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9. ABSTRACT
This study analyzes the role of agriculture in the economic development of Guatemala, and suggests short- and medium-term policies conductive to economic development. The analysis is based on the assumption that no major land reform program could occur during the early 1970s. The nine chapters of this book discuss Guatemalan geography and population; structure and performance of the Guatemalan economy; the role of agriculture in the economy; structure of the agricultural sector; supply and demand projections for basic foods; government policies and programs; improving grain marketing; marketing of basic foods; and alternative policies and programs. Among the conclusions and recommendations in the last chapter are the following: The Guatemalan government should give highest priority to improving the productivity of land and labor resources in the agricultural sector. Programs designed to achieve this goal should emphasize increases in rural employment and improvements in income distribution as well as increased output. Producing more per hectare and more per man is the best way to reconcile the apparent conflict between output and welfare goals. The wages and housing of resident and migratory workers on large commercial farms need to be upgraded to the level of urban industrial workers. Raising yields per hectare on small farms is the best way to overcome growing underemployment and raise rural levels of living for small farmers. Programs of family planning need to be implemented as soon as possible. A major roadbuilding and improvement program should be initiated in the rural areas. Higher-yielding varieties of corn should be introduced, with seed and fertilizer distributed directly to farmers as credit-in-kind. Locally adapted, production-oriented research on means of improving corn and bean production should be initiated. The government program designed for sending qualified students abroad for graduate training in agricultural development should be expanded. Government programs in the Departments of Agriculture and Economics should be provided with

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sufficient funds and personnel to produce more relaible and complete statistical data on agricultural production, so that existing production and marketing programs can be better identified, and the effects of new developmental programs assessed.

GUATEMALA'S ECONOMIC DEVELOPMENT: THE ROLE OF AGRICULTURE

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PREFACE

IN NOVEMBER 1968 the Guatemalan Mission of the United States Agency for International Development arranged for the authors of this book to prepare an analysis of the role of agriculture in the development of the Guatemalan economy. The study was organized and carried out in close cooperation with the AID mission. The Mission Director, Deane Hinton, contributed to the clarification of the objectives of the research and the establishment of working relationships with Guatemalan agencies. The Government of Guatemala fully cooperated with the project. Personnel from the Ministry of Agriculture, the National Planning Council and the Bank of Guatemala played key roles in the data collection and analysis.

This resultant study analyzes the present role of agriculture in the economic development of Guatemala and suggests short- and medium-term policies conducive to economic development. The present land ownership pattern was therefore assumed given, under the belief that a major land reform program presumably could not occur within the time horizon of this study. Additionally, our not concentrating on land reform stemmed from the belief that agriculture can make a major contribution to the economic and social development of Guatemala over the next few years even in the absence of a land redistribution program. This is not to say that major structural changes in the ownership of land might not be desirable on economic, social, and political grounds. Such changes may indeed be basic to a long-run process of economic and social development. However, we do not believe that land reform is the *sine qua non* of agricultural development in the short run.

The political and administrative difficulties of implementing a land reform program have often been used as an excuse for not

undertaking any changes in agriculture. Our analysis and the measures which we recommend, and particularly the high priority which we attach to a major development effort in the traditional agricultural subsector, are entirely complementary to and consistent with a land reform scheme. Yet they can be undertaken now. If a land reform scheme were politically and administratively feasible, it would in all probability strengthen the development effects of the policies we recommend. We hope the land reform fundamentalists will understand what we believe to be the inherent logic of our position.

The active participation of many Guatemalan agencies was essential to the successful completion of the study. Specialists from these agencies were called upon to provide technical advice, background data on particular programs, and insights on the problems and goals of the agricultural sector in Guatemala. The group which worked with us included:

(a) two persons from the National Planning Council; *Mr. J. Victor Espada* and *Mr. Oscar Adolfo Díaz* who, among other things, worked on the preparation of agricultural demand projections, population and employment projections, an inventory of agricultural development projects and helped with the construction of a series of capital flow charts;

(b) three persons from the Ministry of Agriculture, *Ing. Carlos H. Juárez* who was responsible for compiling agricultural price and production data and worked on the basic analysis concerning agricultural investigation and extension; *Mr. Miguel Angel Campos* who worked on agricultural marketing problems and export controls; and *Lic. Carlos F. Acevedo* who assisted with the compiling of the 1964 Agricultural Census data and the analysis of agricultural credit data;

(c) three persons from the Bank of Guatemala; *Lic. Romulo Caballeros* who was responsible for the preparation of supply projections for various agricultural commodities; *Lic. Marco Antonio Aparicio* who provided a series of charts analyzing agricultural credit; and *Lic. Guillermo Schell* who prepared an analysis of several of the major export crops;

(d) *Mr. Rafael Alvarez* who provided statistical and computing support for the entire group and also was in charge of compiling most of the agricultural census data.

A number of other persons cooperated closely with our re-

search group. *Lic. Carlos H. Alpirez,* Chief of Agricultural and Industrial Studies in the Bank of Guatemala and *Lic. René Samayoa,* Chief of National Income Accounts in the same institution provided many useful suggestions and made it possible to carry out parts of the work in the Bank. *Lic. Oscar de León Aragon,* Secretary-General of the National Planning Council, committed valuable resources under his control to the study. *Lic. Jose Victor Velásquez,* Head of the Planning Office of the Ministry of Agriculture, provided constant support for our work as well as many valuable insights for all concerned. *Mr. Alphonse Chable,* the Agricultural Development Officer for USAID/Guatemala, served as a continuous source of information and support for the study. *Mr. Milton Lau* of USAID/Guatemala, provided a great deal of technical advice and insights based on his many years of experience in working with the agricultural sector in Guatemala.

We are deeply indebted to the USAID Mission and to the Government of Guatemala for the opportunity to undertake the research reported in this book. We hope the results prove useful in planning and implementing policies and programs to improve the performance of the agricultural sector both in Guatemala and in other countries which contain a large subsistence agricultural sector. We assume full responsibility for the analysis and conclusions.

CHAPTER ONE

GUATEMALAN GEOGRAPHY AND POPULATION

GUATEMALA lies in Central America just south of the Yucatán Peninsula. It is bounded on the north and west by Mexico, on the east by Belice, to the south and east by Honduras and El Salvador, and on the southwest by the Pacific Ocean.

GEOGRAPHY

Although Guatemala contains only 108,889 square kilometers, approximately the size of the state of Louisiana, it has a very wide geographical diversity.[1] In this land are included high mountain ranges, coastal plains, high plateaus, tropical jungle, and a very dry, almost desert, zone. Numerous volcanoes, some still active, are strung along the Pacific Coast. The variety of geographic areas combined with a wide range of climates and soil types provide adequate conditions for the production of almost any agricultural product.

The Pacific Coast Plain, a strip ranging from twenty to forty miles wide along the southern edge of Guatemala, and the department of Izabal on the eastern Caribbean Coast are the newest centers of agricultural development. Both zones are among the less densely populated areas of Guatemala. Some of the main export crops—sugar cane, bananas and cotton—are produced in these coastal zones.

The highland areas located in the central part of Guatemala are the most heavily populated region of the country. The region includes very little flat land and has a wide range of climates. The

1. More detailed descriptions of the geography of Guatemala can be found in: Whetten, N. L., *Guatemala—The Land and the People*, Yale University Press, New Haven, 1961; and Cohen, Alan, *Economic Development in Guatemala*, unpublished manuscript, USAID/Guatemala.

eastern highlands are dry and less densely populated than the western highlands. The principal products produced in the highlands are corn, beans and wheat. Vegetables and fruits are also important in some highland areas. Coffee and bananas are grown in some of the lower valleys of the highlands.

The northern lowlands of El Petén contain slightly over a third of the total land area of Guatemala but are virtually uninhabited. Efforts are being made to open up the Petén region through road construction programs. This region is expected to become increasingly important during the next twenty years.

CLIMATE

Guatemala's climate varies considerably from one area to another due to differences in altitude, location of the mountains and direction of the prevailing winds. Temperatures in the coastal lowlands remain high all year ranging, on the average, from 20° to 33° centigrade (68° to 92° F). The highlands are relatively cool with temperatures averaging around 17° to 22° centigrade (62° to 72° F) most of the year but with occasional freezing weather in some areas during the winter season.

Rainfall varies considerably among regions. The rainy season in most areas occurs during the six-month period from May until the end of October. Average rainfall in the Escuintla region of the South Coast ranged from around 22 mm. during the dryest months to around 800 mm. in the August-October period of 1966. Rainfall in the highlands regions around Huehuetenango in 1966 ranged from 0.0 mm. in the dryest months to an average of about 230 mm. during the May-October rainy season.

The wide seasonal variation in rainfall on the South Coast makes it difficult to maintain stable feed levels for dairy and beef cattle. Pastures dry up during the dry season and hay is difficult to cure during the wet season. Water control in the form of drainage, irrigation and flood control could play an important role in increasing the productivity of this region.[2] The long dry season in the highlands also reduces the carrying capacity of upland pastures and in some areas makes it difficult to start fruit trees. Irrigation could undoubtedly play an important role in increasing the productivity of some of the highland valleys, especially in vegetable producing areas.

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2. For additional information on a nation-wide water control program see Signell, Lloyd G., "Soil and Water Conservation, Farm Irrigation and Drainage, Watershed Protection," USAID/Guatemala report, September, 1965.

TRANSPORTATION

Lack of transportation facilities[3] constitutes one of the serious problems slowing the economic development and cultural integration of Guatemala. The government has been improving the road system in recent years through the construction of three major highways. The Pan-American Highway extends across the highlands from Mexico on the west to El Salvador on the east. The Atlantic Highway extends from Guatemala City to Puerto Barrios on the Caribbean coast. The Pacific Slope Highway extends along the southern slope of the volcanic chain from Guatemala City to the Mexican border.

A relatively adequate network of narrow dirt highways has been constructed throughout most of the heavily populated highland areas of the country. The vast lowlands, including the entire Petén region on the north, are virtually without all-weather roads. The lack of adequate roads is particularly serious on the South Coast where substantial amounts of land are still difficult to reach by road. As a result, it is expensive to transport agricultural products from these regions to markets.

Guatemala has a railroad system of 625 miles connecting both coasts and the north and south borders. The importance of the railway system has declined in recent years as improvements in the highway system have made bus and truck transportation more competitive.

GOVERNMENTAL DIVISIONS

Guatemala is divided for administrative purposes into twenty-two departments, each headed by a governor appointed by the President. (Figure 1.1.) The departments in turn are divided into municipalities which are ruled by popularly elected municipal authorities. The central government administration is located in Guatema'a City, the national capital.

Statistical data in Guatemala are compiled mainly by department and, to some extent, by municipality.

Some data presented in this report are summarized into three regions by aggregating the departmental data. These regions are:

1. The *Coastal Region* consisting of the departments of Escuintla, Santa Rosa, Suchitepéquez, Retalhuleu and Izabal.
2. The *Central Region* consisting of the 16 interior depart-

3. The material on transportation draws heavily upon: Whetten, *Guatemala.*

FIG. 1.1—Guatemalan governmental divisions (departments)

ments—Guatemala, El Progreso, Sacatepéquez, Chimaltenango, Sololá, Totonicapán, Quezaltenango, San Marcos, Huehuetenango, Quiché, Baja Verapaz, Alta Verapaz, Zacapa, Chiquimula, Jalapa and Jutiapa.

3. The *Petén Region* consisting of the large northern department of El Petén.

Both geographic and demographic differences were considered when defining these regions. The characteristics of the regions are discussed in greater detail in Chapter 4.

POPULATION CHARACTERISTICS

Guatemala's population growth rate is among the highest in the world. The population census of 1964 enumerated 4,287,328 persons in Guatemala, an increase of about one and a half million

over the 1950 census.[4] This increment represents an average annual growth rate of 3.1 per cent.

Presently Guatemalans are classified into two ethnic groups: Indian and Ladino. In 1964 Indians constituted 43.3 per cent of the total population and Ladinos accounted for the rest. The term "ladino" does not reflect biological or racial difference but refers to cultural differences. Indians are those descendants of the precolonial civilizations inhabiting Central America who have not adopted the characteristic features of modern Western culture. Ladinos, then, are "non-Indians."

The Indians are primarily farmers living in the western highlands and in the northern area of the central region. Most Indians are poor, living at near subsistence levels. The Indian who cannot raise enough food for his family may hire out as a laborer, perhaps to a coffee or cotton plantation on the south coast. Some Indians are engaged in the production of handicrafts.

Culturally, the Indians tend to remain isolated in their small communities, maintaining old traditions and customs and continuing to use traditional production practices. Long range social and economic development planning for Guatemala must necessarily include special programs designed to reach these people.

Ladinos tend to be more urban and more highly educated than the Indians and are probably more susceptible to change. Large numbers of them are engaged in agriculture on the coastal region and on the eastern highland slopes of the central region.

POPULATION DENSITY AND MIGRATION

In 1964 Guatemala had a population density of 39 persons per square kilometer. The population density figures for departments show an uneven distribution of the population, ranging from a low of 0.8 persons per square kilometer in El Petén to a high of 366 persons in the department of Guatemala. In general, population density was highest in the western highlands of the central region. Within this region the departments of Guatemala, Sacatepéquez, Sololá, Totonicapán and Quezaltenango all had population densities of over 100 persons per square kilometer.

Estimates of migration within Guatemala show that 14 per cent of the inhabitants in 1964 were living in departments other

4. Statistics cited in this section are drawn from the following sources:

a. Censo de la Población, 1964, Dirección General de Estadística (D.G.E.) Guatemala, 1966. (This census was a 5 per cent sample.)

b. Sexto Censo de la Población, 1950, D.G.E.

c. Report of the Comisión de Redcursos Naturales y Humanos; Tercer Congreso de Economistas de Guatemala, January, 1969.

d. Guatemala en Cifras, 1965 and 1966, D.G.E.

than the one in which they were born. Economic betterment appears to have been the underlying motive for the movements. Large numbers of migrants went to areas having a relative abundance of rich agricultural lands. Another prominent migration stream originated in the provinces and terminated in the Guatemala City area. The majority of the migrants went to the departments of Guatemala and Escuintla. There was also a substantial amount of migration into the departments of Izabal, Retalhuleu, Suchitepéquez, and Quezaltenango.

URBANIZATION

Slightly more than 34 per cent of the total population was classified as urban in the 1964 census. The definition of the urban population changed between the census years of 1950 and 1964 thus making it impossible to quantify the relative change in the size of the urban population. Any area legally recognized as a city or town was classified as urban in the 1964 census.

Guatemala City is the country's most important urban center. Its population was 294,000 in 1950 and 577,120 in 1964, which corresponds to an average annual growth rate of 4.9 per cent. There are eight other important urban areas in Guatemala which in 1964 had populations ranging from 14,000 to 45,000 inhabitants. Quezaltenango is the second largest city in the Republic and is an important trading and banking center for a large agricultural area. Other important urban areas are the cities of Antigua, Mazatenango, Puerto Barrios, Escuintla, Retalhuleu, Chiquimula and Coatepeque.

LITERACY AND EDUCATION LEVELS

The proportion of the population seven years and older that could read and write increased from 28.1 per cent in 1950 to 36.7 per cent in 1964. The proportion of the population classified as literate varied considerably between urban and rural areas. More than 60 per cent of the population over seven years of age in the urban areas in 1964 could read and write while less than 25 per cent of the rural population in the same age class was classified as literate.

The 1964 census also indicated that less than 5 per cent of the population seven years and older had finished elementary school, while less than 1.0 per cent finished secondary education. School enrollment figures indicated that 25 per cent of the young people between the ages of seven and twenty-four years were

actually attending classes. The percentage for rural areas was only 15.2 while that of the urban areas was 45.3.

EMPLOYMENT STATUS

The employment survey conducted by the Statistics Bureau as part of the 1964 population census showed that 1,317,140 persons seven years and older were classified as economically active. The term "economically active" applies to a wide range of people, including those looking for work (1.5 per cent of the economically active population) as well as those employed less than full time. Since the amounts of time worked by the various members of the economically active population are not known, the census classification is of limited value in determining employment levels. Nevertheless the results of the employment survey appear to be the best indicators of overall employment levels available in Guatemala.

The same definition of "economically active" was used in both the 1950 and 1964 employment surveys. The number of persons classified as economically active increased by 349,326 between the two surveys. This represents an average annual growth rate of 2.2 per cent which is well below the 3.1 per cent rate of growth of the population. Of the 1,317,140 economically active persons in 1964, 461,960 were classified as urban and 855,180 as rural. These figures represented 41.5 per cent of the population seven years and older for each group.

Employment survey data reflecting the numbers of economically active persons by sector of activity are available for both 1950 and 1964. These data were tabulated by department and region and are presented in Tables 1.1 and 1.2. Several things stand out in these tables. The percentage of economically active population engaged in agriculture and kindred occupations was 65.4 in 1964; a slight drop from 68.2 per cent in 1950. Such a high percentage is typical for less-developed countries. The slight percentage decrease tends to hide the fact that in terms of absolute numbers there was an increase of 201,590 person economically active in agriculture—which is almost a 30 per cent increase over the 1950 figure. More than half of the increase in numbers (133,984) occurred in the central region, an area already characterized by minifundia in 1950. The possibilities for increasing the land area under cultivation in this region are very limited. The result is that the small farms in this region became even smaller between 1950 and 1964.

While overall employment in agriculture increased at an average annual rate of 1.9 per cent, the average annual rate for all other sectors was 2.8 per cent. It is worth noting that the indus-

TABLE 1.1 ● GUATEMALA: EMPLOYMENT BY SECTOR, 1950

Region and Department	Employment, All Sectors	Agriculture[a]	Agriculture as per cent of total	Mining	Industry
Coastal Region	173,008	131,990	76.29	608	10,604
Escuintla	48,646	37,209	76.49	225	2,793
Santa Rosa	36,136	30,647	84.81	119	1,740
Suchitepéquez	43,837	34,421	78.52	50	3,172
Retalhuleu	23,880	18,361	76.89	210	1,530
Izabal	20,509	11,352	55.35	4	1,369
Central Region	788,580	523,296	66.36	833	100,547
Guatemala	164,690	37,487	22.76	213	38,699
El Progreso	16,599	12,041	72.54	4	2,148
Sacatepéquez	20,309	13,558	66.76	6	2,308
Chimaltenango	41,470	34,311	82.74	15	3,181
Sololá	27,270	23,052	84.53	6	1,758
Totonicapán	33,214	9,730	29.29	0	12,667
Quezaltenango	65,507	42,593	65.02	54	9,931
San Marcos	84,554	71,932	85.07	16	5,630
Huehuetenango	66,672	57,245	85.86	126	4,824
El Quiché	57,876	49,343	85.26	70	3,825
Baja Verapaz	22,340	18,450	82.59	7	1,881
Alta Verapaz	58,168	48,372	83.16	171	4,054
Zacapa	22,939	15,804	68.90	0	2,779
Chiquimula	37,526	31,255	83.29	11	2,618
Jalapa	24,971	20,369	81.57	36	2,178
Jutiapa	44,475	37,754	84.89	98	2,066
Petén Region	6,226	4,264	68.49	0	387
Republic of Guatemala	967,814	659,550	68.15	1,441	111,538

Source: Sexto Censo de la Población, 1950, Dirección General de Estadística.

[a]Includes forestry, hunting and fishing.

TABLE 1.1 ● Continued

Region and Department	Construction	Electricity Gas, Water and Sanitation	Commerce	Transportation and Communication	Services	Other
Coastal Region	3,458	258	8,450	3,313	13,248	1,079
Escuintla	1,106	141	1,983	932	3,761	496
Santa Rosa	817	25	770	189	1,768	61
Suchitepéquez	641	42	1,344	723	3,217	227
Retalhuleu	442	21	941	461	1,781	133
Izabal	452	29	3,412	1,008	2,721	162
Central Region	22,620	979	43,950	11,938	81,516	2,901
Guatemala	13,926	537	18,965	7,485	45,609	1,769
El Progreso	372	9	491	385	1,094	55
Sacatepéquez	762	15	1,022	367	2,187	84
Chimaltenango	518	36	929	327	2,059	94
Sololá	309	2	764	99	1,217	63
Totonicapán	312	5	8,753	99	1,548	100
Quezaltenango	1,423	227	3,985	888	6,200	206
San Marcos	951	23	1,586	413	3,937	66
Huehuetenango	630	26	1,128	191	2,427	75
El Quiché	348	14	1,901	207	2,110	58
Baja Verapaz	505	7	245	64	1,134	47
Alta Verapaz	372	18	1,040	346	3,724	71
Zacapa	481	18	919	582	2,290	66
Chiquimula	426	13	809	189	2,146	59
Jalapa	574	14	488	120	1,163	29
Jutiapa	711	15	925	176	2,671	59
Peten Region	349	7	161	101	941	16
Republic of Guatemala	26,427	1,244	52,561	15,352	95,705	3,996

TABLE 1.2 ● GUATEMALA: EMPLOYMENT BY SECTOR, 1964

Region and Department	Employment, All Sectors	Agriculture[a]	Agriculture as per cent of total	Mining	Industry
Coatal Region	253,020	198,300	78.37	720	14,840
Escuintla	82,040	62,980	76.78	200	6,240
Santa Rosa	46,960	39,540	84.20	140	1,860
Suchitepéquez	54,360	42,620	78.40	20	3,380
Retalhuleu	35,740	28,120	78.68	220	1,660
Izabal	33,920	25,040	73.82	100	1,700
Central Region	1,055,740	657,280	62.26	980	134,020
Guatemala	259,580	36,540	14.08	380	62,120
El Progreso	19,020	15,380	80.86	-	880
Sacatepéquez	24,980	16,120	64.53	-	3,120
Chimaltenango	48,400	39,460	81.53	40	380
Sololá	36,120	30,180	83.55	40	2,900
Totonicapán	41,660	11,940	28.66	-	16,080
Quezaltenango	80,420	50,820	63.19	40	11,380
San Marcos	105,540	90,340	85.60	20	6,460
Huehuetenango	92,200	79,540	86.27	120	5,420
El Quiché	80,160	66,020	82.36	100	5,880
Baja Verapaz	29,320	24,620	83.97	-	1,760
Alta Verapaz	79,020	65,920	83.42	20	5,140
Zacapa	29,280	21,300	72.75	200	2,320
Chiquimula	45,140	36,460	80.77	-	2,980
Jalapa	30,180	25,480	84.43	-	1,580
Jutiapa	54,720	47,160	86.18	60	2,200
Petén Region	8,380	5,560	66.35	20	600
Republic of Guatemala	1,317,140	861,140	65.38	1,720	149,460

Source: Censos de la Población, 1964 (5.0 per cent sample), Dirección General de Estadística.

[a]Includes forestry, hunting and fishing.

TABLE 1.2 ● Continued

Region and Department	Construction	Electricity, Gas, Water and Sanitation	Commerce	Transportation and Communication	Services	Other
Coastal Region	3,460	540	9,540	7,460	16,740	1,460
Escuintla	1,120	100	3,520	2,240	5,420	220
Santa Rosa	900	220	1,220	520	2,480	80
Suchitepéquez	720	60	2,200	1,160	4,060	140
Retalhuleu	460	80	1,020	960	2,560	660
Izabal	260	80	1,580	2,580	2,220	360
Central Region	30,600	1,140	72,380	20,540	130,440	8,320
Guatemala	18,960	820	35,900	13,200	85,480	6,180
El Progreso	380	-	680	500	1,100	100
Sacatepéquez	860	40	1,220	380	2,860	380
Chimaltenango	700	20	860	620	2,860	40
Sololá	320	-	1,280	140	1,260	-
Totonicapán	300	-	11,440	140	1,760	-
Quezaltenango	1,960	120	5,360	1,260	8,720	760
San Marcos	980	40	2,380	820	4,420	80
Huehuetenango	800	-	1,980	420	3,900	20
El Quiché	660	-	4,540	480	2,420	60
Baja Verapaz	360	-	520	240	1,820	-
Alta Verapaz	580	40	2,300	420	4,560	40
Zacapa	860	40	1,100	780	2,500	180
Chiquimula	1,520	20	1,160	460	2,460	80
Jalapa	460	-	640	340	1,580	100
Jutiapa	900	-	1,020	340	2,740	300
Petén Region	160	-	360	180	1,480	20
Republic of Guatemala	34,220	1,680	82,280	28,180	148,660	9,800

TABLE 1.3 ● GUATEMALA: POPULATION

Region and Department	1950[a]	1964[b]	Average Annual Rate of Growth	Population Projections (thousands) 1970	1972	1975	1980
Coastal Region	480	827	4.0[c]	1,048.6	1,135.8	1,281.6	1,572.0
Escuintla	124	257	5.3	350.4	388.5	453.6	588.4
Santa Rosa	110	163	2.8	192.4	203.3	220.9	253.6
Suchitepéquez	124	184	2.8	217.2	229.5	249.3	286.2
Retalhuleu	67	116	4.0	146.8	158.8	178.6	217.3
Izabal	55	107	4.8	141.8	155.7	179.2	226.5
Central Region	2,295	3,427	2.9[c]	4,096.9	4,322.2	4,720.3	5,474.2
Guatemala	439	793	4.3	1,020.9	1,110.6	1,260.1	1,555.3
El Progreso	48	68	2.5	78.9	82.9	89.2	100.9
Sacatepéquez	60	81	2.2	92.3	96.4	102.9	114.7
Chimaltenango	121	163	2.1	184.6	192.5	204.9	227.3
Sololá	83	111	2.1	125.7	131.1	139.5	154.8
Totonicapán	99	146	2.8	172.3	182.1	197.8	227.1
Quezaltenango	184	270	2.7	316.8	334.1	361.9	413.5
San Marcos	233	334	2.6	389.6	410.1	442.9	503.6
Huehuetenango	200	291	2.7	341.5	360.1	390.1	445.7
El Quiché	175	261	2.9	309.9	328.1	357.5	412.4
Baja Verapaz	66	99	2.9	117.5	124.4	135.6	156.4
Alta Verapaz	190	266	2.4	306.7	321.6	345.3	388.8
Zacapa	70	98	2.4	133.0	118.5	127.2	143.2
Chiquimula	113	150	2.0	167.9	174.6	185.3	204.6
Jalapa	75	103	2.3	118.1	123.6	132.3	148.2
Jutiapa	139	193	2.3	221.2	231.5	247.8	277.7
Petén Region	16	30	4.6	39.3	43.0	49.2	61.6
Republic of Guatemala	2,791	4,284	3.1[c]	5,184.8	5,501.0	6,051.1	7,107.8

[a]Sexto Censo de la Población, 1950, Dirección General de Estadística
[b]Censos de la Población, 1964 (5.0 per cent sample). D.G.E.
[c]Not used for projections; regional and national projections obtained by summing departmental projections.

trial-manufacturing sector had an average annual growth rate of only 2.2 per cent and thus did not serve as an important outlet for underemployed farm labor. This becomes especially apparent when considering the small size of the industrial sector in terms of the number of people employed; 11.5 per cent of the economically active population in both 1950 and 1964.

POPULATION AND EMPLOYMENT PROJECTIONS

The population and employment projections presented in this section were prepared by the National Planning Council and are based on trends exhibited between the census years of 1950 and 1964. Projections were made for the years 1970, 1972, 1975 and 1980, on the assumption that the 1950 to 1964 trends would continue. These projections are shown in Table 1.3.

Total population is expected to pass the seven million mark by 1980. The densely populated central region will experience the largest increase in numbers; more than two million by 1980. It is important to note that more than one third of the increase in numbers for the central region is expected to occur in the capital department of Guatemala as people move into the city in search of employment opportunities. Guatemala City will have more than double its 1964 population in 1980 if current trends continue.

The fastest growing area of economic significance is the coastal region which had a 4.0 per cent average annual rate of population increase. This was considerably higher than the 2.9 per cent rate for the central region. By 1980 the coastal region is expected to have double its 1964 population as highland people continue to move into areas having a relative abundance of rich agricultural lands. The Petén region showed a higher rate of population growth (4.6 per cent) but the increase in terms of absolute numbers was very small compared to other regions.

In 1980, 1,892,000 persons are expected to be economically active, an increase of 575,000 over 1964. For the country as a whole it is expected that there will be 1,199,000 economically active persons in agriculture by 1980, an increase of 338,000 over 1964. The percentage of the labor force in agriculture is not expected to change significantly. Expectations are that 63.4 per cent of the economically active population in 1980 will be engaged in agriculture, a very slight drop from 65.4 per cent in 1964. The central region will probably experience the largest percentage drop as people move to the city in search of urban employment. The majority (58.6 per cent) of the economically active population in this region will still be engaged in agriculture, however.

CHAPTER TWO

STRUCTURE AND PERFORMANCE OF GUATEMALAN ECONOMY

THE ECONOMIC GROWTH of the Guatemalan economy during the period 1950–66 was modest. (The values of the major macroeconomic variables are given in Table 2.1 in constant 1958 prices covering the period 1950–66. Table 2.2 provides the cumulative growth rates of a number of variables over the same period.) The cumulative growth rate of Gross Domestic Product (corrected for the terms-of-trade effect) at constant prices amounted to 4.4 per cent between 1950–52 (average) and 1964–66 (average)—only slightly above the population growth rate. As a consequence, per capita income growth was just above 1 per cent per annum over the above period. The evidence strongly suggests that the growth of the economy was export-led. Exports grew at an annual cumulative rate of 7.8 per cent which is considerably higher than the average export growth of the developing world (i.e. 5 per cent) in the same period. It will be argued that the growth mechanism began in the export sector. Exports together with changes in the terms-of-trade affected private investment which in turn affected national income.

The remarkable export performance was partially neutralized by a worsening of the terms-of-trade. The growth rate of exports corrected for the terms-of-trade effect (E + Z) amounted to 5.8 per cent from 1950–52 to 1964–66. The implications of the worsening of the terms-of-trade on gross domestic product are of interest. If the price relationship between imports and exports had been maintained at its 1950–52 level, the growth rate of GDP would have been 4.6 per cent a year, as compared to the actual rate of 4.4 per cent. Thus, unfavorable terms-of-trade were responsible for a reduction of GDP growth of about two-tenths of a per cent cumulatively over the period under consideration.

TABLE 2.1 ● GUATEMALA: MAJOR MACROECONOMIC VARIABLES, 1950–66, IN CONSTANT 1958 PRICES (thousands of quetzales)

Year	Public Transfers	Indirect Taxes	Public Consumption	Private Consumption	Imports of Goods and Services	Private Investment	Public Savings
	T^r	T^i	C^g	C^p	M	I^p	S^g
1950	4.700	37,583	47,043	608,013	104,911	61,638	6,105
1951	5,012	42,405	51,272	614,244	94,472	59,376	8,387
1952	6,150	49,206	59,116	620,372	84,967	45,432	10,717
1953	6,330	52,229	59,729	647,942	95,080	42,312	14,240
1954	5,745	56,765	56,745	684,325	105,768	41,108	24,398
1955	5,490	60,015	54,127	674,852	121,559	55,896	34,312
1956	6,179	61,876	61,683	719,250	153,196	91,309	31,855
1957	7,002	66,826	66,626	763,606	167,210	93,936	33,318
1958	7,669	69,912	70,430	813,041	164,338	86,397	32,307
1959	9,590	72,091	77,750	841,359	163,049	87,355	21,825
1960	8,778	73,548	79,561	868,662	165,231	80,964	22,435
1961	9,885	72,905	83,231	906,867	152,933	81,084	20,249
1962	8,890	69,484	73,800	958,704	164,752	81,438	23,998
1963	7,971	80,553	73,070	1,020,974	213,401	107,815	29,859
1964	9,618	89,692	79,875	1,073,376	234,186	125,226	31,480
1965	12,043	105,104	90,974	1,101,642	246,955	127,421	43,193
1966	13,294	104,893	88,354	1,112,865	248,023	129,079	43,186

TABLE 2.1 ● Continued

Year	Public Investment	Total Consumption	Total Investment	Gross Domestic Product
	I^g	C	I	X
1950	20,032	655,056	81,670	736,433
1951	20,557	665,516	79,933	744,498
1952	23,508	679,488	68,940	756,848
1953	25,278	707,671	67,590	790,504
1954	25,931	741,070	67,039	815,887
1955	34,524	728,979	90,420	834,464
1956	51,172	781,113	142,481	913,827
1957	60,285	830,232	154,221	954,154
1958	49,918	883,471	136,315	976,055
1959	38,163	919,109	125,518	1,013,715
1960	26,848	948,223	107,812	1,039,867
1961	32,369	990,098	113,473	1,073,124
1962	27,240	1,032,504	108,678	1,114,937
1963	20,990	1,094,044	128,805	1,209,394
1964	32,564	1,153,251	157,790	1,279,477
1965	31,434	1,192,616	158,855	1,324,855
1966	35,921	1,201,219	165,000	1,368,293

(Continued)

TABLE 2.1 ● Continued

Year	Direct Taxes $\overline{T}^d$	Net Non-tax Public Income $\overline{T}^o$	Domestic and Foreign Loans $\overline{F}$	Changes in Stocks $\overline{\Delta S}$	Exports of Goods and Services $\overline{E}$	Terms of Trade Effect $\overline{Z}$	Public Financial Investment $\overline{I}_f^g$
1950	10,700	9,548	22,583	-958	91,487	14,089	8,656
1951	11,600	10,671	23,567	-458	82,006	11,973	11,397
1952	13,600	13,183	28,919	-6,973	91,236	9,124	16,128
1953	14,900	13,199	29,250	-1,213	93,898	15,212	18,212
1954	17,000	13,088	21,058	259	87,010	26,277	19,525
1955	18,800	15,129	28,840	14,114	97,153	25,357	28,628
1956	20,800	17,197	40,609	7,192	105,121	31,116	21,292
1957	23,300	16,846	42,087	4,173	111,078	21,660	19,194
1958	23,600	16,906	34,537	-1,068	121,675	0	16,926
1959	21,900	15,165	50,443	-3,305	145,950	-10,508	34,105
1960	21,800	15,474	35,250	5,417	152,978	- 9,332	30,837
1961	23,100	17,365	40,098	-12,985	156,614	-21,143	27,958
1962	21,600	15,688	40,313	-6,033	162,587	-18,047	38,992
1963	19,500	10,800	25,741	8,586	223,030	-31,670	35,307
1964	21,500	9,773	43,526	7,316	214,386	-19,080	45,596
1965	25,600	15,510	13,855	8,234	242,406	-30,301	25,614[a]
1966	28,100	11,834	973	1,494	298,085	-49,482	8,238[a]

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

[a]Estimates.

TABLE 2.2 ● CUMULATIVE GROWTH RATES OF MAJOR VARIABLES 1950–52 (average) TO 1964–66 (average) IN CONSTANT 1958 PRICES

Variable		Growth Rate (per cent)
Gross Domestic Product	(X)	4.4
Total Consumption	(C)	4.2
Public Consumption	(C^g)	3.6
Private Consumption	(C^p)	4.3
Total Investment	(I)	5.4
Public Investment	(I^g)	3.2
Private Investment	(I^p)	6.1
Imports	(M)	7.0
Exports	($\overline{E}$)	7.8
Public Transfers	(T^r)	5.8
Indirect Taxes	(T^i)	6.2
Direct Taxes	($\overline{T}^d$)	5.4
Exports + Terms-of-Trade Effect	($\overline{E+Z}$)	5.8

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

The relevant question appears to be why Guatemala did not enjoy more growth, given the satisfactory export performance, even when allowance is made for the negative terms-of-trade effects. The prime culprit seems to have been the low investment ratio. Comparing the growth process of Guatemala to that of Perú, an economy with a very similar structure, is enlightening. Both countries enjoyed high export growth which was a major determinant of the level of private investment. This relationship can be explained causally as follows: a large part of private investment is either directly or indirectly channeled to the production of export commodities. High export receipts provide an incentive and stimulus for investment into export activities and related domestic activities (e.g., manufactured foodstuffs and beverages). The essential difference between these two countries is that Perú invested a much higher proportion of its GDP than did Guatemala. The investment ratio (gross investment ÷ GDP) grew from 16.1 per cent to 23.0 per cent in Perú over the period 1950–65 and from 10.3 to 11.8 per cent in Guatemala between 1950–52 and 1964–66. There is little doubt that the superior growth performance of Perú over the above period (5.3 per cent) as compared to Guatemala (4.4 per cent) resulted from a much higher investment ratio.

Even though the proportion of consumption expenditures to GDP is very high by international standards in Guatemala (87 per cent in 1966), the rate of growth of consumption was lower (4.2 per cent between 1950–52 and 1964–66) than that of GDP. This suggests that a strategy to reduce consumption expenditures of the higher income classes through appropriate taxation while not squeezing further the consumption ability of the subsistence sector may be needed. Indeed, it would be difficult to imagine how the subsistence sector could absorb a reduction in its present level, or growth rate, of consumption.

Economic development consists not only of income and output growth but also of the achievement of other objectives such as employment creation, a more equal income distribution, balance-of-payments equilibrium, and price stability. The performance of the Guatemalan economy with respect to these objectives will be reviewed briefly.

Population grew at 3.1 per cent annually between the two census years (1950 and 1964); yet the economically active population grew only at a cumulative annual rate of 2.2 per cent—implying that the proportion of the population which is economically inactive must have increased. What makes the situation particularly worrisome is that the percentage of economically active population to total population amounted to only about 31 per cent in 1964.

Information on the distribution of income in Guatemala is

TABLE 2.3 ● POPULATION AND INCOME STATISTICS: SUBSISTENCE AND COMMERCIAL SECTORS OF THE GUATEMALAN ECONOMY, 1950 AND 1962

	1950		1962	
	Per cent of pop.	Per cent of GDP	Per cent of pop.	Per cent of GDP
1. Subsistence Economy	71.3	24.0	72.7	21.9
2. Commercial Economy	28.7	76.0	27.3	78.1
a. Low Incomes	21.1	24.2	20.0	20.9
b. High, Medium Incomes	7.6	51.8	7.3	57.2

Source: Comisión Nacional de Programación Económica, reproduced in Adams, Richard M., "El Sector Agrario Inferior de Guatemala, 1944-65, Les Problemes Agraires des Amériques Latines," Paris, 1967.

scarce. It appears that the distribution of income has become more uneven. Guatemala is almost the prototype of a dual economy. A large subsistence sector continues to exist side by side with a dynamic commercial sector. There is some evidence as indicated in Table 2.3 that the relative population in the subsistence sector increased between 1950 and 1962 while the relative contribution of that sector to gross national product declined.

In order to evaluate the changes in income distribution between the subsistence sector and the rest of the economy, eight departments were selected as being essentially in the "subsistence" sector (Chimaltenango, Sololá, Totonicapán, San Marcos, Huehuetenango, El Quiché, Alta Verapaz, and Jalapa). Each of these departments is characterized by a very high proportion of its labor force in agriculture (at least 80 per cent).[1] Some revealing facts emerge from an analysis of output and population changes based on official statistics. The share of GDP generated in these departments declined dramatically from 16 per cent to 6.4 per cent of Guatemala's GDP between 1951 and 1966 (Table 2.4). Furthermore, the absolute level of per capita output fell from 97 quetzales to 51 quetzales over the same period.[2] This downward trend would have been worse, had it not been for some outmigration from these departments.

1. The census figures for Totonicapán indicate only about 30 per cent of the labor force in agriculture and about 40 per cent employed in industry. In fact, the latter are producing textile goods on a very small scale and can be considered to be in the subsistence sector. According to the official figures per capita income in Totonicapán amounted to only 18 quetzales in 1966.
2. The official rate of exchange between the United States dollar and the quetzal is $1.00 = Q1.00. This rate has been in effect since 1926.

TABLE 2.4 ● RELATIVE SHARES OF EIGHT DEPARTMENTS IN GUATEMALA'S TOTAL POPULATION, ECONOMICALLY ACTIVE POPULATION AND GROSS DOMESTIC PRODUCT (in percentage) AND PER CAPITA GDP, 1951–66

Share of Eight Departments in:	1951	1964	1966
Gross Domestic Product, per cent (in constant 1958 prices)	16.0	8.0	6.4
Total Population, per cent	41.9	39.1	38.7
Economically Active Population, per cent	40.6	39.0	38.7
Subsistence Sector Per Capita GDP (in 1958 quetzales)	97	62	51

Source: Derived from data of the Banco de Guatemala and the Direccion General de Estadística.

An examination of the data indicated that output figures by department are based on departmental estimates of government revenues, total sales (as declared to the Dirección General de Rentas) and the value of agricultural output. There appeared to be some inconsistencies in the raw data which could not be reconciled, i.e., the total value of agricultural output of a number of "subsistence" departments fell during the period 1950–66, while production trends for major crops (corn, wheat, beans, potatoes) appears to have increased slightly in the same departments. It is quite likely that the published departmental gross domestic product figures underestimate the real output level in the series. Nevertheless it would be fairly reasonable to assume that whatever increase in output took place was more than compensated by the population growth in these eight "subsistence" departments, so that per capita output actually declined.

Presumably the departmental output figures do not include incomes of seasonal migratory workers earned on coffee and cotton farms in coastal departments. Since these income opportunities increased, particularly in the sixties, they would tend to offset the extent of the per capita income decline in the subsistence sector as measured from the output side. It is interesting, however, to note that one study arrived at estimates of per capita income for campesinos in the highlands which were of the same order of magnitude as those given in Table 2.4.[3] The estimates were based on sample

3. Schmid, L. "The Role of Migratory Labor in the Economic Development of Guatemala" (unpublished Ph.D. dissertation, University of Wisconsin, 1967).

surveys and interviews and yielded a per capita income of about 43 quetzales in the early sixties. Thus, even if one doubts the accuracy of the underlying data, there appears to be fairly strong evidence that per capita income has probably declined in the "subsistence" sector. Such a worsening of the standard of living of the subsistence sector together with a more unequal income distribution is bound to have serious economic, social and possibly political implications.

The Guatemalan balance of payments has undergone some pressures in the last decade. The excellent export performance, however, made it possible to limit the deficit on current account to a level generally consistent with the new inflow of long term capital. Three commodities still accounted for more than two-thirds of total export value in 1964–66: coffee, cotton and bananas. To some extent the spectacular export performance of Guatemala from 1960 on can be credited to cotton. The value of cotton exports increased from about 5 million quetzales in 1960 to almost 45 million in 1966 and its relative share from 5 to 19 per cent of total exports. In the last few years exports to Central America have risen very rapidly and amount to more than 50 million quetzales at the present time.

The rate of growth of imports has been high compared to that of GDP (7.0 per cent compared to 4.4 per cent over 1950–52 and 1964–66) reflecting an elasticity of demand for imports with respect to output of 1.58 which is quite high for a developing country. Even though Guatemala's overall performance with regard to the balance-of-payments has been reasonably good, there are a number of reasons for being concerned with the country's capacity to maintain external equilibrium in the future.

The last policy objective reviewed here is price stability. This is one area in which the economy has to be given high marks. The implicit price deflator of GDP increased from 100 in 1950 to 119.1 in 1958 and 119.0 in 1966. Thus, according to the official national income data, the GDP price deflator was at the same level in 1966 as in 1958. A look at the consumer and wholesale price indices confirms the amazing price stability enjoyed by the country in the last ten years. It is clear that a high relative weight has traditionally been placed on the achievement of price stability and balance of payments equilibrium by the Guatemalan government. Guatemala's experience with price and exchange rate stability (the quetzale has been on par with the dollar since 1926) may well be unique.

In summary, Guatemala's recent performance can be described as one of economic stability—internally and externally—with modest output growth. It would not be unfair to say that Guatemala's economic and social development record has been poor. There is little doubt that the absolute standard of living of a large part of

the population has declined. Since the size of the population and the labor force increased, the number of unemployed and disguised unemployed must have risen considerably.

QUANTITATIVE RELATIONSHIPS BETWEEN MAJOR VARIABLES—A MODEL OF THE GUATEMALAN ECONOMY

An attempt was made at deriving a number of quantitative relationships between macroeconomic variables over the period 1950–66 by constructing an econometric model of the Guatemalan economy. The equations of the model were estimated on the basis of annual data over the period 1950–66 (i.e., 17 observations) expressed in constant 1958 prices. The data upon which the regressions were based are given in Table 2.1, and come with a few exceptions from the National Income Accounts (Cuentas Nacionales) of the Bank of Guatemala. The estimation procedure used was ordinary least squares. Each statistically estimated relation is given with (a) the standard error of the coefficients in parenthesis below each coefficient, and (b) the value of the coefficient of determination (r^2) and the Durbin-Watson (D.W.) test for serial correlation among residuals, respectively, on the right hand side of each equation. The model is presented in Table 2.5 and the list of variables in Table 2.6.

The model consists of six behavioral relations and five identities. The first relationship explains public transfers (T^r) as a function of gross domestic product corrected for the terms-of-trade effect (X). The relationship shows that about 1.1 per cent of additional GDP consists of public transfers. Equation 2.a reveals a good fit between indirect taxes (T^i) and GDP. It shows that about 8.9 per cent of an increase in GDP goes for payment of indirect taxes. It was not possible to obtain a significant relationship between direct taxes and other macroeconomic variables, probably because of the changes in tax coverage and rates which occurred during the period under consideration. For example, a new personal income tax was instituted in 1964 and led to a substantial jump in direct tax receipts in 1965 and 1966 compared to previous years.

Equations 3.a and 4.a explain public consumption (C^g) and private consumption (C^p) respectively. Government consumption changes on the average by about 5.8 per cent of a given change in GDP. The marginal (and average) propensity to consume (on private account) came out to about 83 per cent. As one would expect, the coefficient of determination is very high (0.99) and the standard error quite low; the Durbin-Watson ratio indicates, however, serial correlation among residuals.

A highly significant import function was obtained by regressing total imports (M) on total consumption (C) and total gross in-

TABLE 2.5 ● GUATEMALA MACROECONOMIC MODEL

		Behavioral Relationships	
1.	T^r	$= -2853 + .0108X$ $(1244)\ (.0012)$	$r^2 = .84$ $d = 1.123$
2.	T^i	$= -20034 + .0889X$ $(6179)\ (.0061)$	$r^2 = .93$ $d = .8216$
3.	C^g	$= 10895 + .0583X$ $(6798)\ (.0067)$	$r^2 = .84$ $d = .9407$
4.	C^p	$= .8289X$ $(.0043)$	$r^2 = .99$ $d = .7435$
5.	M	$= -73773 + .177C + .636I$ $(11089)\ (.019)\ (.106)$	$r^2 = .97$ $d = 1.469$
6.	I^p	$= -26249 + .7960\bar{E}_{-1} + .8749\bar{Z}_{-1}$ $(19903)\ (.1408)\ (.3517)$	$r^2 = .83$ $d = 1.33$
		Identities	
7.	S^g	$= T^i + \bar{T}^d + \bar{T}^o - C^g - T^r$	$(T^i + \bar{T}^d + \bar{T}^o = C^g + T^r + S^g$
8.	I^g	$= S^g + \bar{F} - \bar{I}^g_f$	
9.	C	$= C^p + C^g$	
10.	I	$= I^p + I^g$	
11.	X	$= C + I + \overline{\Delta S} + \bar{E} + \bar{Z} - M$	

NOTES: Exogenous variables are denoted by a bar above the symbol.

See Table 2-6 for definitions of variables. All variables in thousands of 1958 quetzales.

TABLE 2.6 ● LIST OF VARIABLES

T^r	Transfers
T^i	Indirect Taxes
$\bar{T}^d$	Direct Taxes
$\bar{T}^o$	Net Non Tax Public Income
C^p	Private Consumption
C^g	Public Consumption
C	Total Consumption
X	Gross Domestic Product
X^p	Disposable Product
I^p	Private Gross Investment
I^g	Public Investment
$\bar{I}^g_f$	Financial Investment and Amortization of Public Debt
I	Total Gross Investment
M	Imports of Goods and Services
M^c	Imports of Consumer Goods
M^i	Imports of Investment Goods
S^g	Public Savings
$\bar{F}$	Internal and External Public Loans
$\bar{E}$	Exports of Goods and Services
$\bar{E}_{-1}$	Exports of Goods and Services Lagged One Year
$\bar{Z}$	Terms-of-Trade Effect
$\bar{Z}_{-1}$	Terms-of-Trade Effect Lagged One Year
$\bar{\Delta}S$	Changes in Stocks

vestment (I). The function (see Table 2.5) shows that about 18 per cent of additional consumption and about 64 per cent of additional investment are imported. The relatively high import component of investment is, of course, caused by the limited domestic production of capital and other investment goods. There is no evidence that import-substitution has reduced the import component of investment more than marginally over the last two decades. The high dependence on imports which domestic investment entails illustrates the conflict which exists between growth induced by investment, on the one hand, and balance of payments equilibrium on the other.

The next relationship (6.a) provides a reasonably good explanation of the changes in private gross investment (I^p) as a function of exports and the terms-of-trade effect, both lagged one year ($\overline{E}_{-1}, \overline{Z}_{-1}$).[4] Given the erratic changes in private investment over the period under consideration, it is interesting that as much as 83 per cent of the variations in I^p would be explained by changes in $\overline{E}_{-1}$ and $\overline{Z}_{-1}$ ($r^2 = .83$). This relationship can be interpreted causally as follows: Export receipts and changes in the terms-of-trade are the dynamic variables in the economy. Not only is the export sector large in relation to GDP, ($(\overline{E} + \overline{Z}) \div X = 19$ per cent in 1966) but it also provides the stimulus to invest either directly by encouraging reinvestment in the exports activities or indirectly by generating new funds for general investment purposes. Growth in Guatemala, therefore, appears to have been export-led. The magnitudes of the coefficients in equation 6.a are revealing, i.e., a one unit change in last year's exports ($\overline{E}_{-1}$) leads to about eight-tenths of a unit change in current private investment. Thus, private investment appears to be quite sensitive to changes in exports.

The remaining equations in the system are definitional (see Table 2.5.). Equation 7.a defines public savings (S^g) in terms of government revenues on current account from all sources [indirect taxes (T^i) plus direct taxes ($\overline{T}^d$) plus net non tax public income ($\overline{T}^o$) minus public consumption (C^g) and transfers (T^r). Equation 8.a defines public investment (I^g) as equal to government savings plus net internal and external public loans ($\overline{F}$) minus so-called financial investment and amortization of public debt ($\overline{I}^g_f$). This identity is consistent with the way Guatemala's public accounts are consolidated. The next two relationships (9.a and 10.a) define total consumption (C) and total gross investment (I), respectively, as the sum of their private and public components. Finally, the last relationship is the familiar gross domestic product identity, where $\overline{\Delta S}$ indicates changes in stocks.

4. Exogenous variables are denoted by a bar over the symbol.

The relationships in this model can be used independently to explain the major determinants of key variables such as indirect taxes, imports and private investment and project changes in these dependent variables as a function of anticipated changes in the independent variables. Alternatively the whole set of relations can be considered as a model of the economy. In which case the set of endogenous variables (all the variables on the left hand side of the equality signs in Table 2.5) is explained by changes in the exogenous variables, i.e., those variables which are presumed to be determined outside the system. Thus in the model in Table 2.5 we have:

Endogenous Variables: $T^r, T^i, C^g, C^p, M, I^p, S^g, I^g, C, I, X$
Exogenous Variables: $\overline{E}_{-1}, \overline{Z}_{-1}, \overline{E}, \overline{Z}, \overline{T}^d, \overline{T}^o, \overline{I}^g_f, \overline{\Delta S}, \overline{F}$.

The reduced form of the macroeconomic model given in Table 2.7 shows the quantitative effect of changes in the set of exogenous variables on the set of endogenous variables in terms of impact multipliers. It is interesting to note, in this respect, that the impact multiplier of exports ($\overline{E}$) and the terms-of-trade effect ($\overline{Z}$) on GDP is equal to 3.8. This indicates that a one unit change in $\overline{E}$ or $\overline{Z}$ leads to a 3.8 unit change in GDP. The system as specified in the model is moved by changes in the export sector.

The predictive ability of the model given in Table 2.5 over the sample period (1950–66) was tested by computing the values of the endogenous variables based on observed values of the exogenous variables. Such a test was undertaken and revealed that the model as a whole—even though explaining relatively well the major changes in the endogenous variables within the period under consideration—was not capable of coping with very large discrete changes in exogenous variables (e.g., a jump in exports of almost 40 per cent between 1962 and 1963). Likewise, the model could not explain accurately very large shifts in endogenous variables (e.g., the 70 and 50 per cent rise in private and public investment, respectively, between 1955 and 1956. Such changes are abnormal and discontinuous and, as such, cannot be reflected readily by a linear model). It was therefore decided to use the model only to project the growth of GDP. Individual relationships (such as the import and private investment functions) can, however, be used with reasonable confidence to obtain short term projections.[5]

5. Other variations of the model were also formulated. Detailed specification of the reduced forms and the results are available on request.

TABLE 2.7 ● REDUCED FORM OF MACROECONOMIC MODEL

Endogenous Variables	Exogenous Variables									
	$\bar{E}_{-1}$	$\bar{Z}_{-1}$	$\bar{T}^d$	$\bar{T}^o$	$\bar{F}$	$\bar{I}^g_f$	$\bar{\Delta S}$	$\bar{E}$	$\bar{Z}$	Constant
T^r	0.0119	0.0131	0.0150	0.0150	0.1050	-0.1050	0.0411	0.0411	0.0411	-263.68
T^i	0.0981	0.1078	0.1232	0.1232	0.1232	-0.1232	0.3385	0.3385	0.3385	1279.91
C^g	0.0643	0.0707	0.0808	0.0808	0.0808	-0.0808	0.2220	0.2220	0.2220	24872.50
C^p	0.9145	1.0051	1.1489	1.1489	1.1489	-1.1489	3.1562	3.1562	3.1562	198730.00
M	0.6934	0.7621	0.8711	0.8711	0.8711	-0.8711	0.6459	0.6459	0.6459	-65726.88
I^p	0.7960	0.8749	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-26249.00
S^g	0.0218	0.0240	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-23328.91
I^g	0.0218	0.0240	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-23328.91
C	0.9788	1.0758	1.2297	1.2297	1.2297	-1.2297	3.3782	3.3782	3.3782	223602.44
I	0.8178	0.8989	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-49577.89
X	1.1033	1.2126	1.3860	1.3860	1.3860	-1.3860	3.8077	3.8077	0.8077	239751.44

Source: Derived from model in Table 2.5.

MACROECONOMIC PROJECTIONS TO 1972

Considering the dependence of GDP on the export sector, the accuracy of GDP projections will be directly related to the quality of projections in the export sector. Consequently some effort went into the preparation of Table 2.8. It starts with the merchandise exports (f.o.b.) projections of the Bank of Guatemala (column 1) in current prices (1968–72). In order to obtain estimates of exports of goods and services, column 1 was multiplied by 1.15 since the average ratio of exports of goods and services to merchandise exports (f.o.b.) over 1960–66 amounted to that figure (column 2). It was assumed that the unit value of exports would remain essentially at its 1966–68 level (column 3). Then, column 4 was derived expressing exports of goods and services ($\overline{E}$) in constant 1958 prices. Likewise, it was assumed that the unit value of imports would not change compared to its 1966–68 level (column 5) and therefore that the terms-of-trade would remain fixed over the period 1968–72 (column 6). Finally the terms-of-trade effects ($\overline{Z}$) were computed in column 8.

It can be seen that the export prospects over the next few years appear bleak. In both 1969 and 1970 the growth rate of exports (E) is predicted to be between 1 and 1.5 per cent a year, while improving to about 4.5 per cent in 1971 and 6 per cent in 1972. This compares very unfavorably with the historical performance of exports. (The rate of growth of exports amounted to 7.8 per cent annually over the period 1950–52 to 1964–66). Table 2.9 provides the detailed commodity projections underlying the above figures. It reveals clearly that the value of traditional exports (coffee, cotton and sugar) is predicted to remain stationary. The total value of these commodities is projected to be lower in 1972 than in 1966. Whatever growth in exports takes place up to 1972 would result mainly from exports to Central America, "other products" and nickel (starting in 1972). Furthermore, given the difficulties of the Central American Common Market (CACM), the prospects for additional exports to Central America may well be less optimistic than is indicated in the table. Table 2.9 shows also that the unit prices of the major traditional commodities are not likely to increase, providing support for the assumption that the overall unit value of exports will not go up between 1968 and 1972.

The information on $\overline{E}$ and $\overline{Z}$ contained in Table 2.8 (columns 4 and 8) was incorporated into Table 2.10, together with projections of the other exogenous variables appearing in the model.[6] The impact multipliers showing the effect of a one unit change in each exogenous variable on GDP (i.e., X in the model) were applied to

6. It is clear that the predicted values of some of these variables are nothing more than rough estimates.

TABLE 2.8 ● PROJECTIONS OF EXPORTS AND TERMS-OF-TRADE EFFECT (millions of quetzales)

Year	(1) Export Goods f. o. b. (current prices)	(2) Export Goods and Services (current prices)	(3) Export Price Index $\frac{P_{xt}}{P_{x58}}$ (1958 = 100)	(4) Exports of Goods and Services (E) (current prices)
1960	116.2	131.9	86.2	153.0
1961	114.4	128.7	82.2	156.6
1962	118.5	134.8	82.9	162.6
1963	154.1	180.4	80.9	223.0
1964	169.3	195.1	91.0	214.4
1965	187.8	223.5	92.2	242.4
1966	231.9	263.5	88.4	298.1
1967	203.9	234.3	87.0	270.0
1968	238.5[a] (221.1)[b]	274.3[c] (254.7)[b]	87.0	315.0
1969	242.4 (237.4)	278.7 (272.7)	87.0	320.0
1970	245.2 (255.8)	282.0 (292.9)	87.0	324.0
1971	256.6 (266.7)	295.1 (305.7)	87.0	339.0
1972	271.9 (279.8)	312.7 (320.8)	87.0	360.0

[a]Banco de Guatemala projections, 1968-72. See Table 2-9.
[b]Alternative projections contained in source cited in Table 2-10.
[c]The ratio of exports of goods and services to exports of goods f. o. b. has been 1.15, on the average, in the period 1960-66. Consequently column (2) was obtained by multiplying column (1) by 1.15.

(Continued)

TABLE 2.8 ● Continued

Year	(5) Import Price Index $\frac{P_{mt}}{P_{m58}}$ (1958 = 100)	(6) Terms-of-Trade (1958 = 100) (3) ÷ (5)	(7) Purchasing Power of Exports (4) X (6)	(8) Terms-of-Trade Effect (Z) (7) - (4)
1960	91.8	93.9	143.7	- 9.3
1961	95.0	86.5	135.5	-21.1
1962	93.2	88.9	144.5	-18.0
1963	94.3	85.8	191.4	-31.7
1964	99.9	91.1	195.3	-19.1
1965	105.4	87.5	212.1	-30.3
1966	106.0	83.4	248.6	-49.5
1967	106.0	82.1	221.7	-48.3
1968	106.0	82.1	258.6	-56.4
1969	106.0	82.1	262.7	-57.3
1970	106.0	82.1	266.0	-58.0
1971	106.0	82.1	278.3	-60.7
1972	106.0	82.1	295.6	-64.4

TABLE 2.9 ● EXPORT PROJECTIONS TO 1972

		1963	1964	1965	1966
Coffee	Volume[a]	98,242.2	76,051.8	95,279.8	109,231.6
	Price[b]	784.8	934.8	963.0	915.2
	Value[c]	77,075.4	71,088.6	91,691.3	100,067.0
Cotton	Volume	50,420.6	64,078.0	70,591.6	92,800.4
	Price	491.3	500.0	487.0	480.4
	Value	24,291.8	32,064.8	34,447.2	44,535.1
Bananas[d]	Volume	5,622.8	4,139.3	1,510.3	3,133.9
	Price	2.0	2.9	3.3	3.3
	Value	11,497.3	11,845.2	4,972.5	10,455.1
Sugar	Volume	46,676.2	54,864.2	31,588.2	52,269.8
	Price	130.4	154.3	132.6	115.2
	Value	6,118.3	8,489.6	4,171.8	5,977.6
Meat	Volume	6,044.4	4,765.6	5,809.8	5,924.8
	Price	734.8	776.1	784.8	902.2
	Value	4,436.4	3,695.6	4,559.5	5,346.9
Nickel	Volume				
	Price	---	---	---	---
	Value				
Central America Total Value		17,294.4	29,558.2	35,574.2	50,825.3
Other Products Value		13,419.1	12,582.7	13,043.5	14,720.6
Total Value		154,132.7	169,324.7	188,460.0	231,926.7

Source: Banco de Guatemala.

[a]Volume in metric tons.
[b]Price in quetzales per metric ton.
[c]Value in thousands of quetzales.
[d]Volume in racimos (stalks).

TABLE 2.9 ● Continued

1967	1968	1969	1970	1971	1972
81,295.8	98,352.6	92,000.0	92,000.0	98,900.0	111,285.0
841.3	813.4	867.6	847.8	852.2	843.5
68,360.8	80,000.0	80,000.0	78,000.0	84,300.0	87,300.0
67,054.2	83,844.2	83,637.2	83,637.2	83,637.2	83,637.2
469.6	479.0	479.0	479.0	479.0	479.0
31,492.9	40,100.0	40,000.0	40,000.0	40,000.0	40,000.0
2,645.3	4,117.6	4,176.5	4,235.3	4,294.1	4,352.9
3.5	3.4	3.4	3.4	3.4	
9,230.6	14,000.0	14,200.0	14,400.0	14,600.0	14,800.0
60,917.8	45,731.7	45,731.7	45,731.7	46,493.9	46,493.9
145.7	131.2	131.2	131.2	131.2	131.2
8,872.1	6,600.0	6,000.0	6,000.0	6,100.0	6,100.0
8,781.4	9,369.6	9,369.6	9,369.6	9,369.6	9,369.6
906.5	864.5	864.5	864.5	864.5	864.5
7,967.0	8,100.0	8,100.0	8,100.0	8,100.0	8,100.0
---	---	---	---	---	---
57,843.3	67,000.0	70,300.0	73,800.0	77,400.0	81,200.0
20,146.4	22,700.0	23,800.0	24,900.0	26,100.0	27,400.0
203,913.1	238,500.0	242,400.0	245,200.0	256,600.0	271,900.0

TABLE 2.10 ● VALUES OF EXOGENOUS VARIABLES, 1963–72, USED FOR PROJECTION PURPOSES (constant 1958 prices, millions of quetzales)

Year	$\bar{F}$	$\bar{E}$	$\bar{Z}$	$\bar{E}_{-1}$	$\bar{Z}_{-1}$	$\bar{T}^d$	$\bar{T}^o$	$\bar{I}_f^g$	$\bar{\Delta}S$
1963	25.7	223.0	-31.7	162.6	-18.0	19.5	10.8	35.3	8.6
1964	43.5	214.4	-19.1	223.0	-31.7	21.5	9.8	45.6	7.3
1965	13.9[a]	242.4	-30.3	214.4	-19.1	25.6	15.5	25.6[a]	8.2
1966	1.0[a]	298.1	-49.5	242.4	-30.3	28.1	11.8	8.2[a]	1.5
1967	35.0	270.0	-48.3	298.1	-49.5	28.8	14.0	17.0	-
1968	37.0[d]	315.0[b]	-56.4[c]	270.0	-48.3	29.6[d]	14.0[d]	18.0[d]	-
1969	37.0	320.0	-57.3	315.0[b]	-56.4	32.2	14.0	21.0	0
1970	45.0	324.0	-58.0	320.0	-57.3	33.1	14.0	25.0	0
1971	46.0	339.0	-60.7	324.0	-58.0	34.1	14.0	26.0	0
1972	47.0	360.0	-64.6	339.0	-60.7	35.1	14.0	27.0	0

[a]Estimates. It is likely that both $\bar{F}$ and $\bar{I}_f^g$ were considerably larger than indicated. Since they cancel one another out, an underestimation of both variables does not matter.

[b]Derived from Table 2-8. Export projections are based on the Banco de Guatemala projections. Current values were converted into constant 1958 prices on the assumption that the unit value of exports would remain at about its 1966-68 level. For details see Table 2-8.

[c]Terms-of-trade effects are projected on the assumption that the terms-of-trade would be maintained at the 1966-68 level.

[d]Projections based on Gobierno de la República de Guatemala, Consejo Nacional de Planificación, Informe de la Situación Económica de Guatemala y de sus Perspectives hasta 1972. Aug. 1968. Data were converted to 1958 prices.

the corresponding projected value of the exogenous variables in 1972. The resulting computed level of GDP for 1972 was 1,621 million quetzales in 1958 prices, which is only about 18 per cent above its level in 1966. It would therefore seem that the annual growth rate of GDP between 1966 and 1972 could well be around, or even below, 3 per cent. The above forecast is, of course, conditional on the exogenous variables assuming the predicted values given in Table 2.10 and on no structural changes occurring in the economy before 1972. A better than anticipated export performance or improvement in the terms-of-trade would have a substantial positive impact on GDP since the multiplier value is over 3.8. Likewise, structural changes such as increased import substitution, which would have the effect of reducing the parameters of the import function, or a jump in the investment ratio, could lead to a higher growth rate of GDP. It is possible that an acceleration in import substitution in consumer goods and other goods (i.e. chemical and pharmaceutical products) between now and 1972 and an increase in the investment ratio could push the growth rate of GDP to perhaps 4 per cent annually over the period under consideration. This last figure, incidentally, is the one which the Consejo Nacional de Planificación is predicting for 1968–72. On the basis of the above analysis it should be considered as a ceiling unlikely to be reached.

In conclusion, the short run (1968–72) prospects of the Guatemalan economy do not appear bright. The implications of a 3–4 per cent growth rate of GDP for some of the other policy objectives such as employment creation and improving income distribution could be serious. The Dirección General de Estadística projected total population and economically active labor force to 1972. The ratio of the latter to the former falls from 30.7 per cent in 1964 to 28.9 per cent in 1972. A low growth rate of GDP could lead to an even further reduction in the capacity of the economy to absorb workers productively. Furthermore, the unfavorable export prospects will constrain the capacity-to-import and thereby limit the supply of investment goods needed for growth.

CHAPTER THREE

ROLE OF AGRICULTURE IN THE ECONOMY

THE SHARE OF AGRICULTURE in total output between 1950 and 1966 declined slightly from 32.5 to 30.1 per cent. The bulk of the reduction occurred before 1958 (Table 3.1). Since then the relative share of agriculture has remained quite stable. The labor force in agriculture increased from about 660,000 to 860,000 over the period under consideration. As one would expect, the ratio of agriculture to total labor force fell somewhat, from 68.2 per cent in 1950 to 65.4 per cent in 1964.

Within agriculture the major changes appear to be the increasing relative importance of export crops, which grew from 32.4 per cent in 1950 to 37.4 per cent of gross agricultural output in 1966 (Table 3.1). Coffee and cotton account for this trend. The share of meat and livestock production, on the other hand, fell from 25.5 to 22.0 per cent. The increasing use of intermediate capital inputs (e.g., fertilizer, insecticides) is reflected by the fact that inputs amounted to 9.2 per cent of gross agricultural output in 1966 as compared to only 3.7 per cent in 1950.

Table 3.2 shows that gross agricultural output grew at 4.0 per cent annually over the period under consideration compared to 3.6 per cent for agricultural value added. The above difference is explained by the greater relative use of inputs over time. The same table also illustrates the fact that an acceleration of agricultural output took place since 1958 and that agricultural exports have been the dynamic force in that sector. It is well known that an increase in the use of intermediate purchased inputs is a sine qua non of agricultural development. In this respect it is important to note the reasonably high growth rate of inputs used in agriculture. At the same time it has to be recognized that the great bulk of these inputs

TABLE 3.1 ● AGRICULTURE: RELATIVE SHARE IN GROSS DOMESTIC PRODUCT, ECONOMICALLY ACTIVE POPULATION (in percentages) AND DISTRIBUTION OF PRODUCTION WITHIN AGRICULTURE

Agriculture	Percentages		
	1950	1958	1966
Ratio of Agricultural Output to GDP (1958 Prices)	32.5	29.3	30.1
Labor Force Employed in Agriculture	68.2		65.4[a]
1. Total Agricultural Production	100.0	100.0	100.0
1.1. Agricultural Crops	65.0	64.2	68.9
1.1.1. Export Crops	32.4	32.5	37.4
1.1.2. Domestic Consumption Crops	25.5	24.8	24.6
1.1.2.a. Basic Crops	13.3	12.2	13.1
1.1.2.b. Other Products	12.2	12.6	11.5
1.1.3. Intermediate Products	7.0	7.0	6.9
1.2. Meat and Livestock Production	25.5	25.8	22.0
1.3. Forest Products	8.6	9.0	8.2
1.4. Fish	.9	1.0	1.0
1.5. Inputs	3.7	6.9	9.2
1.1.5. Value Added in Sector	96.3	93.1	90.8

Source: Banco de Guatemala, Cuentas Nacionales de Guatemala, 1968, and Censos de la Población, 1964, Dirección General de Estadística.
[a]For 1964.

went into production for exports. It is estimated that approximately one-half of the chemical fertilizer used is applied to coffee and one-fourth to cotton, leaving only one-fourth for all other export and domestic crops. Of the crops for domestic consumption only, wheat is a significant user of fertilizer. Thus, the potential scope for increased use of inputs in the traditional sector and in the commercialized sector producing for domestic consumption is still quite large.

The relative importance of export crops within the agricultural

TABLE 3.2 ● CUMULATIVE GROWTH RATES OF AGRICULTURAL OUTPUT IN 1958 PRICES (percentages)

Agriculture	1950-52 to 1957-59	1957-59 to 1964-66	1950-52 to 1964-66
1. Total Agricultural Production	3.0	5.0	4.0
1.1.5 Value Added in Agriculture	2.7	4.6	3.6
1.1.1 Export Crops	4.1	6.6	5.3
1.1.2.a Basic Domestic Crops for Consumption	.9	6.6	3.6
1.5 Inputs	8.9	9.8	9.3

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

crops group (category 1.1 in Table 3.1) has remained fairly stable within the period under consideration. Export crops increased their relative share of total agricultural crops from 47.8 to 53.5 per cent over the period 1950–52 to 1964–66. This tendency was caused by the tremendous increase in the share of cotton from about 0.5 per cent in 1950–52 to 13.7 per cent of total agricultural crops in 1964–66, while the shares of coffee and bananas declined. The shares of domestic consumption and industrial crops declined somewhat over the period under consideration. Table 3.3 indicates the production figures by major crops. It reveals clearly the previously described production trends and particularly the sharp acceleration of output in the second subperiod (1957–59 to 1964–66) compared to the first one (1950–52 to 1957–59). It has already been seen that cotton is largely responsible for the jump in the growth rate of agricultural export crops. It is less easy—at first sight—to provide a good explanation for the rate of growth of output of basic domestic crops for consumption jumping from 0.9 in the first subperiod to 6.5 per cent in the second one. A look at the annual data confirmed

TABLE 3.3 ● AGRICULTURAL CROPS: PRODUCTION BY MAJOR CROPS (in thousands of 1958 quetzales) AND ANNUAL CUMULATIVE GROWTH RATES, 1950–52 TO 1964–66

Agricultural Crops	1950-52 Avg.	1957-59 Avg.	1964-66 Avg.	1950-52 to 1957-59 Growth	1957-59 to 1964-66 Growth	1950-52 to 1964-66 Growth
1.1.1 Export Crops	77281.1	102415.6	159878.1	4.1	6.6	5.3
Coffee	58530.3	77263.0	102663.7	4.1	4.2	4.1
Cotton	831.2	7489.6	40827.5	37.0	26.0	32.0
Bananas	16488.3	15040.4	9672.5	-1.4	-3.0	NA
Cotton Seed	81.8	794.1	4455.7	38.4	28.0	33.0
Others	1349.0	1561.9	2258.7	2.1	5.4	3.7
1.1.2 Domestic Consumption Crops	66324.2	76389.2	108892.9	2.0	5.2	3.6
1.1.2.a Basic Crops	35272.7	37429.6	58256.9	.9	6.5	3.6
Corn	22104.2	22617.6	34838.5	.2	6.4	3.3
Beans	12284.2	135[illegible].6	21491.0	1.4	6.8	4.1
Potatoes	878.3	1260.3	1927.4	5.3	6.3	5.8
1.1.2.b Other Products	31057.6	38959.6	50636.0	3.3	3.8	3.6
Fruits	11683.7	14075.2	18423.4	3.4	3.3	3.4
Vegetables	10869.4	13817.9	16931.4	3.5	2.9	3.2
Miscellaneous	8435.5	10466.6	15281.2	3.1	5.5	4.4
1.1.3 Products for Industrial Consumption	17907.4	21926.3	30156.2	2.9	4.6	3.8
Sugarcane	9715.9	14609.8	17433.6	6.0	2.6	4.3
Wheat (unprocessed)	2873.1	2506.0	4723.0	-2.0	9.5	3.6
Rice (unprocessed)	1075.0	1353.4	3009.6	3.4	15.8	7.6
Tobacco	844.2	774.7	1628.0	-1.3	11.2	4.8
Rubber	137.1	242.7	1040.3	8.5	23.0	15.6
Others	3262.0	2439.8	2321.7	-4.0	.5	NA
1.1 Total Agricultural Crops	161512.8	200731.0	298927.1	3.2	5.9	4.5

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

the fact that it was not due to unusual weather conditions in any of the benchmark periods. Annual corn output data by departments revealed that the sudden jump in national production was caused almost entirely by the additional land base used for corn in two coastal departments: Escuintla and Suchitepéquez. Corn production in Escuintla remained relatively stagnant between 1950 and 1959 at an average level of about 19,550 metric tons annually.[1] In 1961–62 and 1962–63, respectively, it rose to 60,260 and 85,330 metric tons. The increase in Suchitepéquez was even more dramatic, i.e., from an average level of around 18,400 metric tons in 1950–59 to 113,206 metric tons in 1962–63. The relative contribution of these two departments to total corn output grew from about 8.5 per cent in 1950–52 to 29.8 per cent in 1962–63. It is likely that the large production increase in these coastal departments resulted from the INTA *parcelamientos* program, through which a substantial amount of new land was put under cultivation. For the southern zone (Escuintla, Suchitepéquez, and Retalhuleu) the area under cultivation for corn rose from 64,350 hectares in 1960–61 to 118,430 hectares in 1965–66, and total output almost doubled from 97,244 to 193,016 metric tons over the same period.[2] It was not possible to verify the hypothesis regarding the role of the parcelamientos program in the land base and consequent corn ouput increase. It is conceivable that part of the increase in output was caused by area expansion of large farms in that region.

The same data confirm the output stagnation in the "subsistence" sector departments which were discussed previously. Thus, for four of the eight departments (Sololá, Totonicapán, Huehuetenango, and El Quiché) total corn output fell from 102,856 metric tons in 1960–61 to 88,826 metric tons in 1965–66, and to 89,148 metric tons in 1966–67. Substantial differences in yields (expressed in kilograms per hectare) are noticeable between the southern zone and the above four "subsistence" departments. Corn yields amounted to about 1,646 kg./hectare for the former region, and only about 724 kg./hectare for the latter throughout the period 1960–67. In summary, the observed substantial jump in the growth rate of corn production in the early sixties was occasioned almost totally by an increase in the land base devoted to corn in the southern region. It does not reflect in any way a rise in output (either through acreage or yield effects) in the traditional (subsistence)

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1. The figures quoted here are from the working sheets used to derive GDP by departments in the Cuentas Nacionales prepared by the Banco de Guatemala.

2. *Estimación de Cosechas y Existencia de Ganado*, 1960–1961 and 1965–1966, Dirección General de Estadística.

sector. On the contrary, there is fairly strong evidence that output stagnated or even declined absolutely in these departments.

HOW HAS THE AGRICULTURAL SECTOR GROWN?

If sufficient data were available, the growth rates in agricultural output could be explained in terms of changes in inputs. Ideally it would be possible to show how much of the change in output was accounted for by more land, more labor, fertilizer, improved seed and other inputs and practices. A substitute for a detailed production function analysis is to allocate overall growth in output into three components: an area component, a yield component, and a residual component which primarily reflects changes in the output mix. The relative magnitude of these components will indicate whether agricultural growth has primarily reflected an expansion in the land base, an increase in production per unit of land or a shift to higher-valued crops.

Area and production data were obtained for 7 crops, representing about 70 per cent of the total value of crop production, for the 1950–66 period. These crops were grouped into export crops (coffee, cotton, sugar) and domestic crops (corn, wheat, beans, rice). Average annual rates of growth for each group and the total are shown in Table 3.4.

The results show that the total output of these crops grew at almost 6 per cent per year in the 1950–66 period. The most rapid growth was in the export-crop group where output increased more than 6 per cent per year. The domestic-crop group grew at a more moderate 4 per cent per year.

For each group, growth in yields per unit of land has accounted for about one-third of the increased output. Expansion of area has been more important than yields in producing growth, however.

TABLE 3.4 ● AVERAGE ANNUAL GROWTH RATES IN PRODUCTION, AREA AND YIELD, 1950–66

	Export Crops	Domestic Crops	Total
Value of Production	6.61	4.08	5.81
Area	3.96	1.70	2.28
Yield	2.22	1.26	1.91
Product-Mix	0.43	1.12	1.62

This is especially true for the export crop group where almost two-thirds of the total change was accounted for by growth in area. The low absolute and relative growth in yields, especially for domestic crops, indicates the urgency of programs designed to raise the productivity of land already in production. The necessity for doubling or tripling annual increases in yields will call for new approaches and different priorities in development planning.

THE THREE SUBSECTORS OF AGRICULTURE

There are three subsectors within agriculture which can readily be identified: agricultural exports (coffee, cotton and bananas), traditional agriculture (corn, wheat and beans), and commercial production for domestic consumption (corn, sugar, vegetables, fruit, meat, wood and industrial crops). There is, of course, some overlap between these subsectors. Thus, traditional agriculture does not produce exclusively for self-consumption (i.e., wheat is a cash crop in the subsistence sector). Sugar is both exported and consumed domestically, thereby overlapping the agricultural export crops and commercialized domestic subsectors. Nevertheless the dividing lines are relatively sharp. Table 3.5 was constructed to show the origin of the agricultural production and its destination for the above three subsectors for 1966. It is important to note that the traditional subsector in Table 3.5 is defined regionally as consisting of the eight departments specified in Chapter 2. The other two subsectors are defined along crop lines. This classification provides only an approximation of the actual subsectors and is not completely representative. More specifically, traditional agriculture embraces farmers in other departments besides the eight referred to previously. Conversely, the traditional (subsistence) region, as defined, incorporates coffee production on large *fincas* in San Marcos, Chimaltenango and Alta Verapaz. Coffee output on these commercial farms accrues to traditional farmers only to the limited extent of wages received by the latter.

The figures given in Table 3.5 are meant to convey only rough orders of magnitude. The first row shows the output of the agricultural export crops (coffee, cotton and bananas) subsector produced outside of the eight departments which are defined as making up traditional agriculture or the subsistence sector. All the output of this subsector goes into agricultural exports, except for about ten million quetzales consisting of coffee and cotton which are used domestically. The second row indicates the output of traditional agriculture. Some of the traditional departments produce coffee (e.g., the departments of San Marcos, Chimaltenango and Alta Verapaz accounted for about 36 per cent of national coffee produc-

TABLE 3.5 ● ORIGIN AND DESTINATION OF TOTAL AGRICULTURAL PRODUCTION BY SUBSECTORS, 1966, IN MILLIONS OF QUETZALES AT 1958 PRICES

Destination of Output / Origin of Output	Agricultural Exports	Traditional Agriculture	Commercial Domestic Consumption	Total Output	Major Commodities
Agricultural Export Crops	125		10	135	coffee cotton bananas
Traditional Subsistence Agriculture Region	44 (coffee)	27 (corn beans)	10 (wheat)	81	coffee corn beans wheat
Commerical Domestic Agriculture	37 (sugar meat wood fruits)		201	238	sugar fruits livestock beef wood rubber vegetables industrial-crops
Totals by Destination of Output	206	27	221	454	

Source: Estimated from Banco de Guatemala, Cuentas Nacionales and other sources.

tion in 1966). Thus, the traditional region, as defined, contributed to agricultural exports to the extent of about 44 million quetzales in 1966. The second entry (27 million quetzales) of row 2 represents mainly corn and bean production for self consumption by the traditional subsector. The third entry (ten million quetzales) represents cash sales to the commercial domestic market and consists of wheat and some other minor products. The total agricultural output of the traditional region was estimated at about 81 million quetzales in 1966, or about 18 per cent of total agricultural output.

The third row provides production estimates for the commercial domestic subsector. About 37 million quetzales worth of commodities such as sugar, meat, wood products, and fruits went into agricultural exports,[3] and 201 million quetzales went into domestic consumption.

The last row of Table 3.5 indicates from left to right, the total value of agricultural exports (206 million quetzales), the truly "subsistence" part of the agricultural output of the traditional region (the production for self-consumption, i.e., 27 million quetzales), that part of commercial domestic agriculture which was destined for domestic consumption. Agricultural consumption within the traditional agricultural region is larger than the above-indicated 27 million quetzales since that subsector presumably uses part of the income it earns from wheat and coffee sales to purchase additional food—including corn—from other regions. Furthermore, the output of subsistence farmers outside of the eight departments comprising the "traditional region" should be added to the above figure to obtain the true output of traditional agriculture.[4]

CONTRIBUTION OF AGRICULTURE TO THE BALANCE OF PAYMENTS

As is fairly typical of many developing countries, Guatemala's agricultural sector is the predominant foreign exchange earner, although the share of agricultural exports in total exports has gone from 90 per cent in the fifties to about 81 per cent in 1966. Table 3.6 gives the commodity composition of exports by major commodities over the period 1952–66. The table reveals clearly the relative importance of three commodities (coffee, cotton and bananas) in total exports. These three commodities combined accounted for around 90 per cent of the current value of exports in the fifties. This share declined gradually throughout the sixties—amounting to 67 per cent in 1966. Both coffee and bananas underwent a large relative decline. Cotton proved to be the success crop of the recent period with exports skyrocketing from nothing in the early fifties to almost 45 million quetzales in 1966 (i.e., 19 per cent of total export value). The relative loss of coffee and bananas has been made up by a variety of other agricultural products and semi-manufactured exports. The previously observed fall in the share of

3. It should be noted that the row heading (agricultural export crops) differs from the column heading (agricultural exports). The former covers only coffee, cotton and bananas, whereas the latter includes all agricultural exports.

4. The output of the commercial domestic agricultural subsector should be reduced accordingly since under the selected taxonomic scheme production by the subsistence farmers outside the altiplano is included in commercial domestic agriculture.

TABLE 3.6 ● COMMODITY COMPOSITION OF EXPORTS (percentage of current values)

Year	Total	Coffee	Bananas	Cotton	Oils	Wood	Chicle	Others
1952	100.0	81.8	5.4	--	1.4	0.9	2.0	8.5
1953	100.0	76.7	14.1	--	0.9	0.7	--	7.6
1954	100.0	77.5	11.6	3.8	0.9	0.5	0.5	5.2
1955	100.0	76.5	9.5	4.6	1.1	0.5	1.4	6.4
1956	100.0	79.0	8.0	4.2	2.0	0.5	0.9	5.4
1957	100.0	75.6	8.7	3.9	2.5	0.4	1.0	7.9
1958	100.0	76.0	8.4	5.4	1.3	0.4	0.9	7.6
1959	100.0	74.8	9.7	4.1	0.6	0.5	1.5	8.8
1960	100.0	69.8	11.9	5.2	0.7	0.8	1.7	9.9
1961	100.0	62.8	10.4	9.5	1.2	0.8	2.1	13.2
1962	100.0	59.6	5.5	13.5	2.6	1.0	0.5	17.3
1963	100.0	50.0	7.5	16.2	1.5	0.2	0.7	23.9
1964	100.0	43.0	5.7	18.0	1.3	1.0	0.7	30.3
1965	100.0	47.5	2.3	19.0	1.0	1.1	0.8	28.3
1966	100.0	43.4	4.5	19.2	0.7	0.5	0.1	31.6

Source: Dirección General de Estadística.

agricultural to total exports is a recent phenomenon which reflects largely the opening up of the Central American Common Market to Guatemala's industries.

What has been the net contribution of the agricultural sector to the trade balance?[5] In order to answer this question Table 3.7 was prepared. It estimates the foreign exchange earnings from agricultural exports and the foreign exchange expenditures for

5. It would be even more relevant to try to determine the overall contribution of agriculture to the balance of payments as a whole. This did not prove to be feasible because of the difficulties involved in identifying the foreign capital flows into and out of agriculture.

TABLE 3.7 ● CONTRIBUTION OF THE AGRICULTURAL SECTOR TO THE BALANCE OF TRADE (millions of quetzales at current prices)

	1956	1964	1966
gricultural Exports	118.6	157.9	187.0
nports of Agricultural roducts and Inputs for ector	-28.8	-41.8	-37.9
stimated Balance	89.8	116.1	149.1

urce: Banco de Guatemala, Estadísticas del Sector Externo.

agricultural imports and inputs for three years: 1956, 1964, and 1966.

These estimates of the net contribution of the agricultural sector to the trade balance may be too high, since not all imported inputs destined for the agricultural sector could be identified. Nevertheless, it is evident that the agricultural sector was by far the largest contributor to the previously described strength of Guatemala's balance-of-payments over the last two decades. The fairly bleak prospects which coffee and cotton are facing on the world demand side make it unlikely that these crops can continue to be the dynamic and propulsive forces in the growth of the overall economy. At the same time no other agricultural export crop—or set of crops—looms on the horizon to supplement coffee and cotton foreign exchange earnings. Some potential exists for increased exports of meat, fruits and vegetables to Central America and ever to the United States. However, a realistic appraisal of the demand prospects would have to be relatively pessimistic at this time.

AGRICULTURAL CONTRIBUTION TO EMPLOYMENT

About two-thirds of the labor force (i.e., economically active population) is engaged in agriculture. A slight decline in that share occured between 1950 and 1964 from 68.2 to 65.4 per cent, while the absolute size of the labor force in agriculture rose from 659 thousand to 861 thousand. Thus, while agriculture contributes only about 30 per cent of GDP, it employs 65 per cent of the labor

force. The census figures indicate that the eight departments constituting the "subsistence" subsector employed 409 thousand people in agriculture in 1964. The stagnating—if not declining—output level in that subsector combined with a high rate of growth of populaton (only slightly alleviated by migration) has in all probability pushed down per capita output in the last decade. Since many Highlands Indian minifundistas were facing increasing difficulties in scraping even a subsistence income from their very small holdings (see Chapter 4 for data on farm size), seasonal migration to the large commercial farms in the southern region has become larger. A detailed study of this question estimated that annually between three and four hundred thousand workers migrate from their homes—mainly in the subsistence Highlands departments—to coffee, cotton and sugar *fincas* in the southern region.[6] There appears to be a natural complementarity between harvest time in the altiplano and the large commercial farms in the south. It has been estimated that the campesino with between 0.5 and 2.5 hectares of land is employed on his farm from 50 to 70 days a year.[7] Other sources have placed labor requirements to cultivate 1.7 hectares at about 100 man-days.[8] Harvesting in the Highlands is completed by September, after which time the small campesinos have no employment alternative on their own or neighboring farms. Farmers with 1.7 hectares would be entirely free from working on their own farms from the middle of August to the end of December. They can, thus, work on the coffee *fincas* at no "opportunity cost," since the months of September to November are the main months of coffee harvest. There is somewhat more conflict between corn production in the altiplano and work on cotton farms in the south because of the later harvest for cotton than for coffee.

Schmid has shown that the income earned by migratory workers on the commercial farms was an essential supplement to their meager subsistence income. The annual per capita income of the migratory workers from all sources appeared to be slightly higher than that of the non-migratory campesinos: about 60 quetzales per capita compared to 43 quetzales. It is difficult to compare these figures given the problems of imputing values to non-monetary services such as food and housing received by the migratory workers on the *fincas* and to subsistence output. In any case, income earned

6. Schmid, L. Migratory Labor in the Economic Development of Guatemala (unpublished Ph.D. dissertation, University of Wisconsin, 1967).

7. Hill, George and Gollas, Manuel, "Study of the Minifundia of the Highlands of Guatemala" (Guatemala: unpublished materials, 1964).

8. Wagley, Charles, "Economics of a Guatemalan Village," *American Anthropologist*, No. 48, 1941; Appelbaum, J., "Migraciones Temporales en San Idelfonso Ixtahuacan: Sus Causas y Consequencias," *Public and International Affairs*, Vol. IV, Spring, 1966.

by migratory workers is becoming a more important—almost crucial—element in their survival. The prospects for increased demand for migratory workers on coffee, cotton and sugar farms in the South appear bleak, given the limited world demand for these export crops and the trend towards mechanization in cotton production. The consequences of a leveling-off or decline in these employment alternatives for the traditional subsector could be extremely serious. It reinforces the case for policies and resource allocations designed to increase output in the subsistence sector itself and to concentrate particularly on techniques which tend to be labor-intensive. It can be hypothesized that the best development strategy for Guatemala at the present time is not through an outflow of labor and capital from the traditional region or even the whole of traditional agriculture to industry and commercial agriculture, but through increasing commercialization of the subsistence sector itself. This is particularly true in the light of the limited prospects for exports and consequently the limited productivity of new resources applied to the production of agricultural export crops and the small labor-absorptive capacity of nonagricultural output.

Another dimension of the productivity problem in agriculture is shown in Table 3.8. This table indicates that output per worker in agriculture was almost half as large as output per worker in manufacturing in 1950, but that it had declined to little more than one-third by 1964. If rates of change of output in agriculture and industry in the 1960–67 period are projected, and the labor forces in agriculture and industry continue to grow as they did in the 1950–64 period, output per worker in agriculture will grow slightly in absolute terms but will continue to decline relative to manufacturing. By 1980 it would be little more than 20 per cent as large in agriculture as in industry.

NEED FOR DIFFERENT POLICIES FOR THE THREE AGRICULTURAL SUBSECTORS

It has been seen that in Guatemala even more than in other developing countries agriculture is not a homogeneous sector. At least three subsectors can be readily distinguished and identified: traditional agriculture in the Highlands (corn, beans and wheat) as well as in other parts of the country; agricultural export crops (coffee, cotton and bananas) and commercial agriculture mainly for domestic consumption (most remaining products). The conditions underlying production demand and marketing differ sharply between these subsectors as many parts of this study illustrate.

The significance of the above phenomenon is that governmental policies must be formulated at the subsectoral level. It is not mean-

TABLE 3.8 ● GUATEMALA: OUTPUT PER WORKER IN AGRICULTURE AND INDUSTRY

	1950	1964	Annual Average Rate of Growth	Projections			
				1970	1972	1975	1980
Agriculture (including forestry and fisheries)							
Gross Domestic Product[a]	239.356	384.762	4.0[b]	474.9	514.1	579.0	705.9
Economically Active Population[c]	659.6	861.1	2.0	951.5	1,012.4	1,077.7	1,198.9
GDP Per Person Economically Active	362.9	446.8	2.0	499.1	507.8	537.3	588.8
Manufacturing							
Gross Domestic Product[a]	86.571	179.386	7.5[b]	269.7	310.3	383.0	543.9
Economically Active Population[c]	111.5	149.5	2.2	168.1	176.5	190.4	217.0
GDP Per Person Economically Active	776.1	1,180.2	4.3	1,604.4	1,758.1	2,011.6	2,506.5

[a]Millions of quetzales in 1958 prices.
[b]Based on 1960-67 series.
[c]Thousands.

ingful to talk about a unified national agricultural policy, but it is meaningful to design policies for and allocate public resources to each subsector. In a sense, given limited resources, these subsectors compete with one another. In the past, it appears that the agricultural export crops, and to a somewhat lesser extent the commercial agricultural sector for domestic consumption, received the great bulk of attention and resources. This strategy reflected the high relative weights placed on objectives such as balance-of-payments equilibrium, price stability and static economic efficiency (the maximization of output in the short run) as well as the prevailing payoffs applying to these objectives (e.g., the effect of resources used on the level of achievement of these objectives). At the same time relatively low weights were placed by the government—with the possible exception of the period of the forties and early fifties—on a more equal income distribution and employment creation. The payoffs have changed, and conceivably the relative importance of the above objectives in the preference scheme of the policy maker as well. Export prospects for coffee and cotton appear much less favorable, thereby reducing the payoff of resources allocated to that subsector in terms of contribution to the balance-of-payments and overall output. On the other hand, the standard of living of people in traditional agriculture appears to have dropped, while new and simple technologies are becoming available which may have the effect of increasing the output payoff per unit of resources.

It appears that a relatively stronger case, now more than in the past, can be made for a larger share of resources being directed to traditional agriculture. This means that a plan for the development of the traditional region in the Highlands and perhaps also for traditional farmers in other departments should be designed. Although the empirical evidence which can be brought to bear in support of this strategy is quite limited and inadequate in parts, the long run economic and political cost of taking a "wait and see" attitude pending the generation of better information upon which to make decisions may be much higher than the present cost of programs to help develop the Highlands and other subsistence areas.

CHAPTER FOUR

STRUCTURE OF THE AGRICULTURAL SECTOR

GUATEMALA has such a diversity of topography, climates and soils, that favorable conditions can be found within the country for the production of almost any agricultural product. This great variation presents a large number of difficult problems in land use, while at the same time providing unusual opportunities for a productive and diversified agricultural production. How many farms and farmers are there? How large are the farms and what crops are produced? Are most farms owner-operated or operated by hired managers and tenants? How productive are land and labor resources? Are farm size and tenancy related to resource productivity? The primary purpose of this chapter is to identify the important problems in agricultural resource use and structure and to point out the implications for development policies and programs.

Guatemalan agriculture is carried on largely within two major farming systems: a large-scale, commercial or plantation-type agriculture, and a small-scale, subsistence-type agriculture. While there is considerable variation within these two general systems, the leading characteristics of each are as follows.

COMMERCIAL AGRICULTURE

This sector is oriented primarily toward the production of beef cattle and cash crops for export. Coffee, cotton and bananas are the major export crops produced. Sugar and beef cattle are produced both for the domestic market and export. Other products of lesser importance include essential oils, dairy and poultry.

Coffee is the outstanding plantation crop and is more important in terms of income and exports than any other agricultural product

or industry. Some coffee is produced in almost every department of the Republic, but the vast majority is grown in the upper Pacific piedmont and the Cobán region of the northern slopes. The coffee lands in the Pacific piedmont extend from Mexico on the west to the department of Santa Rosa on the east. Climate, altitude and soil conditions are excellent for production of high-quality coffee in this area. The Cobán district is smaller and of lesser importance as a coffee-producing area.

Cotton has emerged in recent years as the second leading crop of commercial agriculture. Cotton is produced mainly in the Pacific coastal plain and lower piedmont. It is a large-scale enterprise, highly capitalistic in nature, which utilizes modern methods, including machinery, improved seeds, fertilizers and insecticides. Large amounts of credit are required.

Banana production is less important now than it was earlier. Disease and other production problems have reduced production on the Pacific coast. Some expansion has taken place recently in the department of Izabal near the Caribbean coast on the north.

Sugar production in plantation agriculture is devoted to refined sugar which is processed through a few large mills. The refined sugar comes from sugar cane grown on plantations situated mostly in the lower Pacific piedmont area and concentrated in the department of Escuintla. Although sugar cane is still cut by hand, planting, cultivating and hauling operations are largely mechanized. Sugar production has increased slightly in recent years largely in response to higher United States quotas.

Commercial production of cattle is concentrated on large farms. These are located on the Pacific coastal plain and along the eastern border of the country. Production has recently been increasing in the Caribbean lowlands of the department of Izabal. Cattle production appears to be carried on at a low technical level. Little attention is given to pasture improvement, good breeding practices or control of parasites and diseases. Practically the entire production is grass fed. More efficient production has recently been stimulated in some areas by the development of exports of chilled and frozen beef.

While producers of some crops use modern methods and improved technology, many of the large farms in the commercial sector appear to be farmed neither intensively nor efficiently. There is a high degree of absentee ownership. Owners live in the city and visit their farms—whose operations have been turned over to hired managers—only occasionally. The large farms are also wasteful of land. They encompass much more land than is used regularly for production. Production is largely organized around the use of large numbers of resident laborers and migratory workers. How best to insure

intensive and efficient utilization of large holdings is a policy question of major importance in Guatemala. This chapter will investigate the extent to which these criticisms can be supported by data from the 1964 agricultural census. Alternative ways to improve resource use and efficiency on the large land holdings are discussed in Chapter 9.

SUBSISTENCE AGRICULTURE

Subsistence agriculture is carried out by the individual families on small plots wherever they live. A large part of the population lives in the central region which is the location of most of the subsistence farming. There is, however, a growing number of subsistence farms in the coastal region. Production in subsistence agriculture is carried out with primitive techniques using hand labor and a low level of technology. There is a lack of rotation of crops and much of the land is depleted and eroded.

Corn is the basic product of the subsistence sector. It is the most widely cultivated of all crops, and is the staple food grain in the diet of the Guatemalan people. Nearly every farm family cultivates its own small cornfield (milpa). Most corn is produced from native, low-yielding varieties and much of it on land not particularly well-suited to the crop. It is planted on steep mountain slopes and on soils exhausted from centuries of cultivation. It is attacked by diseases and pests, and wasted through primitive harvesting and storage methods. As a result, yields are low, and possibly declining, where the dependence on corn for survival is greatest.

Beans are another major crop of the subsistence sector and are often interplanted with corn in the same field. Production is carried on with most of the same deficiencies as exist for corn.

Some subsistence farmers have a few head of cattle for production of meat and milk for domestic use or, more commonly, several hogs or a few poultry. Little has been done to build up livestock production on small farms for market purposes. Breeds are poor, feeding is deficient, and production is very limited.

A number of other products are produced mainly for the market by the subsistence sector. Wheat production is a good example. It is concentrated on small farms in the southwestern part of the highlands where it is planted and harvested largely by hand. Vegetables are grown on small farms in the vicinity of Lake Atitlán in the highlands. Sheep production is concentrated in small farm flocks found in the western highlands of the central region. Numerous varieties of fruits are grown in small quantities and are sold for local consumption.

Since these products are grown mostly on small farms using

primitive techniques and with low output per man and per hectare, their producers form part of the subsistence sector. A farmer and his family who produce a few hundred-weight of wheat for sale each year constitute a subsistence unit as much as those who produce corn largely for home consumption. The same holds true for farmers who market small quantities of fruits and vegetables.

Problems in the subsistence sector are much different than in the export sector. The basic problem is poverty, a condition rooted in the structure of small farms, the use of primitive methods of production, the existence of underemployment, and the pressure of population growth. Such conditions pose the most difficult possible situation for agricultural change and development.

NUMBER AND SIZE OF FARMS

According to the agricultural census of 1964, 417,344 farm units existed in Guatemala. A farm was taken to be any technical unit producing crop or animal products regardless of size. A farm comprised all parcels of land under the same management. Plots of land assigned to resident farm laborers on large farms for food production were counted as separate technical units.

The number of farms in 1964 was considerably higher than the 348,687 farms listed by the census of 1950. A large part of this difference is due to the fact that in 1950 a farm was defined with a minimum size restriction of one cuerda (about 0.04 of a hectare). As a result, many of the very small farms listed in 1964 would not have been counted as farms in 1950. Also, the 1964 census listed fewer farms in the largest size categories. It is not known if this difference represents an actual decline, or reflects misclassification due to underreporting of holdings by large landowners in the latter census.

The 417,344 farms listed in the 1964 census included a total of 3,442,520 hectares. This is approximately 32 per cent of the total area in the country. This figure is, however, lower than the 3,720,800 hectares in farms as reported by the 1950 census. This difference is due entirely to the lower area reported by the very large farms in 1964. While some of this decrease could be accounted for by the reported decrease in the number of very large farms between 1950 and 1964, it is probable that there was considerable underreporting of sizes of large farms in the latter census.

In Table 4.1, the 417,344 farms listed by the 1964 census are classified by size, following a system which has become popular in Latin America.

The two smallest size groups, including all farms of less than seven hectares, represent the minifundio. They are diminutive in

TABLE 4.1 ● GUATEMALA: NUMBER, SIZE AND FRAGMENTATION OF FARMS, 1964

Farm Size Class	Number of Farms	Per Cent of Farms	Area	Per Cent of Land in Farms	Average Size	Average Number of Parcels Per Farm
Less than 0.70 ha	85,083	20.0	32,619.2	0.9	.38	1.2
From 0.70 to 6.99 ha	279,797	67.0	607,855.6	17.7	2.17	1.6
From 6.99 to 45.13 ha	43,656	10.0	648,900.2	18.8	14.86	2.1
From 45.13 to 902.51 ha	8,420	2.0	1,258,545.2	36.6	149.47	1.8
More than 902.51 ha	388	0.9	894,600.4	26.0	2,305.67	1.5
Totals	417,344	100.0	3,442,520.6[a]	100.0	8.25	1.6

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

[a]Represents 31.6 per cent of the total area of the country (10,888,900 ha.)

size but large in number. Their size is insufficient to fully employ the farm family and produce enough income for family necessities. In 1964, there were 364,880 such farms in the country. This group constituted 87 per cent of the farms but controlled only about 19 per cent of the total land in farms. The average size for these two classes taken together was less than two hectares per farm.

At the other end of the size scale are two groups of large farms (more than 45 hectares each). These farms represented slightly less than 3 per cent of the farms in number but contained more than 60 per cent of the total land in farms. The average size for these large farms was almost 250 hectares per farm.

Comparatively few farms fall in between the small and large extremes—the medium-sized farms which are roughly comparable to "family farms" in the United States. These farms are large enough to fully employ the farm family and to produce a sufficient income to provide a minimally adequate level of living. Considered as farms from 7 to 45 hectares, this group included 10 per cent of the farms representing 19 per cent of the total land in farms in 1964. The average size for this class was about 15 hectares.

As would be expected from the size distribution which has been described, the overall average size of farm in the country was low—only 8.25 hectares per farm. In addition, more than 90 per cent of all farms in the country were smaller than this average size.

The problem of "minifundismo" is compounded in some countries by fragmentation; small farms are composed of several postage-stamp plots in various locations. The problem of fragmentation does not appear to be serious in Guatemala. In 1964, the majority of farms in all size classes consisted of a single parcel of land. (Table 4.1). Indeed, the average number of parcels per farm was highest for the middle sized farms and was slightly higher for the larger farms than for the smaller size classes.

The coastal region contained less than 15 per cent of the farms but about one-third of the total land in farms. The inequality in farm size was somewhat greater in the coastal region than elsewhere in the country. There, only 4 per cent of the farms controlled more than 80 per cent of the land. At the other end of the scale, almost 85 per cent of the farms in this region can be classed as "minifundio;" this large group controlled only about 7 per cent of the land in farms. Also, the percentage of farms in the very smallest size class is larger in this region than elsewhere. These units largely represent farmers who work permanently or seasonally on large farms but who also have their own subsistence plots. The number of these units in the coastal region is thought to be rising due to population growth and migration from other areas. Small farms are smaller on the average in the coastal region than elsewhere in the country.

The central region contained more than 90 per cent of the farms and slightly less than two-thirds of the land in farms. This region has a larger percentage of farms in the second smallest size class than the coastal region. The highlands are the home of the dense Indian population distributed over small farms. About two-thirds of the farms and almost one-fourth of the land was represented by this group in the central region in 1964. Population growth has meant continuing pressure for growth in the number and decrease in the size of small farms in this region. More than three-fourths of the farms classified as "middle-sized" were located in this region. Although less than 2 per cent of farms in this region were classed as "large," they controlled more than 40 per cent of the land in farms.

By eliminating the smallest and largest size classes, for which comparable data were not available, some comparisons between 1950 and 1964 were possible. The most important change is the increase in the number of small farms in 1964. There were about 20 per cent more such farms listed in the latest census, and this increase occurred both in the coastal and central regions. One striking difference, however, is that the increase in the coast did not result in a decrease in the average size of farm in the class. In the central region, in contrast, the average size of small farm declined by almost 50 per cent. The process in the central region represented the subdivision of existing farms into a larger number of smaller units. On the coast, new farms were formed to a great extent by bringing new land into production. If the rate of population growth remains high, pressures will continue to subdivide holdings in the settled area. Farm sizes will decline further, especially in the central region, but also in the coast as new land becomes scarce. Thus, problems of labor absorption and productivity are likely to become more critical in the agricultural sector in the future.

AGRICULTURAL DEVELOPMENT ZONES (PARCELAMIENTOS)

The settlement areas administered by the National Institute for Agrarian Transformation (INTA) are an important element in the farm sector, especially in the coastal region. These zones were initiated following the shift in agrarian policy in 1954 from land redistribution to colonization. Most of the zones were settled in the 1953–63 period. There has been little settlement of new families in recent years. This program has been carried out under an agency charged with integral economic and social development in the colonization zones.

Initially, the zones were located largely on the south coast. Later, colonization projects were initiated in the departments of Izabal on the north coast and Alta Verapaz in the north. Informa-

tion on the number of families who have been given parcels, the modal size of parcel and the total areas involved in the colonization zones is given in Table 4.2. Most parcels are considerably larger than the small farms in the same area. Apparently, the policy has been to form "family-sized" farms in the development zones.

NATIONAL FARMS

Another important element in the structure of the agriculture sector is the group of farms owned by the government and operated by INTA, *fincas nacionales.* These farms were expropriated from German nationals during World War II, and twenty-four have remained in the hands of the government. Some of these farms are potentially among the most productive in the country, but their management over the years has been criticized for inefficiency. Coffee and sugar are the major products of the farms. The avowed policy of INTA is to turn these farms back to private ownership by organizing them into cooperatives owned by their farmer-members. Progress in realizing this goal, however, has been slow. In total these farms involve about 17,000 hectares of cultivable land and provide jobs for some 4,300 workers (Table 4.3).

IMPORTANCE OF SIZE DISTRIBUTION

The most important conclusions and implications of these data on number and size of farms can now be reviewed and emphasized. Guatemala is a classic example of inequality in farm size distribution. Almost 90 per cent of all farms had less than 7 hectares included in the farm unit in 1964. The average size of farm for this large group was only about 2 hectares. Less than 20 per cent of the total land in farms in the country was controlled by these 365,000 farmers. At the other end of the size scale, some 9,000 large farms—representing only 3 per cent of the total number of farms—controlled more than 60 per cent of the area in farms. Between these extremes was a group of about 45,000 moderately-sized "family" farms. This group represented 10 per cent of the farms and controlled about 20 per cent of the land in farms.

Population pressure is resulting in further subdivision of farms and formation of additional minifundio. Thus, there is a continuous increase in the number and decrease in the size of small subsistence farms. As a result, problems of underemployment, cultivation of marginal land, lack of crop rotation, poor technology, and low productivity of land and labor are becoming more serious.

There is a further important implication of the size distribution for programs designed to accelerate agricultural development.

TABLE 4.2 ● ZONES OF AGRARIAN DEVELOPMENT

Parcelamiento	Number of Parcels	Modal Size of Parcel (ha)	Total Area in Parcels	Total Area of Zone (ha)	Total No. of Inhabitants in the Zone[a]
El Cajón	112	20	2230.65	2643.94	700
Cuyuta	269	15	4600.29	6287.62	5664
Nueva Concepción	1119	20	25191.40	34909.28	40672
El Arisco	154	7	1080.59	1677.74	1009
Los Angeles	108	20	2127.01	2325.50	764
Santa Isabel	90	13	1256.55	1353.77	707
Arizona	117	5	597.88	684.89	1420
El Reposo	145	20	2819.63	3422.07	1054
La Máquina	1212	20	27162.49	34479.00	26784
Monterrey	174	20	3011.20	4175.02	5494
El Japón Nacional	81	10	804.09	1525.95	581
Guatalón	39	18	741.01	1075.20	234
Santa Elena	30	20	600.39	671.16	864
Caballo Blanco	117	20	2296.36	3118.56	952
El Rosario	97	20	1988.56	2594.72	2610
Santa Fe	55	20	1055.49	1284.45	372
La Blanca	141	20	2071.24	9823.19	2148
Sebol	612	45	---[b]	25885.41	3300
Santo Tomás de Castilla	114	10	2594.73	4828.45	956
Navajoa	189	87	5833.39	10694.78	1472
Virginia	189	20	3615.87	6258.80	1901
El Encantador y Anleu	15	90	1323.55	1347.38	245
San Joaquín	30	15	452.28	1939.37	566
Santa Ines	14	206	2804.22	14096.61	780
Montufar	246	20	3931.30	10558.27	10418
Las Cabezas	110	10	---[b]	1738.41	495
Totals[c]	5579		160,190.17	189,399.54	112,162

Source: Instituto Nacional de Transformación Agraria, June 1967.

[a]Estimated, based on surveys in the Parcelamientos.
[b]No indication of area settled; not included in total.
[c]List does not include El Cacahuito, Department of Santa Rosa. There is little information concerning this parcelamiento except that INTA reports some 203 people having received land as of 1967.

TABLE 4.3 ● NATIONAL FARMS OF GUATEMALA, 1966

Name and Location of Farm	Area			Coffee Production (kg)	Number of Workers
	Total	Cultivable	Coffee		
Chuchuapa No. 4, Sta. Rose	51	51	13	3,312	38
Chimax y Anexo No. 55, A. Verapaz	1402	286	7	3,266	302
Campur No. 53, A. Verapaz	21343	2700	443	159,712	528
Morelia Sta. Sofia No. 14, Chimalt.	1230	924	571	338,882	315
Chocola No. 22, Suchitepequez	2483	2294	1616	1,050,502	902
Las Camelias Xolhuitz No. 31, Retal.	244	213	129	96,186	64
Candelaria Zolhuitz No. 32, Retal.	2504	746	561	529,276	378
Eden Xolhuitz No. 33, Retal.	125	105	105	96,002	65
Las Mercedes No. 39, Quezaltenango	681	681	471	440,910	512
Pensamiento Palmira No. 40, Quezaltenango	632	613	554	309,856	266
La Montafia No. 50, San Marcos	62	62	44	31,924	33
La Isla, Anexo Chimax, A. Verapaz	269	201	0	0	n.a.
Chipip, Anexo Chimax, A. Verapaz	225	186	42	11,270	n.a.
La Providencia, Chimax, A. Verapaz	3010	773	10	4,922	n.a.
Saxoc No. 60, Chimax, A. Verapaz	865	860	78	30,452	101
San Vicente No. 61, Chimax, A. Verapaz	4512	1977	186	50,140	161
Sacsuha No. 68, Chimax, A. Verapaz	4117	3088	0	0	367
El Carmen Tajumulco No. 85, Sn. Marcos	398	224	49	19,274	81
La Fortuna Anez., Chocola, Such.	7	7	7	6,900	n.a.
El Carmen Villa Seca No. 114, Retal.	323	320	108	51,244	102
Chirrepec No. 134, Alta Verapaz	325	315	0	0	69
Candelaria Pacan No. 135, Such.	45	39	13	3,634	11
La Montafita No. 146, El Progreso	382	367	87	77,464	22
El Engaño Anexo Fca. Chocola, Such.	5	5	5	2,208	1
Totals	45,240	17,037	5,097	3,317,336	4,318

Source: Departamento de Fincas Nacionales (INTA).

Responses to alternative programs and policies can be expected to be different depending on the type of producer. The large number of small farmers have different needs, resources, and limitations, and should not be expected to respond to the same policies and programs as would elicit responses from the large farmers. Similarly the smaller number of decision makers and the considerable difference in economic status and resources of the large farmers could make some programs successful for them but largely ineffective as far as reaching producers in the subsistence sector. Policies and programs must be tailored to the actual conditions of the farmers to be reached and must take full cognizance of their number, size, and realities of their economic status.

FARM TENANCY AND MANAGEMENT PATTERNS

While the Guatemalan agricultural sector is characterized by small minifundios it is also true that most farms are owned by the farmers (Table 4.4). This pattern is most pronounced for the large farms where 90 per cent were owned and almost none were rented in 1964. The proportion of ownership in the middle-size class was 80 per cent, but again few farms were rented. The proportion of owned farms fell to about 60 per cent for the two small farm classes. The other important types of tenancy found among small farmers were renters (13 per cent) and colonos (15 per cent).

Colonos are resident laborers on large farms who receive small plots of land for home food production. This pattern is especially prevalent in the large coffee fincas, but also exists on cattle ranches and cotton farms in the coastal region. Colonos represented slightly more than 10 per cent of all farm units in the country and about 13 per cent of the small farms in 1964. Inasmuch as they are obligated to work on a regular basis on the farm where they are living, they represent a special case of small farms in terms of employment and productivity. The land they use is properly part of the large farms on which they live, but it was presumably netted out of the farm size data for large farms in the census.

In the coastal region a much larger proportion of small farms was rented than for the country as a whole. This is also the region where there is a relatively large proportion of colonos. The central region showed a higher proportion of owners and a less-than-average proportion of renters and colonos. This again underscores the dominance of small Indian owner-operated farms in this region. In the Petén region almost all farms existed on land which is neither legally owned nor rented. This area is largely in the public domain, and no arrangements for sale or lease of land have been made for

TABLE 4.4 ● GUATEMALA: FARM TENANCY PATTERNS

Farm Size Class	Number of farms	Owners[a]		Renters		Collective Ownership		Colonos		Other	
		No. of farms	Per cent of farms	No. of farms	Per cent of farms	No. of farms	Per cent of farms	No. of farms	Per cent of farms	No. of farms	Per cent of farms
Less than 0.70 ha	85,083	51,011	60.0	11,531	13.5	4,169	4.9	14,747	17.3	3,625	4.3
From 0.70 to 6.99 ha	279,797	176,538	63.1	34,683	12.4	14,877	5.3	31,665	11.3	22,034	7.9
From 6.99 to 45.13 ha	43,656	35,712	81.8	657	1.5	1,495	3.4	2,190	5.0	3,602	8.3
From 45.13 to 902.51 ha	8,420	7,611	90.4	145	1.7	51	0.6	2	0.0	611	7.3
More than 902.51 ha	388	347	89.4	10	2.6	1	0.3	--	--	30	7.7
Totals	417,344	271,219	65.0	47,026	11.3	20,593	0.9	48,604	11.6	29,902	7.2

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadística.

[a]Includes farm units where some land is owned and the remainder is held under a different type of tenancy.

the few farms which exist there. These farms were classified in "other."

The census of 1964 classified farms according to whether they were operated directly by their owners or by a hired manager (Table 4.5). As would be expected, there is little hired management in the small and middle size classes. About two-thirds of the very large farms, however, were operated with hired managers. Slightly more than 20 per cent of the two large farm classes taken together were administered by employed managers. About 2,000 farms over 45 hectares in size fell in this "hired management" class in the 1964 census. This is the group of farms to which the "absentee-ownership" label is often applied. Unfortunately it was not possible to cross-classify tenancy with data on land utilization, production practices or productivity, to determine if the performance of this group of farms was poorer than owner-managed farms of comparable size.

Tenancy as such does not seem to constitute a serious barrier to agricultural progress. A high percentage of farms are owner-operated although the owners may not always be able to produce a clear legal title. The pattern of small farm ownership is most highly established in the central region. In the coastal region, however, there are larger numbers of small farmers who rent land or use land as colonos. Titles are also more in question in some of the newer areas of the coastal regions. These factors will make it more difficult to reach small farmers in the coastal areas through conventional credit and technical assistance programs.

LAND UTILIZATION

The most controversial aspect of farm size is the question of land utilization. There is no doubt that land in small farms is used intensively, although usually with primitive techniques and at low levels of technology. Is the land in large farms also used intensively? Do large farmers apply the best methods and technology that are known and profitable to use? This section will analyze this aspect of land use. The questions of production practices and productivity will be discussed in the following sections.

The first problem is to decide what land *can* be used if judgments are to be rendered about *whether* it is used. Census data were grouped into three basic classes: land for cultivation, land in natural and permanent pastures, and land which cannot be utilized (Table 4.6). These data were then tabulated by size of farm. The results are rather remarkable, and indicate graphically one of the fundamental problems of organization and resource utilization in the agricultural sector.

In Table 4.6 the first column of particular interest is the one

TABLE 4.5 ● GUATEMALA: TYPE OF FARM MANAGEMENT

Farm Size Class	Number of Farms	Owner-Operated[a]		Hired Manager	
		Number of farms	Per cent	Number of farms	Per cent
Less than 0.70 ha	85,083	84,879	99.8	204	0.2
From 0.70 to 6.99 ha	279,797	279,246	99.8	551	0.2
From 6.99 to 45.13 ha	43,656	43,224	99.0	432	1.0
From 45.13 to 902.51 ha	8,420	6,614	78.6	1,806	21.4
More than 902.51 ha	388	127	32.7	261	67.3
Totals	417,344	414,090	99.2	3,254	0.8

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadística.

[a] Includes renter-operated, colonos and collective farms.

TABLE 4.6 ● GUATEMALA: LAND UTILIZATION BY SIZE OF FARM

Farm Size Class	Number of Farms	Area	Area Which Can Be Cultivated	Per Cent Which Can Be Cultivated	Area in Pastures[a]	Per Cent in Pastures	Land not Subject to Utilization[b]	Per Cent not Utilizable
Less than 0.70 ha	85,083	32,619.2	30,614.5	93.9	497.5	1.5	1,507.2	4.6
From 0.70 to 6.99 ha	279,797	607,855.6	486,655.3	80.0	48,951.5	8.1	72,248.9	11.9
From 6.99 to 45.13 ha	43,656	648,900.2	321,525.2	49.5	170,430.0	26.3	156,945.0	24.2
From 45.13 to 902.51 ha	8,420	1,258,545.2	421,422.3	33.5	510,092.3	40.5	327,030.6	26.0
More than 902.51 ha	388	894,600.4	233,248.3	25.0	284,033.8	31.7	387,318.3	43.3
Totals	417,344	3,442,520.6	1,483,465.6	43.1	1,014.005.1	29.4	945,050.0	27.5

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadística.

[a]Includes natural and permanent pastures.

[b]Includes mountains, forests and other nonusable land.

(Continued)

TABLE 4.6 ● Continued

Area Which Can Be Cultivated					
Planted Area[c]	Per Cent Planted	Land in Tree and Other Permanent Crops	Per Cent in Tree and Other Permanent Crops	Fallow	Per Cent Fallow
26,927.9	88.0	2,723.0	8.9	963.6	3.1
368,764.1	75.8	35,340.8	7.3	82,550.4	16.9
155,646.1	48.4	32,970.7	10.3	132,908.4	41.3
139,709.2	33.2	165,476.6	39.3	116,236.5	27.5
55,366.0	24.8	82,333.0	36.9	85,549.3	38.3
746,413.3	50.3	318,844.1	21.5	418,208.2	28.2

[c]Includes annual crops, forage and pasture crops and land where the harvest was lost.

showing the percentage of land which is available for crop production. This figure declines dramatically with the size of farm. Cultivable land in small farms represents 80 to 95 per cent of total land, while for the very large farms it represents as little as 25 per cent of the total.

A somewhat better picture of land used for production can be gained by looking also at land in natural and permanent pastures. This is an important category of land use for the family and large size farms; it is much less important for small farms. Adding these two uses together improves the picture for the large farms. Land utilizable for crops and pasture ranges from 95 per cent for small farms to 57 per cent for the very large farms.

The data in Table 4.6 on land not subject to productive utilization simply accept the census classification. Obviously, what land can or cannot be utilized is a function of choice and necessity as much as physical reality. Much land in the highlands, which has been cropped for years, is as "unutilizable" in physical terms as forest and hill land classified as such in large farms. But small farmers have no choice and must eke out their bare subsistence with the land they have. Large farms have the option of using only that part of their land best suited for crops or pasture.

The remainder of Table 4.6 analyzes the use of land *in cultivation* by size of farm. Use is classified by annual crop production and land with tree and other permanent crops. The remaining cultivable land was fallow during the census year.

Small farms use almost all of their cultivable land each year for annual crops. This fact is consistent with the economic reality of the subsistence farmer. For the census year, about one-third of the cultivable land in the two large farms classes was not utilized. The proportion of fallow land, however, was highest for middle-sized farms. This fact bears further investigation and explanation.

These data suggest a significant degree of under-utilization of land in farms in the commercial sector. What would constitute economically efficient utilization can only be known through cadastral surveys and research designed to develop and test profitable cropping patterns and production practices. Another form of inefficient utilization is the intensive cropping of soils using primitive techniques and poor technology as practiced in the subsistence sector. Optimum management of these small farms to maximize production per hectare over time must also be determined through research. Both of these research areas deserve high priority.

There were notable regional differences in the pattern of land utilization. The coastal region had a slightly lower proportion of cultivable land but a much higher proportion of land in pastures than was true overall. As a result, less land in the coast was classified

as "not utilizable." Conversely, there was a slightly larger proportion of cultivable land recorded in the central zone but a much lower proportion of pasture, resulting in a somewhat higher degree of unproductive land. In both major regions, most of the land considered unproductive is included in the large farms.

The proportion of cultivable land which was fallow in 1964 was higher in the central region than on the coast. This was true for all size classes but especially for larger farms. Only about 50 per cent of cropland in mid- and large-sized farms was used for production during the census year. In the central region, the largest farms used the lowest percentage of their crop land, while in the coast the middle-sized group left the largest proportion of land idle.

LIVESTOCK PRODUCTION

The census of 1964 included information about the number of livestock on farms. This information is given in Table 4.7 by farm size classes. Subsistence farms have little pasture land and few cattle. A small proportion had herds of two or three cows used to produce meat and milk mainly for home consumption. Even in the middle-size group, less than half of the farms had beef animals and only about 10 per cent had dairy cows. Herd sizes were relatively small. About two-thirds of all beef and dairy cows were on large farms. Nearly all of the very largest farms had beef herds. The average herd size of 864 animals suggests that large-scale operations are quite common. Almost half of the very large farms also had dairy herds, with an average size of 60 cows per farm.

This situation is different in the case of hogs, sheep and poultry. These are the livestock products of the subsistence sector. Small farms accounted for two-thirds of each of these classes of livestock in the census year. Middle-sized farms were also important producers of these types of animals.

What is lacking in the census data is any indication of the efficiency of livestock production. How many animals of what age are sold for meat each year? What are the birth and death rates for calves, pigs and lambs? How much milk is produced per cow? How many eggs are produced per hen each year? These figures are undoubtedly low and would show that much could and should be done to improve production of livestock products.

AGRICULTURAL PRODUCTION PRACTICES

Certain important aspects of resource use patterns were covered in the census of 1964. These data have been tabulated by size of farm and are presented in Table 4.8.

TABLE 4.7 ● GUATEMALA: LIVESTOCK ON FARMS, 1964

Farm Size Class	Number of Farms	Land in Pasture[a] (ha)	Beef Cattle				Dairy Cattle			
			No. of farms with beef cattle	Number of beef cattle	Avg. per farm	Per cent beef animals in farm size class	No. of farms with dairy cattle	No. of dairy cattle	Avg. per farm	Per cent dairy animals in farm size class
Less than 0.70 ha	85,083	497.5	5,400	13,082	2.4	1.2	854	1,378	1.6	1.7
From 0.70 to 6.99 ha	297,797	48,951.5	44,302	161,507	3.6	14.5	7,254	11,895	1.6	14.4
From 6.99 to 45.13 ha	43,656	170,430.0	19,007	190,958	10.0	17.2	5,471	10,641	1.9	12.9
From 45.13 to 902.51 ha	8,420	510,092.3	6,120	482,267	78.8	43.4	2,838	48,171	17.0	58.2
More than 902.51 ha	388	284,033.8	305	263,511	864.0	23.7	176	10,658	60.6	12.8
Totals	417,344	1,014,055.1	75,134	1,111,325	14.8	100.0	16,593	82,743	5.0	100.0

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

[a]Includes natural and permanent pasture.

(Continued)

TABLE 4.7 ● Continued

Hogs				Sheep				Chickens			
No. of farms with hogs	No. of hogs	Avg. per farm	Percent hogs in farm size class	No. of farms with sheep	No. of sheep	Avg. per farm	Per cent sheep in farm size class	No. of farms with chickens	No. of chickens	Avg. per farm	Per cent chickens in farm size class
10,395	17,970	1.7	7.5	5,586	36,794	6.6	6.9	32,111	391,890	37.7	12.2
56,902	147,098	2.6	61.5	32,816	356,954	10.9	66.5	149,068	2,680,521	53.3	18.0
14,693	49,341	3.4	20.6	7,534	125,027	16.6	23.3	28,723	1,016,157	65.8	35.4
2,869	21,613	7.5	9.0	751	16,531	22.0	3.1	4,692	409,902	55.7	87.4
108	3,346	31.0	1.4	37	1,237	33.4	0.2	161	33,181	41.5	206.1
84,967	239,368	2.8	100.0	46,724	536,543	11.5	100.0	214,755	4,531,651	51.5	21.1

TABLE 4.8 ● GUATEMALA: AGRICULTURAL PRODUCTION PRACTICES

Farm Size Class	Number of Farms	Area in Crop Production (ha)	Energy Used in Production (per cent)			Fertilizer Use			
			Mechanical and human	Animal and human	Human only	No. of farms using fertilizer	Per cent of farms using fertilizer	Per cent of farms using natural fertilizer only	Per cent of farms using chemical fertilizer[a]
Less than 0.70 ha	85,083	30,614.5	0.1	2.5	97.4	29,006	34.1	88.3	19.5
From 0.70 to 6.99 ha	279,797	486,655.3	0.3	6.7	93.0	88,617	31.7	83.1	28.3
From 6.99 to 45.13 ha	43,656	321,525.2	1.8	14.4	83.8	15,260	35.0	78.8	36.1
From 45.13 to 902.51 ha	8,420	421,422.3	13.1	26.5	60.4	3,867	45.9	62.9	62.0
More than 902.51 ha	388	223,248.3	40.2	10.3	49.5	261	67.3	51.7	79.3
Totals	417,344	1,483,465.6	0.7	7.0	92.3	137,011	32.8	83.1	28.4

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

[a]Includes farms using natural and chemical fertilizers.

(Continued)

TABLE 4.8 ● Continued

Fertilizer Use	Irrigation				Colonos		
Quantity of chemical fertilizer used (metric tons)	Number of farms using irrigation	Area Irrigated	Per cent of crop area irrigated	Avg. area per farm irrigated (of farms with irrigation) (ha)	Number of farms with colonos	Number of colonos	Average number per farm
424.7	1,868	384.3	1.3	0.2	98	145	1.5
3,498.5	8,634	4,634.7	1.0	0.5	664	2,163	3.3
2,514.2	2,576	4,587.2	1.4	1.8	1,377	5,583	4.1
20,276.3	1,230	22,032.6	5.2	17.6	2,767	58,594	21.2
7,465.4	83	20,716.9	9.3	249.6	311	36,344	116.9
34,181.1	14,391	52,355.7	3.5	3.6	5,217	102,829	19.7

The first aspect to be examined is the type of energy used on farms. Production on small farms is carried out almost entirely by human labor. A very small proportion of these farms used animal power, but mechanical power was almost unknown in the subsistence sector. It is somewhat surprising that production using hand labor was also dominant in the middle and large farm groups. Even 50 per cent of the largest farms reported production solely with human labor. The only significant use of mechanical energy, however, was found in the large farm groups.

The census data on fertilizer use showed that only about one-third of the small and medium farm size groups used it compared to one-half to two-thirds of the large farmers. Moreover, natural fertilizer was used almost exclusively in the subsistence sector. Chemical fertilizers were used widely only on large farms. Other sources suggest that of current use of chemical fertilizer, one-half goes to coffee, one-fourth to cotton, and the remaining one-fourth to other crops.

Irrigation has not been widely developed in Guatemala. In 1964 only 3.5 per cent of the total cultivable area was irrigated. What irrigated acreage existed was controlled mostly by large farms. More attention needs to be given to irrigation and drainage, especially to their potential role in intensifyng land use through double cropping. Often, response to new inputs such as fertilizer and improved seed may depend on complementary investments in irrigation and/or drainage systems.

Finally, Table 4.8 gives information about the number of colonos. These are found mainly on large farms and their presence explains the labor-intensive production methods mentioned above. The number of colonos reported in this table is more than twice the number shown in Table 4.4 as operating their own farm plots. These additional colonos represent an important proportion of the landless laborer class in the rural sector. This group seems to be growing quite rapidly, especially in the coastal areas.

CROP PRODUCTION AND YIELDS

Cropping patterns can have an important influence on the efficiency of agricultural production. Where are the major crops produced? Which crops are produced by large farmers and which by small farmers? How do yields vary by region and size of farm? Are yields increasing or decreasing? Answers to these questions will help to diagnose basic production problems and to suggest ways to seek improvements in the agricultural sector.

Census data on the number of producers, area and production of corn and beans were obtained and classified by size of farm. These

data do not seem comparable to other production data. The area and quantity information obtained by the census was lower than the data from other sources. They are presented here with this major qualification and for the primary purpose of comparing patterns of production and yields among farm size classes.

Corn Production and Yields

Corn is the most widely produced crop in Guatemala. More than 90 per cent of all farms in the country produced corn in 1964. This figure is higher in some departments and even approaches 100 per cent in departments where subsistence agriculture predominates (Table 4.9). Land devoted to corn represented 78 per cent of the total land used for annual crops in 1964. This figure was 88 per cent in the central region as contrasted to only 52 per cent in the coastal region. The importance of corn is especially strong for small farmers. Not only is corn practically a universal crop for them, it is also the crop to which most of their land is devoted. Small farmers account for more than 60 per cent of the production of corn.

Comparative yields by size of farm for 1964 are shown in Table 4.10. The table includes data for corn grown as a single crop and for first crop corn where double-cropping is practiced. Yields were highest for large farms. This is most likely because improved seed, fertilizer, and other modern practices are used on large farms. Yields were also higher for the smallest farms than for the small and medium size groups. A higher labor input and more intensive production practices probably account for this difference. Yields were lowest for the size classes representing the largest number of corn producers and the greatest area of corn production. These low yields reflect unimproved seed, lack of fertilizer, poor soil, and inadequate crop rotation and pest control. These are the producers who must be reached and the conditions that must be overcome if widespread increases in corn yields are to be obtained.

Some corn is produced under two production practices which have important implications for yields: interplanting with other crops, especially beans, and double cropping of the same land. The interplanting practice is more prevalent among small farmers than among large ones, and is practiced more frequently in the highland region than in the coast. Yields were generally lower for interplanted corn in 1964 (Table 4.11). While this practice is frequently criticized, no one really seems to know what alternatives would permit the peasant producer to produce his basic food supply with more certainty. Serious recommendations for change should be firmly based on results of research at the level of the subsistence farmer.

TABLE 4.9 ● GUATEMALA: NUMBER OF FARMERS PRODUCING CORN AND AREA PLANTED TO CORN, BY DEPARTMENT AND REGION

Department	Number of Farms	Per Cent of Farms	Area Planted to Corn (ha)	Per Cent of Area Cropped
Guatemala Total	387,555	92.9	525,141.6	77.8
Coastal Region Total	61,118	89.2	96,604.1	51.8
Escuintla	15,044	87.5	31,541.8	37.2
Santa Rosa	18,078	98.8	21,951.6	87.4
Suchitepéquez	12,221	79.5	13,621.2	60.6
Retalhuleu	9,214	87.4	17,485.2	45.2
Izabal	6,561	92.4	12,004.3	77.8
Central Region Total	324,128	93.5	423,376.6	87.8
Guatemala	15,716	92.5	22,310.7	93.3
El Progreso	6,820	99.6	10,972.3	87.6
Sacatepéquez	8,016	98.3	8,824.4	86.7
Chimaltenango	21,173	99.8	28,400.2	86.8
Sololá	13,305	84.8	10,829.0	83.7
Totonicapán	18,518	81.7	10,456.6	74.5
Quezaltenango	22,184	85.3	18,316.0	67.7
San Marcos	36,309	89.6	31,080.6	75.6
Huehuetenango	41,073	98.5	56,442.0	92.1
El Quiché[a]	37,308	100.0	50,946.4	97.0
Baja Verapaz[a]	13,831	100.0	24,726.9	95.8
Alta Verapaz	31,189	84.5	60,795.8	96.0
Zacapa	6,656	92.2	11,808.7	77.3
Chiquimula[a]	17,199	100.0	21,361.8	87.4
Jalapa	11,938	92.9	22,420.4	93.1
Jutiapa	21,429	100.0	33,684.8	81.2
Petén Region[a]	2,309	100.0	5,160.9	96.1

Source: Segundo Censo Agropecuario, 1964 Dirección General de Estadistica.

[a]Original data showed more farms producing corn than farms listed in Census; numbers used equal to number of farms and overall total adjusted.

TABLE 4.10 ● GUATEMALA: NUMBER OF PRODUCERS OF SINGLE-CROP CORN, AREA, PRODUCTION AND YIELD, BY SIZE OF FARM

Farm Size Class	Number of Farms	Per Cent of Farms	Area (ha)	Production (mt)	Yield (kg/ha)
Less than 0.70 ha	62,803	80.4	22,612	22,045	975.0
From 0.70 to 6.99 ha	218,914	75.1	257,949	206,903	802.3
From 6.99 to 45.13 ha	33,809	73.0	105,339	84,847	805.0
From 45.13 to 902.51 ha	5,095	71.0	41,094	41,925	1,020.1
More than 902.51 ha	167	79.5	11,543	15,354	1,335.1
Totals	320,788	75.8	438,537	371,074	846.2

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

TABLE 4.11 ● GUATEMALA: PRODUCTION AND YIELDS FOR CORN INTERPLANTED WITH OTHER CROPS

Farm Size Class	Number of Farms	Per Cent of Farms	Area Interplanted (ha)	Production (mt)	Yields (kg /ha)
Less than 0.70 ha	6,696	8.6	2,516	2,006	797.3
From 0.70 to 6.99 ha	52,499	18.0	59,449	7,332	627.9
From 6.99 to 45.13 ha	8,803	19.0	19,934	12,763	640.2
From 45.13 to 902.51 ha	1,441	20.1	7,178	4,932	687.1
More than 902.51 ha	22	10.5	400	426	1,065.0
Totals	69,461	16.4	89,477	57,459	642.2

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

Double-cropping is a means for more intensively utilizing the same land resources. It can be practiced where temperatures and rainfall (both annual amounts and distribution over the year) permit other than seasonal production. Quite often, successful double-cropping depends upon complementary investments in drainage or irrigation to extend the effective growing season.

Double-cropping should be expected to increase the yield per hectare per year if it is to be economical. It is not necessarily true that it should increase the yields per crop produced. This would hold, for example, if shorter-maturing corn varieties were used to permit two crops per year. As a result of the varietal difference, and possibly because of poorer growing conditions for the second crop, each of the two crops would probably yield less than a longer-maturing variety planted during the most favorable part of the growing season. The data in Table 4.12 do suggest that the yield per crop is substantially lower for the second corn crop. However, the total production per hectare per year, or of the two successive crops considered jointly, would be expected to be larger than the yields for single-crop corn given in Table 4.10.

Because of the importance attached to the question of production in the subsistence sector, it could be essential to know where corn yields are highest and lowest and if corn yields are tending to decline or increase in any part of the country. Table 4.13 shows yields by zone for the years in which area data are available. Yields appear to have been rising as much as 1 to 2 per cent per year for the country as a whole. Yields are highest in the coastal departments of Escuintla, Suchitepéquez and Retalhuleu (zone 2) and are also increasing most rapidly there. Yields are also relatively high in the departments of Quezaltenango and San Marcos (zone 3). There appear to have been declines in yields in Huehuetenango and El Quiché (zone 5) and possibly in Chiquimula and Jalapa (zone 8). The data show that yields vary a great deal from zone to zone and from year to year. This variation increases the risks associated with corn production especially where the adoption of new inputs or practices which increase production expenses is concerned.

Bean Production and Yields

Beans are the second most widely produced crop and the crop most often interplanted with corn. Like corn, they are a major product of the subsistence sector. In 1964, about 22 per cent of the farmers in the country produced beans and 12 per cent of the area of annual crops was planted to them (Table 4.14). These proportions are higher in departments where subsistence agriculture is most important. Yields of beans have not been increasing and probably

TABLE 4.12 ● GUATEMALA: PRODUCTION AND YIELDS OF CORN PRODUCED AS SECOND CROP

Farm Size Class	Number of Farms	Per Cent of Farms	Area (ha)	Production (mt)	Yields
Less than 0.70 ha	8,564	11.0	3,167	2,569	828.7
From 0.70 to 6.99 ha	20,077	6.9	21,347	12,667	594.7
From 6.99 to 45.13 ha	3,692	8.0	12,329	6,813	554.0
From 45.13 to 902.51 ha	637	8.9	4,512	3,032	673.8
More than 902.51 ha	21	10.0	1,128	1,035	941.0
Totals	32,991	7.8	42,483	26,116	615.9

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadistica.

TABLE 4.13 ● GUATEMALA: CORN YIELDS BY ZONE (kg/ha)

Zone[a]	Crop Year													
	1949 - 1950	1954 - 1955	1955 - 1956	1956 - 1957	1957 - 1958	1958 - 1959	1959 - 1960	1960 - 1961	1961 - 1962	1962 - 1963	1963 - 1964	1964 - 1965	1965 - 1966	1966 - 1967
1	507	508	542	606	506	620	602	607	593	624	481	481	687	856
2	1,132	1,177	1,022	1,107	1,147	1,265	1,096	1,512	1,580	1,359	1,238	1,238	1,630	1,712
3	935	954	898	1,027	1,087	1,051	957	1,053	994	1,126	1,165	1,165	1,114	1,047
4	573	565	610	650	596	617	679	636	664	709	652	652	832	862
5	678	600	627	667	670	676	674	680	681	719	678	678	643	639
6	757	657	595	750	699	703	729	614	743	852	829	829	1,047	757
7	467	615	468	554	419	517	502	571	564	555	494	494	664	672
8	500	616	502	521	440	597	485	512	577	592	474	474	574	560
9	645	782	677	710	610	700	776	754	808	790	691	691	934	895
Totals	685	706	655	732	691	751	734	776	828	896	808	816	954	902

Source: Dirección General de Estadística.

[a]Zones are statistical zones defined as:

zone 1 Guatemala, Sacatepéquez, Chimaltenango
zone 2 Escuintla, Suchitepéquez, Retalhuleu
zone 3 Quezaltenango, San Marcos
zone 4 Sololá, Totonicapán
zone 5 Huehuetenango, El Quiché
zone 6 Alta Verapaz, El Petén, Izabal
zone 7 El Progreso, Baja Verapaz, Zacapa
zone 8 Chiquimula, Jalapa
zone 9 Santa Rosa, Jutiapa

TABLE 4.14 ● GUATEMALA: NUMBER OF PRODUCERS OF BEANS AND AREA PLANTED, BY DEPARTMENT AND REGION

Department	Number of Farms	Per Cent of Farms	Area Planted (ha.)	Per Cent of Area Cropped
Guatemala Total	90,493	21.7	83,548.0	12.4
Coastal Region Total	9,576	14.0	8,271.7	4.4
Escuintla	908	5.3	636.6	0.8
Santa Rosa	6,538	35.7	5,737.3	22.8
Suchitepéquez	293	1.9	124.4	0.6
Retalhuleu	288	2.7	75.5	0.2
Izabal	1,549	21.8	1,697.9	11.0
Central Region Total	80,181	23.1	74,988.4	15.5
Guatemala	4,219	24.8	5,021.1	22.0
El Progreso	1,850	27.0	1,262.6	10.1
Sacatepéquez	2,072	25.4	1,152.9	11.3
Chimaltenango	6,206	29.3	7,548.5	23.1
Sololá	2,015	12.8	1,363.2	10.5
Totonicapán	1,558	6.9	1,164.8	8.3
Quezaltenango	1,100	4.2	761.6	2.8
San Marcos	5,885	14.5	3,975.8	9.7
Huehuetenango	8,009	19.2	7,906.9	12.9
El Quiché	13,031	34.9	15,219.9	29.0
Baja Verapaz	3,040	22.0	2,385.5	9.2
Alta Verapaz	9,117	24.7	2,722.3	4.3
Zacapa	2,053	28.5	2,090.6	13.7
Chiquimula	5,626	32.7	4,474.7	18.3
Jalapa	3,363	26.2	4,405.5	18.3
Jutiapa	11,037	51.5	13,532.5	32.6
Petén Region Total	736	31.9	287.9	5.4

Source: Segundo Censo Agropecuario, 1964, Dirección General de Estadística.

have decreased, especially in the poorer production areas of the central region.

IMPLICATIONS FOR DEVELOPMENT

The dual structure of Guatemalan agriculture has already been emphasized. Most of the land is in relatively few large farms. This land is used largely for the production of export crops and there are indications that it is used less intensively and efficiently than would be desirable. At the other end of the spectrum is the large number of small farms which exist in the country. Land in these farms is used intensively but at a low level of technology. These small farms as shown in Chapters 2 and 3 mainly produce subsistence crops for home production and sale, except for some specialty crops produced for the domestic market.

An important interrelationship exists between the export and subsistence subsectors—the provision of resident and seasonal migratory labor by subsistence farms for production operations in the export crops. The 1964 census identified almost 50,000 colonos, but other sources suggest that there were as many as 90,000 full-time resident workers on coffee and cotton farms alone in 1965–66. This number could easily have reached 100,000 for all large farms in the country.

Available estimates show that the number of part-time workers employed in coffee and cotton in 1965–66 was on the order of 400,000. A large proportion of these workers were migrants who came from the small farms in the highlands to work in the coffee and cotton harvests and who then returned to their own small farms to produce corn and beans. This pattern is quite complementary in the sense that the peak demands for labor in coffee and, to a lesser extent cotton, are mostly in the off-season for production in the highlands. Thus, the migratory labor is largely drawn from the pool of workers who would otherwise be seasonally unemployed. The wages earned by the migrants represent an important contribution to the total income of their families.

It has been suggested that the availability of a large pool of temporary workers willing to work for low wages discourages efficiency in export crop production and maintains marginal coffee farms in production. Historically, various forms of coercion have been used to insure a sufficient supply of seasonal workers at very low wages. Currently, wage rates and working conditions have been improved, at least slightly, and wage rates probably reflect the low-opportunity costs of labor at home in the highland areas. Improvements in labor productivity in the subsistence sector could elevate opportunity costs for this labor, raise wages for migratory workers,

and create pressure for improved efficiency in export production.

Very little information could be obtained on income and capital flows in the agricultural sector. For cotton, there was some indication that of the total export earnings, approximately one-fourth goes to pay for imported inputs, one-half goes for domestic inputs, and the remaining one-fourth represents profits for the producer. The allocation of these profits between consumption and investment in agriculture or other sectors is not known. Similarly, there is no indication of the extent to which export earnings from coffee, meat, bananas, or sugar are invested in increased production in agriculture or other sectors in the country.

Neither could systematic information on income distribution in agriculture be located. The extreme inequality in farm size distribution strongly suggests a like inequality in income distribution. Certainly, the large numbers of farm families with small plots of poor soil have minimal incomes even if some are able to supplement their production of subsistence crops by work off-farm. This fact is supported by a few studies that contain data on income levels of small highland farmers.[1]

The low productivity of this class of farmers is also evident. Farmers working small plots of land with primitive tools and traditional inputs will never produce much per man nor per unit of land. The necessity to increase productivity—and the rate of growth in productivity—of labor and land in agriculture is a clear implication. New inputs and improved practices which raise yields per acre are one way to approach the productivity problem. Giving more and/or better land to small farmers is another. Moving labor out of agriculture and mechanizing production is still a third. These alternatives must be evaluated in terms of their costs and benefits for the economy as a whole if their implications are to be understood and if choices are to be made consistent with overall national development goals and objectives.

1. For example, Hill, G. W., "The Guatemalan Highlands Indian and His Poverty Agriculture" (unpublished manuscript, 1966).

CHAPTER FIVE

SUPPLY AND DEMAND PROJECTIONS FOR BASIC FOODS

SUPPLY AND DEMAND PROJECTIONS are available from several different sources in Guatemala. In general, there is slightly more agreement on what the demand for various products will be than on what the domestic production will be. The lack of consistent data makes it difficult to judge the accuracy of existing projections. Where possible the linear trend of production and demand during the 1950–66 period has been used as a benchmark for comparison. Unfortunately the 1950–66 data for some products either do not exist or are considered to be too inaccurate to be useful. Linear trend projections tend to be somewhat more conservative than those based on the rate of growth of output. This partially accounts for the fact that the projections based on the linear trend are consistently below those developed by the Banco de Guatemala.

Attention in this chapter is centered on supply and demand projections for corn, beans, wheat, rice, fruits, vegetables, beef, pork, poultry, milk and mutton. The relative importance of these products in terms of their value as a percentage of the total value of agricultural products produced for internal consumption in 1966 is as follows:

1.	Corn	23.8
2.	Milk	13.4
3.	Eggs	10.3
4.	Pork	8.5
5.	Fruits	8.3
6.	Beans	7.9
7.	Vegetables	7.9
8.	Beef	6.7
9.	Poultry	3.7

10.	Potatoes	1.4
11.	Mutton	0.3
12.	Other Food Crops	7.1
13.	Other Livestock Products	0.7
	TOTAL	100.0

The total value of agricultural products for internal consumption in 1966 accounted for about 55 per cent of the value of total agricultural production, while the value of agricultural products for export accounted for slightly over 37 per cent. Products for industrial use accounted for 8 per cent of the total.

The supply and demand projections presented in this chapter indicate what food balances will be if past trends continue. Food consumption habits will undoubtedly change as relative prices change, as incomes increase and as people become more aware of the importance of balanced diets. Such changes are expected to be gradual. Production patterns, on the other hand, could change very rapidly depending on developments in the world market and the success of the various government programs. Thus the supply projections provide only part of the information necessary to determine what government programs are needed.

Supply projections developed by the Banco de Guatemala and demand projections furnished by the Consejo Nacional de Planificación are used throughout this chapter. The projection techniques used varied somewhat from product to product depending on the type of data available. The general procedure used by the Banco de Guatemala was to select a base period, usually 1964–67, and to assume that the future rate of increase in production from the base period value would be equal to the average rate of increase during 1950–67. The Consejo's demand projections, on the other hand, use the 1967 estimates of demand as a basis and compute the rate of increase in demand from a set of assumptions about the rate of increase of population, future income and income elasticities.

GRAINS

Corn is the most important food crop grown in Guatemala. It is grown extensively throughout the country and comprises about 90 per cent of all cereals in the diets of Guatemalans. Beans are the second most important food in the Guatemalan diet. Like corn, they are grown almost everywhere in the country. Rice and wheat are becoming increasingly important food grains. Their increased importance reflects the growth of incomes and urban population.

Corn

The production of corn increased from about 443,000 m.t. in 1950 to more than 680,000 m.t. in 1967. The average annual rate of increase in production during this period was about 3 per cent. Corn production varied considerably from year to year. Part of the variation in production may have been due to changes in the price of cotton relative to corn and resulting shifts of land from cotton to corn and later back to cotton. Part can be attributed to changes in the government's price policies, credit programs, extension programs and changes in the weather. Data on the production and consumption of corn are presented in Table 5.1.

Imports of corn increased suddenly in 1962 to about 26,000 m.t. and then dropped to around 12,000 m.t. in 1963 and have since remained below that level. Execept for 1962, corn imports have always been less than 2 per cent of national production.

Supply and demand projections for corn are presented in Table 5.2. The supply projections developed by the Battelle Memorial Institute (BMI) lie somewhat above those based on the linear trend line and below those prepared by the Banco de Guatemala (BG). The demand projections of the Battelle Memorial Institute are somewhat higher than those prepared by the Consejo Nacional de Planificación (CNP).[1] According to the BMI projections the supply of corn will exceed the demand by about 15,000 m.t. in 1970 and by 44,000 m.t. in 1980. Based on the past trend of production and CNP's demand projections, the demand for corn will exceed the supply by about 87,000 m.t. by 1980. This conclusion corresponds with INCAP's belief that for the 1970's ". . . it is not pessimistic to predict that the lack of efficient storage and price guarantees will cause a recurrent scarcity of production and consequently an inadequate supply of corn."[2] Some changes that may help to increase the supply of corn are already underway, however. Additional corn storage and drying facilities are likely to be available within the next few years. There has also been some increase recently in the use of fertilizers on corn. Such increases are expected to continue.

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1. All references to supply and demand projections made by the Battelle Memorial Institute (BMI) are based on a *preliminary* version of their report entitled, *"Projections of Supply and Demand for Selected Agricultural Products in Central America to 1970, 1975, 1980."* This report was done for the United States Department of Agriculture (USDA) in cooperation with the Instituto de Nutrición de Centro America y Panama (INCAP).

2. From a preliminary version of an INCAP report on the present and future food needs of Guatemala.

TABLE 5.1 ● PRODUCTION, IMPORTATION AND EXPORTATION OF CORN (thousands of metric tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	443.4	0.5	--	443.9
1951	499.7	--	--	499.7
1952	470.2	--	0.1	470.1
1953	436.3	--	0.3	436.0
1954	397.3	--	--	397.3
1955	381.8	5.9	--	387.7
1956	444.7	1.9	--	446.6
1957	454.2	--	--	454.2
1958	477.9	0.2	--	478.1
1959	513.0	--	0.5	512.5
1960	526.3	--	--	526.3
1961	537.4	0.3	1.8	535.9
1962	559.3	26.3	0.6	585.0
1963	698.4	11.9	0.3	710.0
1964	741.0	10.7	--	751.7
1965	732.0	11.1	--	743.1
1966	752.2	--	--	752.2
1967	680.4	8.3	2.7	686.0

Source: Banco de Guatemala,

TABLE 5.2 ● SUPPLY AND DEMAND PROJECTIONS FOR CORN (thousands of metric tons)

Year	Supply			Demand		Surplus[c]
	Trend[a] (1)	BMI (2)	BG (3)	CNP (4)	BMI (5)	(1)-(4)= (6)
1970	779.2	788.0	813.6	--	773.0	--
1972	820.2	855.2[b]	900.4	814.4	833.0[b]	5.8
1975	881.7	956.0	1,048.3	902.7	923.0	-21.0
1980	984.2	1,158.0	1,350.7	1,071.6	1,114.0	-87.4

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

[a]Least-squares trend line is $q = 533.2 + 20.5\,t$ where quantity (q) is in 1,000 m.t. and time (t) is in annual units with 1958 = 0.
[b]Obtained by linear interpolation.
[c]Estimates are based on trend in supply and CNP's demand projections.
[d]All CNP demand projections presented in this chapter are based on the assumption that gross national product will increase at an annual rate of 4 per cent during 1968-72 and increase to 5 per cent during 1973-80.

Beans

Bean production increased from about 59,000 m.t. in 1950 to more than 112,000 m.t. in 1966 and then dropped sharply to around 68,000 m.t. in 1967. The sharp decline in production in 1967 is due partly to adverse weather conditions and partly to changes in the procedures used by the Dirección General de Estadística to estimate production.

Apparent consumption of beans during the 1950–66 period was approximately identical to production. Imports of beans have increased slightly in recent years but on the average have been less

than 2 per cent of national production. Data on production and consumption of beans are presented in Table 5.3.

Supply and demand projections for the 1970–80 period are presented in Table 5.4. Based on the past trend in production, Guatemala will produce 143,000 m.t. of beans in 1972 and 186,000 m.t. in 1980. The Consejo Nacional de Planificación estimates that demand will increase from about 83,000 m.t. to 110,000 m.t. during the same period. The Battelle Memorial Institute's supply and demand projections are considerably lower than those of the Banco de Guatemala and the Consejo Nacional de Planificación. Even so, BMI projects a surplus of bean production during the 1970's that increases from about 8,000 m.t. at the beginning of the decade to around 17,000 m.t. by 1980.

The production projections based on the least-squares trend line for 1954–66 appear to be the most appropriate for planning purposes. We expect consumption to be approximately equal to production. The CNP and BMI projections of demand appear to be rather low. The low projections of the CNP are due to its use of 1967 as a base period for making projections. The BMI projections appear to be based on INCAP's estimates which suggest that the demand for beans will increase from around 43,000 m.t. in 1970 to 53,000 m.t. in 1980. The diversity in these projections stems from considerable uncertainty as to what the past production of beans has actually been.

Wheat

One would expect the data on the supply and demand for wheat to be considerably more accurate than the data for most other agricultural commodities. Most of the domestic production and nearly all wheat imports are processed by the 14 flour mills which are members of the Asociación Nacional de Productores de Harina. Even so, there is considerable uncertainty about what the supply and demand for wheat has been. Part of the uncertainty stems from the preference of some agencies to provide data for calendar years while other agencies use crop years.

The domestic production of wheat increased from nearly 22,000 m.t. in 1950 to slightly over 40,000 m.t. in 1966, an average of approximately 1 per cent per year. Apparent consumption, on the other hand, increased from about 24,000 m.t. to more than 104,000 m.t. during the same period which is an average annual rate of increase of 4.7 per cent. Production and consumption data for wheat during the 1950–67 period are presented in Table 5.5.

Wheat imports have usually accounted for more than 60 per cent of apparent consumption during the 1960's. In 1958 the

TABLE 5.3 ● PRODUCTION, IMPORTATION AND EXPORTATION OF BEANS (thousands of metric tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	59.4	--	--	59.4
1951	65.1	--	--	65.1
1952	66.1	--	--	66.1
1953	64.2	--	--	64.2
1954	60.3	--	--	60.3
1955	53.8	0.3	--	54.1
1956	62.4	0.3	--	62.7
1957	61.9	0.2	--	62.1
1958	71.8	--	--	71.8
1959	49.0	--	0.1	48.9
1960	79.3	--	0.3	79.0
1961	80.6	--	0.8	79.8
1962	81.9	0.3	0.2	82.0
1963	104.7	1.7	0.2	106.2
1964	111.1	2.4	0.7	112.8
1965	109.8	4.1	0.1	113.8
1966	112.7	--	--	112.7
1967	68.0	3.4	1.9	69.6

Source: Banco de Guatemala

TABLE 5.4 ● SUPPLY AND DEMAND PROJECTIONS FOR BEANS (thousands of metric tons)

Year	Supply			Demand	
	Trend[a]	BMI	BG	CNP	BMI
1970	133.2	55.0	148.4	--	47.0
1972	143.9	60.6[a]	159.6	83.2	51.0[b]
1975	159.9	69.0	177.9	92.5	57.0
1980	186.5	87.0	213.3	110.5	70.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

[a]Least-squares trend line for production is $q = 79.95 + 5.33\,t$ where q is in 1,000 m.t. and t is in annual units with 1960 = 0.
[b]Obtained from BMI data using linear interpolation.

Asociación Nacional de Productores de Harina initiated a program to promote the production of wheat in order to assure that at least 30 per cent of the wheat consumed is produced domestically. The program has been successful and domestic production is expected to continue to supply at least 30 per cent of the demand for wheat during the 1970's.

Projections of the domestic production of wheat during the 1970–80 period are presented in Table 5.6. The projections based on the trend of production data during the 1950–66 period appear to be somewhat low. The BMI projections are even lower. The production projections based on the trend of production during the 1955–67 period appear to be the most realistic. According to this trend line, the production of wheat will increase from about 46,000 m.t. in 1970 to nearly 68,000 m.t. in 1980. These projections are slightly above those of the Banco de Guatemala for 1970 but considerably below the bank's projections for 1980.

Demand projections for wheat are also presented in Table 5.6. The projections of the Battelle Memorial Institute lie between

TABLE 5.5 ● PRODUCTION, IMPORTATION AND APPARENT CONSUMPTION OF WHEAT (thousands of metric tons)

Year	Production	Imports	Apparent Consumption
1950	21.9	2.0	23.9
1951	26.3	3.4	29.7
1952	22.3	2.9	25.2
1953	19.8	5.2	25.0
1954	18.4	8.1	26.5
1955	14.6	17.3	31.9
1956	18.3	25.7	44.0
1957	18.4	35.3	53.7
1958	21.5	43.4	64.9
1959	21.5	47.7	69.2
1960	21.2	59.1	80.3
1961	24.6	53.9	78.5
1962	25.8	51.2	77.0
1963	34.1	64.2	98.3
1964	36.1	54.5	90.6
1965	39.4	65.7	105.1
1966	40.1	64.4	104.5
1967	35.3	59.6	94.9

Source: Banco de Guatemala

TABLE 5.6 ● SUPPLY AND DEMAND PROJECTIONS FOR WHEAT (thousands of metric tons)

Year	Supply				Demand			Deficit[e]
	Trend[a] (1)	Trend[b] (2)	BMI (3)	BG (4)	Trend[c] (5)	BMI (6)	CNP (7)	(6)-(2)= (8)
1970	38.4	46.3	34.0	43.8	130.0	117.0	--	70.7
1972	40.6	50.6	36.4	50.0	141.5	127.4[d]	114.9	76.8
1975	44.0	57.1	40.0	61.0	159.0	143.0	128.8	85.9
1980	49.6	67.8	47.0	84.9	187.9	177.0	155.9	109.2

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

[a]Least-squares trend line for production based on 1950-66 data is $q = 24.96 + 1.12t$ where q is in 1,000 m.t. and t is in annual units with 1958 = 0.

[b]Least-squares trend line for production based on 1955-67 data is $q = 27.0 + 2.15\ t$ where q is in 1,000 m.t. and t is in annual units with 1961 = 0.

[c]Least-squares trend line for consumption based on 1950-66 data is $q = 60.49 + 5.79\ t$ where q is in 1,000 m.t. and t is in annual units wit 1958 = 0.

[d]Obtained from BMI data using linear interpolation.

[e]Deficit figures are based on 1955-66 production trend and BMI consumption projections.

those prepared by the Consejo Nacional de Planificación and those based on the linear trend. The BMI projections indicated that the demand for wheat will increase from 117,000 m.t. in 1970 to 177,000 m.t. in 1980. These projections were used to estimate the amount of wheat that will be imported during the 1970's.

Subtracting the projections of supply based on the 1955–67 trend line from the BMI projections of demand we find that wheat imports will increase from about 71,000 m.t. in 1970 to 109,000 m.t. in 1980. This amounts to an average rate of increase in imports of about 5.3 per cent per year compared to an average rate of increase

in domestic production of about 4.8 per cent per year during the 1970 to 1980 period.

Rice

Data on the production and apparent consumption of paddy rice are presented in Table 5.7. Rice production increased from

TABLE 5.7 ● PRODUCTION, IMPORTATION AND EXPORTATION OF ROUGH RICE (thousands of metric tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	8.6	--	--	8.6
1951	11.3	0.1	--	11.4
1952	9.9	--	--	9.9
1953	10.8	--	--	10.8
1954	9.7	0.1	--	9.8
1955	9.1	0.4	--	9.5
1956	10.3	0.2	--	10.5
1957	11.2	0.4	--	11.6
1958	11.7	0.3	--	12.0
1959	14.6	0.1	--	14.7
1960	13.6	--	--	13.6
1961	12.6	--	0.3	12.3
1962	15.8	--	--	15.8
1963	18.2	0.1	0.1	18.2
1964	24.3	--	0.1	24.2
1965	28.2	0.1	--	28.3
1966	30.8	--	--	30.8
1967	22.7	0.3		23.0

Source: Banco de Guatemala

less than 9,000 m.t. in 1950 to nearly 31,000 m.t. in 1966. Consumption appears to have been approximately equal to production during the period. Rice imports and exports have been very small. Some imports and exports of rice between Guatemala and other Central American countries are not included in Table 5.7, however.

There seems to be general agreement that rice production will increase from about 28,000 m.t. of paddy rice in 1970 to around 40,000 m.t. in 1980. (Table 5.8.) The demand projections of the Battelle Memorial Institute indicate a surplus production of about 10,000 m.t. by 1980 while the projections of the Consejo Nacional de Planificación suggest that the rice surplus will be somewhat less than 3,000 m.t. Thus it appears that Guatemala will be a net exporter of rice throughout the 1970's.

FRUITS

Guatemala's climate is favorable for the production of a wide variety of fruit. There has been little interest among farmers in commercial fruit production, however, except for a few commercial plantings of pears, citrus fruits, apples and pineapples.[3]

The need for a substantial increase in fruit production was reported by INCAP in its study of Guatemala's food needs. According to INCAP, fruit production in 1965 was only about 60 per cent of the amount required to provide Guatemalans with the minimum requirements for an adequate diet.

There are almost no numerical data on fruit production before 1965. INCAP estimated that fruit production in 1965 was 100,423 m.t. Their projections of fruit production during the 1970's are as follows:

Year	*Production (m.t.)*
1970	119,271
1975	141,656
1980	168,244

Given the existing data situation, these estimates must be considered to be their best guess.

Estimates of fruit production prepared by the Dirección General de Mercadeo Agropecuario for the 1965–68 period are presented in Table 5.9. Their estimates are slightly higher than those of INCAP.

Comparing INCAP's estimates with the demand estimates in Table 5.10 which were prepared by the Consejo Nacional de

3. Vorhies, R. M., *Fruit Production in Guatemala,* USAID Report, Guatemala, July, 1967.

TABLE 5.8 ● SUPPLY AND DEMAND PROJECTIONS FOR ROUGH RICE (thousands of metric tons)

Year	Supply			Demand	
	Trend[a]	BMI	BG	CNP	BMI
1970	28.4	27.0	27.9	--	20.0
1972	30.7	30.2[b]	31.8	27.7	21.8[b]
1975	34.1	35.0	37.2	30.9	24.6
1980	39.8	41.0	51.6	37.2	30.7

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

[a]Least-squares trend line for production is $q = 14.75 + 1.14\,t$ where q is in 1,000 m.t. of rough rice and t is in annual units with 1958 = 0.

[b]Obtained from BMI data using linear interpolation.

Planificación we find that demand is expected to exceed supply by about 12,000 m.t. in 1975 and by 19,000 m.t. in 1980. These projections are based on the assumption that programs for increasing fruit production will not be implemented soon enough to substantially affect production during the 1970's.

VEGETABLES

The variations in climate and topography in Guatemala permit the production of almost any type of vegetable. It has been estimated that at least 30 different types of vegetables are being grown on a commercial scale. Data on vegetable production is almost nonexistent, however. Thus any demand and supply projections must be used with considerable caution. There appears to be general agreement that vegetable production has increased fairly rapidly since 1960 and that domestic consumption has increased slowly.

TABLE 5.9 ● FRUIT PRODUCTION (thousands of metric tons)

Fruit	1965-66	1966-67	1967-68
Citrus	42.9	53.3	56.1
Coconuts	18.7	19.8	19.6
Avocado	14.8	16.4	15.8
Mango	9.2	8.8	9.3
Pineapple	8.9	9.2	10.0
Apples	3.4	3.6	3.3
Peaches	2.0	2.0	1.6
Pears	1.5	1.6	1.3
Others	20.9	21.5	19.1
TOTAL	122.3	136.2	136.1

Source: Dirección General de Mercadeo Agropecuario.

Exports of vegetables, primarily to El Salvador, reportedly have increased substantially.

The value of vegetable production in 1966 was estimated to be approximately 16 million quetzales while the value of exports was around 1.5 million quetzales.[4] Onions, tomatoes, potatoes, garlic, peppers, cabbage and melons are the most important vegetables produced.

The projections of demand for vegetables made by the Battelle Memorial Institute, the Consejo Nacional de Planificación and the Instituto de Nutrición de Centro America y Panama are presented in Table 5.11. Considering the lack of data, it is not surprising that there are substantial differences in these projections. INCAP's

4. Atlee, Charles B., Jr., *Producción de Hortalizas en Guatemala*, USAID Report, Guatemala, January, 1968.

TABLE 5.10 ● PROJECTED DEMAND FOR FRUITS (thousands of metric tons)

Product	1972	1975	1980
Oranges	77.8	87.6	106.6
Pineapples	10.6	11.8	14.1
Apples	4.2	4.7	5.6
Others	45.7	50.9	60.8
TOTAL	138.3	155.0	187.1

Source: Consejo Nacional de Planificación..

projections represent approximately 50 per cent of the vegetables which it considers necessary to provide Guatemalans with an adequate diet. The BMI projections appear to be rather high while the CNP projections appear somewhat conservative.

According to the CNP projections the domestic demand for vegetables will increase from about 105,000 m.t. in 1972 to around 140,000 m.t. in 1980. INCAP, on the other hand, projects an 80,000 m.t. increase in demand during the 1970–80 period. We are inclined to accept the CNP projections.

Supply projections based on the linear trend of data provided by the Banco de Guatemala are presented in Table 5.12. According to these projections, vegetable production will increase from 146,000 m.t. in 1970 to about 180,000 m.t. in 1980. Production of potatoes is expected to increase from 22,000 m.t. to 30,000 m.t. during the same period.

Comparing the bank's supply projections with the CNP demand projections, we find that the exportable surplus of vegetables decreases slightly from 58,000 m.t. in 1972 to around 40,000 m.t. in 1980.

LIVESTOCK

The number of hogs, cattle and chickens has increased rather rapidly since the early 1960's while sheep numbers have continued to decline. It seems doubtful that hogs and chickens will continue

TABLE 5.11 ● PROJECTED DEMAND FOR VEGETABLES (thousands of metric tons)

	BMI			CNP			INCAP[a]		
	1970	1975	1980	1972	1975	1980	1970	1975	1980
Potatoes	12	16	19	12	13	16	--	--	--
Vegetables	250	301	366	105	117	140	198.7	235.9	280.3
a. Tomatoes	--	--	--	17	19	23	--	--	--
b. Cabbages	--	--	--	10	11	13	--	--	--
c. Garlic	--	--	--	2	2	2	--	--	--
d. Onions	--	--	--	12	14	17	--	--	--
e. Others	--	--	--	64	71	85	--	--	--

Source: Battelle Memorial Institute (BMI)

Consejo Nacional de Planificación (CNP)

Instituto de Nutrición de Centro America y Panama (INCAP)

[a]INCAP figures are designated as "apparent consumption or annual production." Thus, in the case of vegetables, INCAP's projections represent both supply and demand. INCAP lists the original source of their data as, "Anuario Estadístico Centroamericano de Comercio Exterior 1965, SIECA."

to increase as rapidly in the 1970's as they have in the 1960's. Cattle raising is expected to continue to expand, however, as new pasture areas are opened up by the road development program. It seems likely that the number of sheep will continue to decline during the 1970's. Official estimates of livestock numbers are presented in Table 5.13.

Cattle

According to the Dirección General de Estadística, cattle numbers increased from a low of about 992,700 head in 1955 to around 1,383,600 head in 1965 and then declined to 1,241,600 head in 1967. Unofficial estimates suggest that the actual number of cattle exceed the official estimates of the DGE by about 10 per cent. The number of cattle shown in Table 5.13 includes both beef and dairy cattle.[5]

5. Total number of dairy cattle in 1962, for example, was 212,879.

TABLE 5.12 ● SUPPLY OF VEGETABLES (thousands of metric tons)

Year	Vegetable Production[a]	Potato Production[b]	Net Exports of Potatoes
1950	80.7	8.8	--
1951	82.9	9.4	--
1952	86.3	9.8	--
1953	89.0	10.3	--
1954	92.7	9.7	--
1955	96.2	8.3	--
1956	98.2	10.1	--
1957	102.0	13.2	--
1958	105.6	13.5	--
1959	110.2	13.4	--
1960	113.9	12.9	--
1961	119.1	14.2	2.5
1962	118.2	16.6	3.5
1963	122.1	14.3	4.1
1964	125.8	17.5	6.7
1965	129.7	20.7	9.7
1966	133.8	23.2	--
1967	--	14.2	--
	Projections		
1970	146.4	22.4	
1972	153.1	23.9	
1975	163.1	26.2	
1980	179.9	30.0	

Source: Banco de Guatemala

[a]Projections for 1970-80 are based on the least-squares trend line for 1950-66, $q = 106.20 + 3.35\,t$ where q is in 1,000 m.t. and t is in annual units with 1958 = 0.

[b]Projections for potatoes are based on the least-squares trend line for 1950-66, $q = 13.29 + 0.76\,t$ where q is in 1,000 m.t. and t is in annual units with 1958 = 0.

More than 50 per cent of the cattle are raised in the five departments on the south coast.[6] Cattle production in the north coast area has been expanding, however, as new roads have opened up new pasture lands. The annual rainfall on the south coast averages from 2,000 to 3,500 millimeters, most of which comes during late April to late October. Feed is very short during the dry season and the extremely heavy rainfall from May to October makes it difficult to cure roughages during the wet season. As a

6. These are Escuintla, Jutiapa, Santa Rosa, Suchitepéquez and Retalhuleu.

TABLE 5.13 ● LIVESTOCK NUMBERS (thousand head)

Year	Cattle	Hogs	Sheep	Chickens	Goats
1950	919.1	424.2	715.6	4,259.6	78.8
1951	979.4	391.5	--	--	--
1952	1,194.1	414.7	888.5	--	76.6
1953	1,270.3	462.0	812.9	4,654.5	134.2
1954	1,217.8	434.6	868.2	4,259.4	90.7
1955	992.7	390.4	739.3	4,116.1	86.4
1956	1,016.6	361.8	756.2	4,258.7	77.7
1957	1,048.8	401.4	826.2	4,745.9	84.4
1958	1,113.0	403.4	839.5	4,706.9	87.8
1959	1,142.3	406.3	791.6	4,774.8	89.1
1960	1,062.0	--	840.9	4,772.5	92.6
1961	1,134.4	409.3	676.5	4,819.0	88.6
1962	1,121.9	387.9	792.2	4,514.8	85.9
1963	1,263.3	381.0	702.3	5,350.5	89.3
1964	1,323.8	381.0	681.0	--	--
1965	1,383.6	473.9	794.1	6,350.9	--
1966	1,327.6	542.9	526.0	5,945.5	--
1967	1,241.6	594.1	631.6	6,113.4	--
1968[a]	1,230.4	639.2	681.9	5,494.4	--

Source: Dirección General de Estadística

[a]All 1968 figures are preliminary.

result, cattle frequently lose weight during the dry season and the size of the annual calf crop is reduced. The problem of providing adequate feed for cattle throughout the dry season has been cited as the most critical factor facing the cattle industry.[7] A research program designed to solve this problem was outlined in 1967 but very little is being done yet in this area.[8]

There is considerable uncertainty about the future development of the cattle industry in Guatemala. Projections made by the Banco de Guatemala suggest that beef production will increase from around 46,500 m.t. in 1970 to nearly 84,000 m.t. in 1980. Projections based on the past trend indicate production will increase from 31,800 m.t. to 45,400 m.t. during the same period. The key factor in the development of the cattle industry is the ability of exporters to obtain favorable prices for beef in the world market. There is little doubt but that the cattle producers can and will be able to solve their production problems if they can obtain favorable prices. Assuming that prices will continue to remain favorable, the projections of beef production made by the Battelle Memorial Institute appear to be the most realistic available. (Table 5.14) According to the BMI projections, beef production is expected to increase from 42,200 m.t. in 1970 to 64,100 m.t. by 1980.

The BMI projects the domestic demand for beef to be 53,000 m.t. in 1970 and 82,000 m.t. in 1980. These projections seem rather high. Projections prepared by the Consejo Nacional de Planificación suggest that the demand for beef will increase from about 30,400 m.t. in 1972 to around 42,100 m.t. in 1980. We have used the Consejo's demand projections and the BMI supply projections to estimate the exportable beef production during the 1970's. The results presented in Table 5.15 indicate that the amount of meat available for export will increase from 15,300 m.t. in 1972 to 22,000 m.t. in 1980.

The assumption that exporters will be able to obtain favorable prices in the world market is equivalent to assuming that exporters will continue to be able to export substantial amounts of beef to the United States. Of the 4,764 m.t. of beef exported in 1964, for example, about 83 per cent was shipped to the United States and most of the remainder went to Puerto Rico. Thus any new import restrictions on beef entering the United States would undoubtedly slow the growth of Guatemala's cattle industry and invalidate our projections of production and exportable surplus.

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7. Shepard, Vard M., *The Livestock Development of Guatemala*, USAID Report, Guatemala, August, 1967.

8. Noland, Paul R., *Problems in the Animal Nutrition Program*, USAID Report, Guatemala, September, 1967.

TABLE 5.14 ● PROJECTIONS FOR BEEF PRODUCTION

Year	Inventory (1,000 head)		Slaughter Numbers (1,000 head)			Edible Beef per Animal[c] (kg)	Edible Beef Production (1000 m. t.)		
	Trend[a]	BMI	Trend	BMI[b]	BG		Trend	BMI	BG[d]
1970	1,429	1,898	200.0	265.7	292.7	159	31.8	42.2	46.5
1972[e]	1,487	1,879	215.6	285.4	327.0	160	34.5	45.7	52.3
1975	1,575	2,100	236.2	315.0	386.0	162	38.3	51.0	62.5
1980	1,721	2,430	275.4	388.0	509.4	165	45.4	64.1	84.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

[a]Least-squares trend line for the 1955-67 period is $q = 1,166.0 + 29.2\,t$ where q is in 1,000 head and t is in annual units with 1961 = 0.

[b]BMI estimates based on assumption that 14 per cent of inventory is slaughtered in 1970, 15 per cent in 1975 and 16 per cent in 1980.

[c]Based on BMI estimates.

[d]Figures obtained from Banco de Guatemala projections for total production of cattle by subtracting 10 per cent assumed to represent increases in livestock inventory.

TABLE 5.15 ● PROJECTED DEMAND AND EXPORTABLE SUPPLY OF BEEF (thousands of metric tons)

Year	Demand		Exportable Surplus
	BMI	CNP	
1970	53.0	--	--
1972	57.8	30.4	15.3
1975	65.0	34.4	16.6
1980	82.0	42.1	22.0

Hogs

According to the estimates of the Dirección General de Estadística (DGE), the number of hogs increased from 424,200 in 1950 to 594,100 in 1967. (Table 5.13)

Guatemala consumes more pork than it produces. The importation of live hogs has been especially high since 1963. (Table 5.16) This is reflected in the rapid increase in hog numbers reported by the DGE since 1964. The rapid expansion of the hog industry is due partly to the high price of pork. The farm price of fat hogs usually is about double that of beef cattle. The average live weight price of hogs in 1967, for example, was between 23 and 24 cents a pound compared to 12 to 14 cents live weight for cattle.

The projections of hog production based on the past trend in hog numbers indicate that the production of pork will increase from about 15,900 m.t. in 1970 to 18,200 m.t. in 1980. These projections are somewhat higher than those of the Battelle Memorial Institute. (Table 5.17) The projections prepared by the Banco de Guatemala suggest that pork production will be at least twice as great as indicated by the projections based on past trends.

The Battelle Memorial Institute projects the demand for pork to increase from about 15,000 m.t. in 1970 to 21,000 m.t. in 1980. Using these estimates and the production projections based on past trends, the deficit in pork production increases from 900 m.t. in 1970 to 2,800 m.t. by 1980. (Table 5.18) Using the CNP's demand projections and past production trends, the pork production deficit in 1980 is about 11,800 m.t. This figure appears to be somewhat high. Given recent developments in the pork industry, it seems likely that the amount of pork supplied will be fairly close to the amount demanded in the early 1970's, but that the production deficit will increase in the second half of the decade.

TABLE 5.16 ● IMPORTS AND EXPORTS OF MEAT (metric tons)

Year	Chickens (Live)		Beef (Live)		Pork (Live)		Processed Meat[a]	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
1959	111.8	2.6	3,042	388	7.0	124.8	291.2	7.0
1960	140.1	6.0	2,777	249	1.2	148.0	194.0	542.9
1961	46.2	5.5	3,200	305	8.9	211.7	213.9	1,114.4
1962	10.3	4.3	2,789	5	3.7	85.3	160.6	4,919.2
1963	26.0	10.6	11,445	159	237.5	170.7	241.5	6,043.6
1964	35.5	24.3	8,121	215	201.4	84.2	140.6	4,764.6
1965	92.9	41.8	6,844	96	721.2	61.8	290.1	5,811.5
1966	132.5	18.1	10,192	50	697.7	76.1	--	5,924.7
1967	--	23.7	--	82	--	65.3	--	8,780.4
1968	--	--	--	--	--	--	--	--

Source: Dirección General de Estadística.

[a]Imports of processed meats are largely canned and prepared meats. Exports of processed meats are entirely refrigerated and frozen fresh meat.

TABLE 5.17 ● PROJECTIONS FOR PORK PRODUCTION

Year	Inventory (1,000 head)		Slaughter Numbers[a] (1,000 head)		Edible Pork per Animal (kg)	Edible Pork Production (1,000 mt.)	
	Trend[b]	BMI	Trend	BMI		Trend	BMI
1970	480.0	425.6	302.4	268.1	52.6	15.9	14.1
1972[c]	489.8	432.0	308.6	272.1	53.0	16.3	14.4
1975	504.5	441.5	317.8	278.1	53.7	17.1	14.9
1980	529.0	465.9	333.3	293.5	54.7	18.2	16.0

[a]Based on the assumption that 63 per cent of inventory is slaughtered each year.
[b]Least-squares trend line for the 1951-67 period is $q = 426.1 + 4.9\,t$ where q is in 1,000 head and t is in annual units with 1959 = 0.
[c]BMI figures for 1972 obtained by linear interpolation.

TABLE 5.18 ● PROJECTED DEMAND FOR PORK (thousands of metric tons)

Year	Demand		Deficit Production	
	BMI	CNP	a	b
1970	15.0	--	0.9	--
1972	16.2	22.4	(0.1)	6.1
1975	18.0	25.0	0.9	7.9
1980	21.0	30.0	2.8	11.8

Notation: BMI = Battelle Memorial Institute

CNP = Consejo Nacional de Planificación

[a]Deficit production based on trend of production and BMI estimates of demand. Parentheses denote surplus for 1972.

[b]Deficit production based on trend of production and CNP estimates of demand.

Poultry

There was a rapid increase in the production of chickens between 1962 and 1965. This increase was almost entirely due to an increase in the broiler population. The production of broilers has fallen off since 1965, however, due to increased disease problems and lower prices.

The projections of chicken population based on the past trend are:

Year	*Thousands of Birds*[9]
1970	6,410
1972	6,690
1975	7,109
1980	7,808

These projections may be somewhat high because they are heavily influenced by the rapid increase in chicken numbers between 1963 and 1967. Even so, poultry producers are able to increase the number of birds by at least a half million per year if they want. Thus, the projected inventory of 7,808,000 birds by 1980 is certainly feasible.

Egg production has increased rather slowly during the past 17 years. The total number of hens increased from about 1,907,000 in 1957 to around 2,287,000 in 1967. Egg production, based on an assumed 100 eggs per year per hen, increased from about 191 to 229 million during the same period. (Table 5.19) Estimates of

9. The least-squares trend line is $Q = 5{,}012.0 + 139.8T$ where Q is in 1000's of birds and T is in annual units with $1960 = 0$.

TABLE 5.19 ● PRODUCTION OF MILK AND EGGS

Year	Eggs[a] (million)	Milk (1,000 m.t.)
1950	--	76.9
1951	--	--
1952	--	152.6
1953	191.5	169.5
1954	184.6	97.1
1955	163.6	86.0
1956	168.2	89.5
1957	190.7	90.1
1958	208.5	124.0
1959	212.2	135.0
1960	213.9	90.3
1961	222.3	98.2
1962	217.6	122.2
1963	241.8	150.6
1964	--	161.0
1965	227.7	146.2
1966	220.7	163.7
1967	228.7	190.2
1968[b]	215.0	--

Source: Dirección General de Estadística

[a]Based on an estimated 100 eggs per year per hen reported to be in production. (For example, 1,915,000 hens were reported to be in production in 1953.)

[b]1968 figures are preliminary.

egg production vary considerably, however. Available estimates for 1967, for example, range from 250 to 460 million eggs.

Projections of egg production range from 12,000 to 44,500 m.t. for 1970 and from 15,000 to 117,700 m.t. for 1980. (Table 5.20) We are inclined to accept INCAP's estimates of production which indicate that there will be about 15,800 m.t. of eggs produced in 1970 and 22,800 m.t. in 1980. Using INCAP's production projections and the BMI's supply projections, there are 2,800 m.t. of eggs available for export in 1970 and 1,800 m.t. in 1980. The export projections for 1970 seem rather high. It appears more likely that the quantity of eggs demanded will be approximately equal to the quantity supplied during the next 10 years. Egg exports may increase somewhat during the next five years but there is no indication that Guatemala will become a large exporter of eggs.

TABLE 5.20 ● PROJECTED SUPPLY AND DEMAND FOR EGGS (thousands of metric tons)

Year	Production[a]				Demand	
	Trend[b]	BMI	INCAP	BG	BMI	CNP
1970	15.0	12.0	15.8	44.5	13.0	--
1972[c]	15.5	12.4	17.0	54.1	14.2	36.8
1975	16.3	13.0	18.7	72.4	16.0	41.9
1980	17.7	15.0	22.8	117.7	21.0	51.9

Notation: BMI = Battelle Memorial Institute
INCAP = Instituto de Nutrición de Centro America y Panama
BG = Banco de Guatemala
CNP = Consejo Nacional de Planificación

[a]Conversion to metric tons is on the basis of 1,000,000 eggs = 59.36 m.t.

[b]Least-squares linear trend line based on the 1953-67 period is $q = 12.37 + 0.265\ t$ where q is in 1,000 m.t. of eggs and t is in annual units with 1960 = 0.

[c]BMI and INCAP figures for 1972 obtained by linear interpolation.

Dairy Products

Milk production appears to have increased fairly rapidly since 1960. According to a livestock survey taken in September of 1966 by the Dirección General de Estadística, there were 302,620 milk cows in the country, 211,837 of which were in production. The average cow was producing about 2.5 liters of milk per day. The survey was taken during the rainy season when pastures were in excellent condition. Thus the figures probably overestimate the average percentage of cows in production and the total amount of milk produced.

The CIF value of dairy products imported during 1966 amounted to Q 2.42 million. Guatemala exports some milk products to other Central American countries. Most of the fresh milk exports go to El Salvador which is close to the milk producing

areas on the south coast. Data on imports and exports of dairy products are presented in Table 5.21.

Projections of the supply and demand for dairy products vary considerably. (Table 5.22) The Battelle Memorial Institute projected milk production to decrease from 105,000 m.t. in 1970 to 100,000 m.t. in 1980. The Banco de Guatemala projects milk production to increase from 258,000 m.t. in 1970 to more than 350,000 m.t. in 1980. Projections based on the trend of production during the 1953–67 period indicate that milk production will be about 170,000 m.t. in 1970 and increase to around 214,000 m.t. by 1980. These projections appear to be somewhat low.

The demand for milk is projected by the Battelle Memorial Institute to increase from 208,000 m.t. a year in 1970 to 327,000 m.t. by 1980. The Consejo Nacional de Planificación, on the other hand, projects demand to increase from 292,000 m.t. in 1972 to more than 413,000 m.t. in 1980. Using the Consejo's demand projections and the production projections based on the past trend, the milk production deficit increases from 113,000 m.t. in 1972 to 199,000 m.t. in 1980. Using the BMI demand projections and the production

TABLE 5.21 ● IMPORTS AND EXPORTS OF MILK PRODUCTS (metric tons)

Year	Fresh Milk and Cream		Evaporated or Condensed Milk and Dried Milk Products
	Imports	Exports	Imports
1959	9.6	1,830.2	3,545.0
1960	23.4	2,737.2	3,310.9
1961	37.7	2,680.6	2,877.8
1962	3.4	2,060.3	4,066.5
1963	3.8	2,386.1	6,440.2
1964	13.4	2,989.1	5,373.6
1965	12.5	2,049.3	3,477.9
1966	43.1	2,447.6	--
1967	--	2,113.3	--

Source: Direccion General de Estadística.

TABLE 5.22 ● PROJECTED SUPPLY AND DEMAND FOR MILK (thousands of metric tons)

Year	Production			Demand			Deficit	
	BMI (1)	BG (2)	Trend[a] (3)	BMI (4)	CNP (5)	INCAP (6)	(5)-(3) (7)[b]	(4)-(3) (8)[c]
1970	105.0	258.5	170.3	208.0	--	259.5	--	37.7
1972[d]	103.8	274.8	179.0	228.4	292.8	--	113.8	49.4
1975	102.0	301.2	192.0	259.0	333.1	331.2	141.1	67.0
1980	100.0	350.7	214.0	327.0	413.2	422.7	199.2	113.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

INCAP = Instituto de Nutrición de Centro America y Panama

[a]Least-squares trend line for the 1952-67 period is $q = 126.6 + 4.37\,t$ where q is in 1,000 m.t. and t is in annual units with 1960 = 0.
[b]Based on CNP demand projections and trend in production.
[c]Based on BMI demand projections and trend in production.
[d]BMI figures for 1972 are based on linear interpolation.

projections based on the past trend, the deficit for 1972 is 49,000 m.t. and increases to 113,000 m.t. in 1980.

The projections of the deficit of milk production seem somewhat high. Even so, they suggest that if the past trends continue, the demand for milk in the 1970's will undoubtedly increase at a faster rate than the supply. This is substantiated by reports that some of the leading dairy producers are selling their herds to farmers in other Central American countries.

The demand projections of the BMI and CNP appear to be based on what consumers should consume rather than on what they will actually consume. Net milk imports on a fluid weight basis recently have been about 10,000 to 15,000 m.t. a year. It is impossible to obtain a precise estimate from the available data because there is no way to determine exactly how much of the different types of processed milk products were imported. It seems unlikely that milk imports will triple by 1980. If they did, imports

would still be only 45,000 m.t., which is considerably less than suggested by the available projections. For planning purposes, we have chosen to assume that net imports of milk will be equal to 20,000 m.t. in 1970 and 40,000 m.t. in 1980.

Sheep Production

The estimated number of sheep declined from 826,200 in 1957 to 631,000 in 1967. Approximately 90 per cent of the sheep are located in the five Northwestern departments of Huehuetenango, San Marcos, El Quiché, Quezaltenango and Totonicapán. The average number of sheep per producer in these departments ranges from 10 to 27. Some flocks in the departments of Huehuetenango and San Marcos, however, contain over 100 sheep.[10] The majority of the flocks are owned and managed by the indigenous population.

Mutton is not a particularly popular meat and relatively little mutton is sold in meat markets in the larger cities. The estimated number of sheep slaughtered was 114,900 head in 1960 and 78,300 head in 1967. (Table 5.23) There are very few sheep imported or exported.

The number of sheep is expected to continue to decline during the 1970's. The projected numbers of sheep based on the past trend are:

Year	*Thousands of Sheep*[11]
1970	626
1972	600
1975	561
1980	496

The total demand for mutton and wool during the 1970's is expected to remain equal to the supply.

SUMMARY

If past trends continue, Guatemala will be able to export small amounts of beans and rice and fairly substantial amounts of beef and vegetables during the 1970's. It will need to import small amounts of pork and fruits and relatively large quantities of corn, wheat and milk. A summary of the projected surpluses and deficits for the major food products is presented in Table 5.24.

10. Madsen, Milton A., *Report on Sheep and Wool Production in Guatemala*, USAID Report, Guatemala, March, 1966.

11. Projections are based on the least-squares trend line $Q = 756.3 - 13.0T$ where Q is in 1,000 head and T is in annual units with $1960 = 0$.

TABLE 5.23 ● LIVESTOCK SLAUGHTERED (thousand head)

Year	Cattle	Hogs[a]	Sheep
1950	161.5	--	--
1951	168.4	--	--
1952	169.8	--	--
1953	164.3	--	--
1954	171.9	--	--
1955	167.1	--	--
1956	168.3	--	--
1957	175.2	--	--
1958	179.9	732.8	117.5
1959	182.9	725.2	177.5
1960	192.6	825.1	114.9
1961	185.1	769.2	161.3
1962	194.1	714.6	92.5
1963	207.3	643.1	64.3
1964	205.6	765.9	86.7
1965	207.9	829.9	65.9
1966	197.8	953.9	100.9
1967[b]	209.3	1,062.2	78.3

Source: 1950-58 Ministerio de Agricultura.

1959-60 Banco de Guatemala.

[a]Figures reported by the Bank for hogs appear to be three to four times larger than those reported by other agencies.
[b]Preliminary.

There is no reason to believe that past trends will continue. A number of programs have been proposed already for increasing the production of certain agricultural products. Some of these programs undoubtedly will be initiated within the next several years. The supply and demand projections do not provide enough information to allow us to predict which programs will be most successful. Nor do the projections by themselves serve to indicate what types of programs should be undertaken. The projected 1980 deficit of 109,000 m.t. of wheat, for example, does not imply that a substantial addition to the present program to increase wheat production is needed. One result of a self-sufficiency program for wheat undoubtedly would be to enlarge the corn production deficit.

In very broad terms, programs designed to increase grain production would tend to benefit small farmers while programs to increase fruit and livestock production would tend to benefit large

TABLE 5.24 ● SUMMARY OF PROJECTIONS OF SURPLUSES OR DEFICITS FOR MAJOR FOOD PRODUCTS

Product	Year	Surplus (1,000 m.t.)	Deficit (1,000 m.t.)	Surplus or Deficit as a Per Cent of Total Production
Corn	1970	--	--	--
	1980	--	87.4[a]	(8.9)[b]
Beans	1970	8.0[c]	--	6.0[b]
	1980	17.0	--	9.1
Wheat	1970	--	70.7[d]	(152.7)
	1980	--	109.2	(161.1)
Rice	1970	3.0[a]	--	11.5
	1980	2.6	--	6.5
Fruits	1970	--	13.4[e]	(9.5)[f]
	1980	--	18.9	(11.2)
Vegetables	1970	58.0[g]	--	35.6[h]
	1980	40.0	--	22.2
Cattle	1970	15.3[i]	--	33.5[j]
	1980	22.0	--	34.3
Hogs	1970	--	0.9[d]	(5.7)
	1980	--	2.8	(15.4)
Eggs[k]	1970	--	--	--
	1980	--	--	--
Milk[l]	1970	--	20.0	(11.5)
	1980	--	40.0	(18.6)

[a]Based on linear trend supply and CNP demand projections.
[b]Total production based on trend projections.
[c]Based on BMI supply and demand projections.
[d]Based on linear trend supply and BMI demand projections.
[e]Based on INCAP supply and CNP demand projections.
[f]Total production based on INCAP projections.
[g]Based on BG supply and CNP demand projections.
[h]Total production based on BG projections.
[i]Based on BMI supply and CNP demand projections.
[j]Total production based on BMI projections.
[k]Based on INCAP supply and BMI demand projections exports would be 2,800 m.t. in 1970 and 1,800 m.t. in 1980.
[l]See text for a discussion of the significance of the milk deficit figures.

farmers. A program for increasing the production of vegetables would probably benefit both large and small farmers.

Similarly, programs designed to increase vegetable and grain production would tend to be labor-using, while programs directed towards increased production of fruit and livestock products would tend to be capital-using. A fruit program designed to diversify coffee farms would tend to increase the demand for labor during the harvest season for fruit but would reduce the demand for labor during the coffee harvest.

CHAPTER SIX

GOVERNMENT POLICIES AND PROGRAMS

AGRICULTURAL GROWTH takes place in areas having a minimal infrastructure of roads and markets, adequate soils, availability of enough water for crop production, seed varieties with inherent yield potentials, fertilizer to combine with the inputs of land, seed and labor, and production practices which enhance and conserve the productivity of the inputs. The rate at which growth takes place directly reflects the profit potential of the adoption of new practices and inputs. Government policies and programs must embrace action to increase the level and stability of this profitability as an incentive to change, as well as action to assure the necessary services, inputs and technology. Research, extension, storage, processing, markets and transportation are but a part of the essential requisites that must be provided from private or public sources. This chapter is concerned with past public expenditures and programs in Guatemala and suggestions for changes and improvements.

PUBLIC REVENUES AND EXPENDITURES IN AGRICULTURE

This section focuses on the extent to which public resources are used to support agricultural development. It raises the fundamental question of the need to expand public expenditures and public programs. The contribution of the agricultural sector to public revenues is analyzed and compared to public expenditures for rural development.

Agricultural taxes are the major source of public revenue in the agricultural sector. Agricultural taxes vary in amount from year to year but do not appear to have changed much in absolute terms during the last ten years. (Table 6.1) It may well be that

TABLE 6.1 ● GUATEMALA: AGRICULTURAL TAXES (current prices—thousands of quetzales)

Year	Total Agricultural Taxes	Direct Taxes[a]	Indirect Taxes	% of Total Taxes	% of Total Gov. Revenue	% of Ag. GDP	Coffee Export Tax	% of Ag. Taxes	% of Coffee Production Value	Cotton Export Tax	% of Total Ag. Taxes	% of Cotton Production Value
1958	10,486.4	0.4	10,486.0	11.2	9.5	3.7	10,265.2	97.9	13.4	NA	--	--
1959	9,737.3	0.4	9,736.9	10.3	8.9	3.3	9,590.7	98.5	12.9	NA	--	--
1960	8,331.7	0.3	8,331.4	8.8	7.6	2.8	8,182.5	98.2	11.3	NA	--	--
1961	8,439.5	0.3	8,439.2	8.9	7.6	2.9	8,239.8	97.6	12.8	NA	--	--
1962	7,478.3	3.5	7,474.8	8.2	7.0	2.4	7,315.9	97.8	11.6	NA	--	--
1963	6,773.2	505.4	6,267.8	6.7	6.1	1.9	5,949.2	87.8	8.0	NA	--	--
1964	6,728.0	289.8	6,438.2	6.1	5.6	1.8	5,658.7	84.1	6.3	440.2	6.5	1.3
1965	9,620.9	800.7	8,820.2	7.4	6.6	2.5	8,118.1	84.4	8.8	243.4	2.5	0.6
1966	9,451.0	715.0	8,736.0	7.1	6.5	2.3	8,133.5	86.1	9.7	323.3	3.4	0.7
1967	6,521.0	835.2	5,685.8	NA	NA	2.0[b]	5,162.5	79.2	NA	218.0	3.3	NA

Source: Banco de Guatemala and Direccion Tecnica del Presupuesto.

[a]Includes Idle Lands Tax starting in 1963, includes income tax estimates derived by CNP.
[b]Estimated.

the level of agricultural taxation has declined somewhat. It appears that agricultural taxes as a per cent of gross domestic product in agriculture fell from about 3.5 per cent in 1958–59 to around 2 per cent in 1967.

Agricultural taxes represented about 6.5 per cent of total government revenue in 1965–66. Their share seems to have declined steadily since 1958. Similarly, agricultural taxes as a per cent of total taxes were about 7 per cent in 1966, down from more than 10 per cent a decade ago. All of these facts point to a consistent tendency for agricultural taxes to decline relative to agricultural production and to taxes elsewhere in the economy.

Direct taxes in agriculture are relatively unimportant at the present time. Guatemala has both income and property taxes, but neither produces much revenue from the agricultural sector. There is also a special tax on idle land but it is minor from the standpoint of revenue produced. It should be expected that greater emphasis will be placed on these direct taxes in the future as a means of obtaining more revenue for expanding public programs and investments.

The major agricultural taxes are indirect taxes, largely in the form of export taxes on coffee. (Table 6.1) The coffee tax represented 80 per cent of total agricultural taxes in 1967, although its proportion has declined since the early 1960's. Coffee export taxes totaled less than 10 per cent of the value of coffee production in 1966, down from more than 13 per cent in 1958. Export taxes on cotton represented less than 1 per cent of the value of the crop and slightly more than 3 per cent of total agricultural taxes in 1967.

There are two other ways in which transfers can be made from the agricultural sector to promote development in other sectors. One is through price policies. If prices of agricultural products decrease relative to other prices, then a transfer takes place through prices producers receive for food and industrial raw materials. The main shifts in agricultural terms-of-trade appear to have been in the prices of traditional exports such as coffee and cotton. These shifts result in transfers from Guatemala to importing countries and not between sectors within the economy. There do not seem to have been any strong shifts in terms-of-trade against agriculture as far as domestic products are concerned.

Transfers can also be made through the actions of producers and financial institutions in channeling funds from agriculture into investments in other sectors. The magnitudes of these intersectoral flows are not known. More research is needed to measure the rate of investment of agricultural income, especially by large producers of export crops, in other sectors of the economy.

Data were also obtained on aggregate public expenditures (current and capital) for rural development. These expenditures include rural education, road construction, health programs and data collection, as well as the services provided by the Ministry of Agriculture and other government agencies. In 1968, these expenditures totaled about 20 million quetzales and represented 11.5 per cent of total government expenditures. (Table 6.2) In 1966–67, rural expenditures were 13 to 14 per cent of the public budget, while in contrast they were only 6 to 8 per cent in 1960–64.

There also appears to have been some increase in rural expenditures by the government in relation to agricultural output. Recently, this figure has been about 5 per cent, up from 2 to 3 per cent in the early 1960's. (Table 6.2) It is not known to what extent this increase is due to the more complete identification of rural expenditures in the recent years.

If these data are accepted, they imply that government expenditures in the rural sector have been increasing relative to agricultural taxes. Earlier, this relationship seems to have been about one to one. Since 1965, however, the government has been spending from 2 to 4 quetzales in the rural sector for every quetzal it collects in taxes from agriculture. (Table 6.2) Only about one-fourth of these expenditures are made through the Ministry of Agriculture. Other important expenditures include rural education, road construction, health and support of rural development agencies.

Finally, government expenditures were classified into services and social overhead investments. The former includes most of the current work of the Ministry of Agriculture, data collection and the operation of the autonomous development agencies. The latter includes education, health, roads and irrigation. Social overhead has represented about two-thirds of total expenditures in recent years. (Table 6.2) There appears to have been a shift in favor of more infrastructure investments since 1965. However, the level of expenditures in each category is exceedingly low relative to the needs of the agricultural sector for improvement and expansion. Important categories of government outlays for agricultural services and investments are reviewed and evaluated in more detail in following pages.

AGRICULTURAL RESEARCH

The history of agricultural research in Guatemala is somewhat spotty. Considerable success was achieved earlier through the joint "Servicio" sponsored by the Guatemalan and United States governments. Currently, it is questionable that a research program of sufficient scope and continuity exists to provide the new tech-

TABLE 6.2 ● GUATEMALA: PUBLIC EXPENDITURES FOR RURAL DEVELOPMENT (current prices)

	1960-61	1963-64	1965	1966	1967	1968
Total Rural Expenditures	7,974,406	6,881,411	19,302,126	20,554,477	27,271,700	20,530,046
As % of Total Public Expenditures	7.8	6.0	11.6	13.2	14.3	11.5
As % of Agricultural Gross Domestic Product (GDP)	2.7	1.9	5.0	5.1	na	na
As % of Agricultural Taxes	95.1[a]	101.9[a]	200.6	217.5	418.2	na
Expenditures on Agricultural Services	7,812,626	5,802,141	12,244,378	9,192,416	9,386,399	6,685,357
As % of Total Rural Expenditures	98.0	84.3	63.4	44.7	34.4	32.6
Expenditures on Social Overhead	161,780	1,079,270	7,057,748	11,362,061	17,885,301	13,844,689
As % of Total Rural Expenditures	2.0	15.7	36.6	55.3	65.6	67.4

Source: Calculations based on data from Banco de Guatemala and Direccion Tecnica del Presupuesto.

[a] Estimated.

nology and practices required as a base for accelerated agricultural development programs. The main limiting factors seem to be the lack of trained personnel, the low budgetary support for research and the institutional organization of the research program. Moreover, nowhere in proposed programs and projects are substantial funds being suggested for research and investigation; yet the lack of new knowledge and adapted research is probably a key bottleneck in achieving economic and social goals in the agricultural sector.

The major agency conducting crop and livestock research is the División de Investigaciones Agropecuarias of the Ministry of Agriculture. Several other government and private agencies conduct research, however. The programs and facilities of the important research agencies are as follows.

División de Investigaciones Agropecuarias

This Division is part of the same Dirección of the Ministry of Agriculture which includes the Extension Service. It is the largest agency conducting agricultural research. Its budget for 1969 was a little less than Q400,000. It has approximately 50 technicians working in its various stations and programs.

Data for 1967 showed the following distribution of trained personnel:

Ph. D.	2
M. S.	10
Ing. Agr.	7
Perito Agr.	32

A few additional technicians are on leave studying for graduate degrees outside Guatemala. Lack of trained personnel and low salaries are two of the serious problems affecting the work of the Division. The Division carries out its research program at five experimental stations. The location and major activities of each station are:

Bárcena—a small station located near Guatemala City. Experimental work is concerned with corn, beans, sorghum, peanuts and vegetables. Seed production for improved varieties is carried out at this station.

Cuyuta—located in the coastal region at Escuintla. It began as a mechanization center under the development financing agency, INFOP. The station works with corn, sorghum, rice, vegetables and pastures. It is a reasonably well-equipped station.

Chimaltenango—in the highlands, works with corn, beans, potatoes, wheat and vegetables. The station is relatively new and not well developed nor equipped.

Chocolá—located in a coffee area in Suchitepéquez. Work is primarily concerned with coffee, but also includes fruits and vegetables. It has been established for more than 20 years but the program has suffered discontinuities.

Labor Ovalle—a small station located in the highlands near Quezaltenango. It concentrates on wheat, potatoes, corn, and vegetables and fruits; also, on soil fertility. Some financing is provided by the Wheat Growers Cooperative.

The major research installation not included in the above list is Los Brillantes, a station located in the department of Retalhuleu and operated by the Dirección General de Desarrollo Agropecuario. This station has excellent facilities and is the center of the government's diversification program. Research at the station is concerned with rubber, cacao, citrus fruits, spices and other fruits. There are two other experimental stations of this Dirección which operate as substations to Los Brillantes. This Dirección also carries out a livestock improvement program. There is no apparent coordination of the work of the two research agencies.

Additional research is carried on by the National Coffee Association (ANACAFE), the Central American Institute of Nutrition, the Faculty of Agronomy of the University of San Carlos, and producers of essential oils, sugar, and cotton.

Some duplication of research is involved. A good example is the work in agricultural diversification. This is the major concern of Desarrollo but work is also done by Investigación and ANACAFE. Finally, the Ministry has a special department concerned with diversification. There appears to be no coordination of work among these various agencies and no seeming agreement on the objectives and priorities for crop diversification.

Appraisal of Research Programs

The purpose of research is to develop and adapt new technology which is economically feasible for adoption by producers and which raises the productivity of labor and land resources in farming. To be successful, a research program requires an adequate number of well-paid scientists with facilities and supporting technicians to carry out a long-term, planned program of work free from political interference and bureaucratic restrictions.

An attempt was made in this study to review the major lines of research from the viewpoint of their adequacy as a base for acceler-

ated development programs. Most of the current work is on crop biology: improved varieties, response to fertilization, plant population and control of pests and diseases. Research personnel feel that the technical basis exists for increasing yields as much as eight times for corn and beans in the central and coastal regions.

Many of the results reviewed were experimental data measuring the responses to one, or at most two, of the factors influencing yields. Emphasis has been placed on varietal improvement and fertilization, especially for corn. Less work has been done on planting dates, on plant population density, and other cultural practices.

There are two important limitations in the existing information. The first is the limited replication of experiments over area and time. There have been too few experiments to provide more than a general indication of the relation between a specified factor and yields. Given the diversity in soils and climatic conditions, actual responses *on farms* may be very different from those obtained at the experiment stations. More information is needed about this variation and what risk factors are associated with the adoption of the practices by the individual producer.

One illustration of this difference is given by information obtained from the Extension Service. In that agency's 1968 annual report, production data for various crops from demonstration plots around the country are summarized and compared to average yields obtained by traditional production methods. These data showed that the improved practices somewhat more than doubled yields for corn and rice and somewhat less than doubled yields for beans and wheat. Nothing is said, however, about the variation in results obtained on the demonstration plots. Two fundamental questions can be posed:

1. Why are yields on test plots only about double actual average yields when research technicians think increases of 5 to 8 times are feasible?
2. Do the results from the test plots show a secure base for recommending profitable production practices that sufficiently outweigh the risks and costs of changing traditional methods?

The second limitation is that few experiments have been designed to test a "package" of practices. Often, responses are limited if only one factor is changed. For example, fertilization at relatively low levels may exhaust the yield potential of existing varieties. Or population density and other cultural practices may become limiting if high-yielding varieties are subjected to heavy fertilization. Really dramatic increases in yields will probably require that the conjunction of varieties, fertilization and cultural practices be con-

sidered together and worked out as a package for various soil types and climatic conditions.

In this connection, it is obvious that little attention has been paid to understanding the agronomic and economic implications of existing production practices in the subsistence sector. Are existing practices effective or wasteful of soil fertility? Are there changes in cultural practices which could increase yields within the existing structure? Do existing practices reduce or increase the risk of crop failure? How will these risks be affected by the adoption of new technology? Without answers to these questions based on research, it is difficult to see how new practices can be identified which are consistent with the production environment of small farmers and which offer the rate and certainty of return necessary to induce their adoption.

It is equally important that new technology be locally adapted agronomically and tested for its economic feasibility. Some attempts have been made to calculate rates of return on fertilizer use, but essentially nothing has been done to appraise the impact of new methods and inputs on optimum cropping patterns by region and on incomes which can be earned by farms of different sizes. Such research will require a major shift in the philosophy, organization and personnel of the research agencies.

The controversy over mechanization is a good example of the contribution research can make to planning development programs. There is apparently a strong tendency in Guatemala to recommend mechanization of production wherever soil and climate conditions permit. The justification usually given for this recommendation is that mechanization increases productivity per man and reduces per unit cost of production. This recommendation is opposed by those who fear the employment effects of substituting machines for men on the rural labor force. Rational choices can be made only when research shows what mechanization is necessary to permit exploitation of yield-increasing inputs and methods, and for multiple cropping in areas where growing conditions would permit the harvest of two or three crops per year. Such mechanization can be recommended because it is complementary both to the adoption of new technology and to the increased productivity of labor.

AGRICULTURAL EXTENSION

The National Agricultural Extension Service has the primary responsibility for transmitting information on new technology and improved production practices to farmers and stimulating farmers to adopt them. The service was created in 1955 and recently was

merged with the organization responsible for promoting the welfare of the Indian population. This combined service, which forms a unit of the Dirección General de Investigación y Extensión Agricola of the Ministry of Agriculture, is organized into three major divisions: (1) Agricultural Extension Service; (2) Indian Economy Development Service; and (3) Cooperative Development Office.

Agricultural Extension Service

The Extension Program is carried out through 39 offices located throughout the coastal and altiplano regions of the country. The service, from its beginning with 6 offices in 1955, had grown to 30 offices by 1960. This number remained about the same until 1967 when it was increased to 39 in order to cover more completely the northeast departments of Zacapa and Izabal.

Each of the 39 offices is headed by a "Perito Agrónomo" with high school level vocational training in agriculture and some additional training in extension work. Each office also has an assistant (secretario) who works under the direction of the agent. Home demonstration agents are assigned to eight extension offices.

The central office includes a director and sub-director and fourteen supervisors and specialists. The extension offices are grouped into five regions, each of which has a supervisor. One extension agent is assigned to the central office in charge of training. There were 69 technicians in the service in 1969.

Data were obtained on the approximate area of operation of each of the extension offices. At most, the 39 offices in existence cover 25 per cent of the total coastal and central regions. The covered area includes approximately 136,000 rural families. The extension agents, however, work with less than 20 per cent of those families. Each office is reported to serve between 500 and 600 farm families on the average.

The 1969 budget for the Extension Service was Q229,175. The service has received no increased appropriations since its budget was augmented to support the new offices opened in 1967. The service is so small that, in national terms, it provides only about one technician for each 7,500 farmers in the country. Its total budget represents about Q0.50 for each farmer in the country.

Indian Economy Development Service

This department is part of the "División de Extensión y Fomento de la Economía Indígena" of the Research and Extension Agency of the Ministry of Agriculture. It existed previously as an autonomous service and was incorporated into the Extension Service only recently.

The activities of this department are carried out in the northwest where the Indian population is dominant. The work is organized in four centers. In 1968 there were 47 technicians working in agricultural activities in these centers and the sub-centers associated with them. Other technicians work in community development, home improvement and handicraft programs. The primary agricultural activity was the use of demonstration plots to provide small Indian farmers more information about improved practices. Work with corn, wheat, beans and potatoes was emphasized. A total of 1,721 farmers collaborated in the demonstration work, and 27,704 farmers attended the demonstrations. An additional 1,658 farmers were involved in livestock programs carried out by the department.

This department had a budget of Q166,236 to support its work in agriculture and handicrafts and in community development in 1969. This budget represents approximately Q1.00 for each person in the indigenous population in the area covered by the department.

Cooperative Development Office

This office provides technical assistance and services to existing cooperatives and promotes the establishment of new cooperative organizations. Its budget for 1969 was Q19,561. In 1968, the office worked with 20 existing cooperative units and aided in the organization of 85 new ones. A total of 14,000 farm families were involved in the 291 co-ops.

Other Extension-Related Agencies

S.C.I.C.A.S.—(Servicio Cooperativo Interamericano de Crédito Agrícola Supervisado) in its supervised credit program, operates 15 agencies located in the coastal and altiplano regions. There are 19 technicians assigned to these offices. The agency claimed to have made loans to 8,760 farmers in 1967. Obviously, little supervision could be given to each borrower. The agency is planning to increase the number of its offices to 24. It has recently received a $4,500,000 loan from the Interamerican Development Bank to expand its supervised credit activities.

INTA—(Instituto Nacional de Transformación Agraria) has the responsibility for a broad and comprehensive development program in the agricultural development zones which it directs. Its activities range from agricultural extension and home improvement to road building and school operation. The Agency employs a total of 40 Peritos Agrónomos who work as "promotores de desarrollo rural" to provide technical assistance in the parcelamientos.

It is estimated that about 4,500 families are involved in the areas but not all areas have active extension programs. Offices of the extension service are located in four parcelamientos and SCICAS has provided credit for a few of the parcelarios. In general, however, the various agencies have not worked closely together.

Agricultural Development Bureau—is one of the largest departments of the Ministry and carries out both research and extension activities. It works with crops for domestic food production, with special crops that have export potential and with livestock. Some of its promotion activities reach individual farmers. It is estimated that this agency provides direct technical assistance to not more than 5,000 producers. There is no clear division of research and extension work between the research and extension divisions of this bureau. Responsibilities seem to be overlapping with respect to functions, crops and regions.

Summary Comments on Extension

The first fact deserving emphasis is that expenditures on agricultural extension programs in Guatemala are extremely small. Even if generous provision is made for the extension-related activities described above, no more than Q500,000 is currently being spent in the country for technical assistance to farmers. This figure represents little more than Q1.00 per farm. Substantial increases in budget support will be required if extension programs are to be improved in the future.

At the same time there is obvious duplication and lack of coordination in the existing extension effort. That is to say, the resources now available for extension are not being used as efficiently as they could be. The multiplicity of agencies carrying out extension programs is the most obvious deficiency. For example, offices of the Agricultural Extension Service are located where the Indian Economy Development Service operates. Even if these various programs did not overlap each other, the current organization involves too many resources in administration and too few in actual field operations. Also, an effective system of regional and national specialists is not possible with the existing fragmentation of services and programs.

There is overlapping of existing programs both in respect to crops and to geographic areas. Several agencies are charged with working on basic foodcrops and/or with small farmers. Centralization of extension programs in one agency would permit more coordination and control to be exercised. Existing resources could be used more efficiently in terms of the realization of the goals of extension.

There are serious deficiencies in the number and quality of

personnel in extension. Salaries are low so the agencies cannot attract and hold well-trained technicians. Few people are being trained with the skills and preparation to be effective extension workers. No cost-effectiveness studies of extension activities have been made. Yet, where budget support is so limited, such studies are essential if available resources are to be used as effectively as possible.

If we assume that one extension agent is needed for a given number of farmers (e.g., one agent per 200 farmers) then the personnel needed for extension can be derived. Depending on the ratio chosen, we could conclude that Guatemala "needs" one to two thousand extension agents and a 20-fold increase in budgeted expenditures. Such increases are obviously not feasible in the foreseeable future. The danger with this approach is that it is based on the implicit premise that whatever additional funds can be made available should be used to expand extension along conventional lines. This premise should be questioned. The case for more extension should be based on cost-benefit considerations, and extension programs should be supported as needed in a comprehensive program designed to generate the highest returns possible for the money available. Returns may or may not be highest for immediate expansion of the familiar form of extension activity.

AGRICULTURAL EDUCATION

The provision for a growing number of trained persons with scientific and practical knowledge and skills is essential for long-term agricultural growth. The process of strengthening educational institutions has already begun in Guatemala, but efforts must be accelerated if the trained manpower bottleneck is not to thwart all efforts for change and improvement.

Secondary and Higher Education

Higher education in agriculture in Guatemala is carried out by the Faculties of Agronomy and Veterinary Medicine of San Carlos University. The University is state-supported, but autonomous, and is one of the oldest in the Western hemisphere.

The Faculty of Agronomy was created in 1950. By 1968, it had graduated a total of 60 Ingenieros Agronomos. Current enrollment in the Faculty is a little less than 100, but this number will increase due to a reorganization of the basic studies program in the University. There are 6 full-time, 4 half-time and 20 part-time professors in the Faculty. Plans have been made to produce more agronomists each year and this appears to be an important goal for the country.

The Faculty has experimental fields, and professors are doing

some research. However, there are no funds allocated specifically to support research. There is little or no coordination of the Faculty with research and extension activities of the Ministry of Agriculture.

The Faculty of Veterinary Medicine was begun in 1957. By 1969 it had awarded 50 degrees, and 22 students had degrees pending. There are currently 30 students in the Faculty, almost half from countries other than Guatemala. The Faculty has 28 professors, 25 of whom are full-time.

The other important institution training agriculturists in Guatemala is the National School of Agriculture located at Bárcena near Guatemala City. This school is administered by the Ministry of Agriculture and provides training in vocational agriculture at the high school level. At the completion of a three-year program students receive the degree "Perito Agronomo." The school began in 1921 and has graduated a total of 832 students. In 1968, there were 308 students at the school of which 42 were graduated. The school has a faculty of 25 full and part-time professors. Plans are in progress to improve the physical plant and curricula and to increase the number of graduates each year to about 100.

Additional training in agriculture at the high school level will be provided by regional schools which are to be constructed for vocational and teacher training. These schools, and the expansion of the program at Bárcena, will soon begin to ease the shortage of persons with preuniversity training to staff public and private agencies.

Rural Primary Education

There are about 700,000 children of school age (7–14 years) in rural Guatemala. Only 17 per cent of these children are actually in school. This proportion is lower in Indian areas and higher in Ladino communities.

Schools in rural areas normally have no more than three grades. Ninety-five per cent of rural children attending school are, in fact, attending the first grade. Few rural children progress beyond third grade. The total number of rural childen completing sixth grade in 1967 was only about 1,000. Plans are under way to increase the number and quality of rural primary schools, but it will require many years and large budgets before adequate primary education will be available in the rural areas of the country.

AGRICULTURAL CREDIT

Credit for agricultural production in Guatemala is obtained from both private and public sources. In 1964, about 55.5 million

quetzales were provided by public and private banks and credit institutions. (Table 6.3) Other major sources of credit for farmers are input supply companies, processors and buyers of agricultural products, local merchants and moneylenders. Credit unions also provide some credit but they are not very important. The total credit available to the agricultural sector is not known.

Most of the credit provided by financial institutions goes to export crops. Coffee and cotton alone accounted for almost 75 per cent of private-bank credit and 44 per cent of public credit in 1964. (Table 6.3) Other export crops also received important quantities

TABLE 6.3 ● AMOUNT OF CREDIT GRANTED FOR AGRICULTURAL PRODUCTION BY PRIVATE BANKS AND PUBLIC INSTITUTIONS IN GUATEMALA, BY PRODUCTS, 1964

Product	Public Credit[a] (Q 1,000)	Private Banks (Q 1,000)	Total Credit (Q 1,000)	Per Cent of Total Credit	
				Public	Private
A. Basic Crops					
Corn	1,000	300	1,300	5.2	0.8
Beans	700	200	900	3.6	0.6
Rice	280	80	360	1.4	0.2
Wheat	460	110	600	2.6	0.3
Potatoes	80	20	100	0.4	0.1
Total	2,550	710	3,260	13.2	2.0
B. Other Crops					
Coffee	2,500	12,900	15,400	13.0	35.7
Cotton	6,000	14,000	20,000	31.0	38.7
Sugar	450	1,800	2,250	2.3	5.0
Sesame	60	120	200	0.4	0.3
Vegetables	300	1,500	1,800	1.6	4.1
Cocoa	20	110	130	0.1	0.3
Rubber	3,000	370	3,370	15.5	1.0
Bananas	--	--	--	--	--
Other Crops	200	400	600	1.0	1.1
Total	12,550	31,200	43,750	64.9	86.2
C. Livestock					
Cattle	3,700	3,630	7,330	19.1	10.0
Hogs	13	140	153	0.1	0.4
Sheep	4	0	4	0.0	0.0
Poultry	513	500	1,013	2.6	1.4
Total	4,230	4,270	8,500	21.9	11.8
D. All Products	19,330	36,180	55,510	100.0	100.0

Source: Banco de Guatemala.

[a]Includes loans by SCICAS, BNA, INFOP and CHN.

of public (rubber) and private (sugar) credit. Public agencies granted 19 per cent of their credit for cattle production, and the private banks allocated 10 per cent for this purpose. Basic crops as a group received only 13 and 2 per cent, respectively, from public and private agencies.

The data in Table 6.3 imply that most credit goes to large farmers for export crops. The two public agencies which have primary responsibility for providing credit to small farmers are the Banco Nacional Agrario and SCICAS. Both of these agencies maintain credit offices scattered throughout the coastal and central departments. However, these two agencies together account for only about 5 per cent of the total credit supplied by the public and private agencies. Moreover, loans are made annually to only about 10,000 farmers, which is only 2 to 3 per cent of the small farmers in the country. A major expansion in credit reaching the small producers of domestic food crops will be required if widespread agricultural growth and change is to take place.

AGRARIAN REFORM AND COLONIZATION

Given the highly unequal distribution of land in Guatemala it is not surprising that reform-minded governments have tried in the past to carry out land reform programs. The constitution adopted in 1945 prohibited the growth of latifundios and provided for expropriation of land with compensation. The government also encouraged the formation of labor unions on large plantations and initiated legal action to control land rents and force landlords to rent idle land to other farmers at fixed rates. However, no specific agrarian reform program was introduced until the Law of Agrarian Reform, which formulated the Arbenz program, was passed in June 1952.

The major stated objective of this legislation was to provide land to those who had none or very little, as a means of developing agriculture and the country. Government land was to be distributed, and private property expropriated, with compensation provided through long-term agrarian bonds. In implementing the program, emphasis was placed on speedy distribution of land. Programs for credit, technical assistance and community development were poorly managed and badly underfinanced. Many farmers were given parcels too small to support a family and boundaries were often not adequately defined nor titles clear. The program was abruptly halted when the government of President Arbenz was overthrown by revolution in June 1954. Most of the land was subsequently returned to its original owners.

A new plan was enacted into law in February 1956. Although

providing land for the landless was included as an essential element of the new plan, emphasis was placed on the colonization and resettlement of lands already held by the government and not on the transfer of private land. While the law provided for possible expropriation of unused private land, this provision has not been used. Instead, government policy toward landlords has rested on a tax against idle lands which, it was assumed, would induce large landowners either to start using their idle lands or to dispose of them.

The heart of the existing program is the creation of Agricultural Development Zones, which are made up of moderate-sized farms (parcelas) and small lots for business establishments and artisans. Land for the zones has been supplied from large tracts held by the government. The program is administered by INTA and is designed to include extensive programs of assistance for social and economic development.

From 1955 to 1966, a total of 26 zones were created. (Table 4.2) These zones contained 4,481 parcels which have been delivered to farmers. The total population in these zones is estimated to be 112,200 persons. About 20,000 families had been benefited through receipt of small rural or urban lots or through the establishment of communal agrarian properties. A little more than 100,000 hectares were distributed in farmsize parcels, and almost 60,000 additional hectares were distributed in small lots and communal properties. The zones are located mainly on the south coast with the exception of the few areas opened in the northern and eastern departments. Most of the zones were settled or resettled between 1955 and 1963.

Corn is the most important crop produced in the zones. Data on corn production in 1965 were obtained from INTA for most of the zones and are given in Table 6.4. The zones produced in total about 23 per cent of the production of corn in the country on 8 per cent of the total area devoted to corn. Thus, yields were higher in the zones than in the other corn regions, especially the central highlands. The highest yields were obtained in those zones on the south coast where double-cropping is common. Technical assistance and credit are also provided to encourage seed improvement, better soil and crop management, use of fertilizer and weed and pest control.

INTA has attempted to carry out comprehensive programs of economic and social development in the zones. Access roads have been built. Farmers have been assisted in constructing housing and buying machinery. Agricultural extension and supervised credit have been offered. School and health facilities have been established. Cooperative and community organizations have been organized.

Although the programs in the zones are probably underfinanced

TABLE 6.4 ● AREA, PRODUCTION AND YIELDS OF CORN IN THE AGRICULTURAL DEVELOPMENT ZONES, 1965

Zone	Area (ha)	Production (mt)	Yield (kg/ha)
La Maquina	13,974.8	50,600.0	3,621
Monterrey	2,236.0	5,888.0	2,633
Sta. Elena and Guatalon	541.5	277.0	512
Nueva Concepción	14,963.5	49,254.5	3,292
Cuyuta	1,100.5	1,751.4	1,591
El Arisco	631.7	1,247.5	1,975
El Cajon	293.5	575.0	1,959
Los Angeles	139.7	414.0	2,963
Sta. Izabal	250.1	121.9	487
Caballo Blanco	619.1	1,354.6	2,188
Santa Fe	260.6	321.6	1,234
El Rosario	21.7	45.6	2,101
La Blanca	4,114.2	8,667.1	2,107
El Reposo	937.7	1,349.8	1,439
Las Cabezas	357.8	470.5	1,315
Navajoa	279.5	552.0	1,975
Virginia	252.2	498.2	1,975
Santa Ines	349.4	460.0	1,317
Sto. Tomás de Castillo	21.0	41.4	1,971
Montufar	10,341.4	21,877.6	2,116
Sebol	1,257.7	1,656.0	1,317
Total	52,943.6[a]	147,423.7[b]	2,785

Source: Department of Statistics, INTA.

[a]Represents 7.8 per cent of corn area for 1965.
[b]Represents 22.8 per cent of corn production for 1965.

and possibly poorly administered, they undoubtedly do result in improved levels of living for those farmers fortunate enough to be chosen to receive parcels. The government is encountering difficulty, however, in meeting the expense of the operation of the zones. As a result, it does not appear likely that the government will create additional zones in the forseeable future. The government appeared to have been spending about two million quetzales per year on this program until 1968 when INTA's budget was reduced drastically.

The real issue, therefore, is the small number of families which have been settled in the zones, at what cost and with what results. For the 1955–66 period, an average of less than 500 families were settled each year. Only slightly more than one per cent of the farms

in the country benefit from the services offered by INTA. There seems to be little hope that the present program can make any substantially larger impact on the pressing problems of productivity and poverty in Guatemalan agriculture.

A second colonization program is being carried out by an agency charged with developing the Petén region (FYDEP). The work of this agency is being assisted by FAO. The government budgets about 1.75 million quetzales annually to this agency. Available data suggest that less than 500 private farms and 14 cooperative farms had been created by 1968. Some of the major problems which have been encountered include:

1. poor soils and lack of knowledge of optimum production and soil management practices
2. lack of land titles, credit, and technical assistance
3. poor access roads, or none, and lack of markets and marketing facilities
4. deficient budget support for the colonization agency.

It appears that colonization projects have proven expensive in Guatemala in relation to the number of farms created and jobs provided and the amount of land brought into production. There is still land available for settlement in Guatemala, especially in the northern parts of Huehuetenango, El Quiché and Alta Verapaz, in Izabal, and in parts of the Petén. Construction of roads and other facilities will permit spontaneous settlement to take place, a process which is already underway. The question remains as to what government expenditures would be required to raise the rate of colonization to a significant level. Funds are not likely to be available to mount a major effort. Thus, the progress in colonization has been, and is likely to remain, slow. Other policies and programs must be formulated and implemented to meet the basic needs of agricultural development in Guatemala.

AGRICULTURAL PROJECTS

Much emphasis is currently being given in Guatemala to the preparation of agricultural projects. The strategy appears to be one of obtaining international financing for a wide variety of projects as a means of expanding government investments in rural development without the necessity to mobilize more public revenue domestically. Many of these projects were reviewed and were found to be deficient in the analysis of their potential costs and benefits. Some of them appear worthwhile and deserve to be supported.

Even if all of the projects now being proposed were to be

carried out, a maximum of 60,000 hectares of land would be brought into production or improved as a result. The costs would be not only the direct capital investment involved but also the concentration of the resources and capabilities of government agencies on planning and executing these projects. The potential for implementing other policies and programs designed to bring improvements to a large number of existing farmers would be seriously impaired as a result.

GOVERNMENT POLICIES TO ACCELERATE AGRICULTURAL DEVELOPMENT

Possibly the first essential element in accelerating agricultural development is the commitment of the government to a sound set of strategies undistorted by the requirement that they also serve political ends. A clear vision of what is and what will be needed to achieve rural economic advancement is required in developing these strategies. Policies and programs must be supported by the concerted actions of government agencies. Responsibilities for planning and implementing policies and programs must be rescued from overlapping agencies that separate related functions and group separate functions, confuse lines of authority, and develop bureaucracies that emphasize self-preservation rather than performance. Many agencies seem to follow policies that provide few incentives or opportunities for progress and achievement by technicians.

This national commitment will require the mobilization and expenditure of a steadily increasing quantity of resources directed to a wide range of activities. Expenditures and investments must be matched to the specific institutional and service needs of agriculture at each stage of its development and in each of the different geographic areas of the country. Government leaders must fully recognize the role of agricultural development in promoting growth of the non-agricultural sectors of the economy. They must emphasize those investments to be made by the government if they are to be made at all, and those which establish the climate and strengthen the incentives for private participation in rural development.

A particularly important claimant on public expenditures is agricultural research. It has been demonstrated repeatedly that public investments in agricultural research have generated phenomenal returns for farmers and society. Research can generate the possibilities for dramatic increases in productivity and yields that provide the leverage for change of traditional production patterns. No other alternative seems to offer much hope of reducing the large number of subsistence farmers.

Agricultural development strategy can be initiated with im-

ported technology and imported seed, but investments in domestic research usually must be forthcoming to meet the needs of continuing development. Research in agriculture can be highly location-specific because of differences in climate, diseases, insects, and other factors. To this extent, agricultural technology must be developed, adapted and tested for each region of the country. This problem is particularly urgent in a country like Guatemala where geographic and climatic conditions are so diverse.

Research must also be continuous and on an ever increasing scale. As new varieties spread, as fertilizer use increases, new problems will arise. Disease and insect threats will multiply and intensify. Agronomic practices will need to be changed.

As technical information accumulates, a demand for extension services of increased competency will be generated. Part of this demand can be met by private suppliers of farm inputs, but an important part of it must be met by government extension services that link the research organization to the farmers. Before such services are built, however, local research must have found something worthwhile to extend. Unless new technology is available that can offer high returns to its adopters, there will be little pay-off from investments in extension. Such investments can accelerate development only when there is information to extend which is productive and profitable for farmers to adopt.

Similar comments can be made about the role of agricultural credit. Subsidized credit has sometimes been treated as *the* requisite for agricultural change in Guatemala. Unfortunately, the credit provided to small farmers has often been diverted to consumption, and accumulated as bad debt, because there was nothing productive for farmers to purchase. But there is no reason to believe that small and poor Guatemalan farmers cannot be responsible borrowers where credit is provided for purchases of inputs of proven productivity. If credit and extension programs fail to evoke change, the productivity of the practices being promoted should be evaluated. It is difficult to find examples where highly productive and profitable technology that is tested and proven and made available to farmers along with the requisites for its use has remained "unadopted."

The role of investment in agricultural education deserves a prominent place in public sector planning. There is need for an ever-expanding body of persons skilled in the agricultural sciences. A dearth of trained people is placing a serious constraint on improvement efforts in the country. It takes time to train scientists, develop a successful research program and institute an effective extension service. The time to start developing such activities is now. Guatemala can no longer afford to act as if scientists and other

highly-trained workers will not be needed in the future. Some specific suggestions for expanded training and reorganized education and research programs are given in Chapter 9.

Attention needs to be given also to making the most productive use of the pool of persons already trained in agriculture. Personnel policies, wages and benefits, professional facilities and similar factors require urgent attention if the flow of services from scarce skilled manpower is to be efficiently utilized.

CHAPTER SEVEN

IMPROVING GRAIN MARKETING

CORN ACCOUNTED for about 24 per cent of the total value of agricultural products consumed in 1966. It accounts for 90 per cent of the cereals consumed by many Guatemalans. Total corn production in 1967 was more than 750,000 m.t.

Rice and wheat have become increasingly important food grains in recent years. Wheat production in 1966 was about 40,000 m.t. while rice production was reported to be around 30,000 m.t. Total production of rice and wheat is expected to be about 110,000 m.t. by 1980 while corn production is expected to be around 1,020,000 m.t.

The marketing problems involving wheat and rice are minor compared to those involving corn. Some additional storage facilities are needed for wheat. More efficient drying and milling facilities are needed in some rice producing areas. The flour millers and rice wholesalers appear capable of handling these problems on their own when it is profitable to do so. Thus most of our attention in this chapter will be directed towards corn.

Most of the key marketing problems involving corn are in some way related to the lack of adequate corn storage and drying facilities. The lack of drying facilities causes substantial losses of corn at the farm level and to some extent in the marketing channels. The lack of storage facilities results in considerable variation in corn prices. The variability of corn prices may benefit those who are able to hold substantial amounts of corn for three to six months, but it does not help the small corn producer who needs cash at harvest time or the consumer who buys a small amount of corn at a time. Thus a stable corn price is frequently cited as an important objective of the Guatemalan government.

Most of the grain marketed moves through private marketing channels. Some imported wheat and corn and a limited amount of domestic corn moves through the government's storage facilities, but all of this grain is ultimately marketed through private channels.

The government exercises very little control over grain marketing. It has a grading system for the corn that it purchases but no enforced grading system for private dealers. The government has been successful in maintaining its support price for wheat but not for rice or corn.

THE GRAIN MARKETING SYSTEM

The grain marketing system varies somewhat from region to region depending on transportation facilities, the government agencies located in the region, the type of grain involved, and whether or not the region is a net importer or exporter of grain. In general terms, the farmers sell their grain to truckers who sell it to wholesalers and processors who in turn sell to both wholesalers and retailers.

No survey data are available on the percentage of the grain production marketed. Unofficial estimates suggest that from 40 to 80 per cent of the corn production enters the market system, depending on the region. Many farmers sell some corn at harvest time and buy corn later. Much of the corn marketed is bought and sold in small quantities in local markets. It appears likely that from 60 to 80 per cent of the rice and around 95 per cent of the wheat production enters the market system. The high percentage of wheat marketed is due partly to the relatively high price of wheat set by the government.

Rice

Until recently rice production was concentrated in two major areas. One area consists of the departments of Jutiapa and Santa Rosa along the southeastern border near El Salvador. Roughly two-thirds of the rice produced during the 1950's came from this area. The other major rice production area was in the western departments of San Marcos, Quezaltenango and Retalhuleu. The department of Izabal on the north coast has become an important producer of rice recently and will probably become increasingly important in the future.

The government has set a guaranteed support price for rice each year since 1961. (Table 7.1) The Instituto de Fomento de la Producción (INFOP) is responsible for carrying out the price support program and does so by designating some rice mills as au-

TABLE 7.1 ● GUARANTEED PRICES FOR RICE AND PURCHASES BY AUTHORIZED AGENTS OF INFOP

Crop Year	Rice Prices (Q per 100 lbs.)		Purchases (100 lbs.)	Number of Mills
	Long Grain	Short Grain		
1960-61	4.25	3.50	9,244	3
1961-62	4.25	3.50	5,865	4
1962-63	4.25	3.50	51,019	8
1963-64	4.25	3.50	86,975	10
1964-65	4.25	3.50	109,742	12
1965-66	4.31	3.50	100,518	5
1966-67	4.41	3.58	NA	NA
1967-68	4.41	3.58	NA	NA

Source: 1960-66 data: Escobar Colindres, Luis Felipe, Soluciónes Practicas al Problēma de la Comercialización de Granos en Guatemala, Thesis, Universidad de San Carlos de Guatemala, September 1966.
1966-68 data: INFOP.

thorized buying stations. These mills purchased slightly over 4,600 m.t. of rice under agreement with INFOP during the 1965–66 crop year. Purchases by authorized agents in earlier years are presented in Table 7.1.

The guaranteed prices for rice set by INFOP have almost always been below the average market price. INFOP's rice price support program may have helped farmers who were forced to sell their rice during the harvest season, but it does not appear to have been an important factor in increasing rice production.

Unofficial information suggests that from four to eight thousand

tons of rice move from Guatemala to Honduras and El Salvador during the harvest season. Much of this rice returns to Guatemala when prices are higher. These movements are not shown in the official import-export statistics, but the location of the rice production areas is such that the official statistics probably underestimate actual rice movements. It has been suggested that additional storage facilities for rice would help prevent such movements. An additional two to three thousand metric tons of storage capacity should be sufficient to handle the rice reportedly exported and reimported. An average of about 500 m.t. of new storage and drying facilities for rice will also be needed each year during the 1970's to handle projected production increases.

Wheat

Wheat has been cultivated in Guatemala since the seventeenth-century. Production is concentrated in the western sierra region. (Table 7.2) Interest in increasing wheat production has been evident since 1947.[1] The government initiated a small program to promote wheat production in 1952. Although it was able to demonstrate that wheat yields could be increased, national production continued to decline between 1952 and 1958. (Table 5.5)[2]

The major public agencies involved in various aspects of promoting wheat production are:

1. Ministerio de Agricultura
2. Servicio Cooperativo Interamericano del Credito Agrícola Supervisado (SCICAS)
3. Instituto de Fomento de la Producción (INFOP)
4. Banco de Guatemala
5. Gremial Nacional de Productores de Trigo.

The Ministerio de Agricultura has been concerned with research, extension and seed multiplication programs for wheat.[3] SCICAS is primarily concerned with providing credit to wheat farmers. INFOP participates in wheat marketing. The Banco de Guatemala finances INFOP's marketing operations.

The Gremial Nacional de Productores de Trigo is the key

1. *Análisis de la Economía del Trigo en la Republica de Guatemala*, 1947.

2. The best study presently available on how wheat is grown and marketed in Guatemala is entitled *Investigación Sobre el Cultivo del Trigo en Guatemala*. This study presents the results of a large survey taken in 1964 by the Dirección General de Estadística of the Ministerio de Economía.

3. For further information see the report, *Programa Quinguenal de Fomento del Trigo*, Misión Conjunta de Programación Para Centro America, October, 1965.

TABLE 7.2 ● DISTRIBUTION OF WHEAT PRODUCTION BY DEPARTMENT

Department	Per Cent of Total Production
Quezaltenango	39.7
San Marcos	18.0
Totonicapan	14.2
Chimaltenango	12.2
Huehuetenango	7.9
Solola	6.4
Others	1.6
TOTAL	100.0

group in the wheat promotion program. The Gremial is an autonomous public agency responsible for protecting wheat producers' interests, increasing wheat production, improving wheat quality and obtaining favorable wheat prices. To accomplish these goals, the Gremial can construct storage facilities, offer credit, carry on research and extension in all aspects of wheat production and collect basic statistics on wheat. The Gremial is financed by a Q0.10 tax paid on each 100 pounds of domestic and imported wheat. Currently the Gremial is concerned primarily with assuring that the wheat producers have access to good seed, fertilizers and credit. The Gremial has been fairly successful in achieving its goals.

The price of domestically produced wheat is fixed at Q6.00 per 100 lbs. Flour millers are required to buy one ton of domestic wheat for every two tons of imported wheat.

The government's pricing program for wheat has worked reasonably well for several reasons: Most of the wheat products consumed in Guatemala are purchased by persons with above average

incomes. Thus the price of wheat products is not a serious political issue. The high support price for wheat is therefore basically a "bread tax" that transfers income from urban consumers to wheat growers.[4] Secondly, the price program is relatively easy to administer because there are only 19 commercial wheat mills with which the government has to deal, and it does not have to collect or pay out any money to maintain the support price. Finally, and most importantly, Guatemala has to import about two-thirds of its wheat. The high proportion of imports allows the flour mills to maintain a lower average price for flour than would be possible otherwise. This in turn allows the government to maintain a somewhat higher farm price for wheat than would be possible otherwise.

It does not appear desirable for Guatemala to attempt to become self-sufficient in wheat production. To begin with, Guatemala produces only soft wheat. Thus, even if it produced enough wheat to cover domestic consumption in terms of volume, it would have to export soft wheat and import hard wheat. This would either force the domestic price of wheat down to the world price or require the government to subsidize wheat producers or exports—neither alternative is likely to be popular. Secondly, a large program to increase wheat production would tend to increase corn prices as land shifted from corn to wheat production. Finally, more storage capacity would be needed to handle a given volume of domestic production than to handle the same volume of imported wheat. Most wheat is harvested during the six month period from September to February. Thus, if Guatemala were self-sufficient in wheat production it would need about 4,000 tons of storage capacity for each 10,000 tons of production. Imports can be scheduled to allow turnover rates of five to ten times a year. Thus only 1,000 to 2,000 tons of storage capacity is needed for each 10,000 tons of wheat imported.

Corn

Corn is grown extensively throughout Guatemala, but two major production regions account for nearly 65 per cent of the total production. The western sierra departments of San Marcos, Quezaltenango, Totonicapán, Sololá, Huehuetenango and El Quiché constituting the traditional production region accounted for about 30 per cent of total corn production in 1963. (Table 7.3) Corn production on the south coast has increased rapidly during the past ten years. The three south coast departments of Escuintla,

4. The domestic price is "high" relative to the world price of wheat but not necessarily "high" relative to the cost of production.

TABLE 7.3 ● PER CENT OF TOTAL CORN PRODUCTION BY DEPARTMENT, 1962–63

Zone	Department	Per Cent of Total Corn Production 1962 - 63	
1.	Central	7.0	
	Chimaltenango		3.7
	Guatemala		2.6
	Sacatepéquez		0.7
2.	Sur	34.5	
	Escuintla		12.8
	Suchitepéquez		17.0
	Retalhuleu		4.8
3.	Occidental	13.8	
	San Marcos		7.2
	Quezaltenango		6.6
4.	Occidental Media	3.5	
	Totonicapán		1.7
	Sololá		1.8
5.	Nor Occidental	13.2	
	Huehuetenango		7.6
	El Quiché		5.6
6.	Norte	9.5	
	El Petén		1.0
	Alta Verapaz		6.3
	Izabal		2.2
7.	Nor Oriental	4.7	
	Baja Verapaz		2.6
	El Progresso		0.7
	Zacapa		1.4
8.	Oriental	6.0	
	Jalapa		2.9
	Chiquimula		3.1
9.	Sur Oriental	7.7	
	Santa Rosa		3.7
	Jutiapa		4.0
TOTAL		100.0	

Suchitepéquez and Retalhuleu accounted for nearly 35 per cent of total corn production in 1963.

Corn production on the south coast is more mechanized than in the western sierra region. The level terrain and large farms on the south coast, coupled with government programs to promote the use of machinery, are the key factors accounting for the higher degree of mechanization.

About 75 per cent of corn production is used for human consumption. Of the remaining 25 per cent; about 15 per cent is fed to hogs, 8 per cent used in chicken feeds, and 2 per cent used for

seed. Most of the hogs produced in Guatemala are grown by farm workers and Indian farmers. Thus much of the corn used for hog production is probably low quality or spoiled corn that can not be used for human consumption. A substantial part of the corn used in chicken feeds is processed by the commercial feed mills in Guatemala City. Most of this corn comes from the departments of Escuintla and Suchitepéquez.

Given the importance of corn in Guatemala it is surprising how little information is available on corn marketing. There is far more reliable information on wheat production and marketing than on corn, even though farmers produce nearly 20 times as much corn as wheat. There is no reliable information, for example, on the amount of corn that moves through different marketing channels. Truckers play an important role in the commercialization of corn in some parts of the country. They usually buy directly from farmers at harvest time and resell the corn almost immediately to wholesalers in deficit areas. In the western sierra region, however, Indian farmers market much of their own corn in the weekly community markets or sell it directly to local wholesalers. Some corn moves into El Salvador during the harvest time and returns when wholesale prices have increased. As in the case of rice, official import-export statistics probably underestimate such movements.

The lack of storage and drying facilities for corn is of concern to government officials, wholesalers and farmers alike. Government officials are concerned because of the large losses of corn due to the shortage of facilities in the main production regions. Wholesalers are concerned because of the shortage of long term credit for constructing such facilities and because of the inadequacies of the laws governing the operation of warehouse facilities. Farmers are concerned because they feel that more storage and drying facilities would mean higher prices at harvest time. Most of the remainder of this chapter will therefore be devoted to an analysis of the storage requirements for corn.

REGIONAL CORN BALANCES

A first approximation of the volume of corn entering into commerce—and hence an idea of the demand for marketing services—can be achieved by estimating the supply and demand for corn at a regional level.[5] Data for 1964 are used because the 1964 Agricultural Census provides the best information on supply and demand at regional levels. The data are compiled for the nine major zones

5. Much of the material in this section was prepared by Phillip E. Church in February, 1969.

TABLE 7.4 ● REGIONAL SURPLUSES OR DEFICITS OF CORN, 1964

Zone	1964 Production (m. t.)	Projected Annual Increase (%)	Estimated[a] Marketing Losses (%)	Per Capita Consumption (kg/yr)	Surplus or (Deficit) (m. t.)
1	50, 177	1	9	142	(102, 618)
2	271, 294	5	14	160	138, 670
3	105, 437	4	12	171	(12, 608)
4	22,.784	2	9	171	(23, 669)
5	94, 829	3	12	171	(12, 840)
6	70, 684	2	26	108	7, 368
7	35, 185	2	8	125	(1, 458)
8	45, 126	4	11	147	2, 070
9	54, 689	5	9	138	3, 110
TOTAL	750, 205				

[a] Estimated losses given the existing grain storage facilities.

used by the Dirección General de Estadística in its tabulations. Projections for 1970, 1975 and 1980 are based on linear trends.

Regional Corn Supply

The 1964 production and regional surpluses and deficits of corn are presented in Table 7.4. The central sierra zones numbers 1 and 4, are the main deficit regions while zone 2 on the south coast is the only region with a large corn surplus. (Figure 7.1)

The effects of the government's colonization program in zone 2 are visible in the zone's 35 per cent share of national output. The extensive northern zone 6 which includes the departments of El Petén, Alta Verapaz and Izabal has also recently experienced a rapid expansion in corn production. The projected average annual increase in output for each zone is based on past performance and anticipated development efforts by the national government.

Surveys by the Dirección General de Mercadeo Agropecuario reveal wide differences in marketing losses among production zones. These differences are due to differences in storage, transportation and processing facilities. In projecting regional production, it was assumed that increased output will be accompanied by the additional marketing facilities necessary to prevent any increase in corn losses. Corn set aside for seed is assumed to remain equal to 2 per cent of output.

Projections of regional corn supply for 1970, 1975 and 1980 are presented in Table 7.5.

Regional Corn Demand

Corn consumption patterns vary among indigenous and ladino cultures and between urban and rural populations. INCAP's diet survey and census estimates of the population distribution were used to estimate per capita and total corn consumption for each of the nine corn production zones. Abstracting from the consumption effects of possible changes in real income and relative prices, the regional patterns of per capita consumption are expected to change very little during the next ten years.

Of more interest are the possible shifts in demand resulting from shifts in population between zones. Zones 1 and 4 have the major urban populations and are expected to experience the most rapid expansion of population. The extensive northern zone 6 will also grow more rapidly if government colonization programs continue at their current pace. Growth rates are based on changes in population by zone between the 1950 and the 1964 censuses.

TABLE 7.5 ● PROJECTIONS OF EFFECTIVE CORN SUPPLY BY REGIONS

Zone	Effective Corn Supply[a]		
	1970	1975	1980
1. Central	47,314	49,546	51,773
2. Sur	296,125	353,072	410,020
3. Occidental	112,438	130,573	148,708
4. Occidental Media	22,711	24,739	26,766
5. Nor Occidental	96,233	108,466	120,699
6. Norte	56,999	62,088	67,178
7. Nor Oriental	35,467	38,634	41,800
8. Oriental	48,682	56,534	64,385
9. Sur Oriental	63,275	75,442	87,613
TOTALS	779,244	899,094	1,018,942

[a]Projections in Tables 7-6, and 7-7 were prepared by Phillip E. Church, February 1969. Losses and corn used for seed are subtracted from gross supply to obtain effective supply.

Projections of corn consumption for 1970, 1975 and 1980 are presented in Table 7.6.

Regional Corn Balance for 1964

Very little information is available on corn movements in Guatemala. The estimated surpluses and deficits shown in Table 7.4 suggest that the major movements from excess (E) to deficit (D) zones are likely to be as illustrated in Figure 7.1.

The total deficit of all the deficit regions was about 20 per cent

TABLE 7.6 ● PROJECTIONS OF CONSUMER DEMAND FOR CORN BY REGION

Zone	Consumer Demand for Corn[a]		
	1970	1975	1980
1. Central	187,012	228,244	278,310
2. Sur	118,530	149,722	189,826
3. Occidental	120,842	137,378	156,992
4. Occidental Media	51,418	58,450	66,799
5. Nor Occidental	111,382	128,373	148,195
6. Norte	53,970	64,415	77,037
7. Nor Oriental	38,756	44,056	50,350
8. Oriental	42,398	46,861	52,439
9. Sur Oriental	53,314	60,605	69,263
SUBTOTAL	777,622	918,104	1,089,211
Industrial Demand	11,902	14,527	17,152
TOTAL	789,524	932,631	1,106,363

[a]Includes direct and indirect.

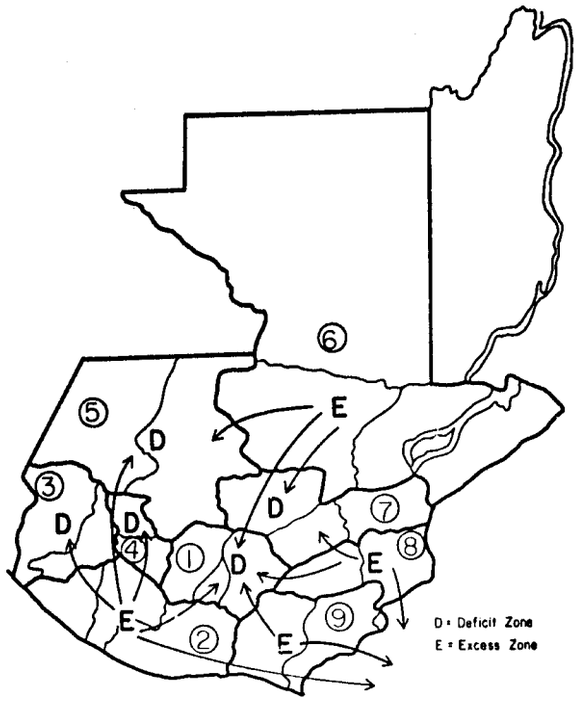

FIG. 7.1—Movement of corn from excess to deficit zones, 1964.

of total corn production for 1964. This figure is not an approximation of the share of corn output marketed. It does not include, for example, the industrial demand for corn in the deficit regions. Moreover, intrazonal and intradepartmental trade is excluded.

The surplus zones often market a large share of output during harvest periods and buy back corn in other seasons. The eastern and southeastern zones 8 and 9 are strongly influenced by demand and supply conditions in El Salvador, where marketing and storage facilities are more highly developed. Zones 8 and 9 frequently export corn to El Salvador during the harvest season and import corn later.

Projected Regional Corn Balances

Some changes in the deficit and surplus patterns are noticeable in the supply and demand projections for 1970, 1975 and 1980. Heavy-consuming zone 1 more than doubles its corn deficit by 1980. (Table 7.7) Population pressures in the major producing region, southern zone 2, are expected to reduce its share of the regional surplus. The projections indicate less than a doubling of

TABLE 7.7 ● PROJECTED SURPLUSES AND DEFICITS OF CORN BY REGION

Zone	Regional Surplus or (Deficit) 1970	1975	1980
1. Central	(139,698)	(178,698)	(226,537)
2. Sur	177,595	203,350	220,194
3. Occidental	(8,404)	(6,805)	(8,284)
4. Occidental Media	(28,707)	(33,711)	(40,033)
5. Nor Occidental	(15,149)	(19,907)	(27,496)
6. Norte	3,029	(2,327)	(9,859)
7. Nor Oriental	(3,289)	(5,422)	(8,550)
8. Oriental	6,284	9,673	11,946
9. Sur Oriental	9,961	14,837	18,350
SUBTOTAL (net)	+1,622	(-19,010)	(-70,269)
Industrial Demand	11,902	14,527	17,152
Projected Imports[a]	10,280	33,537	87,421

[a]Projected imports are based on the assumption that past trends in production and consumption continue during the 1970's.

the zone's surplus by 1980. The other noticeable change in production and consumption patterns is the conversion of northern zone 6 from a surplus to a deficit region due to population inflows and limited opportunities for expanded corn production.

According to these projections, the total deficit of all the deficit regions in 1980 will have risen to about 33 per cent of the effective corn supply. This is a 30 per cent increase over the 1964 share and a good indication of the increasing importance of corn marketing. Rural to urban population shifts in some departments indicate that

intrazonal corn marketing will experience a similar increase in importance.

CORN STORAGE REQUIREMENTS FOR 1970 AND 1980

Given the available information on corn supply and demand patterns it is possible to estimate current and anticipated storage requirements for efficient marketing operations. Such estimates are based on subjective criteria as well as the technical constraints of the market system. These criteria and constraints are discussed first to clarify the estimates of storage needs presented in the accompanying tables.

Existing Storage Facilities

The available statistics on existing storage facilities are extremely sketchy. The information available on grain silos is summarized in Table 7.8. These estimates of grain storage capacity include: (a) the facilities operated by INFOP, (b) the capacity reported by grain dealers having grain silos and (c) the grain silos or small granaries located on the parcelamientos.

According to available data, only 9 of the 22 departments have grain silo facilities. Two-thirds of the silo capacity reported in these 9 departments is located in Guatemala City. More than 60 per cent of this two-thirds is accounted for by the INFOP silos in Guatemala City which are used primarily for storing wheat. The total grain silo capacity is 29,236 m.t. INFOP controls nearly 53 per cent of the reported capacity. INFOP's silo facilities outside of Guatemala City account for about 12 per cent of Guatemala's total capacity and slightly more than 35 per cent of the silo capacity outside of Guatemala City. These facilities have not been used intensively in recent years.

No reliable information is available on the existing warehouse capacity used for storing grain. The best one can do is to make a judgement estimate based on the limited information available on grain turnover in storage facilities and the per cent of corn marketed in various zones.

Assuming an average turnover rate of 3.0, which may be somewhat high for Guatemala, it would require approximately 250,000 m.t. of storage capacity to store the corn now produced in Guatemala. A substantial part of this capacity requirement is probably provided by farmers using a corner of a room for corn storage and by small retailers with a few sacks of grain in a corner of their store. Our estimates of the amount of warehouse facilities needed to handle the grain presently produced and marketed within the

TABLE 7.8 ● SUMMARY OF GRAIN SILO CAPACITY BY ZONE

Zone	Department		Capacity (m.t.)
1. Central			19,440
	Guatemala	19,440	
2. Sur			4,445
	Escuintla	783	
	Suchitepéquez	2,903	
	Retalhuleu	759	
3. Occidental			833
	San Marcos	28	
	Quezaltenango	805	
4. Occidental Media			- -
5. Nor Occidental			148
	Huehuetenango	148	
6. Norte			- -
7. Nor Oriental			- -
8. Oriental			- -
9. Sur Oriental			4,370
	Santa Rosa	1,104	
	Jutiapa	3,266	
TOTAL			29,236

various zones are presented in Table 7.9. These figures do not represent the actual warehouse capacity that exists in the zones. They suggest, however, that between 100,000 and 130,000 m.t. of commercial grain storage capacity are probably available in the country in addition to the silo capacity reported in Table 7.8. A substantial part of this capacity probably consists of small single room storage units, but until a survey of grain warehouse facilities is taken there is no way to determine the extent of such capacity with any degree of certainty.

New Storage Facilities Needed

Given the lack of data on existing storage facilities it is impossible to determine exactly how much new storage capacity is needed

TABLE 7.9 ● WAREHOUSE CAPACITY FOR CORN STORAGE

Zone	Per Cent of Corn Marketed[a]	Warehouse Capacity Estimates[b]
1. Central	65	11,000
2. Sur	80	50,000[c]
3. Occidental	40	13,000
4. Occidental Media	50	4,000
5. Nor Occidental	40	13,000
6. Norte	50	12,000
7. Nor Oriental	50	6,000
8. Oriental	70	10,000
9. Sur Oriental	70	9,000
TOTAL		128,000

[a]Data on the percentage of corn marketed in the various zones are not available. These percentages represent assumptions based on discussions with personnel of the Ministry of Agriculture in Guatemala

[b]These figures are rough estimates of capacity needed to store marketed grain within the region if the average turnover rate is equal to 3. Figures for zone 2 take into account grain movement to zone 1.

[c]A substantial part of this capacity may in fact be located in Guatemala City.

to efficiently handle the existing corn production. We can, however, estimate how much new storage capacity will be needed to handle projected increases in corn production. Estimates of existing storage capacity can be used to estimate the amount of new storage capacity needed to replace existing facilities as they wear out.

Corn comes on the market unevenly during the production year. It is estimated that 88 per cent of total corn production is harvested during the six-month period, August through January. The monthly percentages of corn harvested are presented in Table 7.10. The percentages in Table 7.10 also represent rough estimates of the percentage of corn marketed during the various months. For a given quantity of corn moving into storage according to these percentages and assuming equal monthly drawdowns for consumption, the average turnover rate of the minimum amount of storage capacity needed to handle the grain would be 2.63.[6] Therefore an average turnover rate of 3 provides a fairly conservative estimate of the amount of storage capacity needed to handle a given volume of corn production.

Corn production is expected to increase by about 24,000 m.t. per year during the 1970's. Assuming that, on the average, 75 per cent of this corn enters the marketing system and that the average turnover rate of the storage facilities is equal to 3, an additional 6,000 m.t. of storage capacity will be needed each year to handle the increased corn production. At least another 6,000 m.t. of new capacity will be needed each year to replace existing facilities as they wear out. The total additional storage capacity needed during the 1970's is therefore equal to at least 120,000 m.t. More than half of this capacity should be constructed before 1975.

Considering regional grain movements and the percentage of production marketed in the various zones, it appears that about 20 per cent of the new capacity should be located in zone 1, 40 per cent in zone 2 and 11 per cent in zone 9. The percentages for the other zones are shown in Table 7.11. These percentages serve as rough guidelines as to where new facilities will be needed most to handle production increases. The percentage for zone 1 has been adjusted upward while the percentage for zone 2 was adjusted downward to take account of the large movement of corn from zone 2 to zone 1 during the harvest season. These percentages are based on the assumption that past production trends will continue during the

6. A minimum of 456 m.t. of capacity, for example, would be needed to handle 1,200 m.t. of corn. The 456 m.t. represents the peak inventory level which would occur in January if the percentage of corn marketed each month followed the figures in Table 7.10. The 2.63 turnover rate does not allow for any surplus storage capacity during the peak inventory month.

TABLE 7.10 ● PER CENT OF CORN HARVESTED AND MARKETED EACH MONTH

Month	Per Cent Harvested and Marketed
January	10
February	2
March	2
April	2
May	2
June	2
July	2
August	12
September	15
October	18
November	18
December	15
TOTAL	100

1970's. Any large scale program to increase corn production in any particular region of Guatemala would require a revision of the percentages shown in Table 7.11.

Assuming an average cost of Q90.00 per m.t. of storage capacity and associated equipment, it would cost Q5,400,000 to provide the 60,000 m.t. of storage capacity needed by 1975.

A Grain Storage Program

With the possible exception of Costa Rica, the existing grain marketing systems in Central America are far from adequate. The International Bank for Reconstruction and Development reported in 1967 that storage capacity as a proportion of total output of rice, beans and corn was 2.6 per cent in Guatemala, 17.5 per cent in El

TABLE 7.11 ● ADDITIONAL GRAIN STORAGE CAPACITY REQUIREMENTS FOR 1975 BY ZONE

Zone	Per Cent of New Capacity	Proposed Allocation of Storage Capacity to meet 1975 Requirements (in m.t.)
1. Central	20	12,000
2. Sur	40	24,000
3. Occidental	9	5,400
4. Occidental Media	2	1,200
5. Nor Occidental	6	3,600
6. Norte	3	1,800
7. Nor Oriental	2	1,200
8. Oriental	7	4,200
9. Sur Oriental	11	6,600
TOTAL	100	60,000

Salvador, 2.8 per cent in Honduras, 3.3 per cent in Nicaragua and 23.0 per cent in Costa Rica.[7] The bank was well aware that these percentages tend to understate the actual grain storage capacity in the countries, but they do illustrate that Guatemala is far behind El Salvador and Costa Rica in developing a modern grain storage system.

Guatemala has been slow in developing adequate storage

7. International Bank for Reconstruction and Development, International Development Association, *Economic Development and Prospects of Central America, Vol.* III, *Agriculture*, June, 1967, p. 21. The 2.6 per cent figure for Guatemala is based on a 1962 estimate of 17,800 m.t. of storage capacity and a reported 1965 output of 685,000 m.t. of corn, rice and beans.

facilities for several reasons. First, the government has been unwilling or unable to play a sizeable role in the storage and marketing of corn. Second, private grain dealers have been reluctant to construct modern storage facilities because of uncertainty about the government's policies on grain speculation. Third, there has been a shortage of long term capital for the construction of grain storage facilities.

The need for a grain storage program is obvious both to grain dealers and government officials. Equally obvious is the fact that no workable programs have been developed to meet the need. The outline for a possible grain storage program is presented in this section as a starting point. The program is based on the assumption that past trends in corn production will continue. It would have to be modified if a large scale program to increase corn production was undertaken.

The first step in modernizing the grain marketing system is to develop a workable warehouse law for grains. This step is already underway. The banking system will have to develop lending procedures that will make such a law useful to grain dealers. The Ministry of Agriculture will have to improve its market information and price reporting procedures for corn and will have to assist in the development and adoption of an acceptable set of corn grades.

The second step is to determine how much storage capacity is needed and where it should be located. This information is essential for obtaining and allocating funds for the construction of new facilities. A five year program designed to increase total storage capacity by 60,000 m.t. by 1975 was outlined in the previous section. The construction of 60,000 m.t. of storage capacity would require a total investment between Q4,500,000 and Q5,500 000 depending on the type and location of the facilities. Most of the facilities will probably be small metal bin units located in production regions. Concrete facilities or larger metal bin units may be justified at key population centers on the south coast or in Guatemala City.

The third step is to decide who is to operate the new storage facilities. This decision depends partly on the price policy adopted by the government. At the present time the government follows a price policy that would allow private grain dealers and farmers associations to earn a reasonable profit on the operation of new storage units.

According to our projections, if future corn production does not increase at a faster rate, Guatemala will have to import around 87,000 m.t. of corn by 1980. At the present time, importing corn at world prices and selling at domestic prices would be a fairly

profitable business and will probably continue to be so during the 1970's. This suggests that an import facility for grain at Puerto Barrios might prove to be a good investment. The facility would handle wheat during the early 1970's and both wheat and corn in the late 1970's. If INFOP were to operate such a facility it could devote more of its grain storage capacity in Guatemala City to corn storage.

A grain storage program for Guatemala could benefit farmers and consumers as well as grain dealers. Additional commercial storage facilities would help to reduce seasonal variations in corn prices in two ways: First, by increasing the competition for corn at harvest time the facilities would tend to raise the farm price of corn. Second, by reducing corn losses the new facilities would increase the supply of corn available for human consumption and thereby tend to lower consumer prices. It is estimated that at least 10 to 12 per cent of the corn marketed is being lost in the marketing system. With modern storage facilities it should be possible to reduce losses of grain handled by new facilities to at least 4 per cent.

If the new facilities were located according to the guidelines presented in Table 7.11, the total amount of grain saved per year would be around 14,500 m.t. At current prices this grain would be worth more than Q1,245,000. Assuming these savings could be realized for a 15 year period and using an 8 per cent discount rate, the present value of the grain saved would be more than Q10,650,000. If the new facilities cost Q5,400,000, the benefit-cost ratio would be approximately 1.97. This is not a particularly high benefit-cost ratio, but it does indicate that investment in the facilities would be definitely worthwhile from the standpoint of the country as a whole.[8]

The storage program that has been outlined above is based on the assumption that past trends in corn production will continue. With a large scale fertilizer program such as the one discussed in Chapter 9, total corn marketed would increase by an additional 100,000 m.t. per year within two or three years. Approximately 33,000 m.t. of new storage capacity would be needed to handle this additional corn. The construction of this capacity would add an additional Q2,970,000 to the cost of the storage program. The location of the new facilities would depend on where the fertilizer program was centered. A large scale fertilizer program centered on the south coast would require the construction of approximately

8. The benefit-cost ratio presented does not take into account benefits associated with more stable prices, reduced corn imports and reduced labor requirements to handle a given amount of grain. Such factors would tend to increase the benefit-cost ratio.

23,000 m.t. of new storage in zones 2 and 9 and 10,000 m.t. in zone 1. A fertilizer program focused on the central region would require an additional 10,000 m.t. of storage capacity in zone 1, 16,000 m.t. distributed between zones 3 and 5, and 7,000 m.t. of new capacity in zone 6.

PRICE POLICIES FOR CORN

Our goal in this section is to briefly outline past price movements for corn and to discuss the government's past price policies including the recent Grain Protocol for Central America.

Past Price Movements

The wholesale price of corn usually reaches its highest level in July and its lowest level in October at the peak of the harvest season. The average wholesale price of yellow corn during the 1966–68 period, for example, was nearly 40 per cent higher in July than in October. (Table 7.12) A farmer able to hold corn harvested in October until the following July would have received an average of 29 dollars per metric ton more for his product. This represents an average price increase of about three dollars per month over the 10-month storage period. At these prices, most farm storage units would pay for themselves within three to four years.

Average monthly wholesale prices for corn during the 1956–67 period are presented in Table 7.13. The average wholesale price for corn for the entire period was Q3.82 per 100 lbs. There was a slight tendency for corn prices to increase during the period. The average price of corn during the first four years of the period was Q3.89 per 100 lbs. compared to Q4.03 per 100 lbs. during the 1964–67 period. Thus, the price of corn, like prices of many other commodities in Guatemala, has been remarkably stable during the past ten years.

The guaranteed prices for corn set by INFOP since 1957 have usually been below the average wholesale price. INFOP's corn prices may have been favorable for short periods of time around harvest season, but they have usually been about Q0.50 per 100 lbs. below the annual average, and in three years during the eleven year period were over Q1.30 per 100 lbs. below the market. (Table 7.14) INFOP's apparent inability to buy at the market price could account for its failure to effectively use its silo facilities for corn. This in turn has reduced INFOP's ability to reduce the seasonal variations in corn prices.

TABLE 7.12 ● AVERAGE WHOLESALE PRICE OF CORN BY MONTH, 1966–68

Month	Yellow Corn		White Corn	
	Price Q/m. t.	% of Oct. price	Price Q/m. t.	% of Oct. price
January	80	109.6	80	108.1
February	79	108.2	82	110.8
March	88	120.5	92	124.3
April	95	130.1	97	131.1
May	92	126.0	95	128.4
June	96	131.5	97	131.1
July	102	139.7	93	125.7
August	86	117.8	84	113.5
September	77	105.5	76	102.7
October	73	100.0	74	100.0
November	80	109.6	80	108.1
December	81	110.9	81	109.4
AVERAGE	86	--	86	--

The Grain Protocol

The price policy adopted for corn in Guatemala may well be influenced by the Special Protocol on Grains which came into effect for the five Central American countries in mid-1966.[9] This agreement eliminated the tariffs and quantitative barriers on trade in grains between the countries, except for corn movements between El Salvador and Nicaragua. Thus the five countries now have virtually a free trade area in grain except for wheat and flour for which the local flour mills strongly supported the maintenance

9. For additional information on the Protocol see: International Bank for Reconstruction and Development, International Development Association, *Economic Development and Prospects of Central America, Vol.* III, *Agriculture,* June, 1967, p. 22.

TABLE 7.13 ● MONTHLY WHOLESALE PRICES FOR CORN (Q per 100 lb)

Month	Year											
	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
January	4.48	4.00	3.63	3.13	3.05	2.67	4.16	4.00	3.62	3.50	3.32	3.30
February	4.17	3.40	3.48	3.23	2.98	2.00	4.50	4.00	3.50	3.50	3.40	3.49
March	4.13	3.48	3.70	3.40	3.25	2.12	5.50	3.50	3.50	4.50	3.76	3.90
April	4.70	4.35	4.20	4.17	3.65	2.55	6.00	3.50	4.50	4.50	3.77	4.36
May	5.02	4.47	4.37	4.32	3.68	3.32	5.15	3.90	4.50	5.50	3.69	4.31
June	4.80	4.41	4.15	4.52	3.25	3.65	5.02	4.00	4.62	5.50	3.29	5.09
July	4.53	4.55	4.87	4.37	3.58	4.70	5.00	4.00	5.07	5.50	3.00	4.97
August	4.40	4.42	4.58	3.40	2.93	4.30	4.55	4.00	4.75	5.50	2.56	4.60
September	3.53	3.60	3.58	2.97	2.50	3.42	3.50	4.00	4.05	3.50	2.40	4.48
October	3.30	3.47	3.22	3.25	1.93	3.40	2.87	3.50	4.00	5.50	2.54	4.17
November	3.63	3.27	3.15	3.25	2.78	4.17	2.87	3.00	4.50	3.50	3.00	4.32
December	3.70	3.67	3.35	2.87	2.00	4.58	3.00	4.00	4.06	3.50	3.02	4.30
AVERAGE	4.20	3.92	3.86	3.57	2.96	3.41	4.34	3.48	4.22	4.50	3.15	4.27

TABLE 7.14 ● INFOP'S GUARANTEED PRICES FOR CORN

Year	Central Silo	Regional Silos	Difference between INFOP's Central Silo Price and Avg. Wholesale Price
1957	3.50	3.30	-0.42
1958	4.00	--	+0.14
1959	3.00	--	-0.57
1960	3.10	2.90	+0.14
1961	--	--	--
1962	2.00	--	-2.34
1963	2.50	--	-0.98
1964	2.90	2.65	-1.32
1965	3.00	2.75	-1.50
1966	3.25	3.00	+0.10
1967	3.75	3.75	-0.52
1968	3.75	3.75	--

Source: 1957-66: Escobar Colindres, Luis Felipe, Soluciones Practicas al Problema de la Comercialización de Granos en Guatemala, September 1966.

1967-68: INFOP.

of protected national markets. While the common external tariff on grain imports is fairly high, most grain imported from outside of Central America is handled by state grain boards that are exempt from duty payments. INFOP performs this role in Guatemala.

The key provision of the grain Protocol is that each grain board must give first priority, in meeting deficits, to imports from other Central American countries. Imports from the outside can only be made after consultation with the other countries, and will have to pay a duty equal to the difference between the import price and the official internal support price. The main purpose of the Protocol is thus to provide an incentive for the Central American

countries as a whole to remain self-sufficient in grain production except for wheat.

The coordinating commission for the Protocol has yet to establish a clear-cut long-run price policy for the Central American area. Thus, while the Protocol tends to limit the actions that can be taken by the Central American countries with respect to price policies, the various governments still have a great deal of flexibility in deciding on the type of price policies which they will follow.

Price Policy Suggestions

Our interpretation of INFOP's past price policies is that it has attempted to set a floor on corn prices but has not been especially interested in reducing seasonal price variations. It could have used a more flexible price policy that would have resulted in a high average floor price while at the same time reducing seasonal price variations. INFOP, however, does not have enough storage capacity to reduce substantially the average wholesale price of corn and therefore probably could not have reduced seasonal price variations to any great extent even if it had wanted to. Assuming a price elasticity of 0.7 and the use of about 50 per cent of its Guatemala City capacity for corn, INFOP would be able to alter the average wholesale price by about four to five per cent during the year by effectively using its facilities for the purchase and sale of domestic corn. A somewhat larger effect on prices could be obtained through importing, or threatening to import, corn from outside of Central America.

INFOP needs to become a more aggressive competitor in the corn market. By buying and selling corn at the going market price INFOP would be able to provide storage capacity that is not now being used, while at the same time earning a profit that could be earmarked for the construction of new facilities. A flexible price policy would add competition to the market which should tend to increase farm prices and to reduce seasonal price variations. Once INFOP has effectively demonstrated its ability to profitably use its existing facilities, it could begin adding some storage capacity at key locations. It was suggested previously that the greatest need for new capacity is on the south coast and that an import facility in Puerto Barrios might prove both useful and profitable if operated efficiently by INFOP.

Any price policy designed to eliminate all seasonal price variations would not be desirable. A certain degree of price variation is needed during the year to encourage investment in storage facilities. Thus it would seem advisable for the government to allow the wholesale price of corn to experience an average increase

of at least Q1.00 per metric ton per month between corn harvests. An average annual price change of Q14 to Q15 per metric ton would still be only one-half as large as recent seasonal price variations.

Any effort on the part of the government to increase substantially the farm price of corn as part of a corn production program would not appear advisable. First, the government does not control enough storage capacity to support such an effort. Second, even if the storage capacity was available, it would be a tremendously expensive and potentially wasteful program. Third, corn prices in Guatemala are already very high relative to world prices. Fourth, the program would not benefit consumers and may be of only short-run benefit to farmers. Fifth, high support prices for corn would discourage farmers from diversifying into other crops. Sixth, higher prices for corn would encourage farmers to shift out of wheat, rice or bean production and thereby create new problems.

Any effort to substantially increase corn production should concentrate on increasing output per unit of land and should be supplemented by a program to minimize reductions in the farm price of corn. INFOP's active participation in the corn market would help prevent price declines to some extent. The storage program outlined previously could play an even more important role in the government's efforts to prevent a decline in the farm price of corn.

CHAPTER EIGHT

MARKETING OF BASIC FOODS

THE GUATEMALAN GOVERNMENT leaves most of the food marketing to private individuals. It does, however, attempt to limit their actions in some ways. It controls beef exports and sets the maximum retail price for certain cuts of meat. It sets the retail price of pasteurized milk. It inspects imported food products as part of its disease control program. It tries to assure that only healthy animals are processed and sold by slaughter houses. It sets a minimum price for wheat and buys and sells some corn.

The government provides the food marketing sector with a limited amount of assistance. Part of the price information collected is distributed eventually to farmers and wholesalers, but seldom quickly enough to be of much value. Market outlook information is available occasionally in special reports. Some work is being done on establishing grades and standards for a few food products. Various government agencies have, from time to time, developed plans for investments in food marketing facilities. Few of these plans have been implemented, however, because the planners have been unable to demonstrate to lending agencies that the investments were in fact bankable. The government's cooperation in the Central American Common Market has facilitated the exportation of a number of food products, especially vegetables. The construction of new roads and the improvement of old ones has undoubtedly helped to cut transportation costs and to increase the size of the market open to farmers.

In general, the government appears to have been very rational in selecting which aspects of food marketing it will attempt to regulate and the methods of control. The technology and consumption patterns of the wheat industry, for example, are such that the government can exercise a good deal of control over the price of wheat.

The situation is completely different in the case of corn, and the government has limited its actions to a small purchase, storage and import program. The government appears to have weighted the foreign exchange earnings from beef exports more heavily than the resulting higher retail prices of beef. It has, therefore, made limited use of its power to control beef exports.

The government's ability to control various aspects of food marketing will probably continue to be limited. Whether it will use its limited resources any differently in the future will depend partly on how its goals change.

VEGETABLES

Guatemala's geographic and climatic variations allow the production of a wide variety of vegetables. Its lowland valleys and coastal plains are ideal for irrigated winter production of warm season vegetables. Irrigated highland areas of 3,000 to 6,000 feet elevation produce three to four cool season crops per year. In highland areas between 6,000 and 9,000 feet it is possible to produce cool season crops eight months of the year.

Production Areas

Guatemala's major vegetable producing areas can be classified into three general groups by temperature:

1. Tropical (0 to 3,000 feet)
2. Sub-tropical (3,000 to 6,000 feet)
3. Cool (6,000 to 9,000 feet).[1]

Tropical. The Teculután and Zacapa area in the Motagua River valley has the hottest and driest climate in Central America. It has the largest vegetable producing area and accounts for most of Guatemala's tomato, cucumber and pepper production. This area is also well suited to the production of onions, melons, eggplant and okra.

The areas around Jocotán in the department of Chiquimula and around Laguna de Retana, Asunción Mita, and Atescatempa in the department of Jutiapa also are well suited for the production

1. Much of the material presented in this section is a summary of Atlee, Charles, *Vegetable Production in Guatemala*, January, 1968, USAID/Guatemala report. Other USAID reports on vegetables include: (a) Gailahue, Edward E., *Marketing of Fresh Fruits and Vegetables in Guatemala*, 1964; (b) Jenner, George K., *Processing of Fruits, Vegetables and Related Data*, 1964; (c) Pearl, Robert, *A Study of the Technical Development of the Guatemalan Fruit and Vegetable Processing Industry*, 1965.

of onions, tomatoes and peppers. These areas are well located with respect to the market in El Salvador.

Sub-Tropical. A wide variety of irrigated vegetables for local consumption and export are produced in the areas around Guatemala City, Amatitlán and Villa Nueva. Water is limited and land is expensive in these areas but they have a locational advantage in the marketing of green leafy vegetables and strawberries.

The Antigua area has been a vegetable producing area for more than four hundred years. It supplies a wide variety of good quality vegetables to both the Antigua and Guatemala City markets. Palencia is the chayote and husk tomato producing center of the country. Some green beans, potatoes, cabbage and cauliflower also are grown in this area. About 80 per cent of the garlic comes from the Aguacatán valley in Huehuetenango. Much of the garlic is exported to other Central American countries.

Cool. Onions, beets, cabbage, carrots, cauliflower, lettuce, celery, potatoes and radishes are the most important vegetables grown in the Quezaltenango area. Much of the vegetable production in this area is carried out on small family plots averaging about one-tenth of an acre.

Cabbage, cauliflower, lettuce, peas, beans and squash are the most important vegetables grown in the San Lucas-Milpas Altas area. Potatoes are the major vegetable grown in the Chimaltenango-Tecpán area. Onions, strawberries, tomatoes, cabbage and garlic are the most important vegetables grown in the Sololá area.

Domestic Marketing

Tomatoes are the most important vegetable for processing. Approximately 16,000 m.t. of tomatoes were processed during the 1966–67 season. About 80 per cent of these tomatoes were supplied to the four main processing firms by the Tecelután Tomato Cooperative.[2] Peppers and peas also are processed on a limited scale in Guatemala.

The market for fresh vegetables historically has been characterized by wide variations in prices due to fluctuations in vegetable supplies. These fluctuations have been reduced recently by improvements in market news reporting, storage facilities, processing facilities and the transportation system. The increase in irrigated acreage also has helped by allowing year-round production of some vegetables.

2. The two largest firms, Kerns and Ducal, are owned by W. R. Grace. Del Monte brand foods are processed, under license, by Sharp.

When harvested, most vegetables are washed and packed into rope nets that pull together at the top with a drawstring. These bundles are then carried to the road where they are picked up by a bus or truck and taken to the market. Produce may pass through three or four middlemen between producer and consumer. There is almost no grading of vegetables except for some unofficial grading of a few crops such as garlic and potatoes. Grading at an early stage in the marketing process may have little value anyway because of careless handling procedures used at most points where products are loaded and unloaded. Except for tomatoes, most vegetables are not packed in suitable standardized containers. Very few vegetables are stored except for some potatoes, garlic, onions and squash. Potatoes are seldom stored for more than three to four months.

Export Possibilities for Vegetables

There seems to be general agreement that Guatemala has the potential to profitably export vegetables to the United States. Manasero, in his final report to AID-Guatemala listed tomatoes, sweet peppers, cucumbers, garlic, okra, melons and pineapples as the commodities having the most potential.[3] There is some production of most of these products during the November to February period when prices are usually high in the United States market. Exportation costs for these products range from about 8 to 17 cents a pound. (Table 8.1) The price data provided by Manassero suggest that prices in the New Orleans market during 1966-67 were high enough to allow exporters to earn a profit on several commodities *if* they could have delivered high quality produce when wholesale prices were near their peak. Margins would have been largest on garlic, tomatoes and okra. Exportation of onions to the United States probably would not have been profitable even if top prices were received.

It seems rather doubtful that Guatemala will be able to export vegetables to the United States on a large scale within the next five years. Transportation, either by air or sea, is not as dependable as needed. Furthermore, production and marketing procedures will need to be developed to assure that only top quality vegetables are shipped and that they are harvested at the right time for export purposes. This probably will prove to be a very slow job.

At the present time most vegetable exports are to other Central American countries, especially El Salvador. Potatoes, cabbage, garlic, onions, tomatoes, lettuce and carrots are the most important

3. Final report of Manassero, James R., USAID/Guatemala, August, 1967.

TABLE 8.1 ● WHOLESALE PRICES FOR SELECTED VEGETABLES IN NEW ORLEANS

Product	Per Pound Cost of Exportation[a] (cents)	Wholesale Price in New Orleans: 1966-67		
		Highest Price (cents/lb)	Month	Price during harvest season in Guatemala (cents/lb)
Eggplant	8.6	15.0	June	11.0
Cantaloupes	9.8	18.0	Mar.	--
Tomatoes	13.0	30.0	Dec.	25.0
Watermelons	8.9	15.0	Feb.	--
Cucumbers	9.7	19.0	Mar.	15.0
Sweet Peppers	11.3	35.0	Apr.	18.0
Onions	7.9	8.5	Feb.	7.0
Pineapples	7.3	12.0	Dec.	--
Okra	17.1	35.0	Apr.	25.0
Garlic	13.5	59.0	Mar.	50.0

Source: Final Report of Manassero, James R., USAID/Guatemala, August 1967.

[a]Export costs include: sales commission, duty, brokerage fees, transportation, cartons, handling, preparation for shipment.

export crops. Cool season vegetables are in greatest demand because they are difficult to produce in many parts of Central America. The prospects for increasing vegetable exports to other Central American countries appear to be very promising. The government's continued attention to trade agreements and procedures will undoubtedly facilitate such exports.

Major Problems Facing the Vegetable Industry

Poor quality and high production costs are two of the most important factors limiting increases in vegetable exports and processing. The cost of producing a pound of vegetables in Guatemala is often higher than in the United States because many growers still do not know how to use fertilizer, insecticides and fungicides effectively. Furthermore, cultivation practices are frequently very crude, and irrigation water is often used improperly.

Little research data exists on vegetable production in Guatemala. Little is known about which varieties are best to plant in different zones at different times of the year or about the most effective ways to control insects and diseases under Guatemalan conditions. Only limited data are available on the cost of producing vegetables.

There are very few well trained technicians in vegetable production in Guatemala. Many vegetable producing areas have no extension agents capable of providing technical assistance to vegetable growers. The Bárcena School gradually is helping to improve this situation.

There are few reliable statistics related to acreage, production, exports and prices of vegetables in Guatemala. The possibility of providing vegetable producers with either market or outlook information appears very limited given the existing data collection system.

FRUITS

At least three agencies of the Ministry of Agriculture are engaged in developing the fruit industry. These are the Dirección General de Desarrollo Agropecuario, the Dirección General de Investigación y Extension Agrícola (DGIEA), and the Dirección General de Mercadeo Agropecuario. The Banco de Guatemala, the Coffee Association, FAO, and a number of other public and semi-public agencies are also interested in the development of fruit production in Guatemala.[4]

4. Much of the material presented here on fruit production is drawn from the work of Vorhies, R. M., especially *Fruit Production in Guatemala*, USAID/Guatemala report, July 1967.

In general, the Dirección General de Desarrollo Agropecuario is responsible for supplying prospective fruit growers with planting stock and helping them to arrange credit. DGIEA is charged with doing the research work required to select the best varieties of fruit and to develop appropriate orchard practices. The Dirección General de Mercadeo Agropecuario is responsible for conducting research designed to improve the efficicency of fruit marketing and to increase the profitability of fruit production.

The government has carried out a number of marketing studies for fruit and has proposed the construction of several marketing centers and storage facilities which it believes will encourage fruit production.[5] The government's main emphasis has been directed toward encouraging farmers to produce more fruit on a commercial scale.

The FAO and the Asociación Nacional del Café have a joint program for the replacement of marginal coffee acreage with citrus, mangoes and other fruit crops. Dairying, tea production and oil palms also are being considered for some coffee producing areas. According to the FAO studies, dairying would produce about the same gross output per hectare as coffee production, while tea, oranges or oil palm would more than double gross output. Considering employment, a substitution of coffee by oil palm or oranges would bring no change, while tea would employ about three times as much hand labor as coffee. Dairying would require about 20 per cent of the men previously employed in coffee production. The number of years to break even would be 5–6 years on a new coffee plantation vs. 7 years for dairying and oranges, 10 years for oil palm and 11 years for tea.[6]

It appears likely that coffee producers will move slowly into some of these products. The FAO's orange project probably will be of most interest to coffee farmers because it requires relatively little change in their operations, and prices are currently favorable. It seems unlikely that coffee farmers will move into citrus fruit production on a large enough scale to create serious marketing problems. It should be relatively easy for the coffee producers' association to keep track of the citrus fruit acreage. With such information it would be possible to anticipate marketing problems and to take steps to solve them before they actually occur.

There appears to be adequate information on the orange varieties that will do well in Guatemala. Washington navel oranges are grown in the highland regions and appear to do well between 3,000 and 5,000 feet. Some varieties do well on the south coast between 1,500 and 2,000 feet.

5. For further details see *Projecto Para el Fomento de Frutales Deciduous en el Altiplano*, report by Ministerio de Agricultura and Banco de Guatemala, 1967.
6. Preliminary estimates based on FAO studies.

Although the domestic demand for oranges is expected to be fairly strong, there is an element of risk involved in FAO's orange project due to the uncertainty about the Central American market for oranges during the next 10 years. Large citrus plantings already have been carried out in Central America and others are being planned. Thus the possibilities for exporting fresh oranges appear limited.

Apples are the most important temperate zone fruit grown in Guatemala. Apple production is presently less than the domestic demand. Apples are grown throughout the highland region with the greatest production in the Quezaltenango area. The best altitude for apples appears to be between 7,000 and 8,000 feet. One of the problems of establishing orchards at this altitude is supplying enough irrigation water during the dry season for the first few years until the root systems are established. There is still some debate as to what are the best apple varieties for Guatemala.

The major pear growing area is in the Department of Chimaltenango near the towns of San Lucas and San Bartolomé. Quite a few pears also are grown near Cantel in the Department of Quezaltenango. Pears usually are better suited to lower altitudes than apples. Pear nectar is canned domestically, and there is some interest in canning pear halves and fruit cocktail. There is a small domestic market for fresh pears, but local pears are not very good for eating fresh. Little or no information is available yet on the possibility of growing Bartlett pears commercially in Guatemala.

There are a few commercial plantings of peaches. Most local peaches are small, white-fleshed types. Yellow cling peaches are needed for canning fruit cocktail and peach halves. There should be no problem in marketing good yellow peaches. The main problem appears to be the lack of information on suitable varieties.

Plums have been grown in Guatemala for a long time. The size of local plums frequently is small and the domestic demand is fairly weak. The quality of local plums is the main factor limiting export to other Central American markets.

The potential for increasing production of other deciduous fruits is limited. Sweet cherries do not seem to be well suited because of lack of winter chilling and the brown rot problem. Apricots are seriously affected by brown rot. Figs seem to do well in the middle elevations but very little information is available on the possibility of establishing a dried fig industry There is some production of persimmons but the domestic market is small.

Several types of bushberries are being grown in both commercial and backyard plantings. The domestic market is small, but some probably could be exported to other Central American countries as jams and jellies. Strawberries are grown on a small scale

around Lake Atitlán and Lake Amatitlán. The size of the fruit is small and yields have been low, however. The demand for good strawberries, both domestically and for export, is strong but there is little research available on which varieties are suitable. Grapes do poorly in most areas. A market exists for grapes, but there is very little information on whether or not new varieties can be grown successfully.

It is possible that cashews could be grown on a small scale on the south coast. Little is known about the possibilities of producing most other types of nuts, however.

Many types of wild or semi-wild citrus trees are found in Guatemala. Oranges are grown successfully and enjoy a good market. Tangerines are grown widely and are popular in the domestic market. Lemons and limes are grown on a small scale. The possibility of exporting some limes looks promising, but commercial production is still limited. Production of grapefruit is scattered. Quality of the present product frequently is poor. The domestic market for good quality grapefruit is small.

Guatemala is the native home of one of the three types of avocados. Much of the domestic production is of poor quality, however. Export of avocados to the United States has been prevented by the seed weevil quarantine. A great deal of research will be needed to increase the quality of the crop.

Mangoes grow wild throughout Guatemala up to about 4,000 feet elevation. Fruit flies are a problem in some areas. Additional research is needed on varieties. The commercial production of mangoes may be possible, especially if varieties could be introduced that ripen before or after the Florida mid-summer mango harvest.

Pineapple is grown throughout the warmer regions. Attempts to grow pineapple on a large scale have not been entirely successful, but the development of new varieties and new production techniques may change this situation.

Commercial production of papaya has not been very successful in the past and there is little evidence to suggest that it will be in the future.

Although coconuts are grown in many places in Guatemala, nearly all are sold for drinking, and it is doubtful that a copra industry could be developed. Oil palm may have some possibility, but United Fruit Company's plantings of African oil palm on both coasts have not been particularly successful so far. Olive production has not been successful because they never fruit.

Several types of marketing problems affect fruit production. The quality of much of the fruit produced is rather low. This is due only partly to the varieties grown. In many cases, the quality could be improved considerably by better disease and insect con-

trols, use of better harvesting methods and improved handling of the fruit after it is harvested. The small scale of fruit production creates marketing problems by limiting the possibilities for expanding the processing industry for canned fruits, juices, jams and jellies.

A limited amount of continuous research is needed on varieties and production techniques for a few fruits. The most promising fruits appear to be apples, peaches, oranges, tangerines and oil palm.

MEAT, FISH AND DAIRY PRODUCTS

The main marketing problem affecting the meat industry is the lack of adequate slaughter and refrigeration facilities. This situation probably will improve gradually over the next twenty years as the road system is improved and regional slaughter houses replace the municipal slaughter houses.[7]

The lack of adequate port facilities frequently is cited as the main factor slowing the growth of the fishing industry. The limited consumption of fish appears to be due primarily to an inadequate meat distribution system. The price of fish is competitive with prices of the better cuts of beef and pork. Once adequate refrigeration facilities are available, the consumption of fish undoubtedly will increase.

Beef

Cattle farmers in Guatemala usually are fairly large farmers. About 65 per cent of their stock are straight criollo cattle. First and second cross cattle from criollo cows and from Brahman, Santa Gertrudis, Charolais, Holstein, Brown Swiss and Jersey bulls make up about 30 per cent. Purebred and third cross or better make up about 5 per cent of the cattle. A number of good registered foundation herds are now established and contributing a great deal to upgrading beef herds throughout the country.

Most of the cattle marketed are grass fed. More than 50 per cent of the cattle are raised in five departments on the south coast. Grass in this area is plentiful during the rainy season, but very short by the end of the dry season. This, along with the difficulties in curing roughages during the wet season, makes it difficult to maintain a normal plane of nutrition for range fed cattle.

Cattlemen have shown little interest in using available byproducts for fattening cattle. Their lack of interest stems partly from the fact that there is very little price incentive and a very

7. Some suggestions and technical information related to refrigeration can be found in Phaklides, William, *Preliminary Survey of Refrigeration and Cold Storage Facilities in Guatemala*, USAID report, October, 1967.

limited market for high quality beef in Guatemala. As the market for grain fattened beef expands, cattlemen undoubtedly will become more interested in the use of by-products such as cane molasses, cottonseed hulls and corn stalks.

Cattle producers have been especially interested in credit for the purchase of feeder cattle and for herd improvement. The Banco de Guatemala has responded to this interest by making some 40 million quetzales available to ranchers since 1961.

A large part of the recent interest in expanding beef herds is due to the favorable export situation. There are two beef exporting companies. Their volume of exports grew from 1,150,000 m.t. in 1961 to 8,283,400 m.t. in 1967. (Table 8.2) Beef exports by these companies nearly tripled between 1961 and 1962, and nearly doubled between 1962 and 1963. The rapid rate of increase in beef exports during this period was not matched by increases in the cattle population. Exports were only 17 per cent of the internal consumption, but the rapid increase in exports caused domestic shortages. As a result, meat exports were regulated by Decree Law No. 245 on July 9, 1964. The export quotas are fixed by the Ministerio de Economía. In practice, the export quotas have not limited beef exports, but this situation may change in the near future.

TABLE 8.2 ● BEEF EXPORTS OF TWO EXPORT COMPANIES

Year	Volume (1000's of m.t.)	Value (1000's of Q)	Average Price (Q/kg)
1961	1,150.0	834.0	72.5
1962	3,088.3	2,260.1	73.2
1963	6,114.2	4,542.5	74.3
1964	5,631.3	4,343.0	77.1
1965	4.713.3	3,839.3	81.4
1966	5,453.7	5,557.8	101.9
1967	8,283.4	7,884.0	94.6

Source: Export companies.

The United States also established a quota system for beef imports in 1964.[8] United States imports from Guatemala were less than the quota up until 1968. In September, 1968, the United States requested beef exporting countries to establish voluntary quotas on beef exports. The Ministerio de Economía fixed the beef export quota for 1969 at 21,400,000 pounds—which is the voluntary quota recommended by the United States. The United States import quotas on beef from Guatemala are not expected to increase by more than 3 to 5 per cent per year. The export quotas set by the Ministerio de Economía are therefore enforced by the United States and could prevent exporters from shipping as much beef to the United States as they would like.

The domestic price of beef is fixed by the Ministerio de Economía. The maximum wholesale price for beef is currently set at Q0.27 per pound. The maximum retail price depends on the cut of beef. The maximum price on ordinary stew beef is Q0.27 per pound. The maximum prices for most of the better cuts of beef range from Q0.47 to Q0.55 per pound. There are no maximum prices set on the top cuts.

Price controls on beef are not enforced. Their main effect is to establish the maximum price that the slaughter houses are willing to pay for live animals.

The average export price of beef is currently around Q0.45 per pound. Thus there is little incentive to sell beef domestically if it can be exported.

Domestic beef prices remained fairly stable between 1956 and 1962, and then increased gradually up to 1965 when they began to increase fairly rapidly. The price increases are due to the rapid increases in exports coupled with the slow rate of increase in production.

Per capita beef consumption declined from 8.6 to 5.6 kilos between 1960 and 1967—a decline of about 35 per cent. (Table 8.3) Per capita income grew fairly rapidly during this period. Comparing the trends in per capita incomes, beef consumption and prices, it appears that the higher prices have more than offset the effects of higher income on beef consumption. Part of the decline in beef consumption was due to a change in the price of beef relative to chicken. The increased consumption of chicken has made it easier for the government to allow the increased beef exports.

Other than export limitations, beef exporters do not appear to have any marketing problems which they are unable to solve on their own. The two processing plants for beef exports are inspected periodically by the USDA to assure that they meet USDA standards.

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8. Public Law 88–482 passed in August, 1964.

TABLE 8.3 ● BEEF YIELDS, CONSUMPTION AND PRICES

Year	Average Yield Per Head[a] (kg)	Consumption per Capita[a] (kg/yr)	Average Wholesale Price of Beef[b] (Q/kg)	Average Retail Price of Top Cuts[b] (Q/kg)	Average Retail Price of Stew Beef[b] (Q/kg)*
1956	170	8.8	0.217	0.848	0.522
1957	174	8.9	0.326	0.870	0.522
1958	170	8.9	0.283	0.870	0.522
1959	170	8.6	0.261	0.870	0.522
1960	174	8.6	0.261	0.870	0.522
1961	174	8.1	0.283	0.870	0.522
1962	165	6.8	0.283	0.870	0.522
1963	165	7.0	0.304	0.913	0.522
1964	170	7.0	0.304	0.935	0.522
1965	165	6.6	0.304	1.022	0.543
1966	156	5.6	0.304	1.130	0.543
1967	156	5.6	0.304	1.109	0.543

Source: (a) Banco de Guatemala, Programa de Desarrollo de la Ganadería Bovina de Carne en la Costa Sur, 1968.
(b) Dirección General de Estadística.

*Actual market prices are generally higher than reported fixed prices.

There have been no serious sanitation problems for beef exports. These plants also supply part of the beef consumed in Guatemala City.[9]

Slaughtering facilities outside of Guatemala City leave much to be desired when it comes to sanitation. Furthermore, little attention is given to sanitation in either the transportation or the retailing of beef. Thus improving the slaughtering facilities would solve only part of the sanitation problem of meat marketing.

9. For more detailed information on the slaughter houses supplying Guatemala City see: Snyder, R. W., *A Study on the Production and Distribution of Meat for Guatemala City*, USAID/Guatemala report.

As the cattle industry shifts from the south coast to the north coast, the need for slaughtering facilities near Puerto Barrios will increase. Such facilities would handle beef exports.

Pork

Hogs are produced in relatively small numbers in practically all departments. The bulk of the hog production is on farms of less than seven hectares. Unlike cattle raising, most of the hogs produced are grown by farm workers and Indian farmers. These farmers retain one or two hogs for their own use and sell the balance to local hog buyers. The buyers drive the hogs to nearby towns and sell them to butchers where they are slaughtered and sold to retail merchants or directly to consumers.

There are very few specialized hog producers. They are located mostly in the corn producing areas in the departments of Escuintla, Jalapa and Jutiapa. These departments supply a large percentage of the pork requirements of Guatemala City. Most other departments produce only enough hogs for their own use.

There appear to be no serious marketing problems for hogs. Most of the hogs are marketed under rather unsanitary conditions compared to United States standards; but the scale of most operations is too small to justify the investments that would be needed to improve conditions substantially.

The price of pork is nearly double the price of beef. This is more of a supply problem than a marketing problem. The supply problem in turn is basically a feed problem. The hogs on small farms are usually scavengers. They consume low quality grains and other food items that cannot be used for human consumption. Hogs on many large farms also serve as a means of marketing low quality grains and agricultural by-products.

Hog numbers have increased rapidly since 1964. This increase is due in part to the high price of pork and in part to the development of the prepared animal feed industry in Guatemala. The increased pork production has helped to offset the decline in per capita beef consumption. Several firms have been established recently which specialize in prepared pork products such as pork sausage. These firms will provide a growing market for better grade hogs as domestic consumption and exports of their products increase.

Milk

The major dairy production areas in their order of importance are the departments of Jutiapa, Santa Rosa, Escuintla, Guatemala

and Suchitepéquez. The average daily production per cow for the country as a whole is around 2.8 liters. The average daily production per cow in the department of Guatemala is about 4.6 liters. The higher production in the department of Guatemala is due to better herds, a more favorable climate, better herd management and better feeding programs.[10]

Dairy herds range from 5 to 40 cows, with a few large herds of up to 1,000 cows. The majority of the herds are made up of native criollo and Brahman cows. Most dairy operations are dual purpose, producing both milk and beef. In many cases, the dairy operation is more or less a side business.

Dairy farmers do not consider dairying to be a very profitable business. The main reason is that the price of pasteurized milk has been fixed at the same level for about 16 years while the cost of production has increased. As a result, fresh milk is frequently adulterated by the addition of water and dried milk. Milk produced in some areas on the south coast is shipped to El Salvador in order to obtain higher prices.

No evaporated or condensed milk is produced at the present time. The government's Prolac plant at Asunción Mita, however, does produce some powdered milk. About 150,000 pounds of powdered milk were produced in 1967.

According to the Dirección General de Mercadeo Agropecuario, there were 12 plants in 1966 that processed at least 2,000 liters of milk a day for the production of cream, ice cream, cheese and butter. The number of smaller plants was not specified, but their total production was estimated to be about 5,500 liters per day.

The four large pasteurizing plants in Guatemala City have a total capacity of 91,000 liters a day. These plants worked at about 50 per cent capacity in 1967 although total milk consumption in Guatemala City was about 200,000 liters per day. The plants have collection centers in the milk producing regions of the south coast and transport the milk to the capital in refrigerated tank trucks.

The farm price of grade A milk ranged from 10 to 14 cents per liter in 1967, while grade B milk for manufacturing purposes ranged from 8 to 10 cents a liter. The retail price of fresh milk in Guatemala City averaged 18 cents per liter. Pasteurized milk in bottles retailed at 20 cents and in cartons at 22 cents a liter.

One of the major problems facing dairymen is the production of surplus milk during the wet season from July to October. Many of the small producers only milk cows during the flush pasture season. Some of the surplus milk is processed into powdered milk at

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10. Shepard, Vard M., *The Livestock Development of Guatemala*, USAID report, Guatemala, August, 1967.

the Asunción Mita plant, and most of the rest is converted into cheese.

The annual deficit in milk production is expected to increase from nearly 20,000 m.t. in 1970 to about 40,000 m.t. by 1980. Producers believe that an increase in milk prices would help change this situation. A detailed study of the present cost and price structure is needed, however, before any specific recommendations on prices can be made. It appears likely that an increase in retail milk prices would benefit milk processors more than milk producers. If so, such a price increase would do very little to increase milk production.

An expanded research and extension program designed to improve the productivity of dairy herds would also help. Such a research-extension program would provide dairy farmers with more information on (a) efficient feeding programs, (b) the preparation, storage and use of silage, (c) disease and parasite control and (d) how to plan and carry out herd improvement programs.

A pasture improvement program is needed in addition to a research and extension program for dairying. Such a program would benefit sheep and cattle raisers as well as dairymen.

The program just outlined would tend to aggravate the existing marketing problems associated with surplus milk production from July to October. This problem could be solved partially through more efficient use of the milk drying equipment at the Asunción Mita plant. Some additional investment would be needed in transportation facilities to handle the increased production. Little or no additional investment would be required in milk processing facilities because there is already a substantial amount of excess capacity in the industry. The increased production may induce some additional investment in milk drying equipment.

Except for the marketing of surplus milk from July to October, the dairy industry should be able to solve most of its marketing problems during the 1970's without government assistance. The government will undoubtedly have to support a disease control program and enforce quality standards for milk products, but in the absence of a serious epidemic such programs should be fairly easy to carry out.

Even with price increases and a substantial research and extension program to increase milk production it is likely that Guatemala will be deficit in milk production during the 1970's. Although this may be undesirable from a balance of payments viewpoint, it should make it easier for milk producers and processors to solve any marketing problems that may arise during the next few years.

TABLE 8.4 ● NATIONAL PRODUCTION OF SHRIMP AND OTHER SEA FOODS (figures in 1000 lbs)

Year	Shrimp	Other Sea Foods	Total Fish Products[a]	Imports[b]	Exports	Apparent Consumption
1960	693.9	89.6	1,585.9	1,188.2	556.1	2,218.0
1961	1,249.3	181.0	2,232.7	1,116.9	487.7	2,870.9
1962	2,233.7	326.2	3,362.2	1,238.9	1,862.4	2,738.7
1963	1,990.1	328.1	3,120.6	1,609.9	1,735.2	2,995.3
1964	2,900.4	509.0	4,211.8	1,642.1	2,703.4	3,150.5
1965	1,974.6	560.2	3,337.2	2,768.2	1,667.4	4,438.0
1966	3,117.6	713.8	4,633.8	1,692.8	2,580.0	3,746.6

Sources: Dirección General de Recursos Naturales Renovables; La Situación del Desarrollo Económico y Social de Guatemala, Planificación Económica; División de Fauna Marina; Anuarios de Comercio Exterior, Dirección General de Estadística.

[a]Includes an estimated 802,400 pounds of freshwater fish and fish caught by small fishermen on the Pacific Coast.

[b]Includes fresh, dried and salted fish; shell fish and canned fish products.

Fish

The national production of marine products increased from about 1.6 million pounds in 1960 to more than 4.6 million pounds in 1966—an increase of nearly 192 per cent over the 7-year period. Shrimp accounted for about two-thirds of the marine products in 1966. (Table 8.4) Most of the shrimp catch is exported to the United States.[11]

11. Much of the information in this section summarizes material presented in the study *Industria Pesquera En Guatemala*, from Informe Economico, January-March, 1968, Banco de Guatemala.

The bulk of the commercial fishing is done on the Pacific Coast. Fishing on the Atlantic Coast is more dangerous because of the strong winds during much of the year.

Guatemala maintains a 12-mile limit on national waters. Shrimp, lobsters and a fairly wide variety of popular fish are found within this limit. The shrimp area extends out to about 34 miles. Tuna is found about 180 to 200 miles off the Pacific Coast.

The fishing fleet consists of about 30 commercial boats. The Captain and machinist on these boats are usually Japanese, Mexican, Peruvian or Panamanian. This situation is changing slowly as Guatemalans are trained for the jobs. The two main fishing firms employed around 740 persons on a part-time basis in 1966.

A serious problem facing the fishing industry is the lack of adequate port facilities on the Pacific Coast. The fishing companies have constructed some dock and repair facilities, but dry dock facilities in Mexican ports are used frequently. Much of the shrimp catch reportedly moves from the Pacific Coast to the Matías de Gálvez port on the Atlantic Coast for exportation. The Pacific Coast ports at Champerico and San José do not have facilities for handling large boats at dock side. Products shipped from these ports are loaded on small boats and barges first and then taken to the large boats anchored off shore. The Pacific Coast ports also lack adequate refrigeration facilities for holding large quantities of shrimp. The need for international port facilities on the Pacífic Coast is widely recognized not only by the fishing industry but also by the cotton, coffee, sugar and beef producers. Unfortunately, there are no good natural habors on the Pacific Coast. Thus the cost of constructing port facilities on the south coast is expected to be rather high.

The key law regulating the fishing industry is the Legislative Decree No. 1470 of June 23, 1961. This law authorized the Ministerio de Agricultura to license all firms engaged in commercial fishing in order to assure the rational exploitation of Guatemala's marine resources. Under this law the number of fishing boats that can be licensed is fixed as follows:

For the Pacific—50 shrimp boats and 50 tuna boats
For the Atlantic—35 shrimp boats and 25 tuna boats.

The stated purpose for limiting the number of boats is to protect Guatemala's shrimp resources from excessive exploitation.

The Industrial Promotion Law provides several tax benefits to new firms entering the fishing industry. Under this law new firms are allowed to import machinery and equipment duty free for ten

years. They are also exonerated from all taxes on profits for the first five years and 50 per cent of the taxes for the next five years.

In 1966, about two-thirds as much fish was imported as was exported. (Table 8.4) The apparent consumption of fish per capita in 1966 was only 0.82 pounds, which is about 36 per cent of the minimum recommended consumption.[12] Based on past trends, the total production of marine products is estimated to be 5,805,800 pounds in 1970 and 6,601,000 pounds in 1972.[13]

The low level of fish consumption is due partly to the inadequate marketing system for fresh fish. As the marketing system for fresh meats improves, the consumption of fish undoubtedly will increase. The domestic fishing industry should be able to supply the demand. The key factor is the availability of more refrigerated facilities for transporting and retailing meats.

The modal retail price of fresh fish in Guatemala City in 1967 was Q0.45, which is equivalent to the price per pound of an average cut of beef. The market for top quality shrimp in Guatemala is very limited. Improvements in the marketing facilities for fish would not result in a substantial increase in shrimp consumption.

The favorable export prices for shrimp has led the fishing industry to concentrate on production for the export market rather than on the development of the domestic market. It seems likely that the fishing industry will develop the tuna fishing industry before attempting to expand the domestic market for fresh fish products.

The development of tuna fishing will require substantial investments in addition to the cost of improved port facilities. A plant with a processing capacity of 12,000 tons per year would cost about Q1,500,000 to construct, and require another million quetzales for operating capital. The estimated cost of tuna boats is around one million quetzales each.[14]

The growth of the mixed feed industry has expanded the domestic demand for fish meal considerably. Imports of fish meat increased from 3.7 metric tons in 1960 to 823.6 metric tons in 1965 and then dropped to 391.0 metric tons in 1966. A 2,300 ton fish meal plant would cost about Q415,000 to construct and operate. There is insufficient information available to determine if such a

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12. See De Leon Mendez, Dr. Romeo, *Evaluación de la Información Existente en Relación Al Estado Nutricional de la Población Guatemalteca.*
13. Informe Economico, January–March, 1968, p. 55, Banco de Guatemala.
14. Based on estimates in *Alimentos para Exportación,* 1965, Arthur D. Little report. Also see Informe Economico, January–March, 1968, p. 69, Banco de Guatemala.

plant is economically feasible. According to the Banco de Guatemala's estimates, however, the plant should be able to produce at a cost less than or equal to the present CIF price of fish meal.

The production of quick-frozen fish offers another possibility for developing the fishing industry. A quick-freezing plant with an annual capacity of 1,250 tons of fish would cost about Q120,000 to construct and require another Q50,000 as working capital. The cost per pound of fish would be about Q0.21 provided that the plant were able to operate at nearly full capacity at least 300 days each year. This would be primarily an export operation.

CHAPTER NINE

ALTERNATIVE POLICIES AND PROGRAMS

FOR A GOVERNMENT, agricultural development is a management problem, a problem of selecting objectives, of establishing priorities, and of integrating and implementing the component pieces of a program. In discussing programs and priorities, it is tempting to set forth a list of "essentials" that the government must accomplish. There must be programs of production-oriented research, of road-building, of irrigation and land improvement, of market expansion, of education and extension, of input distribution, of credit and price stabilization, and so on. Projects can be elaborated, financed and implemented in some or all of these areas of action. A prior necessity, however, is a clear understanding and a firm acceptance by the national political elites of the goals and objectives of agricultural growth and development. Starting with policies, programs, and projects puts the cart before the horse; objectives have to be specified before priorities can be determined.

To build a modern and productive agriculture throughout Guatemala will require mobilization and utilization of an increasing quantity of public and private resources. The most important role for the government will be the promotion of programs and institutions that generate streams of new technology, and provision for basic services that require large investments and long periods of time for payoffs. Education, research and infrastructure are high on the list in Guatemala. In addition, policy measures and programs to intensify use of land and to strengthen incentives for private investment in agriculture and supporting industries deserve special emphasis.

GOALS AND OBJECTIVES OF AGRICULTURAL GROWTH

A clarification of goals and objectives is an essential first step in the formulation and implementation of development programs. Where goals are confused or incompatible, policies are very likely to be uncertain and unproductive. When governments are unable or unwilling to specify the objectives of agricultural development, programs of action can remain hesitant, ineffective, and filled with self-defeating features.

The formation of public policy necessarily involves a compromise that mixes different goals. While these goals are not always incompatible, an effective strategy usually requires that weights be attached to settle problems of precedence and priority. The weights attached to some goals are fairly clear from the record of past agricultural policies in Guatemala. Several of the more important goals will be considered in this section. A discussion of the alternative methods that could be used to achieve these goals and the alternative weights which could be assigned to them will then be presented.

The Output Objective

Growth in output is an important contribution which agriculture can make to the overall economy. Given population growth, increases in per capita income and the needs for industrial raw materials and exports, it is possible to derive a desired growth rate for agriculture which is consistent with national economic objectives. If this growth goal can be achieved, agriculture will contribute more and better food for a growing population at constant or declining real prices, earn increasing amounts of foreign exchange, and provide necessary raw materials to expanding food and fiber industries. The increased output may make an important direct contribution to overall growth goals and indirectly stimulate growth in agricultural input and processing industries. Nutritional needs of the population can be more nearly fulfilled consistent with the growth in effective food demand. The market for manufactured consumer goods can expand in the rural areas. Balance of payments problems and pressures on prices, especially of basic food products which are closely tied to wages and industrial costs, can be reduced.

The agricultural sector has made an important contribution to the balance of payments objective in the past. This fact emerged very clearly in the analyses in Chapters 2 and 3 of the overall economy and the agricultural sector. Guatemala faces a growing balance of payments problem, however, reflecting the poor market

prospects for traditional export crops, especially coffee and cotton. This means that, where possible, output expansion for agricultural exports should be directed to new or existing commodities with more promising market potentials.

The nutrition problem is known to be severe and is becoming worse as population grows rapidly. Thus, there is need to increase the output of basic food products for domestic consumption. It should be recognized, however, that expansion of *effective* demand is a necessary pre-condition for success of programs designed to increase output of basic foodstuffs. Effective demand must especially be expanded among the low-income population, the bulk of which lives in the rural areas. This problem is concentrated in subsistence agriculture in the central region. Apparently the country is unwilling to undertake extensive income redistribution to provide the necessary purchasing power to this large population group. Their food consumption and general economic status can be improved significantly *only* if they can be helped to produce more for home consumption and sale. It would seem that Say's Law must be brought into play if food demand among low-income farmers is to rise commensurate with growth in output!

In aggregate terms a growth rate of 5 per cent per year in agricultural output would provide for a 3 per cent population growth, some increase in per capita food consumption in response to income changes, and increasing exports. This rate is somewhat above the level achieved in recent years. There is little doubt, however, that land and labor resources are at hand to achieve this or an even higher growth rate if science and technology can be brought to bear on the problems of agricultural productivity. Higher growth rates will be especially beneficial if production is increased in the areas and among the farmers whose effective demand for food will respond to their increased income. Similarly, more production of export crops is desirable to the extent that markets are available. Higher production of domestic food crops without concern for effective demand or of traditional exports for which there is no market is likely to result in glutted markets and falling prices, which would discourage further growth.

The Employment Objective

Guatemala has a serious and worsening employment problem. Population growth exceeds three per cent per year, and the age distribution is such that the labor force is growing even more rapidly than the overall population. Non-agricultural employment is increasing, but far less rapidly than necessary to absorb the growing work force. The bulk of the larger labor force is being

absorbed in agriculture where employment is growing at about 2 per cent per year. Probably 16,000 to 17,000 workers are added to the agricultural sector each year. Some of this increase is taking place in the coastal region, where the number of small farmers and resident farm workers is growing. The major increase, however, is in the number of subsistence farmers in the central region. There, as shown in Chapter 4, the increase is associated with a substantial decline in the average size of small farms and a noticeable deterioration in soil fertility. Output per person is falling and there is growing underemployment of labor resources. There can be no doubt that the provision of productive employment for a growing work force is an important objective for the agricultural sector.

Income Distribution and Rural Welfare

It is possible to accelerate the growth in agricultural output without concurrent attention to income distribution and rural levels of living. Production can be generated through programs and the play of economic forces with little attempt to benefit the bulk of the rural populace. This approach simplifies development planning but does little to promote development in its broadest sense or the widespread transformation of the traditional sector.

Where production has yet to rise, agricultural development programs should not be justified simply by pointing to the organization of farmers' associations, road construction, improving local self-government, or implementing community development activities. These accomplishments have merit in themselves but may do little to directly advance agriculture. Nevertheless, in a country like Guatemala weight must be given to welfare as well as to output. Thus questions of *where* and *how* output is increased assume added importance.[1] As emphasized in Chapters 2 and 3, growth *without* development has generally characterized the country since 1950. Growth *with* development should become the central concern in the future.

MAJOR ELEMENTS OF AN AGRICULTURAL DEVELOPMENT POLICY

On the basis of the data and analysis presented in earlier chapters it appears that future development programs should give highest priority to improving the productivity of land and labor resources in the agricultural sector. Programs designed to achieve

1. An example is provided later in this chapter where the implication of concentrating corn production programs in the coastal vs. the central region are analyzed.

this goal should emphasize increases in rural employment and improvements in income distribution as well as increased output. Producing more per hectare and per man is the best way to reconcile the apparent conflict between output and welfare goals. To accomplish this blend of output and income distribution objectives, policies and programs must be matched to the needs of different types of farmers and different geographic areas of the country.

The Commercial Large-Farm Sector

The effects of large scale land reforms have not been analyzed in this study. Many people believe that extensive involuntary redistribution of land now in large farms is presently not politically feasible. If so, then policies for the commercial sector should focus on tax, price, and wage programs designed to encourage more efficient production and to support increased investments in services, social overhead, technical assistance and credit programs designed to increase production of exportable crops.

Data presented in Chapter 4 show that substantial amounts of land in the large-farm sector are used extensively (natural pasture) or not at all (fallow). There is no conclusive evidence that crop yields are lower on large farms. The less intensive use of land by large farmers, however, does result in an inverse relationship between size of farm and average output per hectare. Thus, on the average, large farmers produce less per hectare because they use their land less intensively than small farmers. One way to increase the productivity of large units is to make it expensive to hold large tracts of land idle or in extensive uses. The existing idle lands tax is one tool that could be used for this purpose. A property tax progressive with farm size is another and has the advantage that it would probably be easier to administer. The purpose of these tax devices is to encourage owners to either place land in intensive production or sell it to someone who will.

A second need is to influence *what* is produced in the large-farm sector. Price policies can be used for this purpose. The export tax on coffee, for example, is a price policy which reduces the returns from coffee production relative to other crops. Thus it reduces incentive to produce coffee and encourage shifts of land to other commodities. The existing export tax on coffee should, therefore, be continued or even increased as long as market prospects for coffee production in excess of Guatemala's quota remain poor. The use of this price policy could be coordinated with technical assistance and credit programs designed to stimulate profitable diversification opportunities. The large farmers are most likely to have the capital and management knowledge necessary for successful diversification.

A third need is to increase government revenue to support larger public investments in agricultural services and social overhead facilities. This revenue cannot easily be obtained by taxing the small non-agricultural sector; if it is to be mobilized domestically it must come from within the agricultural sector. Any consideration of the ability-to-pay principle shows that such revenues in agriculture must come from the large-farm subsector at least until income in the subsistence subsector can be increased substantially. An effective progressive income tax is probably the most feasible way to augment public revenues to finance expanded agricultural development programs.

Another element in commercial-sector policy is the need to intensify and expand programs designed to improve wages and working conditions for resident and migratory farm workers on large farms. The goal should be to upgrade the employment situation—in terms of wages, housing, medical care, etc.—to the level of urban industry. Higher real wages for workers will create incentives for land owners to increase their productivity. Workers who are paid more must be used to produce more if their employment is to be profitable.

The Subsistence Sector

High priority needs to be given to improving the productivity and welfare of small farmers. All the data that have been reviewed on production, yields, farm size, income and employment indicate that the income position of small farmers has deteriorated considerably since 1950. This is especially true in the central region where population growth is resulting in a decline in the average size of small farms and where yields per hectare are stagnant or declining. Over large areas of the central region per capita production is surely falling, and total production may be declining as well. Emphasis on raising yields per hectare seems to be the best way to overcome growing underemployment and raise rural levels of living for this large population group. Given existing demand conditions for traditional exports and domestic food crops, this policy will also mean little loss, if any, in terms of the output objective.[2]

Programs for family planning and birth control need to be implemented as effectively and as rapidly as possible. Otherwise, improvements in productivity, employment and income will be quickly swept away by population growth. A reduction in the rate of population growth will be required if long-term gains in the subsistence sector are to be attained.

2. Some additional support for this statement is given later in this chapter when alternative programs to increase corn production are analyzed.

Another possibility is to encourage outward migration from traditional rural areas to the cities or to the new agricultural areas in the coastal and Petén regions. There is little reason to believe that the urban working force will be able to absorb unskilled labor in the future at a higher rate than is now occurring. Thus, more migration to the cities will largely swell the ranks of the urban un- or underemployed, a familiar problem in many other Latin American countries. Similarly there appears to be little reason for optimism about the rate at which more families can be absorbed on new lands in the colonization areas.

The basic element in subsistence-sector policy is the necessity to improve yields per unit of land. Most of the land in small farms is already in production. Some of this land can be improved through irrigation and drainage programs, but most of the output increases must be achieved through the use of new inputs and improved practices. Output increases achieved in this way will absorb more labor and help reduce underemployment in the agricultural sector. At the same time, the increased productivity will mean more food for home consumption and more sales for cash income to be used for consumption and input purchases, thereby widening markets and stimulating production in nonagricultural sectors.

Another important element is the development of rural construction programs designed to improve social overhead facilities. Where underemployment is prevalent and productive employment is a high priority objective, rural construction projects can be used to increase job opportunities. Road building is a good example. Rural Guatemala is sadly deficient in access and farm-to-market roads. Such roads are necessary if subsistence farmers are ever to be integrated into the market economy. Using local materials and drawing on the large pool of underemployed workers, a widespread road building and rural improvement program would appear feasible and desirable.

It has been argued that the payoffs to be obtained in the subsistence sector are low. This argument is hard to accept. Available data show that with existing varieties, corn in the central region can return from 4 to 7 quetzales for every quetzal invested in fertilizer. This compares favorably with the returns to corn fertilization available on the coast.[3] With more responsive varieties and a package of improved production practices, the rate of return can be sharply increased. At the same time, more labor will be absorbed in production, productivity per man will be higher, incomes will increase, rural markets for consumer goods and inputs will open

3. Data supplied by Walker, Dr. J. L., North Carolina State University, from his soil testing project in Guatemala. For a large fertilizer program, the overall benefits may be substantially larger in the central region.

and expand, and levels of living will be elevated. This interaction of new technology with output and productivity is the essence of the reconciliation of growth with development in the subsistence sector.

The cultural differences in work habits and receptiveness to change among farmers may make it difficult to design programs tailored to the needs and conditions of different groups, especially in the subsistence subsector. Nonetheless, where highly productive and profitable technology has been tested, proven, and made available to farmers along with the requisites for its use, it has seldom languished unutilized because farmers were small and traditional. If past programs to promote peasant production have yielded little more than disappointment, the absence of productive technology or distorted price relationships are more likely to be the explanation than the neophobia of the farmers.

The most notable success with small farmers has been the wheat program. New, higher yielding wheat varieties are widely used. Most wheat farmers use fertilizer, insecticides and other improved practices. The government has encouraged wheat production through research, extension, credit and price-incentive programs. A side result has been that small wheat farmers are also much more likely to use chemical fertilizers on corn than are other subsistence farmers. This is an example of the stimulative and cumulative power of new technology in transforming traditional agriculture.

INCREASING PRODUCTIVITY IN SUBSISTENCE AGRICULTURE

The initial efforts of a program for the subsistence sector should focus on raising yields per hectare of the two basic subsistence crops, corn and beans. The basic ingredients of such a program would be the promotion of the use of chemical fertilizer and improved seed along with better production practices, insect and disease control, and harvesting and storage methods. Existing varieties and information on soils and nutrient deficiencies should be sufficient to begin this program.

In the early phase, fertilizer and seed could be distributed directly to farmers as credit-in-kind. Private companies could be encouraged to organize distribution systems and provide market outlets. Subsidies to permit inputs to be priced at levels consistent with efficient, large-scale distribution are another possibility. Their purpose would be to remove the dis-incentives of small-scale, high cost distribution on farmer adoption of new inputs. A system of crop insurance and storage facilities to stabilize prices at harvest would reduce risks associated with the use of the new inputs.

Immediate attention needs to be given to the research base for corn and bean improvement. More responsive varieties, profitable levels of fertilization, number and timing of fertilizer applications, plant population density, insect and weed control, and disease prevention, must all be considered when developing a "package" that can dramatically increase yields under various geographic and climatic conditions. This type of locally-adapted, production-oriented research is virtually unknown in Guatemala. A crash program will be needed if research results are to be available as soon as they are required.

At a later stage, more emphasis can be given to the diversification of production in the subsistence sector. The technical basis for diversification is not adequate and must be improved. Vegetables and fruits are the main possibilities. Higher corn and bean yields should release land for diversification and make small farmers more willing and able to try new crops. Insurance against crop losses and market expansion to improve and stabilize prices can be especially important in providing the incentives that are necessary to encourage diversification by small farmers.

WHERE SHOULD CORN PRODUCTION BE INCREASED?

This section is concerned with the question of *where* increased corn production should be encouraged. It assumes that a decision has been made to give high priority to a program designed to raise corn production by means of higher yields per unit of land. It further assumes that human and financial resources are sufficiently limited so that a major program cannot be implemented in both of the major producing areas at the same time. The issue, therefore, is whether precedence should be given to the coast or to the central region.

Several important factors would facilitate the program on the coast. Rainfall, topography and temperatures are quite favorable for corn production. Two and sometimes three crops per year are possible in some zones. There are fewer farms, hence fewer decision makers to be influenced. Financial institutions and input supply systems are fairly well developed. Yields currently obtained are higher than those in the central region and could profitably be increased by applying the proper quantities and types of fertilizers. Farmers are more familiar with chemical fertilizers and farms are more mechanized.

To illustrate the effects of a fertilizer program focused on the south coast, we shall assume that an additional $2,500,000 is used to purchase fertilizer for corn each year. Current yields in the coastal region are estimated to be about 1,200 kilos per hectare overall.

Although experimental data are scarce, the limited information available suggests that it should be possible to increase corn yields by about 1,000 kilos per hectare by using an average of 400 lbs. of fertilizer per hectare. Assuming a farm price of $6.25 per hundred pounds, the total cost of fertilizer per hectare would be $25.00. Thus an annual expenditure of $2,500,000 for additional fertilizer would increase corn production on 100,000 hectares on the south coast by about 100,000 metric tons. This region is already the major surplus corn production region in Guatemala. Thus nearly all of the additional corn produced would be marketed.

The increased production of corn would cause the farm price of corn to fall. The extent of the price reduction would depend on both the price elasticity of demand and the total supply of corn in relation to the level of demand. The projections in Chapter 5 indicate that corn production under current conditions would be about 800,000 metric tons by 1971–72 when a program such as the one being considered here could be carried out. Assuming the price elasticity for corn to be 0.7, and total production including the increase to be 900,000 m.t., the farm price of corn would have to decline, on the average, by 17 per cent in order to clear the market. At present prices this would mean a fall in the farm price of corn from Q66 to Q55 per metric ton. Due to the inelastic demand the total value of the national corn crop would fall from Q52,800,000 to Q49,500,000.

Effects of the program would be quite different for the producers who participated than for those who did not. On the coast, farmers using the fertilizer for corn would increase the value of output per hectare from Q79.20 to Q121.00. This means that the $25.00 spent for fertilizer per hectare would return $42.00 or $1.68 for each dollar spent for fertilizer. In total, the $2,500,000 used to purchase fertilizer would generate a gross additional return of $4,200,000 for the farmers in the program.

The lower price for corn would reduce the value of output for farmers not using additional fertilizer. On the coast, average value per hectare would fall from Q79.20 to Q66.00, a decline of more than 20 per cent. These losses would fall largely on small farmers unless efforts were made to get them to use the fertilizer. Assuming yields in the central region to average 750 kilos per hectare, the value of output for all corn producers in that region would decline from $49.50 to $41.25 per hectare, a decline of 17 per cent. Thus, incomes of all producers not participating in the fertilizer program would fall, and this effect would be especially serious and widespread on the large number of small corn producers throughout the central region.

The lower price would benefit consumers in the urban areas

and the deficit corn consuming areas of the central region. These areas were identified in Chapter 7 as net importers of corn and contain some of the worst poverty zones of the country. Many small highland farmers both sell and buy corn. At harvest they sell some corn to pay debts and obtain cash for other purchases. Later in the year, cash income received for artisan production or off-farm work is used to buy more corn for family consumption. For these producers, gains as consumers would have to be balanced against losses as producers. If corn purchases exceed sales for the year, the producers should experience a net gain. The balance might well incline toward net losses, however, if the increased production were to result in sharp declines of price at harvest followed by higher prices after harvest. Complementary programs of price stabilization and storage could help to prevent this "double squeeze" on deficit producers.

An alternative is to focus the fertilizer program on the central region. There are several disadvantages associated with such a program. Topography, climate, depleted soils and traditional farming methods have resulted in low yields in many zones of the region. Furthermore, the large numbers of small farmers will be difficult to reach with yield-increasing programs. It is also unlikely that a large-scale fertilizer program could be implemented as rapidly in the central region as on the south coast because of the difficulty in extending the program over the entire region.

Current yields in the central region are about 750 kilos per hectare overall. From the experimental data available it is reasonable to assume that production per hectare could be increased to 1500 kilos by using 200 pounds of fertilizer costing $12.50. This calculation assumes the marginal response to fertilizer is greater over the 750–1500 kilo range than over the 1200–2200 range. Thus, an annual expenditure of $2,500,000 for additional fertilizer would increase corn production on 200,000 hectares in the central region by about 150,000 metric tons.

Not all of this corn would reach the market, however. In fact, if production increases were achieved among small and poor farmers, much of the corn would go for family consumption, thereby directly improving their real income. If we assume that one-third of the additional production would be consumed at home, then about 100,000 metric tons would enter the market. Using the same demand assumptions, the farm price of corn would decline to Q55.00 per metric ton as before. The total value of the national crop would be Q52,250,000, down only slightly from the value of Q52,800,000 for the projected 800,000 m.t. crop.

For the farmers using the fertilizer, the additional value per hectare would be $33.00 in response to an expenditure of $12.50

for fertilizer. In total, the $2,500,000 spent for fertilizer would generate $6,600,000 in additional value of output for the producers. This is an increase of more than 50 per cent over the value of additional output on the coast for the same expenditure on fertilizer. Additional labor would be needed on the 200,000 hectares to apply the fertilizer, carry out complementary practices, and harvest the larger crop.

The lower price for corn would have the same beneficial effects for deficit urban and rural areas and the same income-decreasing effects for farmers in the coastal and central regions not involved in the program. If corn production were not profitable on the coast at the lower price, however, producers would possibly be encouraged to diversify production where soil and climatic conditions are relatively favorable for a wide range of products.

The gains from a fertilizer program in the central region can be summarized as follows:

1. a rise in real income for producers using fertilizer from the 33 per cent of additional production consumed at home
2. an increase in cash income of Q6,600,000 for these producers from the outlay of Q2,500,000 for fertilizer—which would be available to purchase food, consumer goods and other farm inputs, thereby raising living standards and opening markets for industry
3. more absorption of labor in corn production because there is less mechanization than on the coast and a larger production area would be involved.
4. prices and supplies of corn for deficit urban and rural markets would be equivalent to those of the program on the coastal region.

The main advantage in the coastal region is the relative rapidity and simplicity of getting the fertilizer used there. It is not at all clear that a program for corn in the central region could be designed within the existing constraints of human and financial resources which could achieve in a period of two to three years the levels of fertilizer use discussed. It would seem, therefore, that relaxing these constraints is exceedingly urgent; some of the suggestions in previous sections were made for this purpose. At the same time, fundamental questions can be raised about the desirability of a large-scale fertilizer program to increase production of a subsistence crop such as corn within a largely commercial subsector. The most serious question would appear to be the income effect on the vast majority of small corn producers who would be cut off from the new and more productive technology being applied by the fortunate few.

Many serious cost considerations have not yet been recognized in this discussion. The most important relate to government-provided research and extension, better storage and marketing facilities, credit, and incentive-producing pricing for inputs and products. More information and analysis would be required to clarify the relevant cost-benefit ratios.

While the assumptions just made seem reasonable in light of current knowledge, more research is needed to improve the numerical magnitudes involved in the discussion. A model which would incorporate realistic production coefficients at alternative levels of fertilization in both regions, empirically-based estimates of home consumption of corn and income and price elasticities for food and non-food expenditures, and accurate knowledge of geographic, seasonal, and vertical price relationships could vastly improve the analysis sketched above.

THE IMPORTANCE OF MARKETING

There has been a good deal of discussion in recent years concerning the importance of marketing in agricultural development. There are two sides to agricultural marketing. One side includes those activities connected with the movement, handling, storage, processing and distribution of food commodities from the time they leave the farm until they reach the final consumer. The other involves the movement of agricultural inputs from the manufacturer to the farmer. The markets for inputs and outputs are closely related. Credit extended by food wholesalers, for example, can facilitate access by farmers to new inputs. The introduction of new inputs and technology may increase the flow of farm products through the food wholesalers. The ability of food wholesalers to obtain favorable prices for farm products and to keep marketing charges low relative to the final value of the product affects the profitability and demand for new inputs and technology. Agricultural development involves changes in both types of agricultural markets.

Given a limited amount of funds for development programs, the question arises as to what priority should be assigned to projects designed to improve the efficiency of the agricultural marketing systems. There is no unique answer to this general question. Some marketing projects should be given high priority while others should remain on the shelf for a few more years. There is a wide variety of factors that must be taken into account when assigning priorities to marketing projects. A few of the more important factors are the scale of production and the nature of the marketing system for each product, the availability of competent personnel to

carry out the projects, and the existence of other programs that might create marketing problems. A few examples will serve to illustrate this point.

The quantity of fresh fruits produced on a commercial scale is too small at the present time to justify a large program to introduce improved methods of handling fruits. Initial attention should be centered on a limited program designed to increase the production of the few fruits that appear to have the most potential for export. Once there is evidence that fairly substantial amounts of such fruits will be coming on to the market within three to four years, the next step would be to begin training specialists in fruit marketing. Once the fresh fruit and the marketing specialists are available, programs to improve the efficiency of the marketing channels for fruits should be given higher priority than programs to increase fruit production. If existing programs to increase fruit production are reasonably successful during the next several years, then graduate level training of fruit marketing specialists should begin in about 1972 and emphasis be placed on fruit marketing problems beginning in about 1975.

In the case of vegetables, the production and marketing programs need to be carried out simultaneously and to receive equal priority. The production program would emphasize the production of high quality vegetables, while the marketing program would emphasize proper handling techniques. Such a marketing program would have two main goals. The most important goal is to increase the profits of vegetable producers. The second goal should be to increase vegetable exports. These goals are basically complementary. A marketing program built around producers' organizations should be able to achieve both goals. Such organizations could provide producers with production information and farm supplies as well as marketing services. The program would have to devote some attention to reducing barriers to trade in vegetables between Central American countries. While technicians may play an important role in identifying such barriers, the elimination of the barriers is primarily a political problem. Central America has made considerable progress in solving such problems in recent years, thus it seems advisable for both production and marketing specialists to proceed on the assumption that existing barriers to trade in vegetables will gradually be eliminated.

Any program designed to increase corn production is unlikely to be successful in the long run unless high priority is given to providing storage and drying facilities for handling the increased production. The key to the success of a corn production program will be the government's ability to prevent a substantial decrease in the farm price of corn as production increases. The availability

of storage and drying facilities can play an important role in reducing the extent of farm price decreases while at the same time helping to stabilize the retail price of corn.

If we limit our attention to fruits, vegetables and corn, and distinguish between production programs and marketing programs, the priorities which we would assign at the present time would be:

Program	*Priority*
Corn production	1
Corn marketing	1
Vegetable production	2
Vegetable marketing	2
Fruit production	3
Fruit marketing	4

The priorities which we would assign to a few of the other commodity oriented programs discussed in this book are:

Program	*Priority*
Fish production	4
Fish marketing (domestic)	3
Beef production	2
Beef marketing	3
Milk production	3
Milk marketing	3

Certain production oriented programs, if undertaken on a large scale, would require some revisions in the priorities listed above. A large pasture improvement program on the south coast, for example, could create milk marketing problems in some areas. In this case, it would be advisable to assign a higher priority to milk marketing projects focused on the south coast area.

It is tempting to argue that marketing programs should receive highest priority because "marketing margins are high while farm prices are low." The implication is that there are more possibilities for reducing marketing margins than for reducing production costs. While this is undoubtedly true in some cases, improvements in the marketing system may in fact increase marketing margins in other cases. A change in the marketing system that provides consumers with products during seasons when the products were not formerly available or results in exporting products not previously exported, for example, may represent a market improvement even though marketing margins are higher. Similarly, providing consumers with higher quality products frequently involves increased marketing costs yet still may be classified as an improvement in the marketing system. (Programs to introduce improved packaging of farm prod-

ucts, for example, may increase both marketing costs and product quality.)

In some cases, the key to reducing marketing margins may well be to concentrate on cultivation and harvesting techniques which result in a better quality and more standardized product being available at the farm gate. Marketing margins for many products will undoubtedly remain high as long as wholesalers find it necessary to deal with large numbers of very small farmers who continue to mix both high and low quality produce in the lots they offer for sale.

We have assigned high priority to many marketing programs not because we believe they will necessarily lead to lower marketing margins but because we feel they are necessary to prevent substantial reductions in farm prices if programs to increase production are successful.

EDUCATION, RESEARCH AND EXTENSION

Progress is being made in improving agricultural education in Guatemala. International loans are supporting expanded higher education facilities at San Carlos and Bárcena, and expanded primary and mid-level school systems. Numbers of students will be expanded at all levels. Curricula are being improved. More professional and sub-professional manpower will be available in the near future.

Graduate-level training for the scientists and other skilled technicians needed for agricultural development seems to be neglected. It does not appear feasible to develop this type of training in Guatemala because needs at vocational, high school, and undergraduate levels are too pressing to permit the diversion of scarce money and manpower to expensive graduate training. A preferred alternative is an expanded long-range program for sending qualified students to other countries for training. This training would emphasize Master of Science programs which usually require about two years to complete. A few students who perform well at the M.S. level could then be selected for Ph.D. training.

A program to provide 100 students with M.S. training and 24 with Ph.D. degrees would be desirable. This program should be planned for a ten-year period and should include students in the agronomic and animal sciences, economics, statistics and related fields. Two years of training will be required for each M.S. student and an additional two years for those selected for Ph.D. programs. If it is assumed that each student-year of training costs $5,000 for maintenance, tuition, books, travel and other expenses, the total outlay for this training would be $1,240,000 over the ten-year period.

Guatemala is unlikely to be able to mount all the basic and applied research required to support accelerated teaching, extension and development programs. Basic research could be carried out in existing regional and international research programs or new regional centers in Central America. Emphasis in Guatemala could then be placed on research for the local adaptation and testing of new knowledge generated in the basic research programs.

IMPROVING STATISTICAL DATA

Frequent reference has been made in this study to the lack or unreliability of the data needed to analyze alternative programs and policies to accelerate agricultural growth and improve the welfare of agricultural producers in Guatemala. A number of good statistical series already exist; some useful ones are just being initiated. Other potentially useful series are needed and many existing ones could be improved as soon as trained personnel and funds can be obtained.[4]

There are several statistical offices in the Ministries of Agriculture and Economics that are making important contributions to the collection, tabulation and publication of data on agricultural production and prices. None of these offices, however, has sufficient personnel and funds to provide accurate and consistent data on a regular and timely basis. A first step in improving the data would be to clarify which series are most important and which offices have the continuing responsibility for collecting and publishing them. Data on area, production and prices of crops and livestock products in producing areas, and prices in rural and urban markets are examples of where several agencies overlap, and publication is irregular and often delayed.

The lack of regular publication of reliable statistics by the statistical offices probably explains why many versions of the same data exist. Other government agencies and private groups have frequently been forced to make their own estimates. This has led to a considerable duplication of effort and much confusion over the differences in the alternative estimates. Consolidation and coordination of these activities would result in improvement in the basic information and elimination of much of the inconsistency.

4. For an excellent survey of agricultural statistics currently being collected and recommendations for improvement, see Becker, J. A., *A Program of Agricultural Statistics for Guatemala,* USAID report. February, 1966.

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