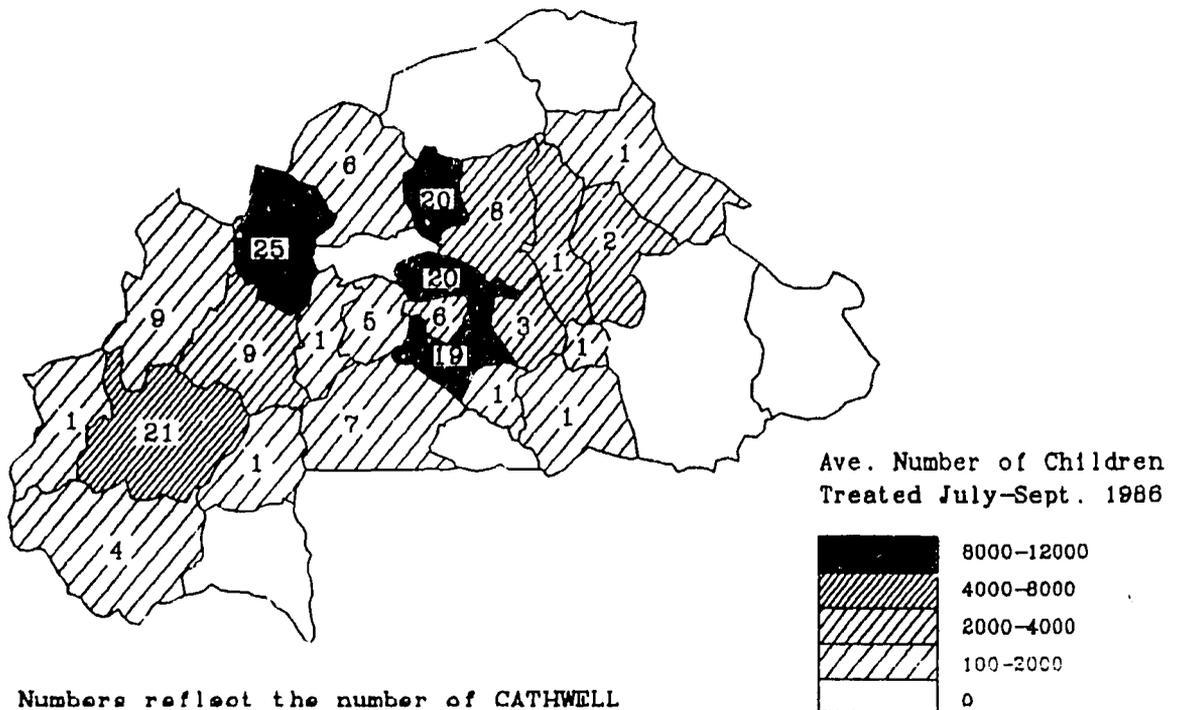
Over one half of the children treated at CRS centers had less than 80 percent of weight for age requirements in the beginning of 1982 and 1985 due to the poor harvests in 1981 and 1984 respectively (Graph 1). In contrast, the lowest percentage (40%) was recorded in July of 1986, following the good harvest in 1985. A seasonal trend evident in the graph occurs each year between March and April, when the highest percentage of malnutrition is recorded. Conversely, the lowest percentages of malnutrition occur in July and December. This annual cycle of malnutrition is contrary to what would normally be expected. Food reserves which are stockpiled from an end-of-year harvest should reduce cases of malnutrition in the beginning of the following year, whereas a gradual increase in malnutrition would be expected as the next harvest approaches and stockpiles from previous harvests dwindle. The malnutrition cases reported by CRS are from a population of children between 0 and 3 years of age, and their consumption may be more related to the availability of milk than of cereal. The annual March-April peak in malnutrition might also be related to the dry season which is usually most pronounced in March. It is possible that, due to water shortages, the use of unpurified water from sources with high bacterial content would result in increases in the incidence of diarrhea which, if severe, would result in cases of malnutrition. The graph may also reflect the effect of CRS feeding programs which provide food through the lean months lasting from April through August when expected cases of malnutrition would be at high levels.

Chart 1: Percent Of Children With Less Than 80 Percent Weight For Age Requirements, 1980 - 1986.



Source: Catholic Relief Services (CATHWELL) data collected from children treated at CATHWELL Nutritional Centers.

Map 5: CATHWELL Nutritional Centers By Province, 1986



Numbers reflect the number of CATHWELL Nutrition Centers per province.

FEWS/PWA, December 1986

APPENDIX I

BURKINA 1986/1987 ESTIMATED CEREAL PRODUCTION

In Sorghum Equivalence, Thousands of Metric Tons

Province	1984	1985	NOVEMBER FORECAST	NOAA ESTIMATE	GOB ESTIMATE	% DIFFERENCES FROM GOB 1986			
						NOAA ESTIMATE	NOVEMBER ESTIMATE	1984	1985
BAM	18.8	33.3	36.0	36.8	44.2	-16.8	-18.6	-67.6	-24.7
BAZEGA	66.6	81.3	91.6	91.4	93.9	-2.7	-2.6	-39.8	-13.4
BOUGOURIBA	44.3	68.7	66.0	66.6	60.3	-6.2	-7.2	-26.6	-2.7
BOULGOU	46.2	102.6	97.6	103.1	114.6	-10.0	-14.9	-60.6	-10.6
BULKIEMDE	47.8	80.2	86.1	86.3	76.3	11.9	11.6	-37.4	6.2
COMDE	77.2	81.9	77.7	93.6	83.6	11.9	-7.0	-7.6	-1.9
GANZOURGOU	20.6	46.6	23.7	64.8	66.6	-17.8	-64.6	-69.2	-30.1
GNAGNA	7.4	67.2	77.3	71.2	60.2	16.3	28.6	-87.8	-4.9
GOURMA	34.3	61.1	98.4	96.7	107.6	-10.0	-8.6	-68.1	-62.6
HOUET	87.9	140.9	147.6	124.8	124.9	-0.1	18.2	-29.6	12.8
KADIOGO	21.4	6.3	9.9	9.9	9.7	1.6	1.7	120.3	-46.3
KENEDOUGOU	38.7	40.7	49.2	48.7	46.3	7.7	8.8	-14.6	-10.
KOSSI	63.8	86.0	84.3	84.0	104.2	-19.4	-19.1	-38.8	-17.6
KOURITENGA	26.6	36.3	9.8	41.3	36.8	12.3	-73.4	-30.4	-4.1
MOU HOUN	68.2	78.2	77.9	77.1	89.0	-13.3	-12.4	-23.3	-12.0
NAHOURI	16.8	18.2	34.3	16.6	20.0	-21.8	71.8	-20.8	-9.0
NAWENTENGA	26.3	16.6	15.7	34.3	38.4	-10.8	-69.2	-31.6	-69.6
OUBRITENGA	37.0	71.7	76.2	76.2	71.7	4.8	6.0	-48.4	0.0
OUDALAN	0.9	12.2	9.0	10.6	12.1	-12.6	-26.3	-92.6	1.1
PASSORE	42.7	66.3	30.4	79.1	76.8	3.1	-60.4	-44.3	-26.7
PONI	46.6	63.3	62.4	62.4	61.8	1.0	1.0	-24.6	-13.7
SANGUIE	24.6	46.6	63.7	69.9	66.4	6.2	-4.8	-66.6	-17.6
SANMATENGA	68.3	67.8	71.6	72.1	96.3	-26.2	-26.7	-39.6	-29.7
SENO	11.4	37.1	26.8	24.4	38.6	-36.6	-30.4	-70.4	-3.6
SISSILI	27.1	39.7	32.6	43.9	46.4	-11.1	-34.1	-46.1	-19.6
SOLU	17.7	10.6	20.9	16.6	23.1	-32.4	-9.6	-23.3	-64.0
SOUROU	36.4	68.6	74.9	72.6	62.3	16.6	20.2	-41.6	-6.0
TAPOA	30.4	33.7	26.8	47.2	63.6	-26.8	-67.8	-62.1	-46.9
YATENGA	29.4	60.7	83.0	76.6	73.6	7.9	12.4	-60.2	-17.7
ZOUNDWEGOU	36.6	31.6	24.6	31.4	37.9	-17.2	-36.4	-3.9	-17.1
BURKINA	1,098.4	1,592.7	1,663.6	1,799.1	1,899.0	-6.3	-12.4	-42.2	-16.1

Sources:

- (1) 1984 and 1985 cereal production from GOB Ministry of Agriculture Reports, as provided in FEWS/Burkina October Reports. 1986 estimated production from "Report on the 1986-1987 Agricultural Campaign as of Sept. 30" by GOB Ministry of Agriculture, as reported in FEWS/Burkina October Report.
- (2) 1986 estimated crop areas from "Report On The Situation of The 1986-1987 Agricultural Campaign", GOB Ministry of Agriculture as of Sept. 30, and provided in FEWS/Burkina October Report.
- (3) NOAA crop yields for maize, millet and sorghum from "Burkina Faso Yield Forecast", NOAA/NESDIS/AISC, Assessment Number 2 issued October 29. Rice production, included in NOAA column, from GOB Sept. 30 estimate since NOAA did not forecast rice yields. Therefore, rice estimate is constant in both NOAA and GOB estimates.
- (4) Sorghum equivalents is a calorific conversion of all cereals to a sorghum equivalent harvest, where:

$$\text{Tons Sorghum} = \frac{(\text{Psg} \cdot \text{Csg}) + (\text{Pml} \cdot \text{Cml}) + (\text{Pmz} \cdot \text{Cmz}) + (\text{Pri} \cdot \text{Crl})}{\text{Csg}}$$

Sorghum Csg=3052 Maize Cmz=3167
Millet Cml=3052 Rice Crl=3687
Psg, Pml, Pmz, Pri = Unit production of each cereal.

APPENDIX II

BURKINA 1986/1987 ESTIMATED CEREAL PRODUCTION

PROVINCE	SORGHUM			MILLET			MAIZE			RICE		
	Yield (kg/ha)	Area (ha)	Prod. (000 mt)									
BAM	591	38,626	22.8	563	34,478	19.4	516	2,818	1.5	888	614	0.4
BAZEGA	800	66,642	52.2	600	62,041	37.2	700	4,268	3.0	902	317	0.3
BOUGOURIBA	815	38,177	31.1	620	30,222	18.7	1300	6,831	8.6	1200	1,035	1.2
BOULGOU	836	61,000	42.6	707	86,666	61.3	768	6,963	6.3	1309	3,285	4.3
BULKIEMDE	594	79,447	47.2	604	43,986	26.6	517	4,133	2.1	727	377	0.3
COMOE	973	22,461	21.9	948	16,181	15.3	1096	27,963	30.6	2026	5,952	12.1
GANZOURGOU	908	66,097	60.0	709	21,978	15.6	514	1,092	0.6	878	369	0.3
GNAGNA	600	60,760	30.5	500	63,620	26.8	800	3,020	2.4	1000	340	0.3
GOURMA	803	70,020	56.2	676	67,498	46.6	709	7,002	6.0	1042	474	0.5
HOUET	1067	70,800	76.6	760	23,470	17.6	1241	23,790	29.5	1021	880	0.9
KADIOGO	700	8,421	5.9	650	6,610	3.6	599	222	0.1	800	30	0.0
KENEDOUGOU	985	21,630	21.3	854	7,070	6.0	1066	15,680	16.6	1122	500	0.6
KOSSO	1079	61,870	66.0	772	49,080	37.9	1196	7,910	9.5	1334	360	0.5
KOURITENGA	681	26,286	17.2	536	30,674	16.4	680	3,766	2.6	961	461	0.4
MOU HOUN	969	64,490	62.6	668	29,260	19.6	1296	4,966	6.4	570	379	0.2
NAHOURI	900	9,373	8.4	850	11,959	10.2	900	1,168	1.0	1000	233	0.2
NAHENTENGA	547	36,516	20.0	528	32,548	17.2	474	2,367	1.1	723	173	0.1
OUBRITENGA	700	62,871	37.0	600	64,604	32.7	800	2,096	1.7	803	238	0.2
OU DALAN	300	2,624	0.8	300	37,649	11.3						
PASSORE	663	68,948	46.7	623	44,462	27.7	566	6,628	3.1	966	143	0.1
PONI	772	41,497	32.0	600	27,464	16.5	900	13,246	11.9	860	847	0.7
SANGUE	633	68,069	36.8	622	29,944	18.6	502	1,494	0.8	575	363	0.2
SANMATENGA	674	83,149	66.0	596	67,904	34.4	777	4,886	3.6	1467	1,099	1.6
SENO	562	26,641	14.9	369	63,364	23.4	460	347	0.2	667	6	0.0
SIBILLI	771	37,446	28.9	639	20,886	13.3	1008	6,216	6.4	830	682	0.6
SOUM	337	17,961	6.1	319	62,801	16.9	260	260	0.1	2148	41	0.1
SOUROU	676	47,739	32.3	610	47,990	29.3	876	632	0.6	1303	99	0.1
TAPOA	948	46,106	43.7	729	22,146	16.1	1314	2,316	3.0	1446	336	0.6
YATENGA	617	62,600	32.3	433	91,000	39.4	396	3,430	1.4	731	800	0.6
ZOUNDWEOGO	900	25,344	22.8	760	17,108	12.8	800	1,179	0.9	1600	730	1.1
TOTALS	760	1,331,098	1011.6	686	1,173,631	687.6	966	166,342	169.7	1,369	20,912	28.4

Source:

(1) 1986 Crop Areas from "Report on the Situation of the 1986-1987 Agricultural Campaign as of September 30", GOB Ministry of Agriculture as reported in FEWS/Burkina October Report.

APPENDIX III
ESTIMATED CEREAL REQUIREMENTS
BURKINA, 1987

Province	1985 Growth Rates	Estimated Population July 1987	Estimated Population Dec. 1987	(Thousands of mt)	
				Cereal Needs July 1987	Cereal Needs Dec. 1987
BAM	0.012	170,421	171,438	32.7	32.9
BAZEGA	0.027	324,578	328,902	62.3	63.1
BOUGOURIBA	0.018	233,041	235,119	44.7	45.1
BOULOGOU	0.027	424,953	430,614	81.6	82.7
BULKIEMDE	0.014	376,796	378,415	72.3	72.8
COMOE	0.032	265,431	269,611	51.0	51.8
GANZOURGOU	0.025	207,456	210,017	39.8	40.3
GNAONA	0.032	243,463	247,297	46.7	47.5
GOURMA	0.032	312,923	317,851	60.1	61.0
HOUET	0.040	633,560	645,082	121.6	124.0
KADIOGO	0.068	515,552	532,505	99.0	102.2
KENEDOUGOU	0.027	147,271	149,232	28.3	28.7
KOSSI	0.029	352,401	357,438	67.7	68.6
KOURITENGA	0.025	207,257	209,815	39.8	40.3
MOU HOUN	0.029	307,715	312,113	59.1	59.9
NAHOURI	0.026	110,892	112,315	21.3	21.6
NAHMENTENGA	0.014	206,166	207,599	39.6	39.9
OUBRITENGA	0.014	314,563	316,749	60.4	60.8
OUDALAN	0.028	112,819	114,376	21.7	22.0
PASSORE	0.008	231,691	232,614	44.5	44.7
PONI	0.018	244,648	246,830	47.0	47.4
SANGUIE	0.014	225,628	227,197	43.3	43.6
SANMATENGA	0.018	385,822	389,264	74.1	74.7
SENO	0.028	246,382	249,764	47.3	48.0
SISSILI	0.036	265,577	270,273	51.0	51.9
SOUM	0.028	205,503	208,341	39.5	40.0
SOUROU	0.029	285,299	289,376	54.8	55.6
TAPCA	0.032	169,134	171,797	32.5	33.0
YATENGA	0.008	554,140	556,347	106.4	106.8
ZOUNDWEOGO	0.022	164,059	165,844	31.5	31.8
TOTALS		8,445,122	8,556,038	1,621.5	1,642.8

Source and Notes:

- (1) Estimated populations from provisional report of 1985 census issued by the GOB National Institute of Statistics and Demography, April 1986.
1985 province populations prorated by provincial growth rates to estimate 1987 July and December populations.
- (2) Per Capita Ration of 192 kg/person/year as estimated by USAID/Burkina.

APPENDIX IV
ESTIMATED CEREAL BALANCE, BURKINA 1986/1987

Province	ESTIMATED NET PRODUCTION (000 mt)				JULY 1987 PRODUCTION BALANCE (Deficit or Surplus)			G.O.B. Cereal Stocks (000 mt)	JULY 1987 BALANCE ADJUSTED (G.O.B. Stocks included)		
	Sorghum/ Millet		Sorghum Rice Equivalent		(000 s)	kg/ person	% Of 192 kg		(000 s)	kg/ person	% Of 192 kg
	mt	person	mt	person	mt	person	mt		person	mt	person
BAM	35.9	1.2	0.2	37.4	4.7	27.4	14.3%	0.0	4.7	27.4	14.3%
BAZEGA	76.9	2.5	0.1	79.7	17.4	53.5	27.9%	0.0	17.4	53.5	27.9%
BOUGOURIBA	42.4	7.3	0.6	50.7	6.0	26.7	13.4%	3.0	9.0	38.5	20.1%
BOULGOU	88.3	4.5	2.2	95.0	14.0	33.0	17.2%	2.6	16.6	39.1	20.4%
BULKIENDE	62.7	1.8	0.1	64.7	-7.6	-20.2	-10.6%	2.4	-5.2	-13.6	-7.2%
COMDE	31.6	26.0	6.0	36.9	14.9	56.3	29.3%	1.9	16.8	63.5	33.1%
GANZOURGOU	55.8	0.5	0.2	56.5	16.6	80.2	41.1%	0.0	16.6	80.2	41.8%
GNAGNA	48.7	2.1	0.2	51.0	4.3	17.5	9.1%	0.0	4.3	17.5	9.1%
GOURMA	86.5	4.2	0.2	91.2	31.1	99.5	51.8%	5.7	36.8	117.7	61.3%
HOUET	79.2	25.1	0.4	105.8	-15.9	-25.1	-13.0%	11.9	-4.0	-6.3	-3.3%
KADIOGO	8.1	0.1	0.0	8.2	-90.7	-176.0	-91.7%	32.4	-58.3	-113.2	-58.9%
KENEDOUGOU	23.2	14.1	0.3	38.2	10.0	67.6	35.2%	0.0	10.0	67.6	35.2%
KOSSI	79.8	8.0	0.2	88.4	20.7	68.9	30.7%	0.0	20.7	68.9	30.7%
KOURITENGA	28.6	2.2	0.2	31.1	-8.7	-41.9	-21.8%	3.1	-5.6	-27.0	-14.1%
MOU HOUN	69.7	5.5	0.1	75.5	16.4	53.4	27.8%	11.5	27.9	90.8	47.3%
NAHOURI	15.8	0.9	0.1	16.9	-4.4	-39.9	-20.8%	1.3	-3.1	-28.1	-14.7%
NAMENTENGA	31.6	1.0	0.1	32.6	-7.0	-33.8	-17.8%	0.0	-7.0	-33.8	-17.8%
OUERITENGA	59.3	1.4	0.1	60.8	0.5	1.4	0.7%	0.0	0.5	1.4	0.7%
OUDALAN	10.2	0.0	0.0	10.2	-11.4	-101.2	-52.7%	0.0	-11.4	-101.2	-52.7%
PASSORE	62.4	2.6	0.1	65.2	20.7	89.4	46.6%	0.0	20.7	89.4	46.6%
PONI	41.2	10.1	0.4	52.2	5.2	21.3	11.1%	4.5	9.7	39.7	20.7%
SANQUIE	47.1	0.6	0.1	47.9	4.6	20.2	10.5%	0.0	4.6	20.2	10.5%
SANMATENGA	76.9	3.2	0.8	81.2	7.1	18.5	9.6%	3.0	10.1	26.3	13.7%
SEMO	32.6	0.1	0.0	32.7	-14.6	-59.3	-30.9%	5.4	-9.2	-37.4	-19.5%
SISSILI	35.9	5.4	0.2	41.8	-9.2	-34.7	-18.1%	0.0	-9.2	-34.7	-18.1%
SOUH	19.5	0.1	0.0	19.6	-19.9	-96.7	-50.4%	0.0	-19.9	-96.7	-50.4%
SOUROU	52.3	0.5	0.1	52.9	-1.9	-6.6	-3.4%	0.0	-1.9	-6.6	-3.4%
TAPOA	50.9	2.6	0.2	53.8	21.4	126.4	65.8%	0.0	21.4	126.4	65.8%
YATENGA	60.9	1.2	0.3	62.5	-43.9	-79.2	-41.3%	7.4	-36.5	-65.9	-34.3%
ZOUNDIÉGO	30.3	0.8	0.5	31.8	0.3	1.8	0.9%	0.0	0.3	1.8	0.9%
Totals	1,444.1	135.7	14.2	1,602.1	-19.3	-2.3	-1.2%	96.1	76.8	9.1	4.7%

NOTES AND SOURCES:

(1) Milling and Waste Loss Rates: Sorghum, Millet, and Maize = 15% ; Rice = 60%

(2) Government of Burkina (GOB) reserves include both Security Stocks and Stabilization Stocks. Security Stocks estimate as of September and Stabilization Stocks as of November, 1986. As reported by FEWS/Burkina.

(3) Sorghum equivalence is a caloric conversion of all cereals by caloric content into a sorghum equivalent harvest:

$$\text{Tons Sorghum} = \frac{(\text{Psg} \cdot \text{Csg}) + (\text{Pml} \cdot \text{Cml}) + (\text{Pmz} \cdot \text{Cmz}) + (\text{Pri} \cdot \text{Crl})}{\text{Csg}}$$

$$\text{Sorghum Csg} = 3052 \quad \text{Maize Cmz} = 3167$$

$$\text{Millet Cml} = 3052 \quad \text{Rice Crl} = 3687$$

Psg, Pml, Pmz, Pri = Unit production of each cereal