

CORNELL
AGRICULTURAL ECONOMICS
STAFF PAPER

NATIONAL FOOD ACCOUNTING AND
ESTIMATING DEMAND FOR FOOD IN TROPICAL AFRICA
TABLES AND CHARTS

By

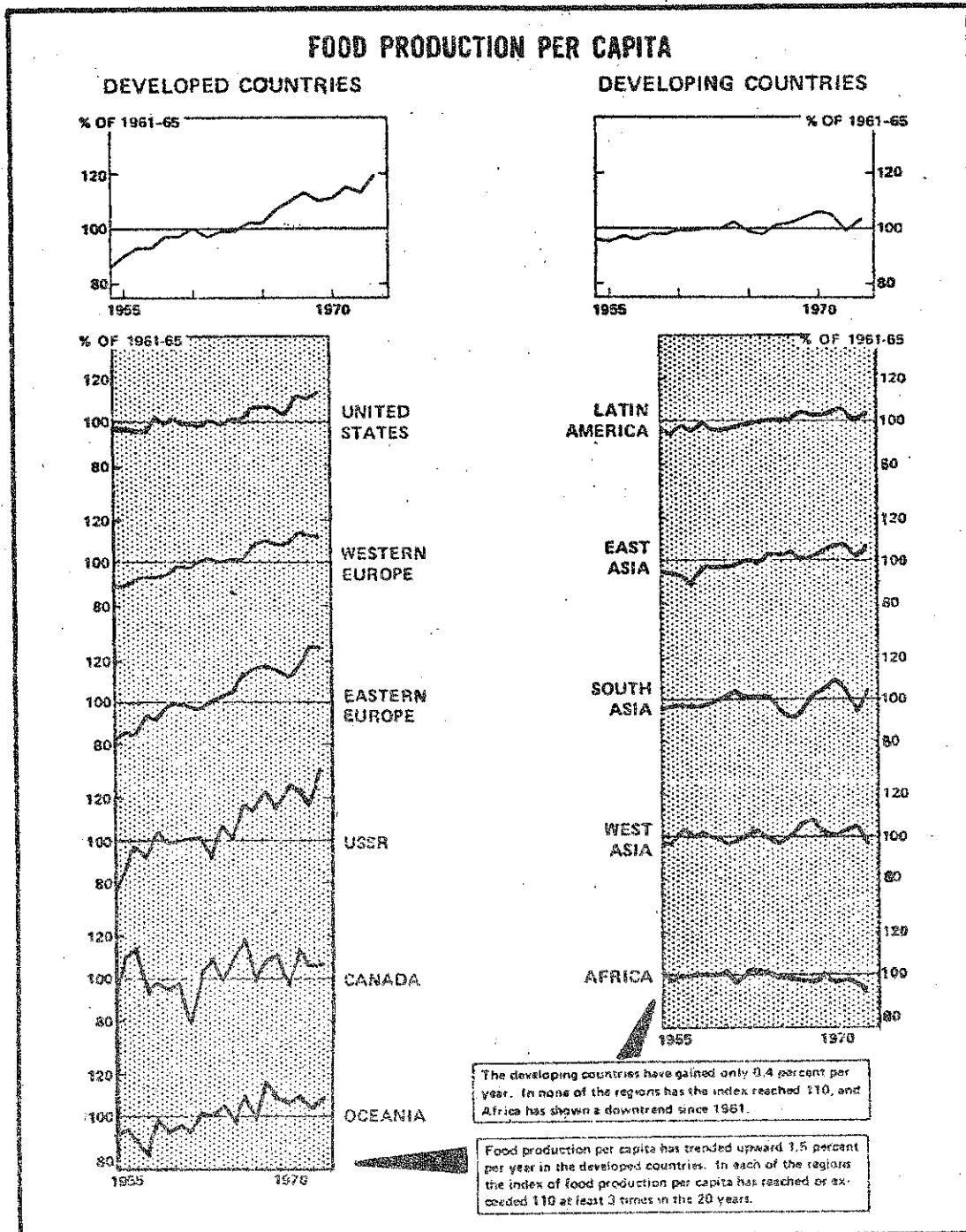
Thomas T. Poleman

May 1976

No. 76-20

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York, 14853

CHART 1*



* Reproduced from USDA, ERS, The World Food Situation and Prospects to 1985 (December 1975), p. 15.

USDA series for Africa per capita food production (Chart 1) based on:

1. Maize in South Africa
2. Wheat in Morocco and Tunisia
3. Cotton in Egypt, Sudan, and Tunisia
4. Cocoa in Ghana, Nigeria, and Ivory Coast
5. Coffee in a number of countries.

TABLE 1. NUMBER OF PEOPLE ESTIMATED BY THE FAO TO HAVE HAD AN INSUFFICIENT PROTEIN-ENERGY SUPPLY IN 1970, BY REGION*

Region	Population (millions)	Percent- age below lower limit	Number below lower limit (millions)
Developed	1074	3	28
Developing*	1751	25	434
Latin America	283	13	36
Far East*	1020	30	301
Near East	171	18	30
Africa	273	25	67
World*	2825	16	462

* excluding Asian centrally planned economies.

* Data from UN, World Food Conference, "Assessment of the World Food Situation--Present and Future" (Rome, 5-16 November 1974), p. 66.

TABLE 2. FAO ESTIMATES OF AVERAGE ENERGY AND PROTEIN SUPPLY, 1961 AND 1969-71, BY REGION*

	Energy		Protein		Energy as Percent of Requirement	
	1961	1969-71 Average	1961	1969-71 Average	1961	1969-71 Average
	(kcal per caput)		(grms per caput)		(percent)	
Developed market economies	2950	3090	87.5	95.1	115	121
Western Europe	3020	3130	89.3	93.7	118	123
North America	3110	3320	92.3	105.2	118	126
Oceania	3210	3260	92.7	108.1	121	123
Other developed market economies	2420	2550	73.3	79.1	102	108
Eastern Europe and U.S.S.R.	2990	3260	85.8	99.3	116	127
TOTAL Developed Countries	2960	3150	87.0	96.4	116	123
Developing market economies	2130	2210	55.0	56.0	93	97
Africa	2120	2190	55.7	58.4	91	94
Far East	2050	2080	51.3	50.7	92	94
Latin America	2410	2530	63.7	65.0	100	105
Near East	2200	2500	62.3	69.3	89	102
Asian centrally planned economies	2020	2170	54.7	60.4	86	92
TOTAL Developing Countries	2100	2200	54.9	57.4	91	95
WORLD	2380	2480	65.2	69.0	100	104

* Reproduced from UN, World Food Conference, "Assessment of the World Food Situation--Present and Future" (Rome, 5-16 November 1974), p. 58.

The figures relate to protein and energy content of the food available at the retail level after allowance for the storage and marketing losses and waste.

NATIONAL FOOD ACCOUNTING

Objectives

To quantify present average situation -----

Breakdown by:

Income -----

Locality -----

Season of year -----

Place in family -----

To quantify likely future situation -----

Data Sources

Food balance sheet

Household budget survey

Nutrition survey

Road check-cum-marketing survey

Food Balance Sheet

Prod. + trade + stocks = seed + feed + waste + nonfood + processing + human consump.

"Famine equation": $\frac{\text{AHC}}{365 \times \text{population}} - 15\% \leq \text{"requirements"}$

Limitations

1. homogeneity assumption
2. data availability

Conclusion: a useful tool, but handle with care. Compare with other evidence.

Household Budget Survey

Most useful data source (but remember purpose for which it was conducted)

Usual coverage:

1. 1 week - 1 month
2. small number of households; extrapolation problems
3. urban-rural breakdown
4. ethnic breakdown
5. varying income ranges; often difficult to relate to total population
6. expenditures, not quantities for foodstuffs

Nutrition Surveys

1. Only source for individual food intake
2. Very expensive, very inefficient in use of manpower
3. Tiny samples or misleading results, "Hunger in America"

Road Check-cum-Marketing Surveys

1. Long time coverage--usually 12 months
2. Stop all or % of vehicles at convenient spot
3. Develop common load denominators
4. Variations: markets as to focus

Cost Comparison

FBS - one man, one country
HBS - Ceylon: 250 surveyors,
10,000 households

Road check - Uganda: \$10,000
Nutrition Survey - INCAP: \$300,000; 34
men; 2,000 households

TABLE 4. Ceylon: Food balance sheet, average 1955-60*
(Average population — 9,303,000)

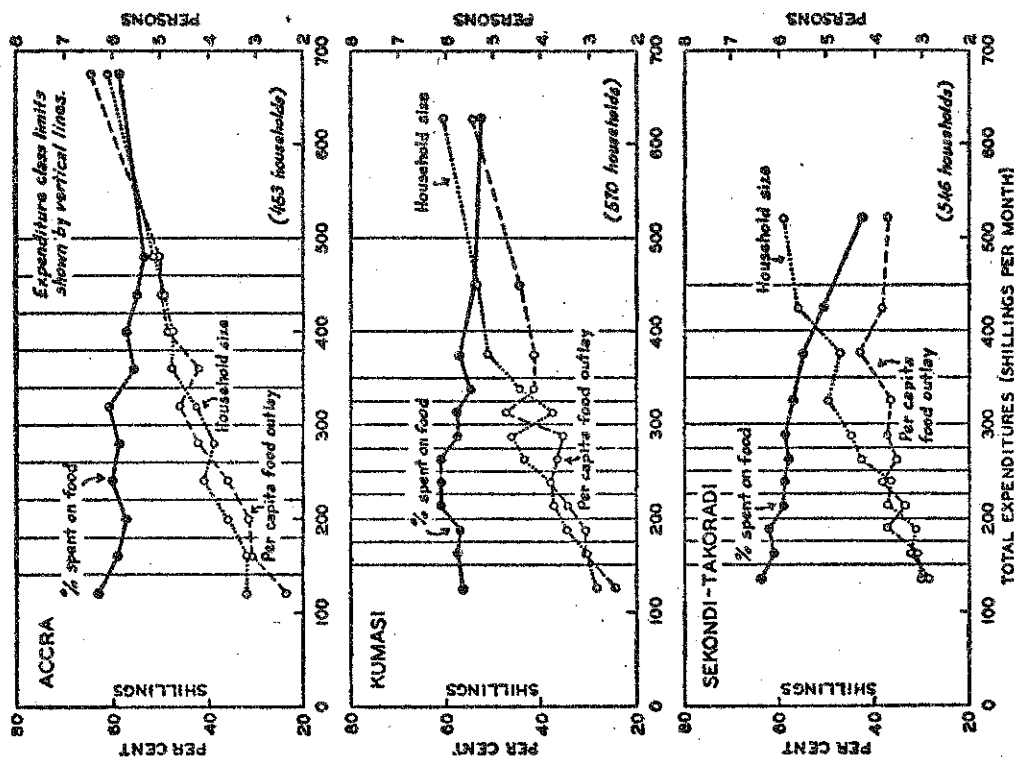
Commodity	Production	Gross exports	Gross imports	Available supply	Seed & feed†	Waste†	Non-food manufacture	Gross food supply	Extraction rate	Net food supply	Per capita supply per day		
											Grams	Calories**	Protein** (grams)
				thousand metric tons					percent‡	1000 metric tons			
Cereals													
Rice	731.9		712.5	1,444.4	59.4	30.3	—	1,254.7	68-72	943.3	277.7	1,000.0	18.90
Wheat flour	—		206.5	206.5	—	—	—	206.5	—	206.5	60.8	223.0	6.00
Maize	7.5		—	7.5	0.5	—	—	7.0	90	6.3	2.0	7.0	0.02
Kurakkan	17.6		—	17.6	0.5	—	—	17.1	90	15.4	5.0	17.0	0.35
Sorghum	0.8		—	0.8	0.025	—	—	0.8	90	0.8	0.3	3.0	0.03
Total												1,250.0	25.30
Roots and tubers													
Manioc	196.5		—	196.5	—	19.6	—	176.9		176.9	52.1	57.0	0.5
Sweet potatoes	38.9		—	38.9	—	3.8	—	35.0		35.0	10.4	10.0	0.1
Potatoes	0.5		36.0	36.5	—	3.6	—	33.0		33.0	9.6	7.0	—
Total												74.0	0.6
Sugar													
Refined	—		144.2	144.2	—	—	—	144.2		144.2	42.5	164.0	—
Not refined	—		20.8	20.8	—	—	—	20.8		20.8	6.0	21.0	—
Jaggery	—		4.2	4.2	—	—	—	4.2		4.2	1.4	5.0	—
Total												190.0	—
Pulses													
Dhall	—		9.2	9.2	—	—	—	9.2		9.2	2.7		
Green gram	3.6		9.4	13.0	0.22	—	—	12.8		12.8	3.8		
Black gram	—		4.2	4.2	—	—	—	4.2		4.2	1.4		
Chick peas	—		4.9	4.9	—	—	—	4.9		4.9	1.4	58.0	12.7
Lentils	—		16.6	16.6	—	—	—	16.6		16.6	5.0		
Other	2.5		5.8	8.3	0.13	—	—	8.1		8.1	2.5		
Total												58.0	12.7
Vegetables	475.0		—	475.0	—	25.0	—	450.0		450.0	125.2	28.0	1.7

Commodity	Production	Gross exports	Gross imports	Available supply	Seed & feed†	Waste†	Non-food manufacture	Gross food supply	Extraction rate	Net food supply	Per capita supply per day		
											Grams	Calories**	Protein** (grams)
				thousand metric tons					percent‡	1000 metric tons			
Fruits	55.0		—	55.0	—	5.0	—	50.0		50.0	14.8	9	0.06
Meat													
Beef	12.9		—	12.9	—	—	—	12.9		12.9	3.8	5.0	0.60
Buffalo	0.9		—	0.9	—	—	—	0.9		0.9	0.3	0.2	0.04
Mutton	1.3		—	1.3	—	—	—	1.3		1.3	0.3	0.1	0.04
Pork	1.1		—	1.1	—	—	—	1.1		1.1	0.3	0.9	0.04
Poultry	0.1		—	0.1	—	—	—	0.1		0.1	0.3	0.4	0.04
Canned meat	—		—	—	—	—	—	—		0.1	—	—	—
Total												7.9	.76
Eggs	7.5		1.4	8.8	—	—	—	8.8		8.8	2.5	4.0	0.3
Fish													
Fresh	42.8		—	42.8	—	10.7	17.3††	15.0		15.0	4.4	6.0	0.8
Dried	5.9		38.8	44.7	—	—	—	44.7		44.7	13.2	40.0	6.0
Tinned	—		4.0	4.0	—	—	—	4.0		4.0	1.4	4.0	0.3
Total												50.0	7.1
Milk													
Cow	57.1		—	57.1	—	—	—	57.1		57.1	14.0	9.0	.5
Buffalo	15.2		—	15.2	—	—	—	15.2		15.2	4.4	4.5	.2
Milk foods	—		1.6	1.6	—	—	—	1.6		1.6	.6		
Total												13.5	.7
Oils & fats													
Coconut	2,300.5	6.7	—	2,293.8	—	—	2,213.8††	80.0	—	80.0	24.0	42.0	.5
Coconut oil	1,100.0	750.0	—	325.0	—	—	—	325.0	—	325.0	37.0	320.0	—
Butter	—		0.1	—	—	—	—	0.1		0.1		0.2	
Total												362.2	.5
TOTAL												2,046.6	49.7

* Reproduced from Thambapillai Jogaratnam and T. T. Poleman, Food in the Economy of Ceylon (Cornell Intl. Agric. Dev. Bull. 11, Oct. 1969), pp. 9-10.

CHART 2. TYPICAL BUDGET SURVEY FINDINGS ON FOOD EXPENDITURE BEHAVIOR*

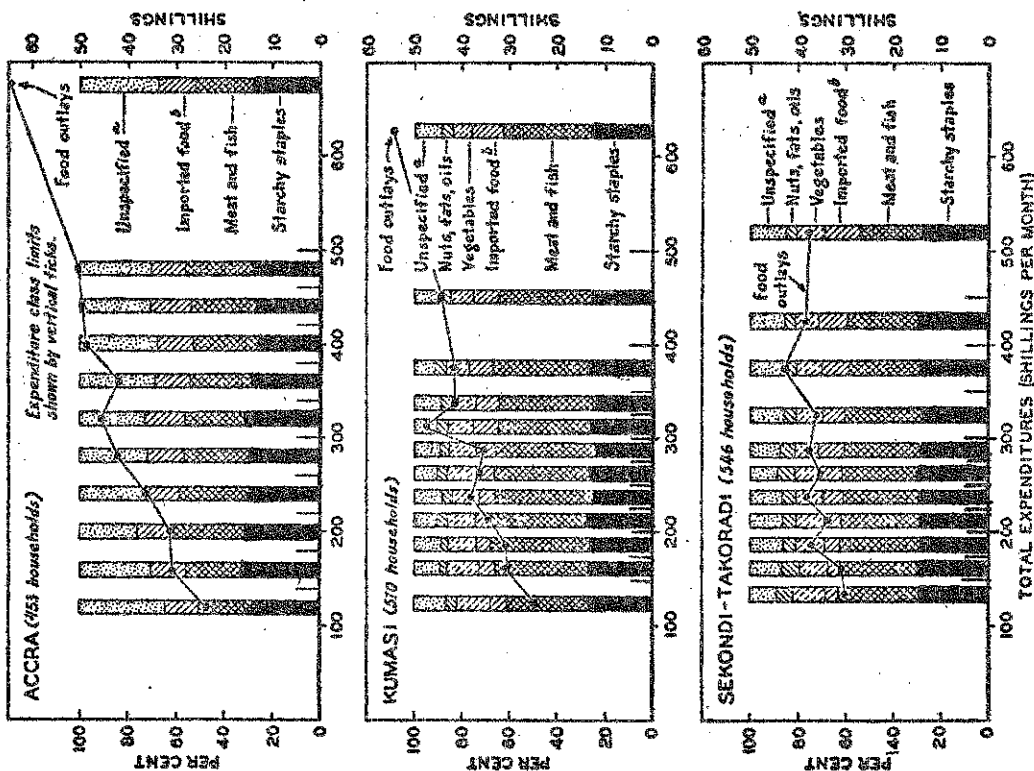
GHANA, URBAN HOUSEHOLD BUDGET SURVEY SAMPLES, 1953 AND 1955:
PERCENTAGE OF TOTAL DOMESTIC EXPENDITURES SPENT ON FOOD, PER CAPITA
MONTHLY FOOD OUTLAYS, AND HOUSEHOLD SIZE, BY EXPENDITURE CLASS^a



* Based on data in Gold Coast, Off. Govt. Stat. (Stat. and Econ. Papers) 1953 Accra Survey of Household Budgets (No. 2, December 1953), pp. 10-12; Kumasi Survey of Population and Household Budgets, 1955 (No. 5, March 1956), pp. 36-37; and Sekondi-Takoradi Survey of Population and Household Budgets, 1955 (No. 4, March 1956), pp. 32-33. Positioning of data for extreme expenditure classes reflects actual average expenditures; for other classes the midpoint. Figures do not include expenditures on drink.

* Reproduced from T. T. Poleman, The Food Economies of Urban Middle Africa (Cornell Int'l. Agric. Reprint), pp. 145, 155.

GHANA, URBAN HOUSEHOLD BUDGET SURVEY SAMPLES, 1953 AND 1955:
PERCENTAGE BREAKDOWN OF FOOD EXPENDITURES, AND THE PER CAPITA
MONTHLY FOOD OUTLAYS, BY EXPENDITURE CLASS^a



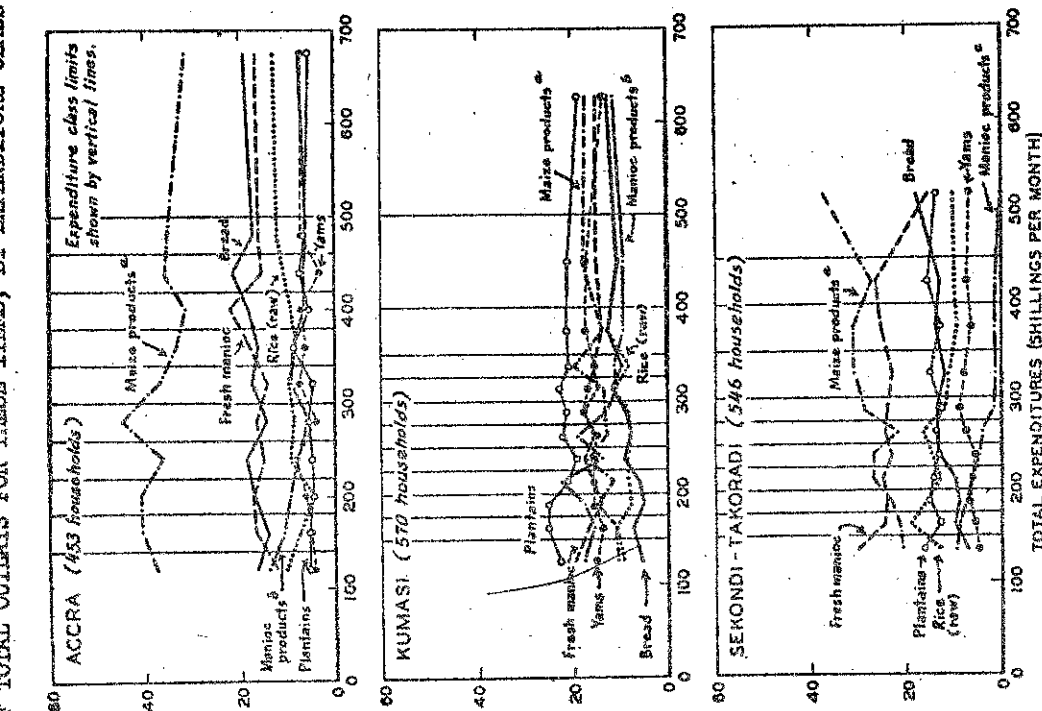
* Based on data in Gold Coast, Off. Govt. Stat. (Stat. and Econ. Papers) 1953 Accra Survey of Household Budgets (No. 2, December 1953), pp. 10-14; Kumasi Survey of Population and Household Budgets, 1955 (No. 5, March 1956), pp. 36, 37, 42; Sekondi-Takoradi Survey of Population and Household Budgets, 1955 (No. 4, March 1956), pp. 32, 33, 38. Positioning of data for extreme expenditure classes reflects actual average expenditures; for other classes the midpoint. Figures do not include expenditures on drink.

^a A residual figure. In addition to such truly unspecified items as snacks purchased away from home, it includes expenditures for the less important starchy staples, meat and fish items, vegetables, and nuts, fats, and oils. (For Accra, of course, it includes all outlays for items in the latter two groupings.) It is best thought of as being prorated among the major commodity groups.

^b Packaged imported items. It includes such things as sugar and canned meat and milk, but not wheat flour and the like.

CHART 3. TYPICAL BUDGET SURVEY FINDINGS ON FOOD EXPENDITURE BEHAVIOR*

GHANA, URBAN HOUSEHOLD BUDGET SURVEY SAMPLES, 1953 AND 1955: EXPENDITURES FOR SELECTED STARCHY STAPLES AS A PERCENTAGE OF TOTAL OUTLAYS FOR THESE ITEMS, BY EXPENDITURE CLASS *



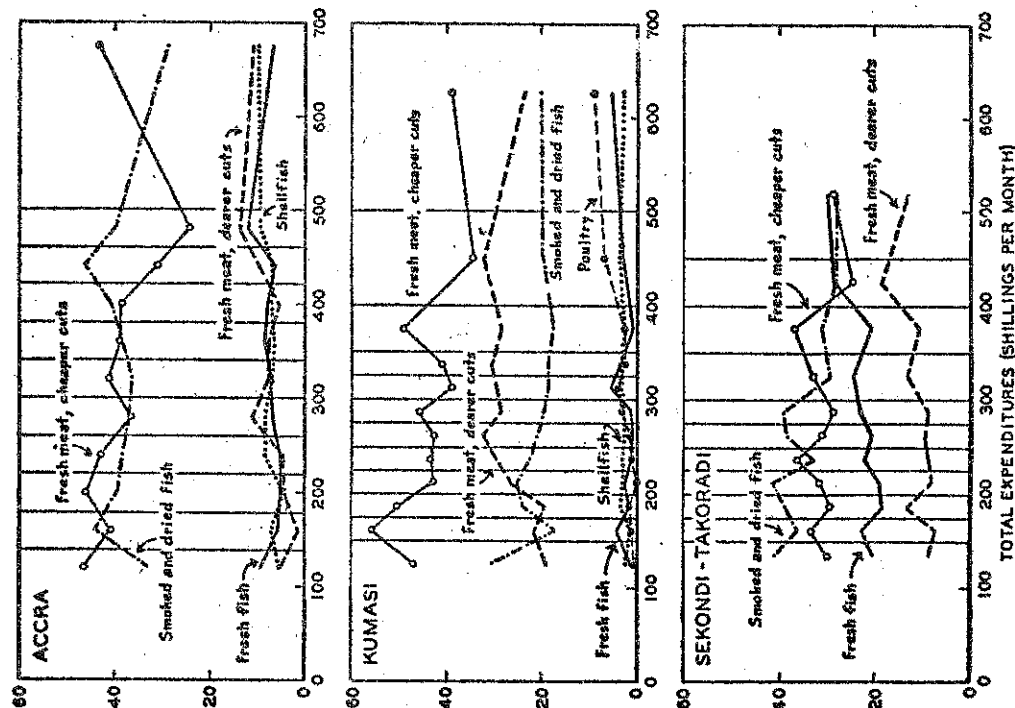
* See source note to Chart 5B.

a Kenkey and dough.

b Gari and kokonte.

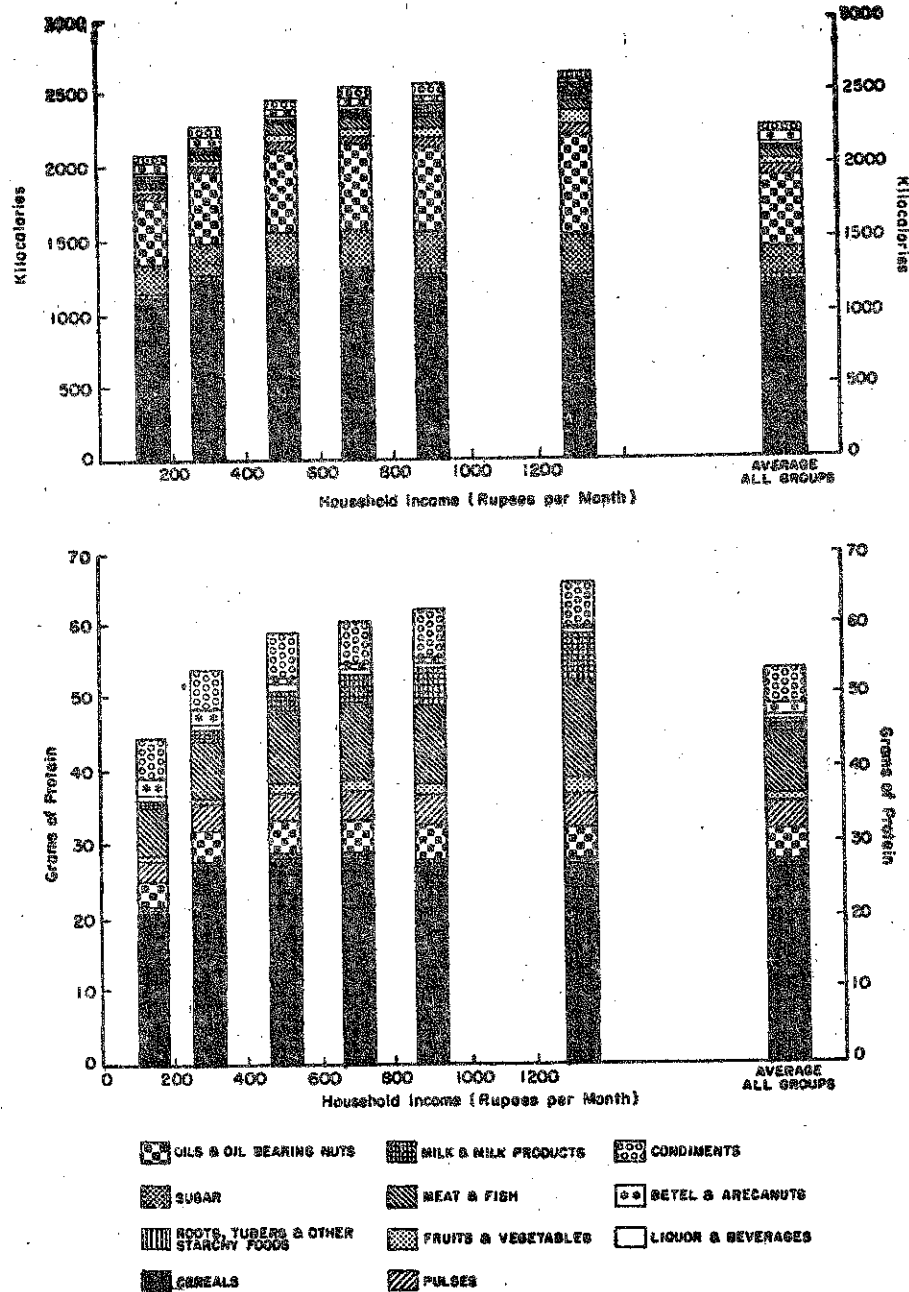
c Kokonte.

GHANA, URBAN HOUSEHOLD BUDGET SURVEY SAMPLES, 1953 AND 1955: EXPENDITURES FOR SELECTED MEAT AND FISH PRODUCTS AS A PERCENTAGE OF TOTAL OUTLAYS FOR THESE ITEMS, BY EXPENDITURE CLASS *



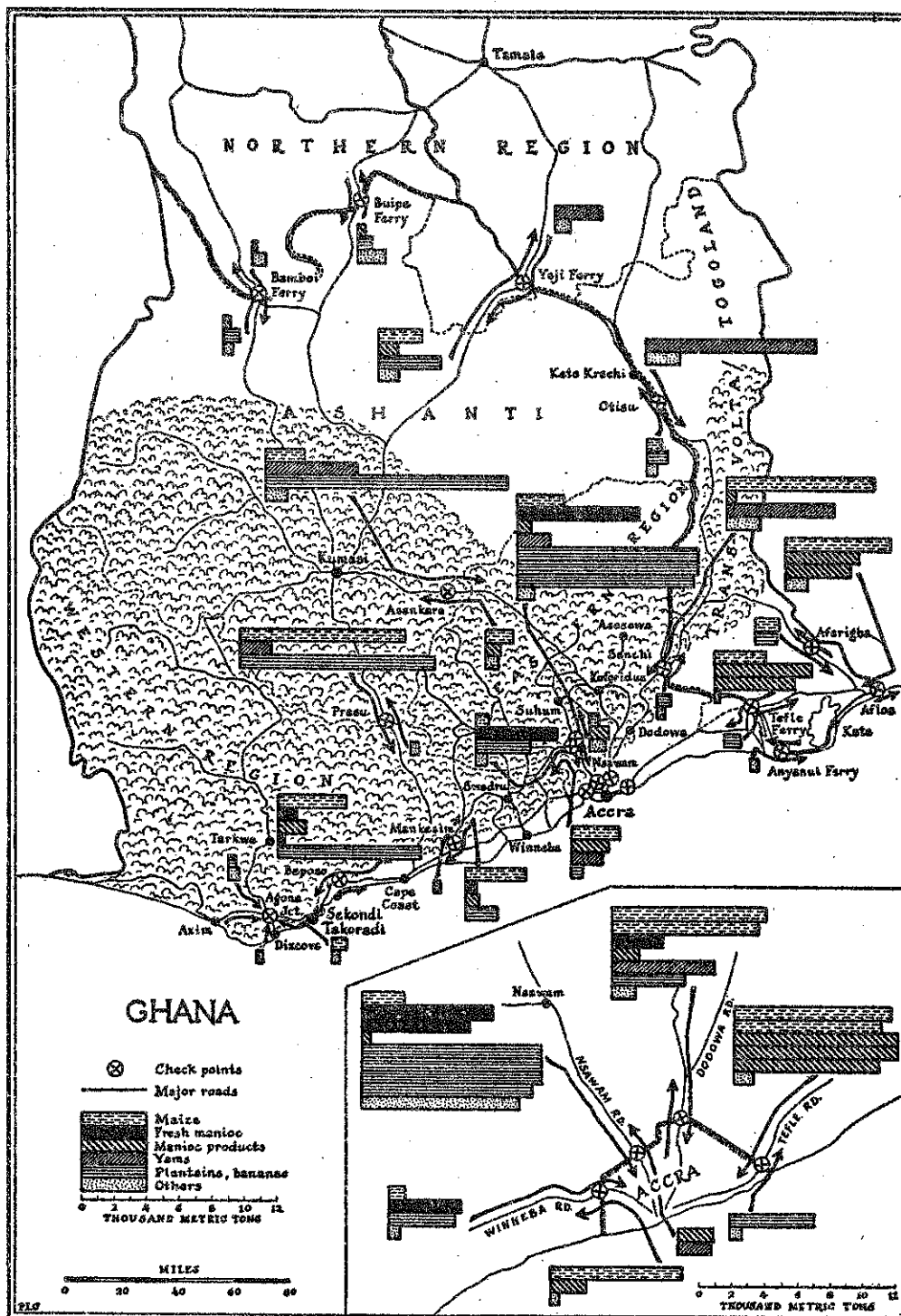
* Based on data in Gold Coast, Off. Govt. Stat. (Stat. and Econ. Papers), 1953 *Accra Survey of Household Budgets* (No. 2, December 1953), p. 14; *Kumasi Survey of Population and Household Budgets, 1955* (No. 5, March 1956), p. 42; *Sekondi-Takoradi Survey of Population and Household Budgets, 1955* (No. 4, March 1956), p. 38. Positioning of data for extreme expenditure classes reflects actual average expenditures; for other classes the mid-point.

CHART 4. FINDINGS OF NEW TYPE BUDGET SURVEY:
APPARENT PER CAPITA DAILY ENERGY AND PROTEIN AVAILABILITIES
IN SRI LANKA, 1969-70*



* Reproduced from T. T. Poleman, "World Food: A Perspective," Science, 9 May 1975, p. 516.

Chart 5. GHANA, PRODUCE MOVEMENT CENSUS, 1957/58: ANNUAL FLOW OF STAPLE FOODS PASSING THE SEVERAL CHECK POINTS*

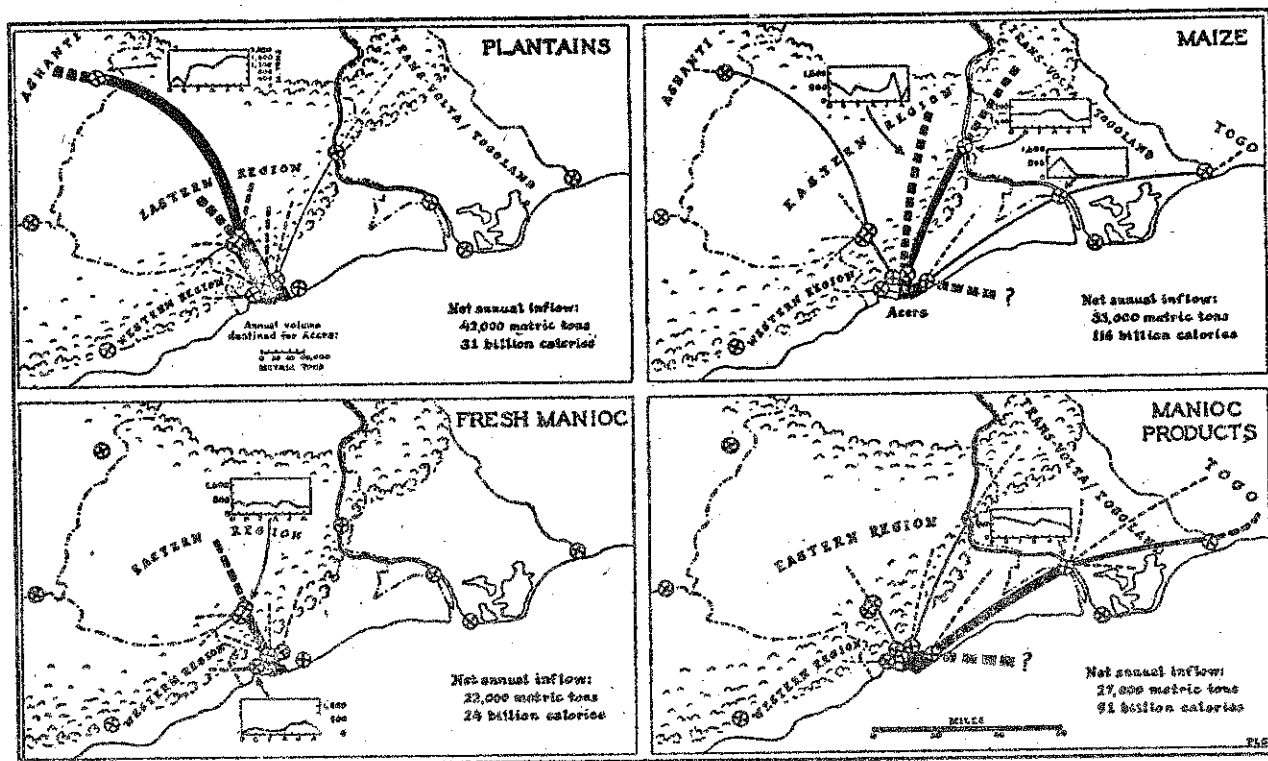


* Based on unpublished returns from the 1957/58 Produce Movement Census. Where data reported other than by weight, tonnages were estimated using the following conversion factors: maize—bag: 220 lbs.; rice—bag: 240 lbs.; millets—bag: 204 lbs.; sorghum—bag: 200 lbs.; manioc products—bag: 150 lbs.; manioc roots—bag: 200 lbs.; cocoyams—bag: 150 lbs.; and yams—tuber: 7 lbs. Factors from Ghana, Off. Govt. Stat., "Distribution Statistics—Produce Movements. . . Conversion Factors" (n.d., mimeo.).

Movements of less than 400 metric tons not shown.

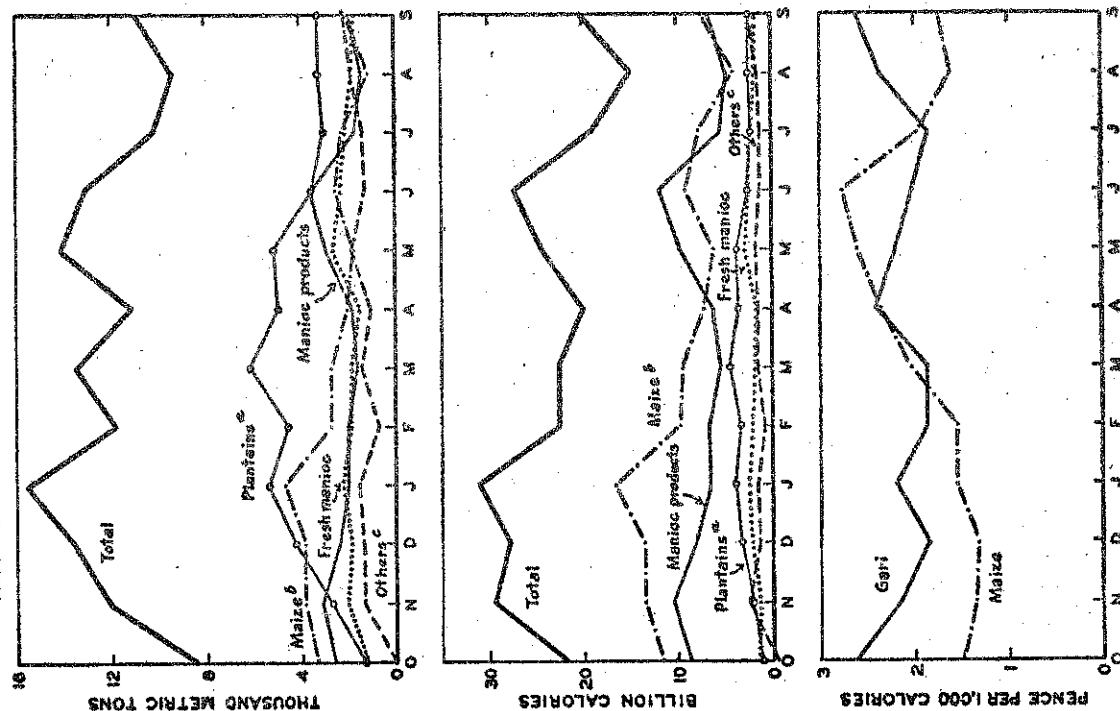
Reproduced from T. T. Poleman, The Food Economies of Urban Middle Africa (Cornell Int'l. Agric. Dev. Reprint), p. 165.

Chart 6. GHANA, PRODUCE MOVEMENT CENSUS, 1957/58: DIRECTION AND ANNUAL MAGNITUDE OF INFLOW OF PRINCIPAL STAPLE FOODS INTO ACCRA*



* Based on unpublished returns from the 1957/58 Produce Movement Census.

CHART 7. GHANA, PRODUCE MOVEMENT CENSUS, 1957/58: NET MONTHLY INFLOW OF STAPLE FOODS INTO ACCRA; AND AVERAGE MONTHLY WHOLESALE PRICE OF MAIZE AND GARIN IN THE ACCRA MARKET.*



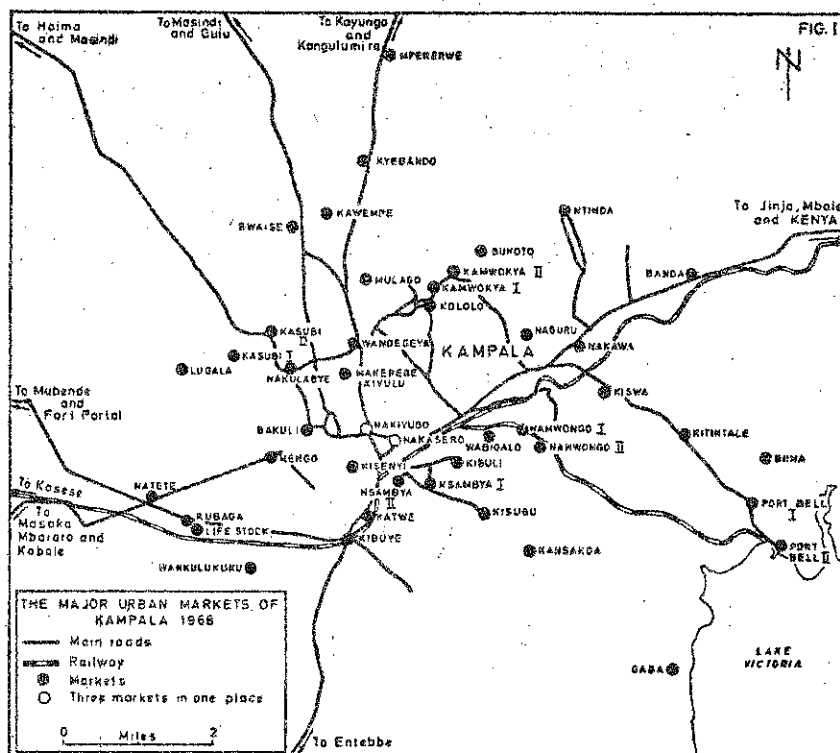
* Net inflows based on unpublished returns from the 1957/58 Produce Movement Census; price data from Ghana, Dept. Agr., *Monthly Report—Foodstuffs Supply Position (various issues)*; calorie values calculated using conversion factors given in FAO, *Food Consumption Tables—Minerals and Vitamins—For International Use* (Nutr. Studies 11, 1954), pp. 10-12, 18.

^a Includes bananas.

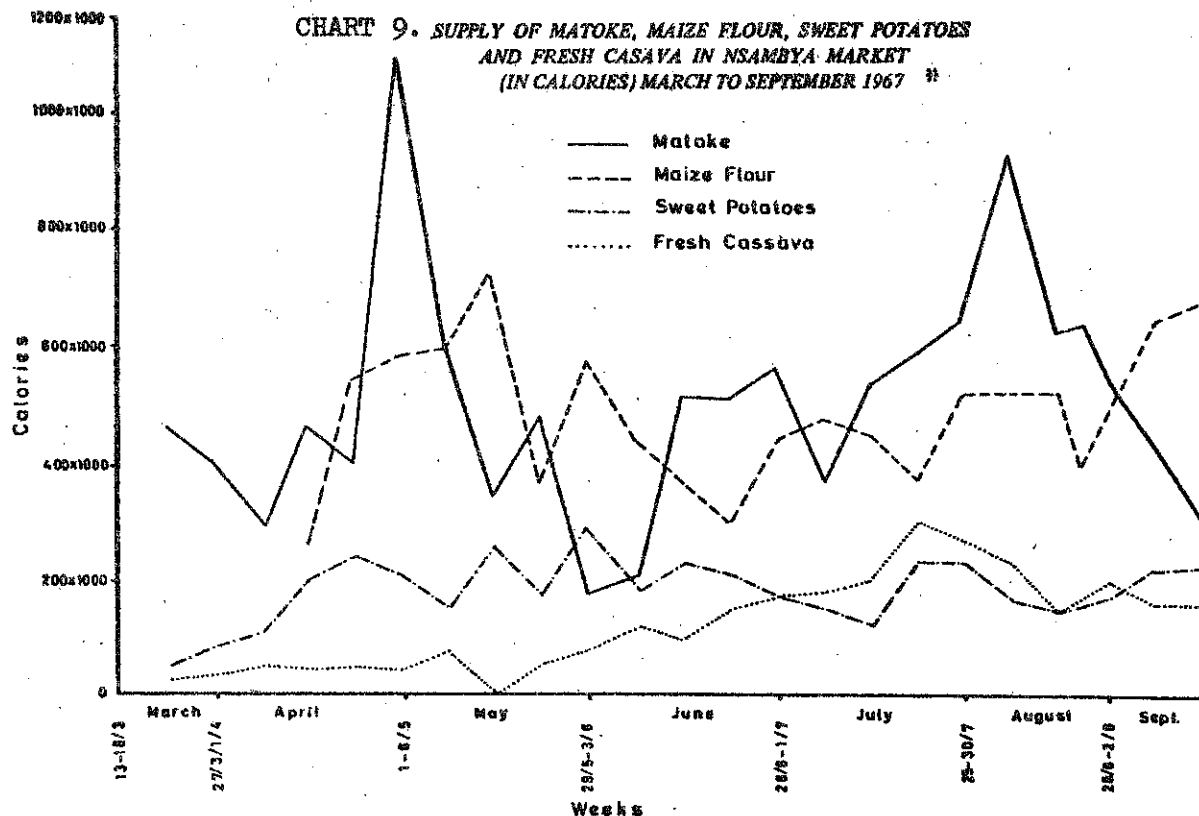
^b Includes sorghum.

^c Rice, millets, yams, cocoyams, "other cereals," and "other roots and tubers."

CHART 8. KAMPALA MARKETS MONITORED DURING PRODUCE MOVEMENT CENSUS, 1967/68*



* Reproduced from J. J. Oloya and T. T. Poleman, The Food Supply of Kampala (Makerere Institute of Social Research, July 1972), p. 16.



* Reproduced from J. J. Oloya and T. T. Poleman, The Food Supply of Kampala (Makerere Institute of Social Research, July 1972), p. 38.

Readings on
NATIONAL FOOD ACCOUNTING

1. T. T. Poleman, "Quantifying the Malthusian Dilemma," in Poleman, Beeghly, Matlon, and McGregor, The Economic Applications of Vital-Rate Monitoring (Cornell Int'l. Agric. Dev. Mimeo 38, Nov. 1972).
2. M. J. Schultheis, The Statistics of the World Food Problem: A Review Essay (Cornell Agric. Econ. Staff Paper No. 15, July 1970), pp. 20-28.
3. T. T. Poleman, "Survey on Nutritional Concomitants of Urbanization in Selected Countries of Sub-Saharan Africa" (FAO, 1965) (Reprinted as Cornell Agric. Econ. Staff Paper 73-15, July 1973).

THE FOOD BALANCE SHEET

4. H. C. Farnsworth, "Defects, Uses, and Abuses of National Consumption Data," Food Research Institute Studies, Vol. II, No. 3.
5. T. Jogaratnam and T. T. Poleman, Food in the Economy of Ceylon (Cornell Int'l. Agric. Dev. Bulletin 11, 1969), pp. 1-18.
6. E. B. Simmons and T. T. Poleman, The Food Balance Sheet as a Parameter of Tropical Food Economies: The Case of Mauritius (Cornell Int'l. Agric. Bulletin 29, June 1974), pp. 2-20, 61-73.
7. M. J. Purvis, "Evaluation and Use of Underdeveloped Agricultural Statistics: The Food Economy of Malaysia" (Cornell University, unpublished Ph.D. dissertation, 1966), pp. 62-143 (optional; for the enthusiast only).

THE CONSUMPTION SURVEY

8. T. T. Poleman, "The Food Economies of Urban Middle Africa: The Case of Ghana," Food Research Institute Studies, May 1961, pp. 135-143.
9. T. Jogaratnam and T. T. Poleman, op. cit., pp. 19-37.
10. E. B. Simmons and T. T. Poleman, op. cit., pp. 20-56.
11. M. J. Purvis, op. cit., pp. 144-209 (optional).
12. A. P. den Hartog, "Unequal Distribution of Food Within the Household," Nutrition Newsletter (FAO), Oct.-Dec. 1972, pp. 8-17.

13. FAO, Program of Food Consumption Surveys (Rome, 1964), (optional; on Mann 2-day reserve).

14. FAO, Bibliography of Food Consumption Surveys, 1964 and Supplements, 1965 and 1967 (mimeographed), (optional; on Mann 2-day reserve).

15. FAO, Review of Food Consumption Surveys 1970, Vol. 1A (Rome, 1970), (optional, on Mann 2-day reserve).

ROAD CHECK-CUM-MARKETING SURVEYS

16. T. T. Poleman, op. cit., pp. 161-172.

17. Gold Coast, Office of the Gov't. Stat., Agricultural Statistical Survey of South-East Akim Obuakwa, 1952-3 (Stat. and Econ. Paper No. 1, Sept. 1953).

OTHER TECHNIQUES

18. M. K. Bennett, "The Food Economy of the New England Indians, 1605-75," The Journal of Political Economy, October 1955.

19. D. S. Ferguson, The Nigerian Beef Industry (Conrell Int'l. Agric. Dev. Bulletin 9, 1967). (An optional skim).

CONVERSION FACTORS (These are on Mann 2-day reserve; look at them to become familiar with this type of source.)

20. FAO, Food Composition Tables - Minerals and Vitamins - for International Use (Rome, 1954).

21. USDA, Econ. Res. Ser., Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products (Stat. Bull. No. 362, June 1965).

22. FAO, Food Composition Tables: Annotated Bibliography (Nutrition Information Documents Series 1, Rome, 1969).

23. UN, Statistical Office, World Weights and Measures: Handbook for Statisticians (Stat. Papers Series M, No. 21, Rev. 1, New York, 1966).

24. The Economist, Guide to Weights and Measures (2nd Ed., London, 1962), pp. 53-65.