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Peru

An Export Market Profile

H. Christine Bolling

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Abstract

Peru is the fifth largest Latin American market after Mexico, Brazil, Venezuela, and Colombia, for U.S. agricultural products. Peru purchased \$162 million worth of U.S. agricultural commodities in 1988. Agricultural imports from the United States have increased more than sevenfold since 1970. Peru is in a severe slump and is the second largest recipient of P.L.-480 aid in Latin America. Wheat, feed grains, and oilseed products will continue to constitute the major share of U.S. agricultural exports to Peru. Commercial purchases may decrease in the near future, and food aid needs will continue to be substantial.

Keywords: Peru, economic growth, agricultural imports, agricultural production, agricultural trade policies, market shares, import projections.

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Summary

U.S. exports to Peru, valued at \$162 million in 1988, increased more than sevenfold since 1970. Prospects for U.S. agricultural exports to the Peruvian market in the 1990's, however, depend on the U.S. ability to compete with other countries in this slow-growing market. U.S. agricultural exports to Peru are likely to reach \$190 million by 1995. Peru has the fifth largest Latin American market for U.S. agricultural products after Mexico, Brazil, Venezuela, and Colombia. U.S. exports to Peru will be dominated by wheat, corn, soybean oil, and soybean meal.

The United States had a dominant share of the Peruvian wheat market, especially during the Soviet embargo period. This share has declined in recent years as Argentina has become price-competitive and regained its historical market share. Other major competitors for the Peruvian market are Brazil, Chile, New Zealand, the European Community, Canada, Bolivia, and Ecuador.

The following major problems will affect current and prospective U.S. exports to Peru:

- o Peru is in the midst of an economic crisis that has threatened political stability and growth prospects for the agricultural and economic sectors.
- o Much of Peru's population is very poor with diets comprised of the least expensive staple foods.
- o A large foreign debt limits the availability of foreign exchange.
- o Peru has generally restricted agricultural imports to limit foreign exchange expenditures. It limits imports by using import quotas and tariffs.
- o Peru's import potential is hampered by infrastructure. Some regions are remote and virtually unreachable.

Glossary

<u>Abbreviation</u>	<u>Spanish Name</u>	<u>English Name</u>
BAP	Banco Agrario	Agrarian Bank
ECASA	Empresa Comercialidora del Arroz	Marketing Board for Rice
ENCI	Empresa de Comercializacion de Insumos	Marketing Board for Inputs
DGAIC	Direccion General de Agro-Industrial Commercializacion	General Director of Agro-industry and Marketing
INE	Instituto Nacional de Estadistica	National Institute of Statistics
INP	Instituto Nacional de Planificacion	National Institute of Planning
JURPAL	Las Juntas Reguladores de Precios de Productos Alimentaciones	Department of Price Regulation for Food

Import value (c.i.f.) and U.S. share of major agricultural products, Peru 1/

Product and origin Units		1970	1980	1988
Wheat	Million dollars	38.4	142.1	114.6
United States	Million dollars	9.5	120.8	56.8
U.S. share	Percent	25	85	50
Corn	Million dollars	.3	69.3	54.7
United States	Million dollars	.3	69.3	30.6
U.S. share	Percent	100	100	56
Soybeans	Million dollars	.7	0	4.7
United States	Million dollars	.7	0	4.7
U.S. share	Percent	100	0	100
Rice	Million dollars	0	101.2	5
United States	Million dollars	0	43	5
U.S. share	Percent	0	43	100
Tallow	Million dollars	.7	1.4	.5
United States	Million dollars	.4	1.4	.5
U.S. share	Percent	57	100	100
Dairy products	Million dollars	11.9	46.9	73.1
United States	Million dollars	1.2	2	13
U.S. share	Percent	10	4	18
Vegetable oil	Million dollars	8.1	25	39.4
United States	Million dollars	2.7	19.4	2
U.S. share	Percent	33	78	5
Tobacco	Million dollars	.5	3.1	0
United States	Million dollars	.3	2.3	0
U.S. share	Percent	60	74	0
Chickens	Million dollars	0	1.1	0
United States	Million dollars	0	.6	0
U.S. share	Percent	0	73	0
Meat and offals	Million dollars	0	0	36.8
United States	Million dollars	0	0	.4
U.S. share	Percent	0	0	1
Sugar	Million dollars	0	0	51.7
United States	Million dollars	0	0	0
U.S. share	Percent	0	0	0
Total agricultural products	Million dollars	131.1	477	504
United States	Million dollars	20.3	310	156
U.S. share	Percent	15	65	31

1/ C.i.f. is cost, insurance, and freight.

Source: (19).



Peru

An Export Market Profile

H. Christine Bolling

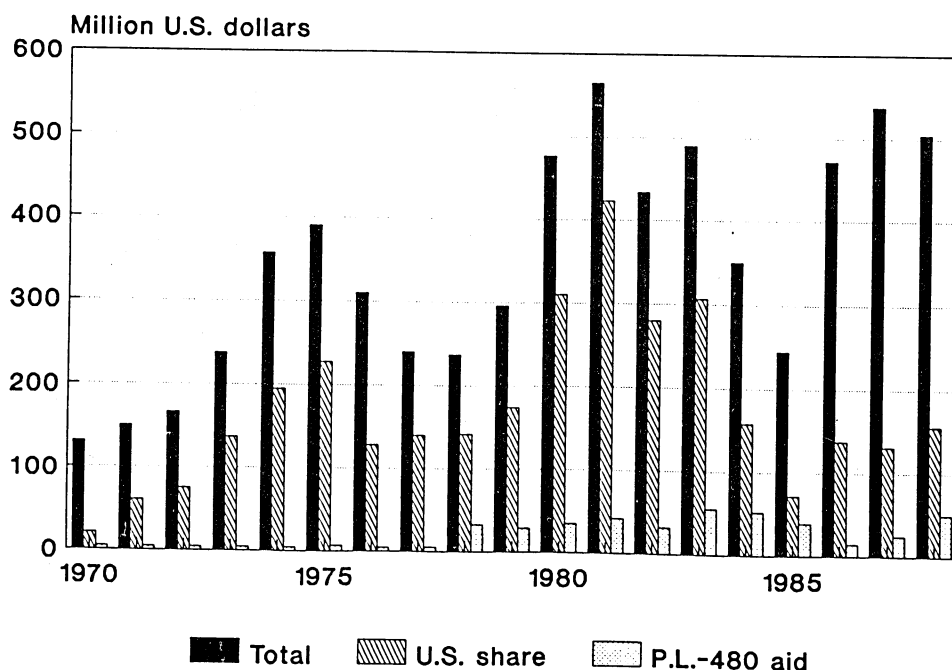
Introduction

The Alan Garcia Government is under attack on many issues in 1989, and Peru is again in a period of hyperinflation. Outside economic forces, such as prices for primary products, caused Peru's foreign exchange earnings to be less than expected in the 1980's. The cutback in export earning capacity limited Peru's capacity to import goods and services and to repay its foreign debt.

The Alan Garcia Government was elected in 1985, in the midst of economic stagnation. The government made headlines by refusing to pay back its foreign debt. The government claimed that repayment would divert much needed investment capital from the country, which would limit hopes for economic recovery. The government committed itself to policies to reactivate the economy, adopting protectionist import policies to shelter underutilized agricultural and industrial sectors from foreign competitors and to conserve foreign exchange. Garcia planned to minimize foreign debt repayments, thus freezing funds needed to rejuvenate the economy. The refusal to make debt repayments when due led the International Monetary Fund to declare Peru ineligible for additional assistance and created a growing spirit of confrontation between Peru and its foreign creditors. The years 1986 and 1987 were boom years, with real economic growth of 6-7 percent, but the growth slowed by 1988. Despite the nonpayment of debt, Peru's foreign currency reserves have been exhausted. Peru's agricultural imports from the United States grew to \$162 million in 1988, up 23 percent from 1987 despite this backdrop of political and economic turmoil (fig. 1).

This study identifies Peru as a potentially limited commercial market for U.S. agricultural commodities in the current economic climate. It examines the major factors related to import growth during the 1970's and early 1980's--mainly population, income, and domestic food production--as well as the country's position regarding foreign reserves, food aid, and import prices. These factors are keys for determining the potential, as well as the constraints, for U.S. exports to Peru through 1995.

Figure 1--Peru: Agricultural imports



The General Economy

Population growth is expected to be the driving force for increased food imports in 1989, rather than such macroeconomic factors as changes in income and foreign reserves. Peru will be feeding nearly 30 percent more people in 1995 at its present population growth rate, than in 1985. Per capita real income will, at best, be recovering from the decline of the early 1980's to match the level of 1970. Any real growth above this level will occur in the early 1990's. Foreign reserves in 1995 are not expected to improve over the 1980 level and will further limit internal income growth.

Population

Peru had a population of 21 million persons in 1988 (table 1). Population growth, at 2.6 percent per year, has been high, and life expectancy is 59 years. About 7.3 million people, nearly a fourth of the country's population, are concentrated in the Lima/Callao area. Arequipa has a population of nearly 500,000. Chiclayo, Chimbote, Cusco, Iquitos, Huancayo, Piura, and Trujillo are other large metropolitan areas with populations of 100,000 or more. Peru's population has been constantly migrating from the mountains and other rural areas to the major urban centers of Lima/Callao, Arequipa, and Chimbote. Sixty-eight percent of the population was classified as urban in 1985.

Table 1--Peru: Macroeconomic statistics

Year	Population	GDP <u>1</u> /	CPI <u>2</u> /	Foreign reserves	Official exchange rate	Real GDP	Real foreign reserves	Per capita real foreign reserves	Per capita real GDP
	Million	Billion intis <u>3</u> /	1980=100	Million dollars	Billion intis	Intis	Billion 1980 intis	---1980 intis---	
1960	10.02	56	2.94	33.7	905	0.03	2,036.6	307.8	30.66
1961	10.32	64	3.12	63	1,689	.03	2,215.4	541.3	52.45
1962	10.63	73	3.33	69.3	1,858	.03	2,442.7	557.9	52.48
1963	10.96	79	3.52	77.8	2,086	.03	2,544.7	592.6	54.07
1964	11.3	97	3.87	92.8	2,488	.03	2,721.3	642.9	56.89
1965	11.65	115	4.5	107.5	2,883	.03	2,859.5	640.6	54.98
1966	12.01	137	4.9	90.2	2,419	.03	3,061	493.7	41.10
1967	12.31	157	5.39	105.6	3,194	.03	3,168.4	592.6	48.14
1968	12.67	186	6.41	91.4	3,537	.04	3,168.4	551.8	43.55
1969	13.05	209	6.81	142.2	5,503	.04	3,299.3	808.1	61.92
1970	13.45	241	7.15	296.3	11,466	.04	3,540.6	1,603.6	44.87
1971	13.59	264	7.64	380.9	14,740	.04	3,721.5	1,929.3	141.96
1972	13.95	295	8.18	442.5	17,124	.04	3,939.2	2,093.4	150.06
1973	14.35	359	8.96	526.1	20,360	.04	4,183.4	2,272.3	158.35
1974	14.75	448	10.48	925.2	35,805	.04	4,470.2	3,416.5	231.63
1975	15.16	55	12.95	425.5	17,249	.04	4,576.1	1,331.9	87.85
1976	15.57	765	17.29	289.3	16,322	.06	4,729.1	944	60.63
1977	15.99	1,058	23.87	356.8	29,903	.08	4,715.9	1,252.7	78.34
1978	16.41	1,678	37.68	389.7	60,921	.15	4,633.5	1,616.7	98.52
1979	16.85	3,119	62.81	1,520.7	341,316	.22	4,832.1	5,434.1	322.5
1980	17.3	4,972	100	1,979.8	571,469	.28	4,971.8	5,714.7	330.33
1981	17.75	8,520	175.39	1,199.5	506,525	.42	5,723.3	2,887.9	162.7
1982	18.23	14,183	288.42	1,349.6	941,440	.69	5,168.9	3,264.1	179.05
1983	18.71	26,313	609	1,365.1	2,218,234	1.62	4,549.6	3,642.4	194.68
1984	19.21	59,865	1,280.18	1,630.5	5,656,447	3.47	4,765.9	4,418.5	230.01
1985	19.7	157,977	3,371.98	1,842	17,848,190	1.09	4,842.4	5,293.1	268.68
1986	20.21	N.A.	5,999.46	645.8	19,948,500	13.95	5,258.4	N.A.	N.A.
1987	20.73	N.A.	10,920	518.4	N.A.	16.84	5,615.9	N.A.	N.A.
1988	21.27	N.A.	163,800	N.A.	N.A.	128.83	5,138.5	N.A.	N.A.

N.A. = Not available or not applicable.

1/ GDP represents gross domestic product. 2/ CPI represents Consumer Price Index. 3/ Intis represents the currency of Peru.

Source: (8), see References.

Peru's population is comprised of persons of European heritage, Hispanic mestizos, and native indians. About half of the population is white or mestizo and the other half is indian, although the ethnic divisions are not always clear. The indian population is divided between the tropical forest indians and the Quechua and Aymara-speaking indians of the central and southern Andes. The major demographic factors creating added demand for food are rapid population growth and continued rural-urban migration.

Income

Peru is classified by the World Bank as a middle-income country with a gross domestic product (GDP) of \$16 billion in 1988, or nearly \$750 per capita. Most of Peru's GDP is generated in the services industry. Agriculture's share is declining, reaching about 11 percent of GDP in 1988, while industry's share is rising. Manufacturing accounts for a fifth of Peru's GDP (table 2). Nearly 40 percent of manufacturing is for food processing and textiles.

Peru experienced a sharp economic decline during 1980-85, with GDP declining at an annual rate of 1.6 percent (fig. 2). In the current period of austerity and inflation, the real purchasing power of the average wage earner is about 40 percent of what it was a decade ago, with per capita income in real dollars back to the level of 1965. Peru has a long history of booms and busts, in part because of its colonial heritage. The historical period

Table 2--Distribution and rate of growth of major economic sectors

Sector	Share of GDP		Rate of growth of GDP	
	1965	1985	1965-80	1980-85
<u>Percent</u>				
Agriculture	18	11	1	1.9
Industry	29	38	4.4	-3
Manufacturing	17	20	3.8	-3.8
Services	53	51	4.3	-1.2
Total	100	100	3.9	-1.6

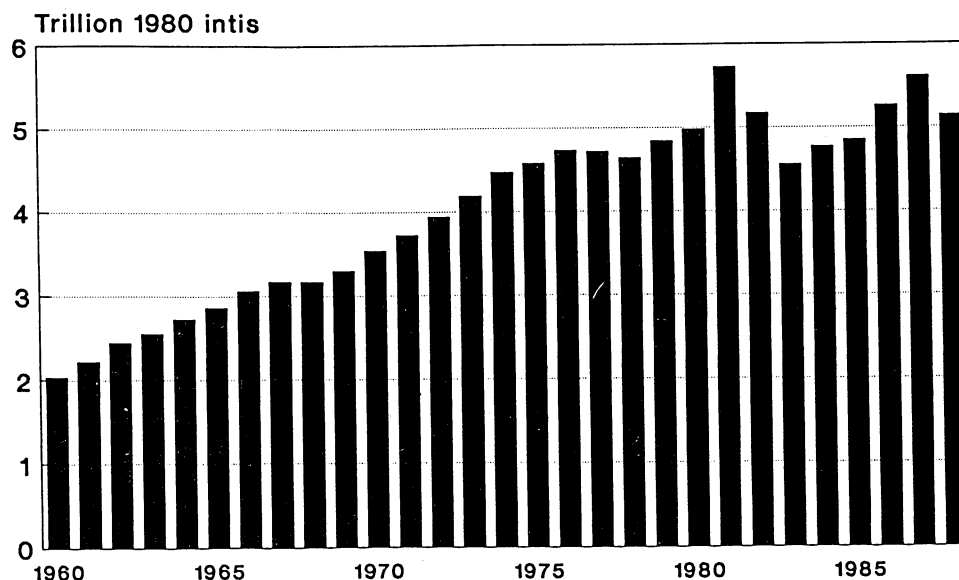
Source: (22), see References.

of prosperity resulted from the mining and export of gold, silver, and mercury. The guano boom, subsequently bolstered by cotton, sugar, and nonferrous metals, ushered in other periods of rapid economic expansion. Fishmeal and crude oil produced renewed export-led growth in recent years, but the basic problems of the economy still prevail. These export industries employ relatively few workers, generally rely on imports for major inputs, and do not develop a strong industrial base, which would give stability to the general economy.

The continued reliance on a few primary export commodities induced boom and bust cycles that were highly related to the fluctuations of international commodity prices. Peru often experienced severe financial crises after periods of rapid economic growth because economic contraction followed the slowing of export expansion. Large investments caught in middevelopment, substantial foreign indebtedness, high propensity to import, and the government's active role in financial affairs contributed to the severity of the adjustment.

Peru appeared to be in a period of strong economic growth in 1987 after sustaining sharp declines in 1977-78 and 1983, but was again declining in 1988. The volatility of the economy is evident from the brief periods of hyperinflation that have plagued Peru (fig. 2). Peru's Consumer Price Index (CPI) was more than 30 times its 1980 level by March 1988. Peru experienced inflation of more than 100 percent in 1983, 1984, 1985, and 1988. Inflation also plagued Peru during the 1970's (table 1).

Figure 2--Peru: Gross domestic product



Import Purchasing Power

Foreign debt has been the principal issue affecting Peru's trade policies. Peru's foreign debt totals about \$14 billion, compared with \$9.9 billion in 1979. Scheduled annual debt servicing payments are about \$2 billion. In 1986, President Alan Garcia proposed that Peru limit payments on foreign debt to 10 percent of the coming year's expected export revenue, about \$320 million. Payment of loans from international organizations like the Inter-American Development Bank (IDB) would have first priority for payment.

Peru adopted import-restricting policies in the 1980's as it attempted to deal with its balance of payments and foreign debt problems. Peru also asked for a rollover in commercial bank loans. Scheduled interest and principal payments amount to 140 percent of projected exports. Even interest payments on foreign debt are coming due faster than the Peruvian Government can pay them.

Peru has maintained a positive trade balance in most years, usually through restrictive import policies (table 3). Peru's export earnings are mostly from petroleum products, copper, lead, zinc, silver, and coffee. Petroleum had been the leading export for Peru in the late 1970's, but earnings from petroleum also collapsed in 1986.

Foreign reserves, at the end of 1988, had slipped to \$518 million, compared with a high of almost \$2 billion in 1980 (fig. 3). The balance-of-payments statistics demonstrate the changed foreign exchange situation that foreign reserves statistics alone do not capture (table 3). Foreign reserves increased from \$296 million in 1970 to \$1.5 billion in 1979-81 and declined only to \$1.4 billion in 1986. The balance was maintained because Peru did not pay accrued foreign debt of \$1.3 billion in 1983, \$1.4 billion in 1985, and \$1.8 billion in 1986. Peru's policy of limiting its foreign debt payments and extending payments into the future will keep foreign reserves low well into the 1990's. The current financial crisis is a continuation of Peru's economic problems.

Peru's financial situation was already considered alarming a decade ago. The growing budget and public sector deficits and expansionary policies, along with worsening terms of trade and a recession in Peru's main export markets, drained foreign reserves and increased the country's foreign debt. The austerity programs that were introduced in 1975 failed to halt the erosion of foreign reserves. When conditions worsened in 1976, the Government of Peru mounted a stabilization effort endorsed by the IMF that included expenditure cuts, higher prices for state-enterprise products, a large devaluation of the sol, and the switch from a fixed exchange rate to a crawling, pegged

Table 3--Peru: Balance of payments

Item	1979-81 average	1985	1986
<u>Million U.S. dollars</u>			
Current account	-274	123	-1,030
Merchandise exports	3,527	2,978	2,509
Copper	648	475	436
Petroleum products	705	645	235
Lead and zinc	513	214	168
Silver	283	139	110
Coffee	164	163	285
Merchandise imports	-2,915	-1,806	-2,525
Trade balance, f.o.b. <u>1/</u>	612	1172	-16
Other goods and services:			
Credit	853	947	889
Debit	-1,906	-2,128	-1,998
Capital account	-8	192	1,118
Investment income	-283	-1,252	-1,263
Other short-term capital	96	-344	210
Net errors and omissions	199	-286	-53
Counterpart items	14	-210	-222
Government debt rescheduling	-11	0	0
Payment arrears	0	1,420	2,117
Change in reserves	-410	-110	373
Foreign reserves	1,566	1,827	1,430

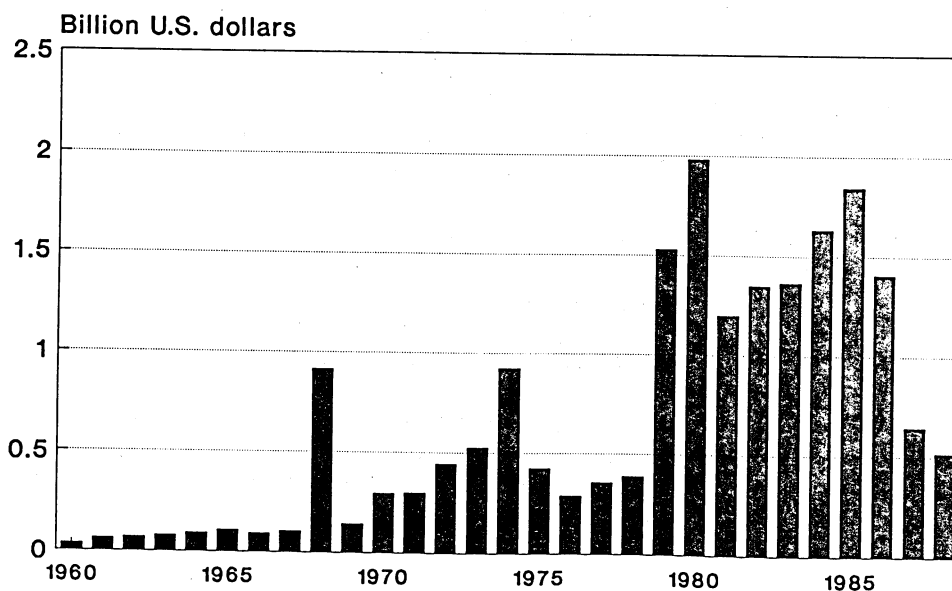
1/ F.o.b. represents the prices of export goods and import goods valued at the point of export.

Source: (7), see References.

exchange rate.¹ Peru was unable to service its external debt by 1978. Peru pulled itself out of the tenuous situation in 1979 by refinancing the bulk of its foreign debt. Rising international prices for metals, sugar, and petroleum (the country's major exports) aided the recovery of Peru's international financial situation.

¹Currency of Peru changed from soles to intis in 1986.

Figure 3--Peru: Foreign reserves



Food Consumption Trends

The average Peruvian diet is short of calories according to the minimum requirement recommended by the Food and Agriculture Organization (FAO) (5).² Per capita caloric intake of food fell during the 1970's, and the 1983 El Nino disaster, plus the continuing economic slump through 1985, caused a further decline in per capita caloric intake.³ The decline occurred despite commercial imports and Public Law (P.L.) 480 food aid.

Nearly a fourth of the food (calories) during 1979-81 was from imported grains and oilseed products, particularly wheat (table 4). Domestically produced sources of calories include sugar, potatoes, plantains, and cassava. Potato consumption declined during 1970-80 from 120 kilograms to 70 kilograms a year but provided 8 percent of the calories. Sugar, at 32 kilograms, provided 19 percent. Among grains, flour from wheat provided more calories than rice or corn. Use of all three grains increased, but per capita wheat consumption declined slightly to

²Numbers in parentheses refer to items listed in the references.

³The El Nino disaster was the result of an extreme weather phenomenon that occurs when changes in the ocean currents cause drought in the highlands and torrential rains in the desert areas. In 1983, the El Nino caused the worst weather-related disaster on record in Peru.

51 kilograms in 1980. Per capita consumption of milled rice and corn flour remained about the same during the decade. Per capita consumption of wheat and rice appears to be increasing in the 1980's (table 5). Imported soybean oil now provides more calories than domestic cottonseed oil, which is a reversal from a decade earlier. Per capita vegetable oil use increased rapidly during the 1970's but has leveled off during the 1980's.

Cabbage, tomatoes, onions, peas, and broad beans are the chief vegetables consumed in Peru. The major fruits consumed are plantains, citrus, apples, mangoes, avocados, pineapples, and papaya. Citrus consumption declined sharply during the 1970's. These foods are important for diet and are not traded widely.

The average Peruvian diet is deficient in protein as well as in calories. The most important protein source in the Peruvian diet is fish. Cow's milk is also important. Fresh milk consumption has declined, but evaporated and dry skim milk use have increased as manufacturing of milk has risen.

Peruvians tripled their consumption of poultry from 1970 to 1980, to 8 kilograms a year. Per capita consumption of chicken remained in the 8-9-kilogram range from 1980 to 1986. Beef (including offals) consumption totaled about 6.5 kilograms and provided about the same amount of protein as poultry. Pork ranked after beef.

Food consumption patterns vary by region, partly because of food availability and partly because of income. Near Lima, the diet averages about 2,800 calories per day; in the coastal area, 2,400 calories; in the Selva (jungle), 1,900 calories; and in the Sierra (mountains), 1,600 calories. The diet in the Sierra is weighted toward tubers and potatoes. The coastal diet, in contrast, contains more fruits and vegetables, fish, eggs, and dairy products.

Consumer Policy

Peru has maintained a policy of providing food at low prices to the consumer because of the large low-income population. The government introduced subsidies for bread and noodles in 1980 to minimize the cost increases of these basic foods. The manufacturers' price for flour used for bread and noodles was half that of flour used for other products. Until 1983, Peru subsidized its basic food products through Empresa Comercializacion de Insumos (ENCI) and Empresa Comercialidora del Arroz (ECASA), its central marketing agency for other basic commodities (see glossary of terms). Peru dropped many products from its price control list during 1983-85 but has since reinstated them.

Table 4--Peru: Per capita consumption of basic foods, 1979-81 average

Food	Kilograms per year	Calories per day	Protein grams per day
Wheat	51.4	386	12.5
Rice	40.6	297	5.9
Barley	7	47	1.3
Corn	23.3	219	5.7
Oats	1	6	.2
Quinoa	.5	5	.2
Cassava	17	42	.3
Potatoes	69.8	140	3.6
Sweet potatoes	7	17	.2
Other roots	6.8	11	.2
Sugar	32.3	316	0
Dry beans	2.4	22	1.4
Broad beans	1.1	10	.7
Dry peas	.9	9	.6
Other pulses	.8	8	.6
Peanuts	.3	3	.2
Coconuts	.9	3	0
Other nuts	.8	5	.2
Cabbage	1.6	1	.1
Tomatoes	3.1	2	.1
Squash	3.3	1	0
Onions	7.5	8	.3
Green peas	1.6	2	.1
Green beans	1.7	2	.1
Carrots	1.5	1	0
Green corn	6.6	7	.2
Plantains	37	64	.8
Citrus fruit	12.6	6	0
Apples	4.1	6	0
Peaches	1.3	2	0
Watermelon	1.7	1	0
Mangoes	3.9	3	0
Avocados	2.9	7	0
Pineapples	2.3	2	0
Papayas	2.2	1	0

Continued--

Table 4--Peru: Per capita consumption of basic foods, 1979-81
average--Continued

Food	Kilograms per year	Calories per day	Protein grams per day
Beef and veal	5.2	29	2.1
Edible offals (beef)	1.3	4	.7
Lamb	1.2	5	.5
Edible offals (lamb)	.3	1	.1
Goat meat	.5	2	.2
Pork	4.1	19	1
Edible offals (pork)	.3	1	.1
Poultry	8.4	6	.8
Other meat	1.9	6	.8
Eggs	2.8	10	.8
Fish and seafood	29.7	49	6.7
Whole milk	36.7	64	3.2
Skim milk	8.4	11	1.4
Cheese	1.4	15	1
Goat milk	.6	1	.1
Soybean oil	4	97	0
Palm oil	.3	8	0
Cottonseed oil	1.3	32	0
Lard	.7	17	0
Other animal fats	.9	19	0
Coffee	1.8	2	0
Cocoa beans	.1	0	0
Tea	.1	0	0
Beer	34.3	33	0
Wine	.6	1	0

Source: (5), see References.

Table 5--Per capita consumption of basic food items

Year	Wheat	Corn	Rice	Edible oils	Soybean oil
Kilograms/person					
1980	53	26	27	11	2
1981	59	30	31	10	4
1982	55	23	30	10	4
1983	57	27	29	8	5
1984	56	23	29	7	3
1985	47	23	29	6	2
1986	59	20	33	11	3
1987	61	27	37	10	4

Source: Calculated from (20), see References.

The subsidy for wheat during the 1970's was the difference between the cost, insurance, and freight (c.i.f.) price and the price that the government sold wheat for to the flour mills. The overvalued exchange rate during the 1970's meant that consumers were being subsidized even more than nominal prices and exchange rates indicated. Consumers also enjoyed a large subsidy for rice, since controlled consumer prices were well below both domestic producer prices and world prices. The Peruvian Government attempted to eliminate price controls and food subsidies in the early 1980's. Milk, bread, pasta, and wheat prices were freed in 1983.

Wheat prices, in particular, were adjusted to more closely reflect world market prices. The food price policy shifted back to one of imposing price controls since the Garcia Government was elected in 1985, at least in the short run. Retail prices for these foodstuffs are given in table 6.

The program of stabilizing basic consumer prices was at considerable cost to the government in 1984 and 1985 (table 7). The decline in world prices for major commodities in 1986, created a situation where the earlier subsidies to mills were no longer operational. In 1986, the difference between the lower import price and the higher prices for corn, rice, and milk was used to defray the costs of these domestic products. Wheat also was not as highly subsidized as it had been in the past.

Consumer Prices

Although the Peruvian CPI increased fourteenfold during the 1970's, real prices for some basic foods, such as white potatoes, sweet potatoes, cassava, and noodles, were increasing faster than the overall rate of inflation (table 8). Chicken and rice retail prices increased at a slower pace. The renewal of controlled prices left basic food prices increasing more slowly than inflation.

Agricultural Production

Population pressure on the land base is severe since less than 5 percent of Peru's land is arable. Agriculture employs about 40 percent of the labor force, comprises 11 percent of the GDP, and accounts for about 25 percent of the value of all exports from Peru. Population has been increasing at nearly 3 percent each year, while agricultural production has stagnated, leaving Peru with an increasing food gap. Per capita food production declined during the 1970's and continues to do so in the 1980's. Peru's agricultural production peaked in 1976, according to the report World Indices of Agricultural and Food Production (17). The stagnation in agriculture has been attributed to causes such as government policies, a prolonged drought during 1977-80, and the El Nino disaster of 1983.

Table 6--Peru: Prices of selected commodities subject to price controls

Table 6--Peru: Prices of selected commodities 1982-1987

Commodity	Units	1982		1983		1984		1985		1986		1987
		June	December	June	December	June	December	June	December	June	December	March
Intis 1/												
Rice	Kg	0.22	0.28	0.39	0.75	1.12	1.72	3.01	3.5	4.2	5	5
Hard corn	Kg	.13	.17	.24	.37	.63	.84	1.8	2.15	2.65	4.1	4.1
Sorghum	Kg	.12	.16	N.A.	N.A.	.59	.78	1.68	2.01	2.4	3.7	3.7
White sugar	Kg	.24	.32	N.A.	N.A.	1.12	1.4	2.74	2.8	3.56	4.63	6
Wheat flour	Kg	.15	.19	N.A.	N.A.	2.41	3.09	6.32	9.65	9.69	9.75	9.75
French bread	40 g	.01	.01	.03	.04	.07	.09	.15	.18	.26	.33	.33
Oil	Liters	N.A.	N.A.	N.A.	N.A.	4.42	6.21	14.82	13.06	13.79	13.79	14
Pasteurized milk	Liters	.21	.25	.33	.53	.74	1.03	2.4	2.8	3.45	3.95	5.28
Evaporated milk	14.5 oz.	.3	.36	.5	.85	1.52	1.75	3.7	4.2	5.2	6.03	7.5
U.S. dollars												
Rice	Kg	.33	.28	.25	.33	.33	.3	.27	.23	.39	.3	.34
Hard corn	Kg	.19	.17	.15	.16	.19	.15	.16	.14	.19	.31	.28
Sorghum	Kg	.18	.16	N.A.	N.A.	.18	.14	.15	.13	.4	.29	.25
White sugar	Kg	.36	.47	N.A.	N.A.	.34	.25	.24	.19	.56	.36	.41
Wheat flour	Kg	.22	.28	N.A.	N.A.	.72	.54	.56	.56	.69	.75	.66
French bread	40 g	.01	.01	.02	.02	.02	.02	.01	.01	.03	.02	.02
Oil	Liters	N.A.	N.A.	N.A.	N.A.	1.33	1.09	1.32	.87	.79	1.06	.95
Pasteurized milk	Liters	.31	.25	.21	.23	.22	.18	.21	.19	.45	.31	.36
Evaporated milk	14.5 oz.	.44	.53	.32	.37	.37	.31	.33	.28	.20	.47	.51

N.A. = Not available or not applicable.

1/ Intis represents the currency of Peru.

Source: (19), see References.

Table 7--Peru: Subsidies for principal foods

Commodity	1984	1985	1986
<u>Million intis</u>			
Wheat	N.A.	N.A.	<u>1/</u> (984)
Nonfat dry milk	131	20	(16)
Dried milk fats	122	18	(66)
Imported dried milk	99	60	98
Domestic corn	9	14	141
Imported corn	N.A.	N.A.	(407)
Other	N.A.	N.A.	9
Domestic rice	511	459	1,117
Imported rice	(146)	(167)	(152)
Total subsidy	726	461	(218)

N.A. = Not applicable.

1/ Numbers in parentheses indicate payment by millers or manufacturers rather than subsidy.

Source: (2), see References.

Table 8--Retail prices for selected commodities

Commodity	<u>Subsidy price</u>		<u>Real prices</u>		<u>Price in \$U.S.</u>		<u>U.S. price</u>	
	1969-71 average	1979-81 average	1969-71 average	1979-81 average	1969-71 average	1979-81 average	1969-71 average	1979-81 average
	<u>Intis/kilogram</u>		<u>Intis/kilogram</u>		<u>Dollar/kilogram</u>		<u>Dollar/kilogram</u>	
White potatoes	4.21	39.88	58.47	63.49	0.1	0.17	0.19	0.48
Sweet potatoes	1.94	25	26.94	39.8	.05	.11	N.A.	N.A.
Cassava	4.91	47.96	68.19	76.35	.12	.21	N.A.	N.A.
Rice	8.8	67.67	122.22	107.74	.22	.3	.51	1.13
Chicken	53.44	386.72	770	615.70	1.43	1.72	.91	1.59
Noodles	9.84	109.97	136.66	175.08	.25	.48	N.A.	1.51

N.A. = Not applicable.

Source: (14), see References.

The largest crop area is planted in corn, which made a comeback in the 1980's with an annual 6.4-percent increase in production compared with the decline in the 1970's. Potatoes are the traditional staple of Peru; however, potato production has continued to decline through two decades, falling by 4.3 percent each year during the 1980's. These staples, as well as domestic wheat, barley, quinoa, sweet potatoes, and cassava often do not leave the farms. Potatoes in more recent years have gradually entered the commercial markets (13).

Sugarcane, cotton, and coffee have been leading export earners, but the importance of these commodities in overall trade has declined.

Plantation crops that declined during the 1970's because of land reform programs and the long-term decline in those commodity prices have made some comeback during the 1980's. Rice production has experienced the most growth because it is the only food crop that has consistently received substantial production subsidies. Rice production declined an annual 2.1 percent during the 1970's and increased 5.5 percent each year during the 1980's (table 9). Sorghum and poultry have also shown some consistent growth. Production of barley, potatoes, cassava, sugarcane, cottonseed, and beef have declined. Crops account for three-fourths of the agricultural production in Peru.

Production of meat and dairy products has not kept pace with population growth, although the country has a large livestock sector. Livestock producers face many difficulties, such as inadequate pastures, poor range management, lack of feed, and price controls that are disincentives to upgrading stock and grazing land.

Peru made progress in its poultry and egg industries during the 1970's. Poultry meat increased 8.5 percent each year in the 1970's and 4.8 percent per year during the 1980's. Egg production grew an annual rate of 6.9 percent during the 1970's and 10.4 percent during the 1980's to reach 187,000 tons in 1985. Beef production declined during the 1970's, while pork and milk made slight gains. All but poultry products have slumped in the early 1980's as a consequence of economic hardships.

The food gap between production and consumption is filled by imports of wheat, corn, rice, and oilseed products in some years.

Regionalization of Peru

Peru has three distinctive regions (the Costa, the Sierra, and the Selva) that have diverse climates, populations, general economies, and agricultures. One must be aware of the regional differences to understand Peru's problems. The central region, or Costa, is the narrow belt of arid land between the foothills

Table 9--Peru: Production of selected agricultural products

Product	Average			Annual growth rate	
	1969-71	1979-81	1984-86	1971-80	1981-86
	- - - 1,000 tons - - -			- - - Percent - - -	
Wheat	128	97	98	-5.7	-0.5
Rice, paddy	541	514	742	-2.1	5.5
Corn	605	543	761	-1.6	6.4
Barley	164	162	104	.2	-5.2
Sorghum	15	45	32	13.8	-9.3
Dry beans	50	41	46	-.6	+5
Potatoes	1,918	1,585	1,472	-2.4	-4.3
Cassava	477	377	366	-2.4	-2.9
Sweet potatoes	167	125	144	-3.6	4.9
Onions	149	153	90	-.7	-2.4
Sugarcane	7,345	5,920	6,825	-3.2	3.5
Tobacco	3	4	3	-.3	-13.2
Cotton	86	95	72	.9	2.7
Cottonseed	144	158	140	1.5	3.7
Soybeans	1	5	3	16.1	6.1
Bananas	654	765	450	-.7	-2.9
Coffee	59	71	74	2.1	2.7
Beef and veal	95	74	99	-3.4	7.7
Mutton and lamb	33	33	23	-6.2	4.6
Pork	49	56	56	1.8	.6
Poultry meat	46	127	187	8.5	4.8
Milk	595	640	648	.6	-3
Wool, greasy basis	10	10	8	-6.2	-2.5
Eggs	27	48	55	6.9	10.4

Source: (17), see References.

of the Andes and the Pacific Ocean, as well as the lower valleys of the westward-flowing rivers. The Costa's coastal region contains most of the large commercial farms and is the largest source of Peru's export crops. It also accounts for a high percentage of Peru's agricultural wealth. The Costa accounts for less than 22 percent of total cropland; however, it produces over 40 percent of all crops in terms of value. The Costa's main agricultural problem is lack of water, although it has been extensively developed through irrigation. Increasing soil salinity recently caused some land to go out of production.

Large public and private investments have been made for the construction of irrigation projects in the region. The Costa is the largest source of Peru's main export crops: cotton and sugar. Potatoes, corn, beans, rice, wheat, eggs, milk, and many fruits and vegetables are also raised there.

The Sierra, the mountainous region, provides a harsh environment for habitation but is heavily populated. Nearly 60 percent of Peru's population lives in the Sierra, and the region is considered overpopulated relative to the resources that are available. The Sierra is the home of the Quechua- and Aymara-speaking indians in the south and central Andes, and of the mestizo in the northern valleys. The indians of the Sierra practice a more traditional subsistence type of agriculture. The vast majority of the indians play a very limited role in Peru's monetary economy. Poverty in the rural areas of the southern Sierra is striking, and the main problems faced by agriculture in Peru are problems of the Sierra. This region has a steep, broken topography, and the adverse effects of overcropping, uncontrolled soil erosion, and soil depletion have caused production declines. Soils in this region are relatively poor and a large portion of the land remains fallow each year. The area's remoteness also presents transportation and communication problems.

The Sierra's arable land is located at altitudes of 2,500-3,500 meters (8,000-11,000 feet) above sea level. The Sierra has three subregions: the Inter-Andean valleys, the Altiplano (3,500-4,000 meters), and the Puna (above 4,000 meters). The Sierra's agriculture is largely determined by altitude. The highest zone has natural pastures and is used for livestock, such as llama and alpaca in the south and cattle, sheep, and horses throughout. The next highest zone is mostly devoted to potato and tuber cultivation. The third zone is adapted to cereal production, such as corn, barley, and wheat. Coca, plantains, manioc, sweet potatoes, peppers, and sugarcane are also cultivated in this zone.

The Selva is inhabited mostly by indians who live in agricultural villages near rivers, and nomadic hunters and food-gatherers who live in the tropical rain forest. The village inhabitants practice slash-and-burn agriculture, planting manioc, squash, yams, sweet potatoes, beans, peanuts, plantains, and corn. Coffee, tea, cacao, rice, corn, bananas, and cassava are the principal commercial crops cultivated in the Selva. Iquitos is the principal area that has been developed in this largely underdeveloped region. Fruits, coffee, and tea are grown near the trans-Andean mountains so that they can be easily transported to market. The Selva has two subregions: the high Selva (700-1,800 meters), which is subtropical, and the low Selva (below 700 meters), which is tropical. The Selva area has abundant land capable of cultivation, but the soil is shallow and very acid. The area is also remote from the population centers

of the coast, and products have to be transported across the Andes to reach those markets.

Land Base

Many of Peru's problems are due to its natural land base and types of soil. Peru has attempted to alleviate its land base limitations by developing irrigation systems, but there are huge natural difficulties to overcome.

Peru has relatively limited agricultural land in spite of the country's size. Of the 128 million hectares in Peru's total land area, less than 3 percent are classified as cropland (table 10).

Table 10--Peru: Selected agricultural inputs

Input	Units	1969-71	1979-81	1985
Land area	1,000 ha.	128,522	128,522	128,522
Arable land and permanent crops	do.	2,813	3,438	3,517
Arable land	do.	2,558	3,133	3,200
Permanent crops	do.	255	305	317
Permanent pastures	do.	27,120	27,120	27,120
Forestland and woodland	do.	73,800	77,566	69,900
Irrigated land	do.	1,106	1,180	1,200
Labor:				
Total population	Million	13,913	17,295	19,698
Agricultural population	do.	6,353	6,956	7,680
Agriculture's share of population	Percent	47	40	39
Economically active population	Million	3,913	5,189	6,204
Employed in agriculture	do.	1,754	1,937	2,273
Agriculture's share of total	Percent	45	37	37
Arable land/person	Ha.	18	18	16
Fertilizer:				
Fertilizer use	1,000 tons	76	122	82
Nitrogen	do.	62	90	54
Phosphate	do.	8	18	14
Potash	do.	6	14	14
Total use per hectare of arable land	kg/ha.	27	35	22
Nitrogen	do.	22	26	15
Phosphate	do.	3	5	5
Potash	do.	2	4	3

Sources: (3, 4), see References.

About 800,000 hectares of cropland are in the Costa, 2.3 million hectares in the Sierra, and 600,000 hectares in the Selva. Seventeen percent of the total land area is natural pastureland. Nearly a third of the land is unusable for agriculture. Much of the land is either in the upper elevations of the mountains, or part of the dry sandy coast where irrigation is precluded.

Soils

Only 1.5 percent of Peru's soils are classified as class 1 to class 4 in the international soil classification system. Class 1 to class 4 soils are appropriate for cultivation of crops. They include alluvial soils, subhumid forest soils, and red and grey desert soils of high mountain valleys. Over 90 percent of the land is class 5 to class 7 soils, which have only limited agricultural use. Another 6 percent of the land's soil is on steep mountain slopes in the desert or in permanent snow areas.

Irrigation

Irrigation systems in Peru were developed before European settlement but have fallen into disrepair. Water is brought to the coastal desert by more than 60 rivers flowing from the Sierra. There were 1.2 million hectares of irrigated cropland; 700,000 in the Costa and 500,000 in the Sierra in 1972. Nearly 200,000 hectares in the Costa had gone out of production by the late 1970's because of increased salinity. The bulk of the government's investment in agriculture during the 1970's was concentrated in large irrigation projects in the Costa. Some small irrigation and rehabilitation projects were also carried out in the Sierra. Major investment efforts, however, are now required to rehabilitate existing irrigation systems, and attempting to increase Peru's irrigated area would be very expensive.

Fertilizer

Peruvian farmers are moderate users of fertilizer, applying slightly less per hectare of arable land than Venezuela and Colombia. Fertilizer use increased from 27 kilograms per hectare of arable land in 1970 to 35 kilograms by 1980, but dropped to 22 kilograms by 1985. Fertilizer use rose an average of 5 percent a year during the 1970's to a total of 122,000 tons in 1980. Use dropped to 82,000 tons by 1985, as the cost of importing fertilizer became too expensive. Nitrogenous fertilizers account for the bulk of fertilizer used. Rice and sugarcane are the principal crops using fertilizer. Much of the fertilizer is imported because only 55,000 tons of urea are produced in the country.

Feedstuffs

Feedstuffs are also used moderately in Peru, mostly for poultry production. Corn, sorghum, fishmeal, and soybean meal are the principal feedstuffs, with corn being the dominant grain and fishmeal being the dominant protein (table 11). Soybean meal use increased rapidly during the 1970's and early 1980's. The protein content of feeds has increased dramatically because of increased fishmeal and soybean meal use.

There has been an implied improvement in efficiency of feed use per pound of meat produced since 1970. Total digestible nutrients, protein, and fat fed per pound of poultry meat produced have all declined. About 2.8 pounds of corn and 0.2 pound of sorghum were used to produce 1 pound of chicken in 1985, while about 5.6 total pounds of those grains were used in 1970. One pound of protein meal (fishmeal and soybean meal) was used in

Table 11--Chicken meat production and related feed use with 1990 and 1995 projections

Item	Units	1969-71 average	1979-81 average	1985	Projections	
					1990	1995
Chicken production	1,000 tons	46	127	180	200	270
Domestic feed use:						
Corn	do.	245	425	518	560	750
Sorghum	do.	16	53	44	60	60
Fishmeal	do.	24	69	110	120	165
Soybean meal	do.	5	44	64	80	90
Cottonseed meal	do.	80	66	58	60	80
Total digestible nutrients of major feeds	Units	22,653	45,943	56,959	N.A.	N.A.
Protein content of major feeds	do.	4,038	10,553	14,709	N.A.	N.A.
Fat content of major feeds	do.	1,150	2,296	2,933	N.A.	N.A.
Total nutrients of major feeds	do.	2,704	4,936	5,581	N.A.	N.A.
Total digestible nutrients per pound of meat	Units/lb.	492	362	316	N.A.	N.A.
Protein per pound of meat	do.	88	83	82	N.A.	N.A.
Fat per pound of meat	do.	25	18	16	N.A.	N.A.
Total nutrients per pound of meat	do.	59	39	33	N.A.	N.A.
Corn per pound of meat	do.	5.3	3.3	2.8	2.8	2.8
Sorghum per pound of meat	do.	.3	.4	.2	.2	.2
Fishmeal per pound of meat	do.	.5	.5	.6	.6	.6
Soybean per pound of meat	do.	.1	.4	.4	.4	.4
Cottonseed meal per pound of meat	do.	1.7	.5	.3	.3	.3

N.A. = Not applicable.

Sources: (10, 20), see References.

1985, compared with 0.6 pound in 1970. Most of the poultry feeding improvements took place in the early 1970's.

Land Tenure and Reform

Historical, economic, and social factors left a few families owning most of the agricultural land in Peru. Consolidation of estates, particularly on the coast, increased after 1900 because of the development of large sugar and cotton plantations. Most of the rural population had small holdings or no land at all. Peru undertook three major land reforms in 1964, 1969, and 1984.

The first land reform bill was passed in 1964. By 1968, 600,000 hectares had been expropriated, and over 2 million hectares of idle land reverted to the state. Only around 300,000 hectares, however, were distributed to 11,000 families. A major side effect of the 1964 land reform law was to accelerate the withdrawal of capital from landholdings by wealthy owners, a trend begun in the 1950's.

The new military government drafted a new decree in June 1969, in a more rigorous attempt at land reform. The maximum individual holding was fixed at 150 hectares in the Costa and between 15-55 hectares of irrigated land in the Sierra. Maximum holdings of forest or pastureland were set at 1,500 hectares. The law also required that owners live on their property, that agricultural workers participate in the profits and management, that all forms of farm rentals be abolished, and that the exchange of personal services for the use of land be discontinued. Farm units under 3 hectares were forbidden, and amalgamation of small plots was encouraged. The reform's objective was to expropriate 14,500 estates that encompassed 43 percent of the agricultural land.

Expropriation and redistribution of land was largely completed by the late 1970's. Nine million hectares were expropriated, of which 8.8 million hectares were distributed to 379,000 families. In addition, 2.9 million hectares were reverted to state ownership, of which 1.1 million hectares in the Selva was distributed to 10,706 families. The basic restructuring of land was to occur through large-scale cooperatives. Land redistribution involved nearly 40 percent of the country's agricultural land and affected about 25 percent of the rural families. Private medium and large farms controlled less than 10 percent of the agricultural land, and that land was largely in the Sierra and the Selva.

The economic achievements from cooperatives and land redistribution were less than anticipated, and, in 1984, a Peruvian Government decree permitted members of cooperatives to vote on redistribution of land back to private individuals. Private redistribution occurred mostly in the coastal areas. The total effect of the three land reforms was a net increase of 5

percent in the number of landowners but the problem of the landless still remained.

Farm Policy

Peru's overall agricultural policy has been aimed at keeping consumer prices low. The Peruvian Government intervenes in the agricultural sector through its Ministry of Agriculture and its marketing organizations ECASA and ENCI, which distribute farm inputs and market key commodities. Producer prices of fresh milk, nonfat dried milk, butter oil, corn, wheat, rough rice, cottonseed, and cottonseed cake are set by the government.

The government relied mostly on price controls at the producer and consumer level, and fixed the marketing margins on basic commodities during the 1970's. For example, farm prices were fixed for corn and sorghum by decree from the Ministry of Economy and Finance in coordination with the Ministry of Agriculture. Peru also had laws that required producers to allocate 40 percent of their land to food crops, rather than export crops, to increase food supplies. The trade policy of an overvalued sol further magnified the disparity in farm prices that was working against growth in the agricultural sector.

Adjustments in the early 1980's, however, corrected most of the price distortions. Some price reforms were made by the Agricultural and Development Law, November 17, 1980, but the most important provisions that could have caused change (such as keeping controls on producer prices) were left intact. The elaborate production planning scheme of the Agricultural Production System, introduced in 1975, was disbanded; some price controls on meat, vegetables, and cooking oils were removed; and direct subsidies on coarse grains and cottonseed were removed. The ENCI and ECASA kept their monopoly rights to export and import basic commodities and to control marketing margins. Farm wheat prices were decontrolled in 1983. Price control had shifted to the private sector by early 1985, although producer prices for fresh milk, nonfat dried milk, butter oil, rice, cottonseed and cottonseed cake were still being set by the government. The government also had some special programs to develop agriculture in remote areas. ENCI, by purchasing and marketing the product, controlled jungle corn and sorghum prices at all marketing levels in 1984. The government subsidized these producers by paying a uniform price, even in remote areas, and absorbing transportation costs. Due to inflation in the 1980's, the control prices rose every 1-2 months in accordance with Peru's CPI, which contrasted with the slower rates of adjustment in earlier years. The government also introduced controls of farm storage and control of interregional movements of agricultural products.

The government also exerts some control of agricultural production through production credit. Institutional agricultural credit is provided almost exclusively by Banco Agrario (BAP). Commercial banks, once a major source of credit, now provide only about 5 percent of the total. Interest rates for agricultural credit in recent years have been negative in real terms, resulting in the decapitalization of BAP and subsidization of agriculture. Over 70 percent of the credit was channeled into crops through loans with maturation of 1-2 years. Over 60 percent of this credit was concentrated in cotton and rice and directed mostly at cooperatives and other large agricultural units. Following the agricultural production decline in the early 1980's, the Peruvian Government set on a course of large production subsidies through negative real interest rates on agricultural production loans, guaranteed producer support prices, and low-cost fertilizers. The subsidy program was expensive, but it was financed partially through favorable Central Bank exchange rates, which were the differences between low import prices and the higher domestic prices, and partly from general revenues. Because of lower world prices since 1986, ENCI has used the difference between the world price and the higher domestic price to mills to absorb the costs of even higher priced domestic corn at mills. Lower world wheat prices also allowed ENCI to charge prices to mills that are higher than the import price. ECASA used the difference between the low world rice price and the high domestic price to defray the cost of domestic rice to the consumer in 1986 and 1987.

Farm Prices and Subsidies

Peru's wheat, corn, and sorghum are priced slightly above the U.S. gulf ports price. Cotton is priced below the U.S. market price, reflecting Peru's role as a major cotton exporter.

Farmers have had difficulty keeping abreast of runaway inflation in recent years, even when farm prices increased more than the CPI during the 1970's (table 12).

Price mechanisms vary among commodities and over time. Some of the specific price mechanisms are given below.

Wheat

Wheat used in the manufacture of flour for bread and noodles is also controlled by the government. Both domestic wheat and imported wheat are priced below world levels on entering flour mills. The majority of the domestically produced wheat is soft

Table 12--Farm prices for selected commodities

Commodity	Average price per unit			Peruvian real prices			U.S. currency	
	1969-71	1979-81	1984	1969-71	1979-81	1984	1969-71	1979-81
	-----Intis/ton-----			-----1980 intis/ton-----			Dollars/ton	
Wheat	4,258	200,487	918,530	59,138	177,847	71,760	110	642
Rice	4,901	83,765	658,820	6,805	26,863	51,463	176	268
Corn	3,394	66,076	704,760	47,138	58,614	55,051	87	212
Barley	2,547	71,403	N.A.	35,375	63,339	N.A.	65	228
Cassava	1,174	45,584	N.A.	16,305	40,436	N.A.	30	146
Cocoa	14,995	552,089	N.A.	208,263	489,744	N.A.	387	1,770
Coffee	16,456	344,283	3,823,957	228,555	305,405	298,704	425	1,104
Dry beans	8,102	180,691	2,628,270	112,527	160,286	205,333	209	579
Ground nuts	8,356	142,367	N.A.	116,055	126,290	N.A.	216	456
Potatoes	2,273	52,466	429,880	31,569	46,541	33,579	59	168
Seed cotton	10,559	157,109	2,243,476	146,652	139,367	175,271	273	504
Sorghum	3,106	51,638	509,150	43,138	45,806	39,771	80	165
Sugar	198	7,918	96,850	2,750	7,023	7,557	5	25

N.A. = Not available.

Source: (6), see References.

white wheat and is used primarily for local consumption in the Sierra. Because only a small amount of domestic wheat enters the flour milling industry, the price controls apply mostly to imported wheat that enters commercial channels. ENCI provides a subsidy to the mills since it pays a higher price for the wheat than the price at which it sells to the mills. Mills are often part of vertically integrated operations that pass these lower prices on to the bread baking and pasta operations. With lower world wheat prices since 1986, however, ENCI has charged a higher price to mills than the imported price.

Corn

Peru has a single national price for corn. Official prices for corn (and sorghum) have been set by the government since June 1971. Imported corn is also subject to price controls at a level lower than the national price for farmers. Prices were determined by the regulatory price commission Las Juntas Reguladores de Precios de Productos Alimentaciones (Department of Price Regulation for Food) when corn was offered in the market for uses other than feed. All price controls on mixed feeds were removed in 1980, however. ENCI has used the difference between the lower world corn prices and the higher mill prices to absorb the costs of domestic corn since 1986.

Rice

Rice has been marketed through ECASA since March 1980. The price of unpolished rice is fixed by the Direccion General de Agro-industrial Comercializacion, General Director of Agro-industry and Marketing (DGAIC). Rice milling is performed by private firms under contract to ECASA. Domestic rice producers must receive an order from a local ECASA office before they can sell their rice to a local mill. ECASA controls distribution to regional warehouses, after the grading and polishing at the mill, based on quotas established by the Ministry of Agriculture. ECASA set farm-level prices (polished rice equivalent) 30 percent above the prices charged to consumers in 1982. The difference between the consumer price and import cost or producer price was made up by the National Treasury. Milling and transportation costs were also subsidized by the government (12). Lower world rice prices have allowed ECASA to use the differences between the low world price and the price of domestic rice to defray the cost of domestic rice to consumers since 1986.

Agricultural Trade

Peru imports mostly wheat through its central market agencies, but in some years, it imports corn, rice, dairy products, vegetable oil, meat and offals, and sugar. There have been some years when the United States was the sole supplier of wheat,

corn, soybeans, rice, and tallow to Peru (table 13). The United States has seen an erosion of its market share to Peru since 1983, because of increased competition from other countries and an overall decline in Peru's total commercial import demand for some commodities.

Peru's agricultural imports increased from \$131 million in 1970 to \$504 million in 1988. Agricultural imports in 1988 were 18 percent of total imports by value. The United States supplied 31 percent of Peru's total agricultural imports in 1988, which was a smaller share than in previous years. The United States faces increased competition with Argentina for Peru's grain and oilseed product market and continued competition with the European Community for the nonfat dried milk market.

Peru has been eligible for P.L.-480 aid for many years because of its low per capita income and the U.S.' desire to support the country's economic development. P.L.-480 aid has ranged from \$4.3 million in 1974 to a peak of \$55.4 million in 1983 (table 14). Wheat was the most important commodity in the U.S.-Peru P.L.-480 program in 1983 and 1984 following the El Nino disaster, but rice, soybean oil, wheat flour and bulgur wheat, corn meal, corn-soya milk, and rolled oats have also been important items (table 15). The country will continue to need credit for economic development and foreign exchange, and the P.L.-480 program is an integral part of Peru's decision for importing foodstuffs from the United States. Sixty-one percent of the P.L.-480 funding was for Title I aid (concessional sales) in 1986, and the remainder Title II (donations and disaster relief). Title II's share was the larger by 1987.

Ports and Transportation

Transportation facilities are a serious limitation to increasing imports in the country. Peru's infrastructure is so poorly developed that penetration of the internal market may be hampered by the lack of facilities for transportation and trade.

Imported grain is handled mainly at the ports of Callao and Matarani, although there are other minor ports along the 2,000 kilometer coastline. Callao, drawing up to 9.1 meters, can accommodate medium-sized vessels and is being dredged to 11 meters. Callao has a grain elevator (capacity of 23,000 tons) that can unload wheat at 300 tons per hour. Matarani, in southern Peru, is connected by rail to Arequipa. The port also has warehouse facilities and unloading equipment for discharging grain at 200 tons per hour.

Trucking is difficult since only 11 percent of the 57,000-kilometer road network is paved and 20 percent is graveled. Access to the mountain highlands is very difficult, and the large

Table 13--Peru's imports and U.S. share of major agricultural products

Commodity	1970			1971			1972			1973		
	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share
	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent
Wheat	38.4	9.5	25	52.3	21	40	54.2	34	63	96	72	75
Corn	.3	.3	100	0	0	0	8.5	8.5	100	20.9	20.9	100
Sorghum	.2	0	0	.6	.6	100	3	3	100	2.4	.2	8
Soybeans	.7	.7	100	0	0	0	6.5	6.5	100	5.4	5.4	100
Rice	0	0	0	0	0	0	0	0	0	0	0	0
Tallow	.7	.4	57	.9	.9	100	1.2	1.2	100	1	1	100
Dairy products	11.9	1.2	10	16.9	.9	5	28.4	1.6	5	28.2	1.5	5
Vegetable oil	8.1	2.7	33	17.8	16.1	90	12.3	7.8	63	27	22.5	83
Soybean meal	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco	.5	.3	60	1.9	1.2	63	5	5	100	1.5	1.5	100
Baby chicks	0	0	0	7	.7	100	6	6	100	1	1	100
Meat and offals	0	0	0	0	0	0	0	0	0	0	0	0
Sugar	0	0	0	0	0	0	0	0	0	0	0	0
Other agricultural imports	70.3	5.2	7	36.9	15.6	42	19.6	7.9	40	54.6	11	.2
Total agricultural imports	131.1	20.3	15	150	60	40	166.3	74.8	45	238	137	58
Nonagricultural imports	490.6	178.3	36	602.6	160.2	27	808.1	163.2	20	997	153	15
Total imports	621.7	198.6	32	752.6	220.2	29	974.4	238	24	1,235	366	30

Continued--

Table 13--Peru's imports and U.S. share of major agricultural products--Continued

Commodity	1974			1975			1976			1977		
	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share
	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent
Wheat	136	91	67	135.7	122	90	118.8	65	55	96.9	57	59
Corn	41.4	38	92	54.1	54.1	100	36.9	25	68	21.3	21.3	100
Sorghum	8	.1	1	5.2	3.3	63	0	0	0	6	6	100
Soybeans	3.8	3.8	100	7.9	7.9	100	6.5	6.5	100	6.9	6.9	100
Rice	0	0	0	31.2	0	0	19.2	0	0	0	0	0
Tallow	2	2	100	1.3	1.3	100	1.7	1.7	100	2	2	100
Dairy products	37	1.5	4	38.5	.6	2	27.3	.6	2	21.8	1.2	6
Vegetable oil	40	38	95	40.2	15.2	38	36.4	15	41	37	31	84
Soybean meal	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco	1	.9	90	3	2.8	93	1.6	1.5	94	.7	.5	71
Baby chicks	1	.8	80	1.2	.8	67	1.2	.8	67	1	.6	60
Meat and offals	0	0	0	0	0	0	0	0	0	0	0	0
Sugar	0	0	0	0	0	0	0	0	0	0	0	0
Other agricultural imports	86.8	18.9	22	71.7	20	28	60	12.5	21	46.4	13.5	29
Agricultural imports	357	195	55	390	228	58	310	129	42	240	140	58
Total nonagricultural imports	1,933	333	17	2,239	562	25	2,000	501	25	2,065	410	20
Total imports	2,290	528	23	2,629	790	29	2,310	630	27	2,305	550	24

Continued--

Table 13--Peru's imports and U.S. share of major agricultural products--Continued

Commodity	1978			1979			1980			1981		
	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share
	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent
Wheat	103.4	59	57	145.1	75	52	142.1	120.8	85	169.6	169.6	100
Corn	16.6	16.6	100	16.7	16.7	100	69.3	69.3	100	50.4	50.4	100
Sorghum	0	0	0	3.7	3.7	100	0	0	0	0	0	0
Soybeans	8.6	8.6	100	6.3	6.3	100	0	0	0	3.9	3.1	80
Rice	0	0	0	47.6	30.6	64	101.2	43	43	50	35	70
Tallow	2.1	2.1	100	2.5	2.5	100	1.4	1.4	100	1.2	1.2	100
Dairy products	20.8	1.2	6	17.5	1.2	7	46.9	2	4	58.8	3	5
Vegetable oil	48	40	83	15.3	15.3	100	25	19.4	78	34.2	24.3	71
Soybean meal	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco	1.5	1.2	80	1.5	1.2	80	3.1	2.3	74	2.7	1	37
Baby chicks	6	4	67	1.5	1.2	80	1.1	.6	73	1.1	.6	73
Meat and offals	0	0	0	0	0	0	0	0	0	0	0	0
Sugar	0	0	0	0	0	0	0	0	0	0	0	0
Other agricultural imports	35.4	12.9	36	38.3	20.3	53	73	51.2	70	193.1	134.8	70
Total agricultural imports	237	142	60	296	174	59	477	310	65	565	423	75
Nonagricultural imports	1,523	378	25	1,850	526	28	2,585	790	31	3,250	767	24
Total imports	1,760	520	28	2,146	700	33	3,062	1,100	36	3,815	1,190	31

Continued--

Table 13--Peru's imports and U.S. share of major agricultural products--Continued

Commodity	1982			1983			1984			1985		
	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share
	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent
Wheat	155	155	100	152	132	87	143.4	87.5	61	99.3	20	20
Corn	56	53	95	61	56	92	16.2	16.2	100	28	13.3	47
Sorghum	0	0	0	0	0	0	0	0	0	0	0	0
Soybeans	.2	.2	100	3	3	100	1.8	.8	44	.3	0	0
Rice	17.2	16	94	40	40	100	11	11	100	0	0	0
Tallow	1	1	100	3	3	100	1.3	1.3	100	1.8	1.8	100
Dairy products	63.5	1.5	2	42	1.5	4	40	7.8	19	30	2.7	10
Vegetable oil	28	16	57	46	36	78	33.7	6.4	19	20.6	8.8	43
Soybean meal	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco	4	.3	7	3	.8	27	2.5	.2	8	0	0	0
Baby chicks	1.3	.9	69	1	.8	80	.5	.1	20	0	0	0
Meat and offals	43	1.1	2	21	.3	1	16	.2	1	12	.1	1
Sugar	0	.0	0	63	2.6	3	34	2.8	8	0	0	0
Other agricultural imports	65	35	54	55	30	55	52.6	25	48	53	25.3	48
Total agricultural imports	434	280	65	490	306	62	350	159	45	245	72	29
Nonagricultural imports	3,287	920	28	2,232	694	31	1,790	589	33	1,561	420	27
Total imports	3,721	1,200	32	2,722	1,000	37	2,140	748	35	1,806	492	27

Continued--

Table 13--Peru's imports and U.S. share of major agricultural products--Continued

Commodity	1986			1987			1988		
	Total	U.S.	Share	Total	U.S.	Share	Total	U.S.	Share
	Million dollars		Percent	Million dollars		Percent	Million dollars		Percent
Wheat	118.3	27.6	24	102	24.2	24	114.6	56.8	50
Corn	32.6	23.5	72	36.4	36.4	100	54.7	30.6	56
Sorghum	0	0	0	0	0	0	0	0	0
Soybeans	3.1	3.1	100	1	1	100	4.7	4.7	100
Rice	31	8	26	35.5	4.2	12	5	5	100
Tallow	2	2	100	.5	.5	100	.5	.5	100
Dairy products	65	11	17	65.7	5.6	9	73.1	13.0	18
Vegetable oil	19	0	0	25	1	4	39.4	2	5
Soybean meal	19.9	11.6	58	26.8	16.5	62	38.5	15	39
Tobacco	0	0	0	0	0	0	0	0	0
Baby chicks	0	0	0	0	0	0	0	0	0
Meat and offals	66	.1	0	85.5	.4	0	36.8	.4	1
Sugar	46	18	39	59.4	13.6	23	51.7	0	0
Other agricultural imports	88	44.7	50	79.2	28.6	36	70.8	28.0	40
Total agricultural imports	471	138	29	537	132	24	504	156	31
Nonagricultural imports	2,054	454.1	22	2,531	529.2	21	2,226	531.98	24
Total imports	2,252	592	23	3,068	661.2	22	2,730	687.9	25

Source: (19).

Table 14--U.S. P.L.-480 aid to Peru, value by commodity

Commodity	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<u>1,000 dollars</u>														
Bulgur wheat	389	708	347	357	761	1,968	1,709	2,371	1,857	2,222	3,327	1,919	1,401	524
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	6,868
Corn meal	265	412	216	338	961	1,614	1,618	2,495	2,222	2,700	3,517	1,819	334	183
Corn soya milk	676	1,789	496	432	895	1,686	2,046	2,571	1,439	1,348	2,399	1,694	0	0
Grain sorghum	119	0	0	328	0	0	0	0	0	0	0	0	0	0
Rolled oats	427	295	289	423	533	1,979	65	2,303	2,202	322	0	0	0	0
Sorghum grits	31	55	36	0	0	0	0	0	0	0	0	0	0	0
Soybean oil	959	521	164	541	15,366	3,920	3,025	3,763	3,401	17,527	7,972	12,404	1,100	973
Wheat flour, grain equivalent	914	5,313	641	786	1,089	2,733	2,099	2,840	2,360	3,575	5,030	3,010	2,128	1,112
Wheat flour soya	536	10	98	115	264	1,250	564	713	524	0	0	0	0	0
Nonfat dried milk	0	631	614	951	1,421	391	500	1,547	237	111	1,631	1,072	6,069	702
Peanut oil	0	359	1,085	660	264	0	0	0	0	0	0	0	0	0
Wheat	30	0	0	277	6,202	0	98	396	642	10,460	10,989	17,128	0	12,846
Dehydrated potatoes	0	13	0	0	0	0	0	0	0	0	0	0	0	0
Dried peas	0	0	15	0	0	0	0	0	0	146	0	0	0	0
Rice	0	0	0	34	6,227	13,111	23,026	23,163	17,186	17,151	16,538	381	5,84	462
Poultry feed	0	0	0	0	0	0	0	347	0	0	0	0	0	0
Anhydrous milk products	0	0	0	0	0	0	0	0	0	0	429	0	2,253	0
Cheese	0	0	0	0	0	0	0	0	0	0	846	0	0	0
Total	4,316	7,196	4,001	5,242	33,983	28,652	34,750	42,162	32,417	55,416	52,395	39,427	13,883	23,679

Source: (18), see References.

Table 15--U.S. P.L.-480 aid to Peru, quantity by commodity

Commodity	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	Metric tons													
Bulgur wheat	1,834	3,833	1,963	2,370	3,957	8,538	7,119	9,482	8,432	10,356	15,559	8,779	7,302	3,243
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	97,346
Corn meal	1,558	2,154	1,198	1,779	5,144	7,227	6,144	9,249	10,626	11,795	15,356	8,611	1,899	1,463
Corn soya milk	2,170	4,725	1,360	1,239	2,753	4,704	5,498	6,335	5,289	4,259	7,052	5,360	0	0
Grain sorghum	1,000	0	0	2,999	0	0	0	0	0	0	0	0	0	0
Rolled oats	1,658	1,141	1,133	1,466	1,953	6,005	227	6,226	5,668	1,034	0	0	0	0
Sorghum grits	135	233	176	0	0	0	0	0	0	0	0	0	0	0
Rolled oats	1,658	1,141	1,133	1,466	1,953	6,005	227	6,226	5,668	1,034	0	0	0	0
Sorghum grits	135	233	176	0	0	0	0	0	0	0	0	0	0	0
Soybean oil	953	511	231	697	24,482	4,282	3,456	4,614	4,771	22,118	8,119	18,366	1,670	1,634
Wheat flour, grain equivalent	3,745	7,667	3,112	4,372	5,327	11,752	9,043	10,738	13,409	20,082	30,113	19,557	15,144	7,851
Wheat flour soya	1,862	1,436	362	431	919	3,816	1,520	0	1,868	1,504	0	0	0	0
Nonfat dried milk	0	497	477	644	3,493	1,112	1,422	3,697	2,169	1,040	6,203	5,406	13,394	4,123
Peanut oil	0	325	1,027	647	295	0	0	0	0	0	0	0	0	0
Wheat	199	0	0	2,497	47,858	0	450	2,026	3,810	70,753	73,163	13,156	0	121,061
Dehydrated potatoes	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Dried peas	0	0	44	0	0	0	0	0	0	498	0	0	0	0
Rice	0	0	0	113	23,678	48,668	54,245	44,146	57,314	51,679	50,483	1,324	1,903	2,683
Poultry feed	0	0	0	0	0	0	0	1,030	0	0	0	0	566	0
Anhydrous milk products	0	0	0	0	0	0	0	0	0	0	17	0	0	0
Cheese	0	0	0	0	0	0	0	0	0	0	1,100	0	0	0

Source: (18), see References.

areas of tropical rain forests in eastern Peru are mostly inaccessible.

Import Policy

Peru has a tight rein on imports as a means of controlling the balance of payments. The Ministry of Agriculture has a global import program whereby yearly import quotas are set for wheat, feed grains, and rice. Import licenses are operative and are issued by the Directorate of Foreign Trade in the Ministry of Industry. While wheat and rice are exempt from import levies, feed grains, such as corn and sorghum, have import levies of 15 percent. ENCI and ECASA have been the sole importers of basic grains since 1985. Private importers in earlier years were allowed to import corn. Peru's trade policy has been more liberal than it currently is. The Belaunde Government of the early 1980's was dedicated to liberalizing trade policy. This policy began to run aground in 1982, however, as a result of the national economic crisis and the need to conserve foreign exchange. Tariffs on corn, sorghum, and fertilizers were increased in 1983. The Peruvian Government placed a 10-percent duty on the c.i.f. value of all imports later in 1983. The general tariff was raised to 15 percent in 1984, but duty exemptions were established for wheat, nonfat dry milk, butter oil, whole dry milk, and rice.

Imports of a number of luxury commodities, such as wine and cigarettes, were suspended in January 1985. The Alan Garcia Government put a tax on the c.i.f. value of imports in January 1986 to pay for the guaranteed price-support program for basic commodities. The government's role as an importer of agricultural products changed significantly in 1983 as imports of fertilizers, corn, and sorghum (all formerly under the control of ENCI) were turned over to the private trade, but, in 1985, the government reverted back to the old system of ENCI control of agricultural imports. ENCI and the Ministry of Agriculture continue to authorize a global import program on an annual basis.

ECASA is the sole importer of rice. The DGAIC sets the annual volume of rice imports. Imported rice is exempt from tariffs and duties. Wheat import quotas are set by the Ministry of Agriculture, ENCI, and MEFC. The DGAIC determines the annual needs of the flour mills and assigns monthly quotas. Corn imports are controlled by quotas assigned to private feed mills by the Ministry of Agriculture in coordination with ENCI.

Import Potential of Basic Commodities

The supply and distribution of major import commodities were examined and their import levels were projected for 1995. This section presents a discussion of commodity-specific developments

for grains and oilseeds during the 1970's and 1980's with projections to 1995. The projections are based on a most likely scenario because of the uncertainty that surrounds the Peruvian political economy. Grains are the leading import item and have import growth potential. Grains and oilseeds and derived products will remain the principal import items, so projections of production, consumption, and trade of these commodities are developed. Commodity-specific discussions are included to give a historical context for the 1995 projection of these important commodities.

Projections of supply and demand potential for 1995 are based on the structural models discussed in the appendix. Assumptions of future changes in income and population growth and consumer prices for basic foods underlie these projections. Assumptions about near-term changes in producer prices are key to the future supply of these major agricultural products. Projections are based on the assumptions of an average of 3.5-percent real income growth, 2.6-percent population growth, and foreign reserves of \$1.5 billion. The latter assumes that Peru will either continue not to pay or will roll over its current foreign debt. Real prices at retail and farm levels are assumed to remain at their 1980 level so that no structural change will take place due to changes in relative prices among commodities. The historic supply, demand, and trade situation of the basic grains and oilseeds and the projections based on the equations presented in appendix table 1 are the most likely outcome for production, consumption, and trade of these commodities in 1995.

Wheat

Peru produces some wheat, but imports make up the bulk of wheat consumed in the country. Wheat is the largest U.S. agricultural export to Peru, and wheat is Peru's largest agricultural import.

Wheat is a traditional crop that is almost exclusively produced in the mountain regions. Native varieties are hard white wheats. Ayacucho, La Libertad, Ancash, Junin, and Huanuco are some of the important producing departments. Production went from 128,000 tons in 1969-71 to 140,000 tons in 1988 (fig. 4, tables 16 and 17). Frequent drought, competition with malting barley, and general disinterest and even abandonment of wheat-growing areas contributed to the decline. Only a small amount of domestically produced wheat enters commercial milling channels.

Wheat imports increased from 652,000 tons in 1969-71 to 1,150,000 tons in 1988, mostly because of increased consumption of bread and pasta products. Wheat imports increased at an annual rate of 1 percent per year in the 1970's and 3.6 percent per year in the 1980's (table 17). Wheat flour and bulgur wheat are also imported. Some wheat imports have been P.L.-480 aid, mostly Title I, amounting to 70,000 tons each year.

Figure 4--Peru: Wheat production, consumption, and net imports

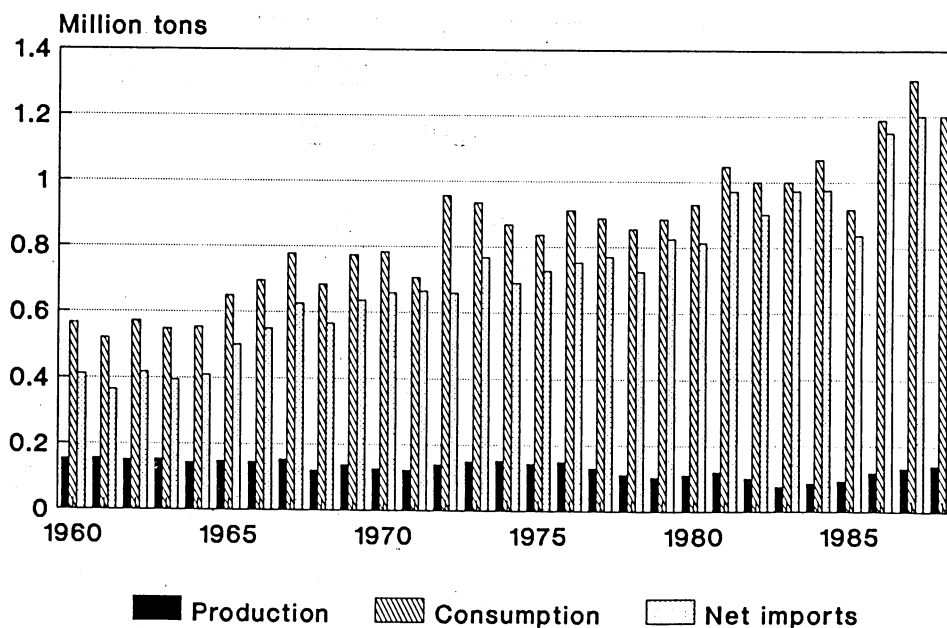


Table 16--Peru: Annual growth rates of production, consumption, and trade of grains

Grain	Area harvested	Yield	Production	Imports	Consumption	Feed use
<u>Percent</u>						
Wheat:						
1971-80	-6.3	1	-5.4	1	1	0
1981-88	1.1	1.2	2	3.6	2.8	0
Rice:						
1971-80	-2.3	1.1	-1.2	0	3.1	0
1981-88	2.9	.7	3.7	5.4	5.8	0
Coarse grains:						
1971-80	.1	-.6	-.5	1.7	.2	.3
1981-88	1.1	2.4	5	-.4	3	6.1

Source: Calculated from (20), see References.

Table 17--Peru: Production, consumption, and trade of grains with 1990 and 1995 projections

Item	Average			Projections	
	1969-71	1979-81	1984-86	1990	1995
<u>1,000 hectares</u>					
Area harvested:					
Wheat	140	89	90	89	85
Rice	132	126	190	225	250
Barley	184	163	85	70	85
Sorghum	5	14	15	17	20
Corn	373	312	400	393	425
Total	834	704	780	794	865
<u>Tons per hectare</u>					
Yield:					
Wheat	.91	1.11	1.11	1.16	1.2
Rice	2.74	2.95	2.54	2.76	2.9
Barley	.89	0.9	1.06	1.1	1.1
Sorghum	3	3.21	3.33	3.52	3.6
Corn	1.62	1.76	1.83	1.88	1.95
Total					
<u>1,000 tons</u>					
Production:					
Wheat	128	99	100	103	100
Rice	362	372	483	620	725
Barley	164	147	90	77	95
Sorghum	15	45	50	60	70
Corn	605	550	770	740	830
Total	1,274	1,213	1,493	1,600	1,820
Beginning stocks:					
Wheat	0	73	58	50	50
Rice	70	80	299	50	50
Barley	0	5	5	10	10
Sorghum	0	3	30	30	30
Corn	0	30	25	25	25
Total	70	191	417	165	165
Total imports					
Wheat	652	869	835	1,100	1,300
Rice	12	168	5	30	0
Barley	13	37	50	50	40
Sorghum	7	8	0	0	0
Corn	16	358	200	315	445
Total	700	1,440	1,090	1,545	1,660

Continued--

Table 17--Peru: Production, consumption, and trade of grains with 1990 and 1995 projections--Continued

Item	Average			Projections	
	1969-71	1979-81	1984-86	1990	1995
<u>1,000 tons</u>					
Exports:					
Wheat	0	0	0	0	0
Rice	0	0	0	0	0
Barley	0	0	0	0	0
Sorghum	0	0	0	0	0
Corn	0	1	2	0	0
Total	0	1	2	0	0
Consumption:					
Wheat	752	955	927	1,200	1,400
Rice	364	487	575	650	725
Barley	177	184	140	110	135
Sorghum	22	53	60	60	70
Corn	621	898	968	1,055	1,275
Total	2,939	2,577	2,670	3,130	3,605
Food use:					
Wheat	752	955	927	1,200	1,400
Rice	364	487	575	650	725
Barley	122	169	127	100	125
Sorghum	6	0	0	0	0
Corn	376	473	418	495	525
Total	1,620	2,084	2,047	2,500	2,775
Feed use:					
Wheat	0	0	0	0	0
Rice	0	0	0	0	0
Barley	55	15	13	10	10
Sorghum	16	53	44	60	60
Corn	245	425	518	560	750
Total	316	493	575	630	820
Ending stocks:					
Wheat	0	0	0	50	50
Rice	0	0	0	50	50
Barley	55	15	13	10	10
Sorghum	16	53	60	30	30
Corn	245	425	550	25	25
Total					

Sources: (14, 19), see References.

Imported wheat was subsidized for many years, inducing increased demand. ENCI and its predecessors were the exclusive importers, purchasing through brokers on a tender basis. Millers purchased the wheat from ENCI on board ship at Peruvian ports at a price set by ENCI that was lower than the c.i.f. price. Most mills are located in Lima, but others are in Arequipa, Trujillo, and Iquitos. Wheat flour is supplemented with potato flour in breadmaking. Wheat extraction rates are about 81 percent. About 70 percent of wheat flour goes into bread, 10-15 percent into noodles, and 1-5 percent to the traditional products, crokus and pashus. Twelve mills were operating in 1982 but were underutilized (14). The mills are assigned monthly quotas for the receipt of wheat. Four flour mills received maximum quotas of more than 100,000 tons, five mills have quotas of 20,000-99,999 tons, and three received quotas of under 20,000 tons.

Wheat flour is the principal carbohydrate in the Peruvian diet and virtually all of the milled wheat is from imported sources. Total wheat consumption increased from 751,000 tons in 1969-71 to 1.2 million tons in 1988. This represented an increase of 1 percent each year in the 1970's and 2.5 percent each year during the 1980's. Per capita consumption declined from 55.8 kilograms to 55.2 kilograms in 1986. Wheat flour competes with corn and rice in the Peruvian diet.

Commercial import demand is driven by such factors as the growth in real GDP and the level of P.L.-480 aid, the deflated world prices of wheat, and by real foreign reserves.

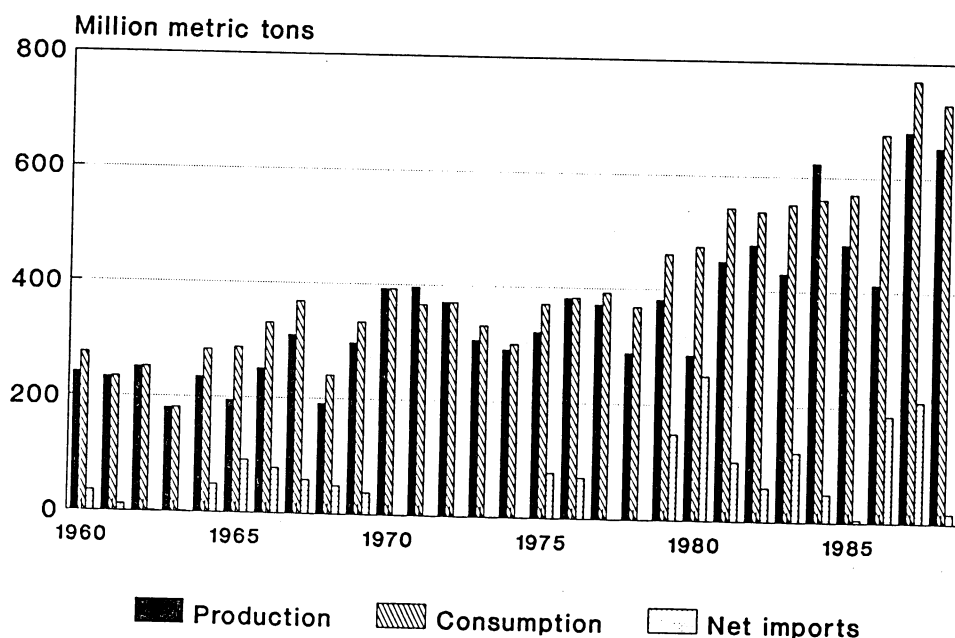
Projections based on the equations in the appendix and the projected growth in income and reserves show that wheat imports could reach 1.3 million tons by 1995. Despite limited growth in per capita real income, the government will likely try to maintain per capita consumption of wheat because Peru is short of food. Peru will most likely supplement commercial imports with P.L.-480 aid.

Rice

Rice production stagnated during the 1970's, declining 1.2 percent each year from 393,000 in 1969-71 (fig. 5). As Peru recovered from the El Nino disaster, it again increased rice production at the rate of 3.7 percent each year to 653,000 tons in 1988. The northern coastal area is the major rice-producing region in Peru, but in recent years, rice production has expanded into the Selva. Rice production, consumption, and imports have been highly controlled.

Rice consumption rose from 364,000 tons in 1969-71 to 728,000 tons in 1988. Consumption increased 3.1 percent during the 1970's and 5.8 percent during the 1980's. Per capita consumption leveled off at 27 kilograms during the 1980's. Imports of rice

Figure 5--Peru: Rice production, consumption, and net imports



have been sporadic. Peru was self-sufficient in rice in most years. Rice imports, however, accounted for 18-20 percent of the value of total agricultural imports in 1979 and 1980. Drought years are the most likely years when domestic rice production shortfalls and imports occur, although crop damage in 1983 was due to heavy rain and floods at harvest. Rice imports are exempt from import duties. Rice imports increased from 12,000 tons in 1969-71 to 168,000 tons in 1979-81, but declined to 17,000 tons in 1988, when Peru harvested a near-record crop.

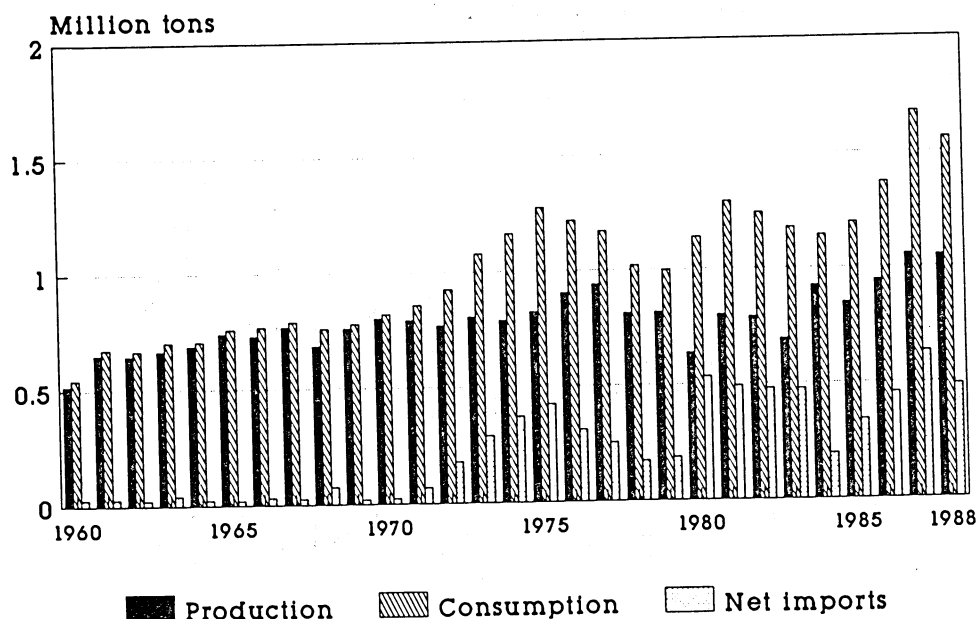
Rice production will most likely balance consumption needs through 1995, except in the occasional years when a crop shortfall requires imports.

Changes in prices of corn and cotton, which compete for the same land area, appear to have a significant influence on farmers' decisions to cultivate rice. Rice has a negative income elasticity of -0.5. Per capita consumption of rice changes little when consumer prices change.

Corn and Sorghum

Coarse grains, principally corn and sorghum, declined in production in the 1970's, but grew by 5 percent each year during the 1980's. Consumption grew from 0.2 percent each year in the

Figure 6--Peru: Coarse grain production, consumption, and net imports



1970's to 3 percent each year in the 1980's because of increased feed needs. Import substitution policies caused imports of coarse grains to decline 0.4 percent each year during the 1970's, compared with 1.7 percent each year during the 1970's (fig. 6).

Corn is the most important crop in Peru in terms of acreage planted. Production increased from 605,000 tons in 1969-71 to 880,000 tons in 1988. Corn is planted throughout Peru, but the bulk of the acreage is in the Sierra. Yields are highest in the Costa because of irrigation. Large producing areas include Cajamarca in the North Sierra, Piura, Lambayeque, La Libertad, Ancash, Lima, and Ica on the coast, and San Martin in the Selva.

Sorghum is produced in Peru on the north coast (Piura and La Libertad). Sorghum's water requirement is lower than corn's, making it more suitable for the coast's dry growing conditions.

Corn and sorghum are used primarily for feed. Seventy-five percent of domestic hard yellow corn is marketed through commercial mills.

Peru relies on imported corn for about 40 percent of its needs. Corn imports rose from 16,000 tons in 1969-71 to 358,000 tons in 1979-81, mostly because of the introduction of the commercial poultry industry. Imports reached 450,000 tons in 1988 after a decline in the early 1980's. Most of the imported corn goes to the Ica, Trujillo, and Lima provinces. Twenty of the 24 feed

mills with import quotas for corn and sorghum are located in Lima.

There is no significant correlation for the country as a whole, between corn area and farm level prices for corn, sorghum, or cotton. On the consumption side, the per capita consumption of corn has an income elasticity of 0.4 and is directly related to the consumer prices for chicken.

Corn is also used for feed. Feed use is based almost entirely on growth of the poultry industry. Feed use of corn will most likely reach 750,000 tons in 1995, compared with 518,000 tons in 1985, if poultry production increases at a rate projected to meet consumer needs (based on demand generated by income and population growth) and the feed conversion rate between corn and poultry is that which now prevails in the 1980's. Sorghum production and use will also increase. The harvested area of sorghum is responsive to real farm level cotton, rice, and sorghum prices. Sorghum is principally used for feed. I assume that the same import pattern will prevail in the 1990's, since Peru has used domestic sorghum for feed in past years and has not imported sorghum, despite the feed-grain deficit.

Corn will continue to be a principal import item through 1995. Corn imports will depend primarily on the level of poultry production, which is regulated by and closely tied to consumption. Poultry production and consumption are consequently primarily driven by per capita income growth, which is projected to be limited until the end of the decade. Peru may have to import 445,000 tons of corn by 1995, based on the regression analysis and income projections estimated in this study because of continued growth for poultry feed along with continued feed use of corn.

Oilseeds

The oilseed economy is heavily influenced by fish oil and fishmeal production and exports.(figs. 7-9, table 18).

Cottonseed is the only major oilseed produced, but soybean products have made inroads into the Peruvian market. Soybean oil and meal are imported in much larger amounts than raw soybeans. Cottonseed production declined from 163,000 tons in 1969-71 to 145,000 tons in 1988. Between 1969-71 and 1988, a sharp decline was followed by a rebound because of declines in the world market cotton prices followed by increases in the 1980's. Domestic oilseed was supplemented by 6,000 tons of soybeans in 1969-71, and 30,000 tons in 1988. Cottonseed and soybeans provide all the raw material for the domestic oilseed crushing industry. Domestically produced oils are heavily supplemented by imports. The total crush from cottonseed declined by 1.2 percent each year during the 1970's, but increased to 5.2 percent each year during

Figure 7--Peru: Oilseed production

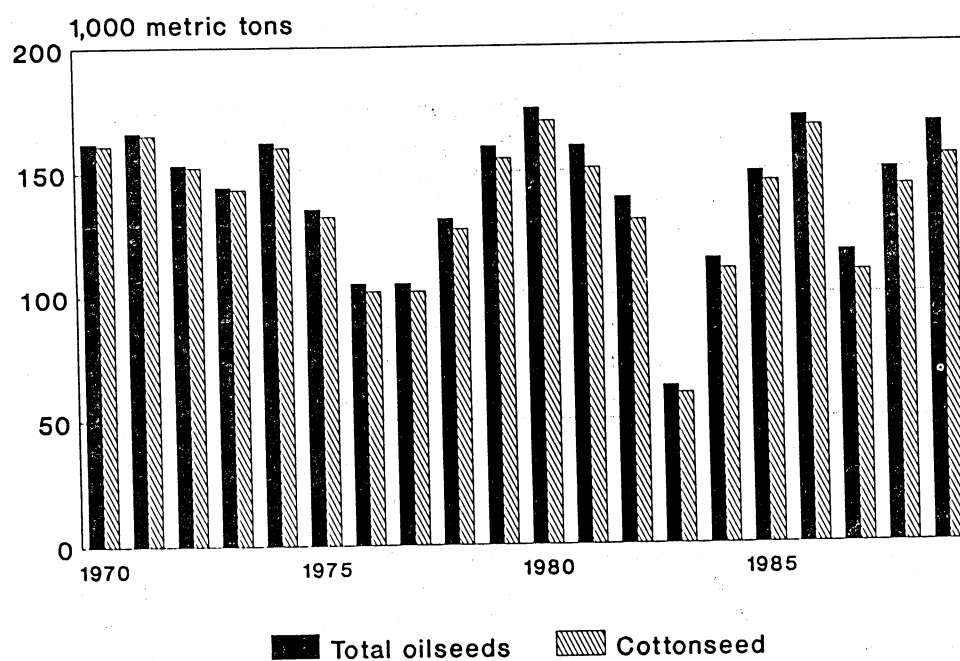


Figure 8--Peru: Total oilseeds use

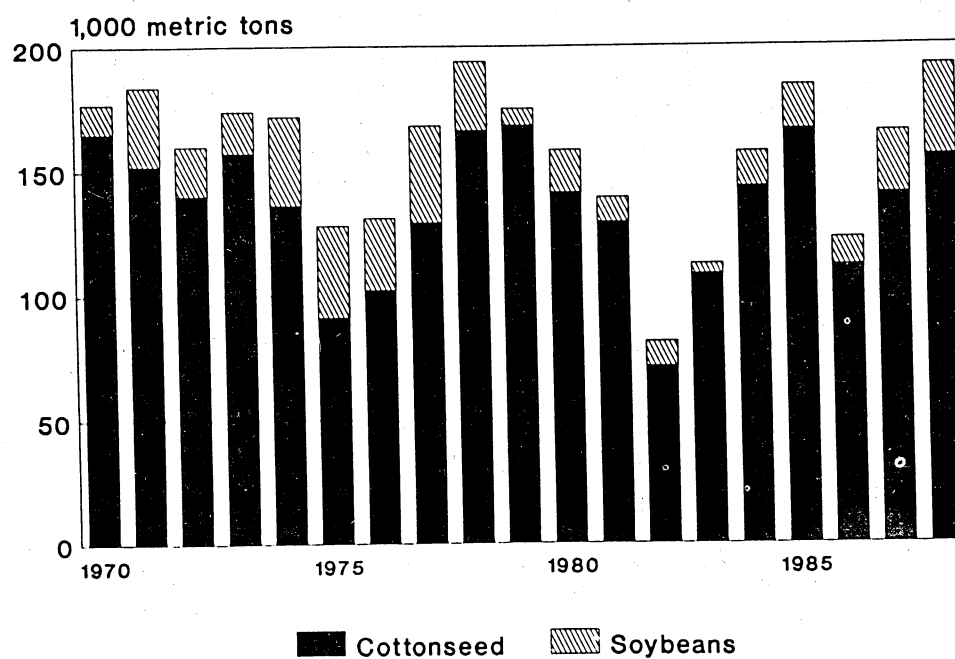
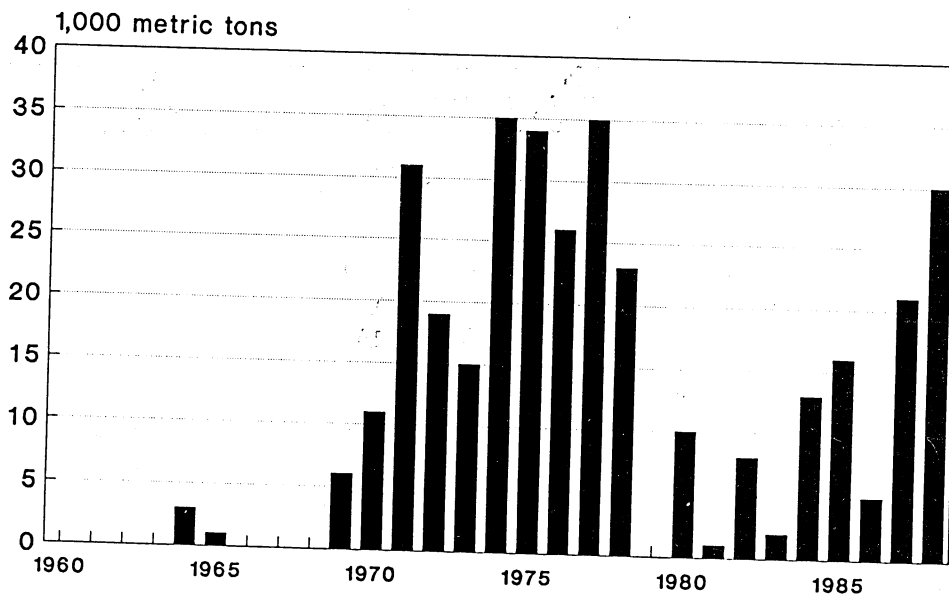


Figure 9--Peru: Soybean imports



the early 1980's. The crush of soybeans declined 0.7 percent each year during the 1970's, but increased 12.4 percent each year during the early 1980's, due to the rapid increase in imports(table 19).

Edible Oils

The larger crush of oilseeds during the 1980's came from increased cottonseed production and soybean imports. Increases in production of cottonseed oil (5 percent), soybean oil (9 percent), fish oil (16 percent), and palm oil (24 percent) have cut into the potential for soybean oil imports. Fish oil and cottonseed oil are the dominant oils for food use in Peru, although soybean oil has made considerable inroads into the Peruvian vegetable oil market. Fish oil, cottonseed oil, and more recently palm oil, have come from domestic sources. Fish oil production declined from 324,000 tons in 1969-71 and partially rebounded to 200,000 tons in 1988 (figs. 10-13, table 20). Cottonseed oil production was nearly steady at approximately 25,000 tons through the 1970's. Palm oil has come on the market only since the late 1970's, reaching 30,000 tons in 1988. Palm oil and fish oil have experienced the largest consumption growth during the early 1980's at 22.8 percent per year and 11.6 percent per year, respectively (table 21). Total edible oil consumption could be 225,000 tons in 1995 given the projections for income growth. Soybean oil imports could reach 95,000 tons, if some growth is projected for palm oil and fish oil and practically no growth for cottonseed oil.

Table 18--Peru: Production, consumption, and trade of major oilseeds with 1990 and 1995 projections

Item	Average			Projections	
	1969-71	1979-81	1985	1990	1995
<u>1,000 tons</u>					
Production:					
Soybeans	1	6	2	5	5
Cottonseed	163	159	145	141	160
Total	164	165	147	146	165
Beginning stocks:					
Soybeans	0	1	0	0	0
Cottonseed	7	8	8	5	5
Total	7	9	8	5	5
Imports:					
Soybeans	6	11	13	10	10
Cottonseed	0	0	0	0	0
Total	6	11	13	10	10
Total use:					
Soybeans	7	17	14	15	15
Cottonseed	166	158	143	125	160
Total	173	175	157	140	175
Crush:					
Soybeans	6	16	11	15	15
Cottonseed	162	142	127	125	160
Total	168	158	138	140	175
Feed, seed of waste:					
Soybeans	1	1	1	1	1
Cottonseed	4	16	16	16	16
Total	5	17	17	17	17

Source: (20), see References.

Figure 10--Peru: Oil production

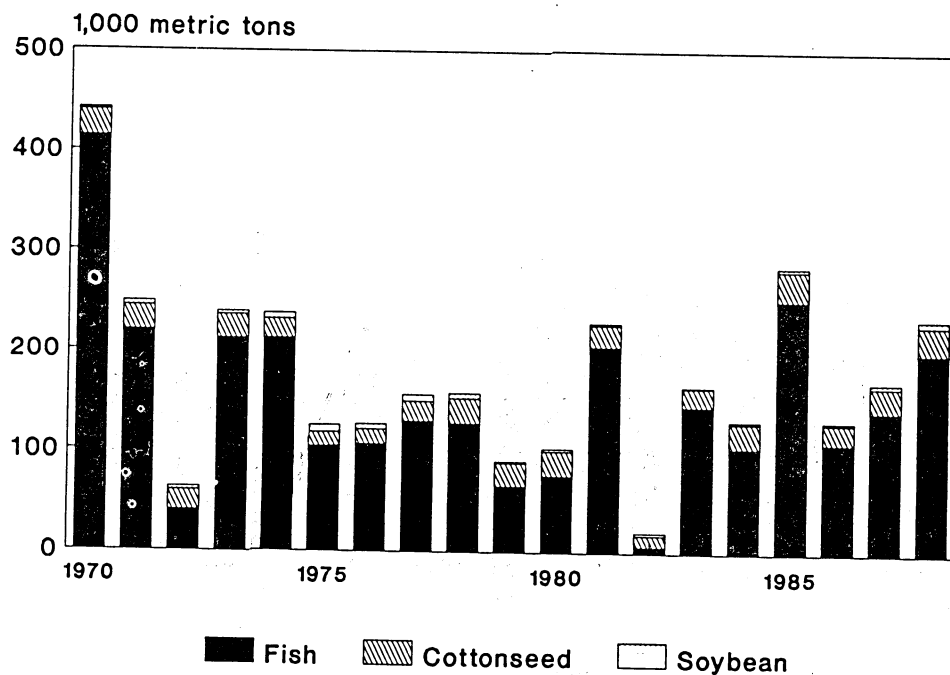


Table 19--Peru: Annual growth rates of production, consumption, and trade of selected oilseeds

Oilseed	Area	Yield	Production	Imports	Exports	Total crush
<u>Percent</u>						
Cottonseed:						
1971-80	-1.1	0	-1	0	0	-1.2
1981-88	1.8	2.3	4.1	0	0	5.2
Soybeans:						
1971-80	19.1	3	22.8	10.8	0	.7
1981-88	-5.5	6	.1	14.7	0	12.4

Source: Calculated from (20), see References.

Figure 11--Peru: Oil consumption

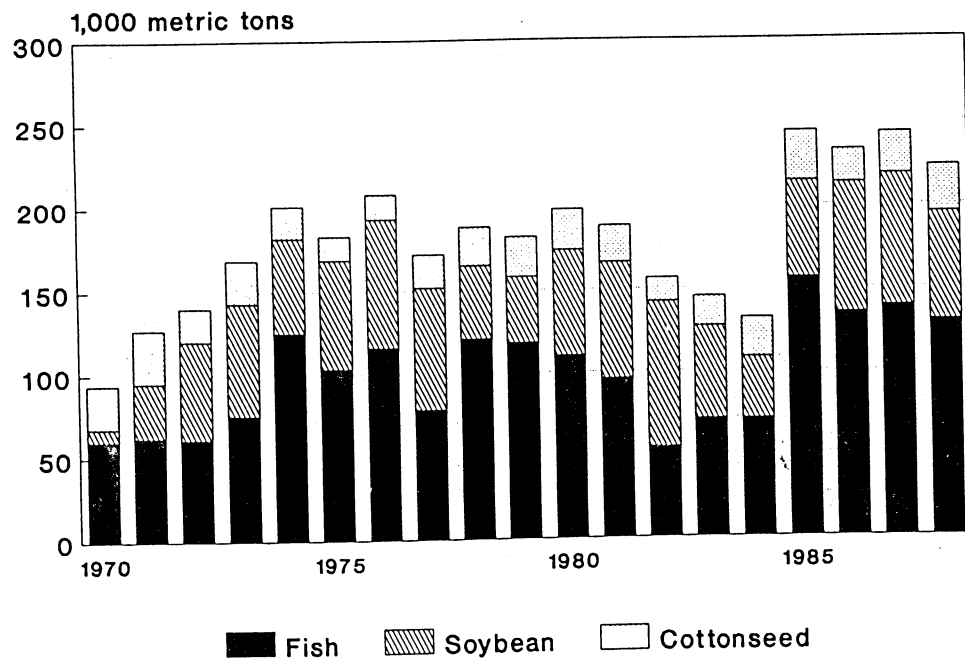


Figure 12--Peru: Oil imports

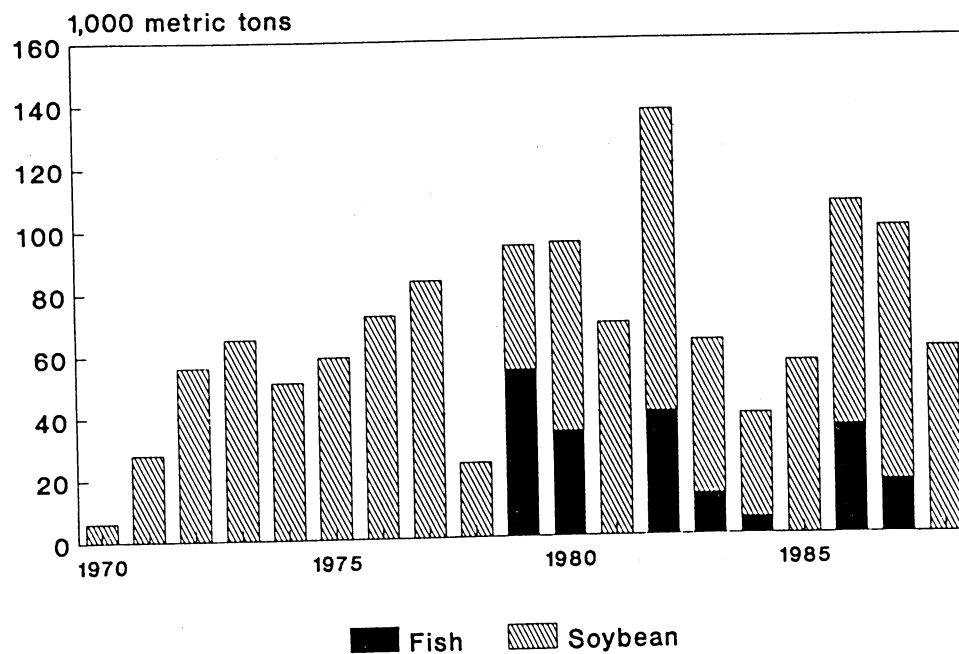
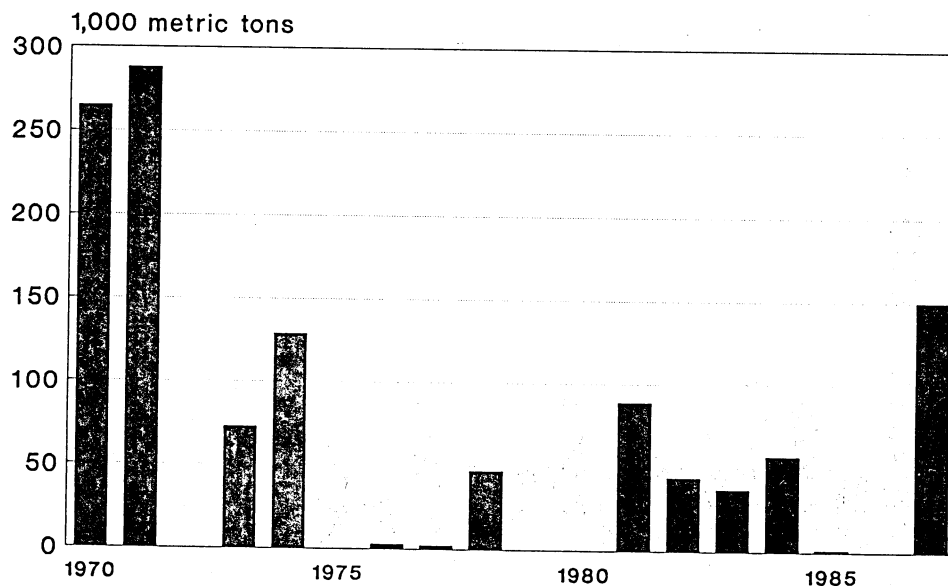


Figure 13--Peru: Fish oil exports



Protein Meals

Peru has traditionally been a producer and exporter of fishmeal, with fishmeal being one of its top export earners (figs. 14 and 15). The anchoveta catch declined in the 1970's because of production declined at an annual rate of 8 percent in the 1970's but increased 15 percent each year in the 1980's. Increased poultry production in Peru led to increased protein meal needs. The demand for protein meals increased 9 percent each year in the 1970's and 3.6 percent each year during the early 1980's. Peru increased soybean meal imports from zero in 1970 to 60,000 tons in 1988, a 20-percent annual increase to fill the gap between protein meal production and demand. Protein meal production is dominated by fishmeal. Fishmeal alone declined from 1.9 million tons in 1969-71 and partially recovered to 1 million tons in 1988 (table 22). A good share of the fishmeal is exported, however, with only a small portion left for domestic use.

Fishmeal was the principal protein meal used in 1985, mostly to save foreign exchange (fig. 16). Cottonseed meal from domestically produced cottonseed was the principal oilseed used in the 1970's. Soybean meal use increased from 5,000 tons in 1969-71 to 64,000 tons in 1985. Total use of oilmeals and fishmeal increased more than 9.4 percent each year during the 1970's and 3.6 percent each year during the early 1980's. Fishmeal use increased 23.8 percent annually during the 1970's but only increased 7.2 percent annually during the 1980's. Soybean meal use increased 12 percent each year during the 1970's and 19.3 percent during the early 1980's. Cottonseed meal use increased 4.6 percent each year during the 1980's, after

Figure 14--Peru: Fishmeal exports

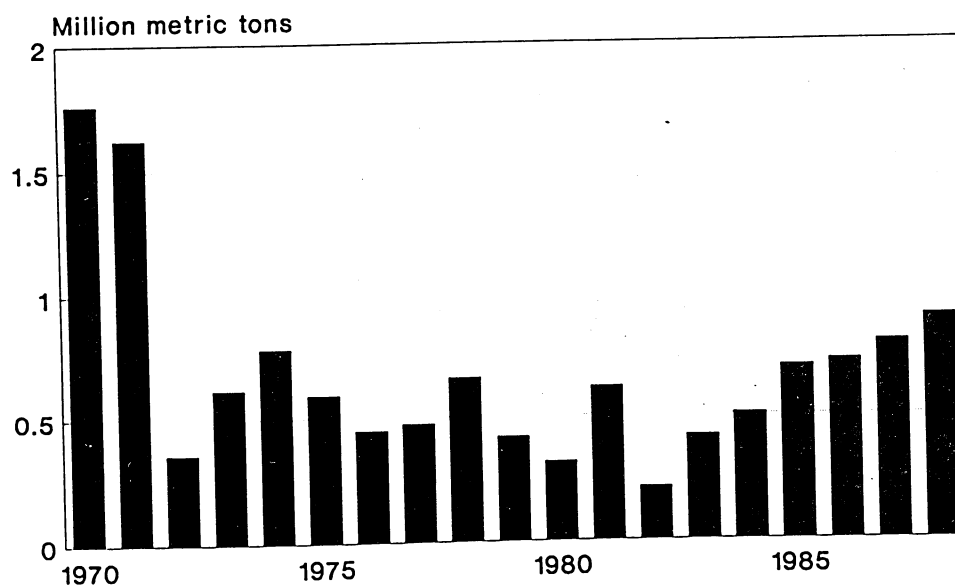


Figure 15--Peru: Meal production

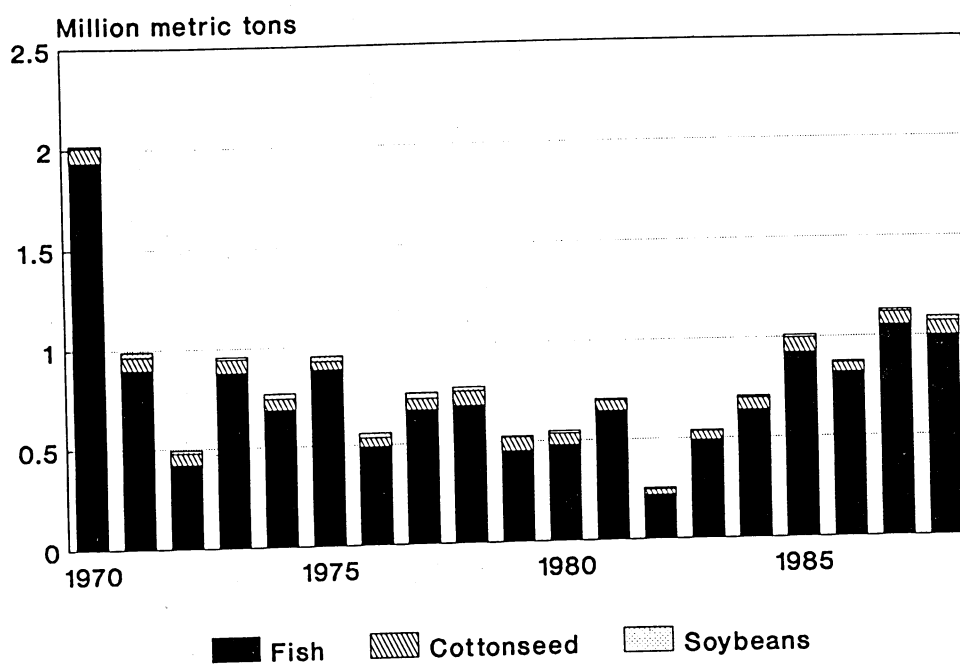


Table 20--Peru: Production, consumption, and trade of major vegetable oils with 1990 and 1995 projections

Item	Average			Projections	
	1969-71	1979-81	1985	1990	1995
<u>1,000 tons</u>					
Production:					
Soybean oil	1	3	2	5	5
Cottonseed oil	26	24	25	25	30
Palm oil	0	6	10	20	25
Fish oil	324	89	104	125	135
Total	351	122	144	175	195
Beginning stocks:					
Soybean oil	0	5	0	0	0
Cottonseed oil	0	0	0	0	0
Palm oil	0	0	0	0	0
Fish oil	35	43	85	50	50
Total	35	48	85	50	50
Imports:					
Soybean oil	14	42	34	70	95
Cottonseed oil	4	0	0	0	0
Palm oil	0	0	0	0	0
Fish oil	0	29	5	0	0
Total	18	71	39	70	95
Exports:					
Soybean oil	0	0	0	0	0
Cottonseed oil	0	0	0	0	0
Palm oil	0	0	5	15	20
Fish oil	206	16	37	40	50
Total	206	16	42	55	70
Domestic use:					
Soybean oil	15	49	37	76	100
Cottonseed oil	30	24	24	24	30
Palm oil	0	6	4	5	5
Fish oil	70	116	71	85	90
Total	115	195	136	190	225
Food use:					
Soybean oil	15	49	37	76	90
Cottonseed oil	30	24	24	24	30
Palm oil	0	6	3	5	5
Fish oil	70	110	56	70	75
Total	115	189	120	175	200

Source: (20), see References.

Table 21--Peru: Annual growth rates of production, consumption, and trade of vegetable oils

Item	Production	Imports	Exports	Total use	Feed use
<u>Percent</u>					
Total oils:					
1971-80	0	0	0	0	0
1981-88	0	0	0	0	0
Cottonseed oil:					
1971-80	1.2	0	0	1.4	0
1981-88	5.4	0	0	4.8	0
Soybean oil:					
1971-80	-.6	11.8	0	16.6	0
1980-88	9.2	0	0	.4	0
Fish oil:					
1971-80	-10	0	-36	8.3	0
1981-88	16	0	-11.7	11.6	0
Palm oil:					
1971-80	N.A.	N.A.	N.A.	N.A.	N.A.
1981-88	24.4	0	0	22.8	0

N.A. = Not available.

Source: (20), see References.

Figure 16--Peru: Meal use

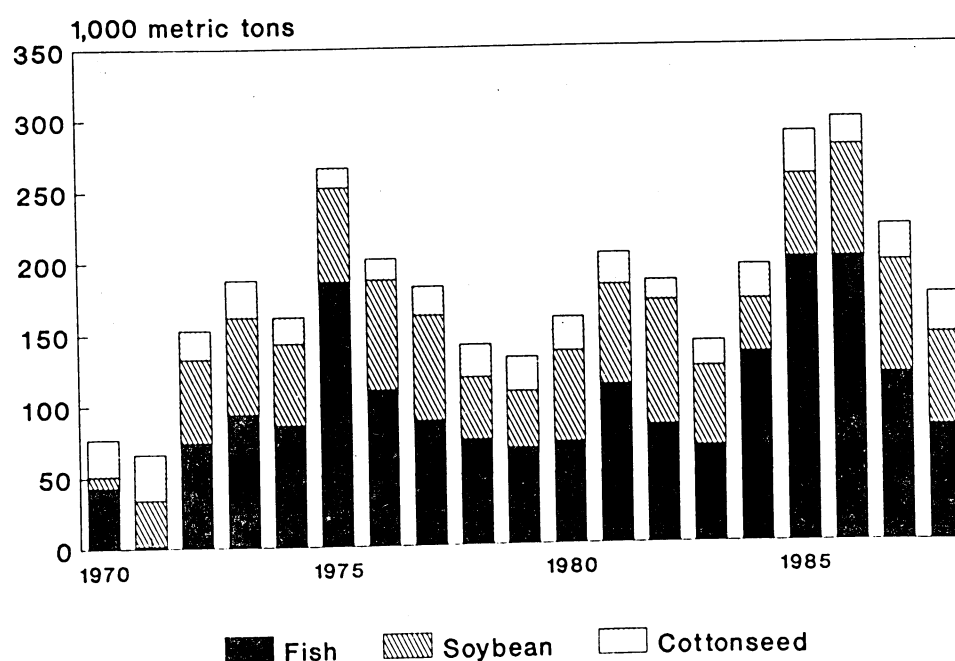


Table 22--Peru: Production, consumption, and trade of major protein meals with 1990 and 1995 projections

Item	Average			Projections	
	1969-71	1979-81	1985	1990	1995
<u>1,000 tons</u>					
Production:					
Soybean meal	5	13	9	12	12
Cottonseed meal	76	67	61	72	77
Fishmeal	1,934	539	639	900	1,000
Total	2,015	619	709	984	1,089
Beginning stocks:					
Soybean meal	0	0	3	3	3
Cottonseed meal	0	2	2	2	2
Fishmeal	456	164	76	50	50
Total	456	166	81	55	55
Imports:					
Soybean meal	0	31	55	65	100
Cottonseed meal	4	0	0	0	0
Fishmeal	0	0	0	0	0
Total	4	31	55	65	100
Exports:					
Soybean meal	0	0	0	0	0
Cottonseed meal	0	0	0	0	0
Fishmeal	1,784	463	505	780	835
Total	1,784	463	505	780	835
Domestic use:					
Soybean meal	5	44	64	80	90
Cottonseed meal	80	66	58	60	80
Fishmeal	24	69	110	120	165
Total	109	179	232	260	355
Feed, seed, and waste:					
Soybean meal	5	44	64	80	110
Cottonseed meal	80	66	58	60	80
Fishmeal	24	69	110	120	165
Total	109	179	232	260	355

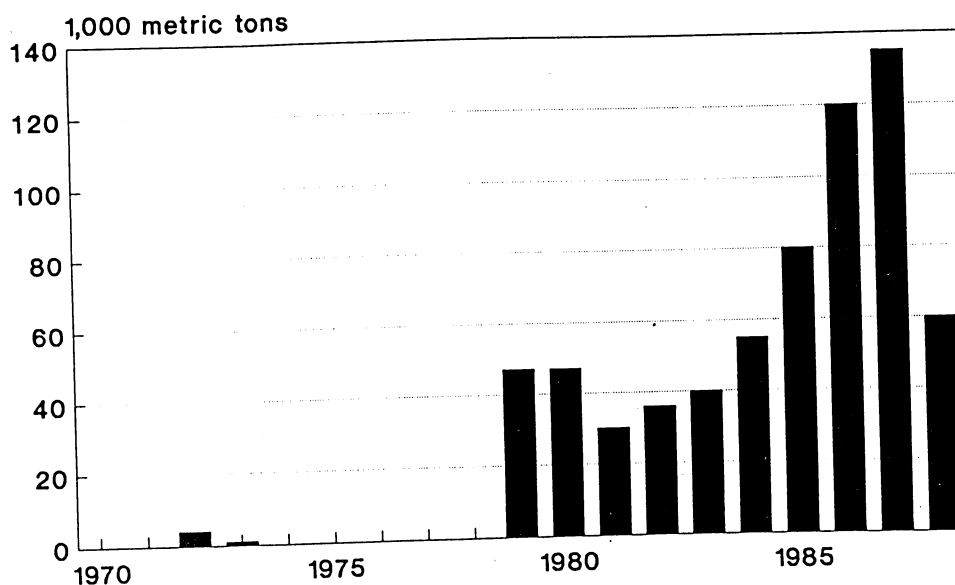
Source: (20), see References.

Table 23--Peru: Annual growth rates of production, consumption, and trade of selected oilseed products

Item	Production	Imports	Exports	Use
	<u>Percent</u>			
Total oilseed meal and fishmeal:				
1971-80	-7.6	0	-10.9	9.4
1981-88	10.7	20.6	12.8	3.6
Soybean meal:				
1971-80	2	0	0	12
1981-88	12.8	20.7	0	19.3
Fishmeal:				
1971-80	-8.1	0	-10.9	23.8
1981-88	15	0	15	7.2
Cottonseed meal:				
1971-80	-1.3	0	0	-1.4
1981-88	5	0	0	4.6

Source: Calculated from (20), see References.

Figure 17--Peru: Soybean meal imports



declining 1.4 percent during the 1970's (table 23). Small amounts of the soybean meal was from imported soybeans that were processed in Peru, but most soybean meal was imported already processed (fig. 17).

The 1995 projection for soybean meal imports depends on the health of the Peruvian fishmeal and cottonseed industries and on the use of protein meals in poultry feed. Only a limited amount of fishmeal will be used in the domestic poultry industry since fishmeal is an important foreign exchange earner. All cottonseed will be used for cottonseed meal for poultry feeding, leaving a shortage of about 100,000 tons of soybean meal to be imported.

Outlook for Economic Growth and Trade

Projections of the major agricultural imports are given in table 24. Projections for Peru are subject to many caveats. Peru's income growth pattern is extremely volatile because it is an open economy dependent on a foreign trade sector of primary exports that are subject to wide swings in prices.

Peru's political situation is also subject to wide swings in political philosophy. The projections here are conservative, reflecting the adverse times that Peru suffered in the early 1980's and is likely to suffer in the 1990's. Strong income growth in 1986 and 1987 may be difficult to sustain, and Peru continues to face its foreign debt problems with little relief on the horizon.

Population is still a major determinant of food consumption and import growth. Population growth is expected to continue at about 2.6 percent each year through 1995. Some improvements in the Peruvian economy are expected to occur after 1990, with a possible annual growth in real GDP of 3-4 percent. Per capita real income, however, will rise in later years, reflecting a long history of volatility in the economy.

Table 24--Peru: Estimated imports of major agricultural commodities, 1985, 1990, and 1995

Commodity	1985	1990	1995
<u>1,000 tons</u>			
Wheat	835	1,100	1,300
Corn	200	315	445
Sorghum	0	0	0
Soybeans	10	10	10
Soybean oil	34	85	90
Soybean meal	55	65	100
<u>Million dollars</u>			
Wheat	142	128	150
Corn	17	32	38
Sorghum	1	0	0
Soybeans	14	2	2
Soybean oil	3	35	37
Soybean meal	0	11	17
Other	117	208	244
Total	353	385	420

Source: (20), see References and calculations from projections.

References

1. Banco Central de Reserva del Peru. Memoria, 1986.
2. Bolling, H. Christine, "Price and Exchange Rate Transmission Revisited: The Latin America Case," Elasticities in International Agricultural Trade, eds. Colin Carter and Walter H. Gardiner, Westview Special Studies in International Economics and Business. Westview Press, Boulder, CO, 1988.
3. Food and Agricultural Organization of the United Nations. Agricultural Production Yearbook. Rome, selected issues.
4. _____. Fertilizer Yearbook. Rome, selected issues.
5. _____. Food Balance Sheets. Rome, 1983.
6. _____. "International Price Data Base," Unpublished, Rome, 1986.
7. International Monetary Fund. Balance of Payments Yearbook. Washington, DC, 1982.
8. _____. International Financial Statistics. Washington, DC, 1985.
9. King, Richard A. "Production and Marketing of Yellow Corn and Grain Sorghum in Peru," International Programs-Paper Series, Paper No. 3. School of Agriculture and Life Sciences, North Carolina State Univ. Raleigh, NC, June 1982.
10. Morrison, Frank Bay. Feeds and Feeding, A Handbook for the Student and Stockman. The Morrison Publishing Company, Clinton, IA, 1959.
11. Nyrop, Richard F., ed., Peru, A Country Study. Foreign Area Studies, The American Univ., Washington, DC, July 1980.
12. Orden, David, Duty Greene, Terry Roe, and G. Edward Schuh. "Policies Affecting the Food and Agricultural Sector in Peru, 1970-82: An Evaluation and Recommendations," prepared for the USAID Mission Contract 527-0166-C-00-3001-00, Dept. of Agri. and Applied Econ., Univ. of Minnesota, Oct. 6-Dec. 6, 1982.
13. Organization of American States. Pan American Union-General Secretariat, Inventory of Information Basic to the Planning of Agricultural Development in Latin America: Peru. Washington, DC, Dec. 1964.
14. Scott, Gregory J. Markets, Myths, and Middlemen, A Study of Potato Marketing in Central Peru. International Potato Center (CIP), Lima, Peru, June 1985.
15. Simmons, Richard. "Wheat Production Report," unpublished working paper, North Carolina State Univ., Raleigh, NC, Apr. 3, 1984.

16. U.S. Department of Agriculture, Economic Research Service.
Foreign Agricultural Trade of the United States, selected issues.
17. _____. World Indices of Agricultural and Food Production.
SB-730, June 1985.
18. _____. U.S. Agricultural Exports Under Public Law 480.
ERS-Foreign 395 (supplemented by unpublished data), Oct. 1974.
19. U.S. Department of Agriculture, Foreign Agricultural Service.
Peru: Annual Agricultural Situation Report, selected years.
20. _____. Production, supply, and distribution tables for
selected commodities of selected years.
21. The World Bank. Peru: Major Development Policy Issues and
Recommendations. A World Bank country study, Washington, DC, June 1981.
22. _____. World Development Report, 1987. Oxford Univ. Press,
New York, 1987.
23. _____. World Tables. Baltimore: Johns Hopkins Press, 1979.
24. _____. World Trade Tables. Baltimore: Johns Hopkins Press
1979.
25. Valdes, Alberto, and Elena Alvarez. "Government Policy and Food Supply
Management in Peru, 1950-1981," report prepared by the International Food
Policy Research Institute for the Inter-American Development Bank,
Washington, DC, July 1984.
26. Yeutter, Clayton, Frank Light, Walter Minger, John Pino, Robert Ross, and
James Starkey. "Report of the U.S. Presidential Task Force to Peru,"
unpublished, U.S. Department of Agriculture, 1982.

Appendix: Projection Methodology

The 1995 projections presented in this appendix are based on structural equations. Import demand is derived as an excess demand from domestic supply and demand equations except for the wheat model. The wheat demand model is specified as an import demand model. Annual observations for 1961-84 generally represent the data base of these models. The ordinary least squares and Cochrane-Orcutt methods of estimation are used.

Wheat

The model for wheat includes separate equations for import demand for wheat and domestic supply. ^{1/} The import demand equation includes variables for domestic production, Title I P.L.-480 imports, real foreign reserves, real GDP, and the real wholesale price for wheat. The quantity of commercial imports and domestic production are obtained from Foreign Agricultural Service supply and distribution tables for major grains (20). Title I P.L.-480 imports are taken from U.S. Agricultural Exports Under Public Law 480 (18). Real GDP in 1980 prices and foreign reserves and the Consumer Price Index are taken from International Financial Statistics (8). Commercial wheat imports are hypothesized to be directly related to GDP and foreign reserves and inversely related to domestic wheat production, Title I P.L.-480 imports, and the wholesale wheat price. Title I P.L.-480 imports, real income growth, and the real wholesale price appear to be the relevant variables determining wheat imports. The wheat area equation includes variables for lagged production and real farm prices for wheat, barley, and potatoes. Farm prices are obtained from Peruvian sources and the GDP deflator is from International Financial Statistics (8). Both production from the previous year and real wheat producer prices are directly related to this year's output. Possible competing grains are inversely related. The traditional nature of Peruvian wheat production and adverse weather conditions, captured by a dummy variable in the model, is the major determinant of wheat production. None of the farm prices appear to significantly affect the area planted to wheat. Price elasticities for the wheat area planted are as follows:

<u>Wheat area</u>	<u>Coefficient</u>	<u>Elasticity ^{1/}</u>
Independent variable:		
Real farm price for wheat	0.009	0.006
Real farm price for barley	-.013	.045
Real farm price for potatoes	.009	.030

^{1/} Calculated at the mean.

^{1/} Detailed equations are given in App. table 1.

Very little production enters the commercial market. Two regression equations for production are estimated (app. table 1), the first includes production, the second excludes production.

The commercial import demand equation includes variables for P.L.-480 imports, real foreign reserves, real GDP, and the real world price for wheat (the U.S. gulf ports price converted to Peruvian sales at the official exchange rate and deflated by Peru's CPI). The quantity of commercial imports and domestic production is from Foreign Agricultural Service supply and distribution tables for major grains (20). The P.L.-480 imports are from U.S. Agricultural Exports Under Public Law 480 and its supplements (18). The deflated world price for wheat is available in Foreign Agricultural Trade of the United States (16). Commercial wheat imports are directly related to GDP and foreign reserves and are inversely related to domestic wheat production, P.L.-480 imports, and the deflated world wheat price. Because wheat imports are controlled by the Peruvian Government, it appears that P.L.-480 aid and growth in real GDP are the principal determinants of import demand for wheat. The deflated world price of wheat followed by real foreign reserves is next in importance. The model that includes production shows a positive relationship between wheat production and imports. The relationship, however, may be spurious because of the weak linkages between wheat production and imports. When crops in the mountain region fall short, the food gap is usually met by aid rather than by commercial imports.

<u>Wheat imports</u>	<u>Coefficient</u>	<u>Elasticity</u> ^{1/}
Independent variable:		
Wheat price	-0.417	-0.279
Rice price	.011	.021
P.L.-480 imports	-.739*	-.049
Real foreign reserves	.029*	.086
Real GDP	.161*	.974
Real exchange rate	-.179	.082

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

^{1/} Calculated at the mean.

Other crops

Sorghum, corn, cotton, and rice supplies are obtained from separate equations for area and yield. Yields are defined in terms of growth rates because more sophisticated models do not improve the statistical fit. The sorghum area equation includes variables for lagged area and real farm prices for sorghum, corn, rice, and cotton. Farm prices are obtained from Peruvian sources and FAO, and the GDP deflator is from International Financial Statistics (8). Both harvested area from the previous year and real sorghum prices are directly related to this year's harvested area. Possible competing field crops are inversely related. Even though Peru has periodic droughts, the drought in 1983 was severe enough to be taken into consideration as an off year. The harvested area of sorghum appears to be responsive to real farm level cotton, rice, and real sorghum prices with cotton and rice prices being inversely related to sorghum area.

<u>Sorghum area</u>	<u>Coefficient</u>	<u>Elasticity 1/</u>
Independent variable:		
Real cotton price	-0.005*	-0.995
Real rice price	-.027*	-2.692
Real corn price	.16	.897
Real sorghum price	.028*	1.377

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

The cross-price elasticity for corn may be insignificant because sorghum is grown in a small geographic area, while corn is grown throughout Peru under many different conditions and climates. Nationally, lagged corn area is highly related to corn area in the current year, showing the traditionality of corn production. For the country as a whole, there is no significant price response between corn, rice, sorghum, or cotton.

<u>Corn area</u>	<u>Coefficient</u>	<u>Elasticity 1/</u>
Independent variable:		
Real cotton price	0.024	0.109
Real rice price	.201*	.388
Real corn price	.295*	.468
Real sorghum price	.158	.206

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

The cotton area equations also include variables for lagged area and real farm prices for sorghum, corn, rice, and cotton. Farm prices are obtained from Peruvian sources and FAO, and the GDP deflator is from International Financial Statistics (8). The harvested area for cotton appears to be most responsive to the real rice price and the previous year's cotton area, reflecting the specificity of the cotton producing area to cotton production.

<u>Cotton area</u>	<u>Coefficient</u>	<u>Elasticity 1/</u>
Independent variable:		
Real cotton price	0.005*	0.056
Real rice price	-.111	-.527
Real corn price	.086	.331
Real sorghum price	-.072	-.231

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

The harvested area for rice appears to be most responsive to the lagged area for rice, reflecting the specificity of the growing area. Rice area is directly responsive to price changes in the farm price for rice, but the competitiveness between rice, corn, and cotton also appears to be significant. There should be an increase in rice production as real farm level rice prices increase, but there could be a significant decline in area planted to rice as real farm level corn and cotton prices increase. The years of 1968 and 1980 were off years because of weather conditions.

<u>Rice area</u>	<u>Coefficient</u>	<u>Elasticity ^{1/}</u>
Independent variable:		
Real cotton price	-0.0024	-0.030
Real rice price	.035	.186
Real corn price	-.202*	-.884
Real sorghum price	-.224*	.803

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

^{1/} Calculated at the mean.

Field crop yields, since 1965, have hit lows in 1970, 1978, and 1983 and peaks in 1965, 1974, and 1982. Yield variability is mostly due to weather. Wheat and corn yields have experienced an 8-9 percent variability from 1965 to 1983, including the shortfall years that resulted from the El Nino weather pattern.

Sorghum yields, however, have shown much more variability. Growth in yields has been erratic when major grain yields during the 1960's are compared with those of the 1970's.

Annual growth of crop yields

Crop	1961-70	1971-80
	<u>Percent</u>	
Wheat	-1.3	1
Corn	2.2	.8
Rice	4.5	1.7
Sorghum	-.8	1.1

Wheat and sorghum yields declined during the 1960's, but rice yields grew considerably due to new technologies introduced with the Green Revolution. Rice has been consistently subsidized and has received yield-increasing investments. Corn yields increased but not so dramatically as rice yields. Yields of these four major crops increased during the 1970's but at a slow rate.

Crop yields continued to vacillate in the early 1980's and no real gains were made through 1986. Projection yields for 1995 are obtained from time trends and total production estimates are obtained from area times yield.

Consumption Variables

Per capita consumption of rice, corn, and wheat is calculated from total consumption data reported in Foreign Agricultural Service's supply and distribution tables, divided by the population reported in International Financial Statistics (8, 20). Income is per capita gross domestic product reported in International Financial Statistics (8). Retail prices for potatoes, rice, cassava, chicken, and noodles are reported by the International Potato Center and originally reported by National Insitutute of Statistics (14). Cochrane-Orcutt and ordinary least squares techniques are used to estimate the consumption equations. As income increases, per capita consumption increases except possibly for potatoes. When the real consumer price of the commodity increased, per capita consumption of that commodity declined. When the real price of competing commodities increases, usually consumers switch to the commodity and per capita consumption rises. The signs of the coefficients that are significant provide evidence supporting this rationale.

Coefficients obtained from regression analysis

Independent variable	Corn	Wheat	Potatoes	Rice
Coefficient:				
Real wage	0.699*	N.A.	N.A.	-0.75*
Real rice price	-5.336	18.729*	-19.493	20.033*
Real chicken price	1.653*	-.082	2.071	1.669*
Real noodle price	.699	-25.546*	-46.656	-14.062*
Real potato price	-1.064	-31.024	-86.323	-42.683*
Real cassava price	3.863	30.666	62.677	42.951*
Real income	N.A.	-.058	-.458	N.A.
Elasticity: <u>1/</u>				
Real wage	.419	N.A.	N.A.	-.495
Real rice price	.203	.342	.225	-.843
Real chicken price	.410	-.001	.155	.458
Real noodle price	.036	-.631	.726	-.799
Real potato price	.024	.338	N.A.	-1.07
Real cassava price	.091	.349	-.45	1.125
Real income	N.A.	.248	-1.394	N.A.

N.A. = Not applicable.

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

When comparing income and price elasticities among the basic carbohydrates, they must be interpreted with caution because of the quality of the fit, as measured by the corrected R^2 . If real wages in Lima are used as the income variable, then per capita corn consumption increases with real income, but rice does not; and per capita consumption of potatoes and wheat appears to be inversely related to income growth. Per capita consumption of wheat, potatoes, rice, and probably corn declines when real retail prices of these commodities increase. The cross-price relation, however, is not so clear. Per capita consumption of corn and rice increases as real retail prices for chicken increase, indicating the substitution between chicken and these basic carbohydrate foods.

The same relationship appears to exist between the real retail price for rice and per capita wheat consumption, between the real cassava price and potato and rice consumption, and between the real noodle price and potato consumption. A complementary relationship is due to the shortage of calories in the national diet and the additiveness of carbohydrates, especially in the diets of the poorest segments of the Peruvian population.

Per capita consumption of chicken is based on the production data published in World Indices of Agricultural and Food Production (17). The Cochrane-Orcutt regression technique is used to estimate the model. Per capita consumption of chicken increases with an increase in real income and declines with an increase in the real retail price for chicken. Per capita consumption also increases with an increase in the real price of competing foods. Regression analyses indicate that the major competing food is rice, and may indicate a changeover from the heavy carbohydrate diet to one with more protein.

<u>Per capita consumption of chicken</u>	<u>Coefficient</u>	<u>Elasticity 1/</u>
Per capita real income	0.098*	5.713
Real rice price	3.126*	.689
Real chicken price	-.225	-.324
Real noodle price	-1.549	-.461
Real cassava price	3.079	.423
Real potato price	-2.775	-.365

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

The income elasticity for chicken is extremely high but may represent the unsatisfied demand for meats in general. Changes in the real price for chicken do not significantly affect per capita consumption for chicken, but there is a significant competitiveness between rice and chicken as evidenced by the significance of the coefficient for the rice price albeit that the cross rice-poultry price consumption elasticity is only 0.689.

Edible Oils

Per capita consumption of edible oils is based on the availability of vegetable oils and fish oil for food, which is published in the Foreign

Agricultural Service supply and distribution tables and on population, which is published in the International Financial Statistics (8). Per capita consumption of edible oils is expected to be directly related to income and to some complementary foods.

The regression analysis in this study indicates that per capita consumption of vegetable oil is highly related to per capita income and to the real consumer price for rice, noodles, and potatoes and inversely related to the real price of chicken. The direct price relationship indicates that vegetable oil competes with rice, noodles, and potatoes, since as their real prices increase, consumers switch to vegetable oil (combined with other foods). Because chicken is fried in edible oil, per capita consumption of vegetable oil declines with chicken as the real chicken price increases.

<u>Per capita consumption of edible oils</u>	<u>Coefficient</u>	<u>Elasticity 1/</u>
Independent variable:		
Per capita real income	0.078*	2.307
Real rice price	5.726	.641
Real chicken price	-.86	-.629
Real noodle price	2.384	.361
Real potato price	5.891	.393

*Indicates that the coefficient is significant at the 5-percent level according to the t-test.

1/ Calculated at the mean.

Chicken Production and Feed Use

Most feed is used for poultry production in Peru. Poultry production has grown from 46,000 tons in 1969-71 to 127,000 tons in 1979-81 and 180,000 tons in 1985.

Corn, sorghum, fishmeal, and soybean meal are the principal feedstuffs. Poultry production data are from the publication World Indices of Agricultural and Food Production (17). Feed use data for corn, sorghum, fishmeal, and soybean meal are from the Foreign Agricultural Service supply and distribution tables for Peru (20). Evaluation of the feeds according to protein, fat, nutrient, and total digestible nutrients content is based on Morrison's Feeds and Feeding (10). There is a close correlation between feedstuffs use and poultry production according to the regression analysis noted in appendix table 1, because poultry production is the principal user of feedstuffs.

Consumption of Major Foods

Projections for consumption through 1990 are based on the regression coefficients in appendix table 1 and the assumption of income and population growth given in the table below.

Projections

The following assumptions were made for the projections,

Year	Real GDP	Population
	growth	growth
<u>Percent</u>		
1990	3.6	2.6
1991	3.5	2.6
1992	3.5	2.6
1993	3.5	2.6
1994	3.5	2.6
1995	3.5	2.6

1. Real GDP will grow annually by 3-4 percent. The years 1986 and 1987 have had real GDP growth of 6 percent, but Peru is not expected to sustain that level.
2. Population will grow annually by about 2.6 percent. Peru will be able to register per capita real income growth in only a few years of the 1980's.
3. Peru will be able to maintain its foreign reserves at \$1.5-1.8 billion only as long as Peru maintains its present policy of limiting payments on its foreign debts. Negative trade balances (in some years) together with mounting foreign debt repayment may eventually cause a sharp decline in foreign reserves.
4. There will be no significant technological change for feeding poultry that will alter the present input/output relationship between grain/oilseed meal feeds and poultry production.

Appendix table 1--Production variables, Peru

Variable	Coefficient	T-statistic	R ² corrected	Durbin Watson test	F-test	Standard error	Elasticity at the mean
Wheat area	N.A.	N.A.	0.953	-1.659	44.349	5.28	N.A.
Intercept	1.131	.046	N.A.	N.A.	N.A.	N.A.	N.A.
Wheat area lagged	1.043	8.528*	N.A.	N.A.	N.A.	N.A.	N.A.
Real potato farm price	.009	.249	N.A.	N.A.	N.A.	N.A.	0.03
Real wheat farm price	-.008	-.287	N.A.	N.A.	N.A.	N.A.	-.045
Real barley farm price	-.013	-.412	N.A.	N.A.	N.A.	N.A.	-.013
Dummy 1, 1964	-17.531	-2.893*	N.A.	N.A.	N.A.	N.A.	N.A.
Dummy 2, 1978	-31.506	-4.975*	N.A.	N.A.	N.A.	N.A.	N.A.
Dummy 3, 1980	-24.244	-3*	N.A.	N.A.	N.A.	N.A.	N.A.
Commercial wheat imports (1)	N.A.	N.A.	.899	1.736	43.377	63.377	N.A.
Intercept	240.854	2.452*	N.A.	N.A.	N.A.	N.A.	N.A.
Wheat price	-.417	-1.398	N.A.	N.A.	N.A.	N.A.	-.279
Rice price	.011	.127	N.A.	N.A.	N.A.	N.A.	.021
P.L.-480 imports	-.739	-2.162*	N.A.	N.A.	N.A.	N.A.	-.049
Real foreign reserves	.029	2.216*	N.A.	N.A.	N.A.	N.A.	.086
Real GDP	.162	6.875*	N.A.	N.A.	N.A.	N.A.	.974
Real EXR	-.179	-.521	N.A.	N.A.	N.A.	N.A.	.082
Commercial wheat imports (2)	N.A.	N.A.	.932	2.012	46.796	50.256	N.A.
Intercept	207.67	1.528	N.A.	N.A.	N.A.	N.A.	N.A.
Wheat price	-.599	-2.621*	N.A.	N.A.	N.A.	N.A.	N.A.
Rice price	.027	.883	N.A.	N.A.	N.A.	N.A.	N.A.
P.L.-480 imports	-1.199	-3.315*	N.A.	N.A.	N.A.	N.A.	N.A.
Real foreign reserves	.029	2.289*	N.A.	N.A.	N.A.	N.A.	N.A.
Real GDP	.098	3.725*	N.A.	N.A.	N.A.	N.A.	N.A.
Wheat production	1.533	2.26*	N.A.	N.A.	N.A.	N.A.	N.A.
P.L.-480 imports (CORC)	N.A.	N.A.	.833	1.717	14.802	7094.35	N.A.
Intercept	194496	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Real GDP lag	-19.141	2.53*	N.A.	N.A.	N.A.	N.A.	N.A.
Real foreign reserves lag	-1.261	2.157*	N.A.	N.A.	N.A.	N.A.	N.A.
Total U.S. P.L.-480 aid lag	N.A.	.005	-1.225	N.A.	N.A.	N.A.	N.A.
Sorghum area	N.A.	N.A.	.831	1.529	15.771	2.481	N.A.
Intercept	17.322	1.746	N.A.	N.A.	N.A.	N.A.	N.A.
Sorghum area lagged	.688	4.225*	N.A.	N.A.	N.A.	N.A.	N.A.
Real cotton price	-.005	-1.841*	N.A.	N.A.	N.A.	N.A.	-.995
Real rice price	-.039	-4.368*	N.A.	N.A.	N.A.	N.A.	-2.692
Real corn price	-.016	.896	N.A.	N.A.	N.A.	N.A.	.897
Real sorghum price	.028	2.323*	N.A.	N.A.	N.A.	N.A.	1.377
Dummy 1, 1983	-14.548	-4.701*	N.A.	N.A.	N.A.	N.A.	N.A.

See notes at end of table.

Continued--

Appendix table 1--Production variables, Peru--Continued

Variable	Coefficient	T-statistic	R ² corrected	Durbin Watson test	F-test	Standard error	Elasticity at the mean
Cotton area	N.A.	N.A.	0.619	2.248	6.841	21.226	N.A.
Intercept	85.586	1.218	N.A.	N.A.	N.A.	N.A.	N.A.
Cotton area lagged	.74	5.127	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	-.111	-1.487	N.A.	N.A.	N.A.	N.A.	N.A.
Real sorghum price	-.072	-.719	N.A.	N.A.	N.A.	N.A.	N.A.
Real cotton price	.005	.237	N.A.	N.A.	N.A.	N.A.	N.A.
Real corn price	.086	.891	N.A.	N.A.	N.A.	N.A.	.335
Rice area (CORG)	N.A.	N.A.	.701	1.653	8.022	17.007	N.A.
Intercept	401.26	5.919	N.A.	N.A.	N.A.	17.007	N.A.
Rice area lagged	.132	7.698*	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	.035	.63*	N.A.	N.A.	N.A.	N.A.	.186
Real sorghum price	-.224	2.876*	N.A.	N.A.	N.A.	N.A.	.803
Real cotton price	-.0024	-2.876*	N.A.	N.A.	N.A.	N.A.	-.03
Real corn price	-.202	-2.331*	N.A.	N.A.	N.A.	N.A.	-.884
Corn area	N.A.	N.A.	.637	2.427	5.519	21.011	N.A.
Intercept	170.365	5.491*	N.A.	N.A.	N.A.	N.A.	N.A.
Corn area lagged	-.079	-.438	N.A.	N.A.	N.A.	N.A.	N.A.
Real corn price	-.295	-3.044	N.A.	N.A.	N.A.	N.A.	0.468
Real rice price	-.201	.236	N.A.	N.A.	N.A.	N.A.	-0.388
Real sorghum price	.158	1.636	N.A.	N.A.	N.A.	N.A.	0.206
Real cotton price	.024	.04	N.A.	N.A.	N.A.	N.A.	0.109
Dummy 1, 1978	-73.17	3.115*	N.A.	N.A.	N.A.	N.A.	N.A.
Dummy 3, 1983	-64.06	-2.24*	N.A.	N.A.	N.A.	N.A.	N.A.
Per capita consumption of wheat	N.A.	N.A.	0.178	2.248	1.506	4.378	N.A.
Intercept	130.119	2.384*	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	-18.729	-1.742	N.A.	N.A.	N.A.	N.A.	.342
Real chicken price	-.082	-.046	N.A.	N.A.	N.A.	N.A.	-.001
Real noodle price	-25.546	-2.534*	N.A.	N.A.	N.A.	N.A.	-.631
Real potato price	-31.024	-1.427	N.A.	N.A.	N.A.	N.A.	.338
Real cassava price	30.666	1.427	N.A.	N.A.	N.A.	N.A.	.32
Real income	-.058	-.595	N.A.	N.A.	N.A.	N.A.	-.248
Per capita consumption of corn	N.A.	N.A.	.478	2.068	2.885	1.794	N.A.
Intercept	7.681	.411	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	-5.336	-1.16	N.A.	N.A.	N.A.	N.A.	.203
Real chicken price	1.653	3.508*	N.A.	N.A.	N.A.	N.A.	.41
Real noodle price	.699	.118	N.A.	N.A.	N.A.	N.A.	.036
Real potato price	-1.064	-.102	N.A.	N.A.	N.A.	N.A.	-.024
Real cassava price	3.863	.374	N.A.	N.A.	N.A.	N.A.	-.091
Real wages	.699	1.869*	N.A.	N.A.	N.A.	N.A.	.419

See notes at end of table.

Continued--

Appendix table 1--Production variables, Peru--Continued

Variable	Coefficient	T-statistic	R ² corrected	Durbin Watson test	F-test	Standard error	Elasticity at the mean
Per capita consumption of potatoes	N.A.	N.A.	.851	1.712	14.368	4.629	N.A.
Intercept	305.056	5.278*	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	-19.493	-1.714	N.A.	N.A.	N.A.	N.A.	.225
Real chicken price	2.071	1.098	N.A.	N.A.	N.A.	N.A.	.155
Real noodle price	-46.656	-4.375*	N.A.	N.A.	N.A.	N.A.	-.726
Real potato price	-86.323	-3.688*	N.A.	N.A.	N.A.	N.A.	-.52
Real cassava price	62.677	2.758*	N.A.	N.A.	N.A.	N.A.	-.45
Real income	-.458	-4.411*	N.A.	N.A.	N.A.	N.A.	-1.394
Per capita consumption of rice	N.A.	N.A.	.794	1.774	6.526	1.412	N.A.
Intercept	65.807	5.183*	N.A.	N.A.	N.A.	N.A.	N.A.
Real rice price	-20.033	-5.281*	N.A.	N.A.	N.A.	N.A.	-.843
Real chicken price	1.669	5.492*	N.A.	N.A.	N.A.	N.A.	.458
Real noodle price	-14.062	-3.505*	N.A.	N.A.	N.A.	N.A.	-.799
Real potato price	-42.683	-4.845*	N.A.	N.A.	N.A.	N.A.	-1.07
Real cassava price	42.951	5.016*	N.A.	N.A.	N.A.	N.A.	1.125
Real wages	-.754	-3.099*	N.A.	N.A.	N.A.	N.A.	-.495
Per capita consumption of chicken	N.A.	N.A.	.903	1.295	13.028	.575	N.A.
Intercept	-22.899	-2.515*	N.A.	N.A.	N.A.	N.A.	N.A.
Per capita real income	.098	4.107*	N.A.	N.A.	N.A.	N.A.	5.713
Real rice price	3.126	2.216*	N.A.	N.A.	N.A.	N.A.	.689
Real chicken price	-.225	-.975	N.A.	N.A.	N.A.	N.A.	-.325
Real noodle price	-1.549	-.999	N.A.	N.A.	N.A.	N.A.	-.461
Real cassava price	3.079	1.348	N.A.	N.A.	N.A.	N.A.	.423
Real potato price	-2.775	-1.155	N.A.	N.A.	N.A.	N.A.	-.365
Per capita consumption of edible oils	N.A.	N.A.	.907	2.712	19.855	.683	N.A.
Intercept	-19.639	-2.637*	N.A.	N.A.	N.A.	N.A.	N.A.
Per capita real income	.078	6.745*	N.A.	N.A.	N.A.	N.A.	2.307
Real rice price	5.725	4.605*	N.A.	N.A.	N.A.	N.A.	.641
Real chicken price	-.86	-3.957*	N.A.	N.A.	N.A.	N.A.	-.629
Real noodle price	2.384	1.923*	N.A.	N.A.	N.A.	N.A.	.361
Real potato price	5.891	2.509*	N.A.	N.A.	N.A.	N.A.	.393
Per capita consumption of chicken	N.A.	N.A.	.903	1.295	13.028	.575	N.A.
Intercept	-22.899	-2.515*	N.A.	N.A.	N.A.	N.A.	N.A.
Per capita real income	.098	4.107*	N.A.	N.A.	N.A.	N.A.	5.713
Real rice price	3.126	2.216*	N.A.	N.A.	N.A.	N.A.	.689
Real chicken price	-.225	-.975	N.A.	N.A.	N.A.	N.A.	-.325
Real noodle price	-1.549	-.999	N.A.	N.A.	N.A.	N.A.	-.461
Real cassava price	3.079	1.348	N.A.	N.A.	N.A.	N.A.	.423
Real potato price	-2.775	-1.155	N.A.	N.A.	N.A.	N.A.	-.365

See notes at end of table.

Continued--

Appendix table 1--Production variables, Peru--Continued

Variable	Coefficient	T-statistic	R ² corrected	Durbin Watson test	F-test	Standard error	Elasticity at the mean
Per capita consumption of edible oils	N.A.	N.A.	.907	2.712	19.855	.683	N.A.
Intercept	-19.639	-2.637*	N.A.	N.A.	N.A.	N.A.	N.A.
Per capita real income	.078	6.745*	N.A.	N.A.	N.A.	N.A.	2.307
Real rice price	5.725	4.605*	N.A.	N.A.	N.A.	N.A.	.641
Real chicken price	-.86	-3.957*	N.A.	N.A.	N.A.	N.A.	-.629
Real noodle price	2.384	1.923*	N.A.	N.A.	N.A.	N.A.	.361
Real potato price	5.891	2.509*	N.A.	N.A.	N.A.	N.A.	.393
Chicken production	N.A.	N.A.	.948	1.395	76.294	9.751	N.A.
Intercept	-333.891	-3.933*	.948	1.595	76.294	9.751	N.A.
Real income	.096	5.519*	N.A.	N.A.	N.A.	N.A.	N.A.
Real foreign reserves	-.003	-1.658	N.A.	N.A.	N.A.	N.A.	N.A.
Chicken production	N.A.	N.A.	.933	2.758	76.73	13.159	N.A.
Intercept	103.732	1.663	.933	2.758	76.73	13.159	N.A.
Nutrients	.016	3.693*	N.A.	N.A.	N.A.	N.A.	N.A.
Chicken production	N.A.	N.A.	.925	2.654	58.494	13.906	N.A.
Intercept	131.6	2.154*	N.A.	N.A.	N.A.	N.A.	N.A.
Fat	.023	3.218*	.925	2.654	58.494	13.906	N.A.
Chicken production	N.A.	N.A.	.916	2.446	55.982	14.761	N.A.
Intercept	150.499	2.492*	.916	2.446	55.982	14.761	N.A.
Protein	.004	2.684*	N.A.	N.A.	N.A.	N.A.	N.A.
Chicken production	N.A.	N.A.	.936	2.693	75.54	12.898	N.A.
Intercept	97.757	1.653	.936	2.693	75.54	12.898	N.A.
Total digestible nutrients	.002	3.87*	N.A.	N.A.	N.A.	N.A.	N.A.

N.A. = Not applicable.

* Indicates that the coefficient is significant at the 5-percent level according to the t-test.

Appendix table 2--Farm, consumer, and trade policy for basic agricultural commodities, Peru

Import policy	Farm policy	Domestic trade and consumer policy
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Basic commodities:

1985

Policy is to move away from domination of parastatal agencies in agricultural marketing. Reorganization of the Board of Directors at Marketing Board for Rice (ECASA) and inclusion of producer members. Import licenses and quotas required for basic commodities except for rice and milk.

Farm prices are generally uncontrolled.

1984

Import quotas are set for wheat, corn, and rice.

Government encouraged double cropping by setting farm support prices for corn, sorghum, chickpeas, lima beans, and soybeans.

1983

Decree in early 1983 took away the monopoly on basic food imports from Marketing Board for Inputs (ENCI). The private sector has continued to rely on ENCI to do its purchasing on a service contract basis. Government of Peru announced its intention to dissolve ENCI and ECASA and return importing and marketing to private sector. Government has imposed additional duties on imports to supplement its revenues. Imports of basic goods require Ministry of Agriculture overall authorization under a global import program.

Wheat:

1985

Most imports of wheat are carried on by ENCI, under service contract with the private sector. Import licenses and quotas.

1984

Wheat and grains produced in Sierra under government control.

Continued--

Appendix table 2--Farm, consumer, and trade policy for basic agricultural commodities, Peru

Import policy	Farm policy	Domestic trade and consumer policy
<p><u>1983</u> Imports are no longer government's exclusive domain. Duties exonerated on wheat. Peruvian Government import quota for wheat. Ministry of Agriculture authorizes flour mills to import directly or have option of purchasing wheat through ENCI.</p> <p>Rice:</p> <p><u>1985</u> Rice trade is still under government control.</p> <p><u>1984</u> Duties exonerated for rough and milled rice.</p>	<p>Marketing of wheat also removed from exclusive domain of ENCI. Wheat and by-products dropped from list of products subject to price control.</p> <p>ECASA purchases rice from farmers at fixed prices that are adjusted periodically for inflation. Government purchases and commercializes jungle rice.</p>	<p>Rice prices are set at consumer levels.</p>
<p>Feed grains:</p> <p><u>1985</u> Import licenses and quotas in corn/sorghum.</p> <p><u>1984</u></p>	<p>ENCI purchases and commercializes jungle corn and sorghum and controls prices at all marketing levels Ministry of Economy and Finance in coordination with Ministry of Agriculture. Control prices are raised every 1-2 months at the rate of inflation, contrasting with slower adjustments in previous years.</p>	<p>Prices controlled by government at all marketing levels.</p>

Continued--

Appendix table 2--Farm, consumer, and trade policy for basic agricultural commodities, Peru

Import policy	Farm policy	Domestic trade and consumer policy
<p><u>1983</u> Imports liberalized from the exclusive right of GOP. One trading company has started importing its own corn.</p>		
<p><u>1982</u> Import duties for yellow corn and sorghum increased from 10 to 15 percent in March.</p>		Producers may sell product to the government under a price-support system.
<p>Beef:</p>		
<p><u>1982</u></p>		Consumer prices for bovine offals were freed (Sept.).
<p><u>1981</u> Private sector may import meat.</p>		Consumer beef price freed from government control. Government of Peru lifts "veda" beefless days.
<p><u>1980</u></p>		Government of Peru frees prices of all meats (Sept.). Still has official retail prices for offals (tripe, stomach, heart, and liver).
<p>Nonfat dry milk (NFDM), butteroil and dry wholemilk:</p>		
<p><u>1984</u> Duties exonerated for NFDM butteroil, and dry wholemilk.</p>	<p>Producer prices for milk are adjusted for inflation and are adjusted on the basis of consultations among producers, the Ministry of Agriculture, and private processing plants who purchase milk from farmers.</p>	
<p><u>1983</u> Import licenses and quotas for NFDM, butteroil, dry wholemilk.</p>	<p>Producer prices set for fresh milk, NFDM, butteroil.</p>	

Continued--

Appendix table 2--Farm, consumer, and trade policy for basic agricultural commodities, Peru--Continued

Import policy	Farm policy	Domestic trade and consumer policy
<u>1982</u> The government continued its policy of decontrolling agricultural items.		Pasteurized milk decontrolled (May). Government of Peru announced that consumer subsidies would be eliminated Jan. 3, 1981.
Soybeans:		
<u>1985</u> Import licenses and quotas.		
Soybean oil:		
<u>1985</u> Import quotas and licenses. Import duties on Latin America Free Trade Area (LAFTA) vegetable oils, 80-90 percent below the general tariff.		
<u>1983</u> Importing liberalized from government exclusiveness.		Marketing no longer exclusive domain of ENCI. ENCI sells imported crude soybean oil at .245 soles/kg. to processing plants.
Soybean meal:		
<u>1985</u> Import licenses and quotas. Soybean meal is duty free from Paraguay and Bolivia.		
Cottonseed and cotton seed cake:		

Continued--

Appendix table 2--Farm, consumer, and trade policy for basic agricultural commodities, Peru--Continued

Import policy	Farm policy	Domestic trade and consumer policy
<u>1985</u>	Producer price set for cottonseed and cottonseed cake.	

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