

POTATO SUPPLY, DEMAND, AND MARKETING IN CENTRAL PERU

by

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PREFACE

This report describes potato supply and demand characteristics in the central regions of Perú and analyzes the potato marketing system. It is hoped that this information will be useful to those who may initiate further research and analysis of Perú's potato industry.

The information in this report was gathered during 1971-73 while the author was working with the Dirección General de Comercialización of the Ministry of Agriculture in Perú under contract with the Iowa Universities Mission. Dr. Samuel Fahr, Iowa Mission Chief of Party, helped support the activities related to this research. Many persons within the Ministry of Agriculture helped the author gain an understanding of the potato situation. In particular, acknowledgment is made to help given by Ing. Ricardo Fort L. of the DGG and Ing. Hugo Vargas C. of the DGPA.

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LIST OF ABBREVIATIONS

BFA	Agricultural Development Bank
CIP	International Potato Center
CPI	Consumer Price Index
DGC	Agricultural Marketing Division, Ministry of Agriculture
DGIA	Agricultural Research Division, Ministry of Agriculture
DGPA	Agricultural Production Division, Ministry of Agriculture
EPSA	Public Agricultural Services Company
ONEC	National Statistics and Census Office
SIMAP	Agricultural Market Information Service
SIPA	Former Agricultural Research and Extension Service
SNA	National Farmers Society
UNA	National Agriculture University

I. POTATO PRODUCTION, SUPPLY, AND DEMAND IN PERU

1.1 Producing Regions, Population Concentration, and Trends

Potatoes are produced in every coastal and sierra department, except Tumbes which borders Ecuador. Very few potatoes are produced in the eastern selva regions. The geographic locations of various major producing regions and important cities are shown in Figure 1, and production statistics for northern, central, and southern production areas during 1955-71 are given in Table 1.1. Average yield statistics for these areas are presented in Table 1.2, while Table 1.3 contains population estimates for 1970.

1.1.1 Central Regions

The central regions currently produce about 50 percent of the nation's potatoes and account for nearly 48 percent of total population. Both the central coast and central sierra regions appear to have expanded production rapidly during the 1960s. Potato production in the central sierra increased at a 10 percent annual rate, mainly due to land area increases. Most of the Ministry of Agriculture Potato Programs have focused on the central sierra regions. The small, highly-productive central coast production areas expanded output at an average annual rate of 9.0 percent, about half of which was due to yield increases. The coastal production areas are important because of their nearness to Lima and because their harvests occur during sierra off seasons. The central regions are discussed in more detail later.

1.1.2 Northern Regions

The northern regions contain about 33 percent of total population and currently provide nearly 25 percent of national potato production. Average yields in northern sierra areas have been higher than for other sierra regions, even though no special potato production programs have been undertaken. This may be partly accounted for by the relative newness and, hence, generally better sanitary conditions of some northern production centers. Overall production in these areas has increased at about 2.5 percent annually. The period prior to 1967 was marked by very rapid expansion. Thereafter, production appears to have declined because of disease problems and consequent quarantine of the entire north in early 1971.

Presence of bacterial wilt (Marchitez Bacteriana) was first noticed in Cajamarca in 1967. Since that time, other northern production centers have shown evidence of the disease's ravages. In highly infected areas, production losses can be total as is reported to have occurred in Virú on the coast near Trujillo. In the very high altitude production zones, cool weather and better natural resistance of some native varieties appears to restrain damages and the diseases spread.

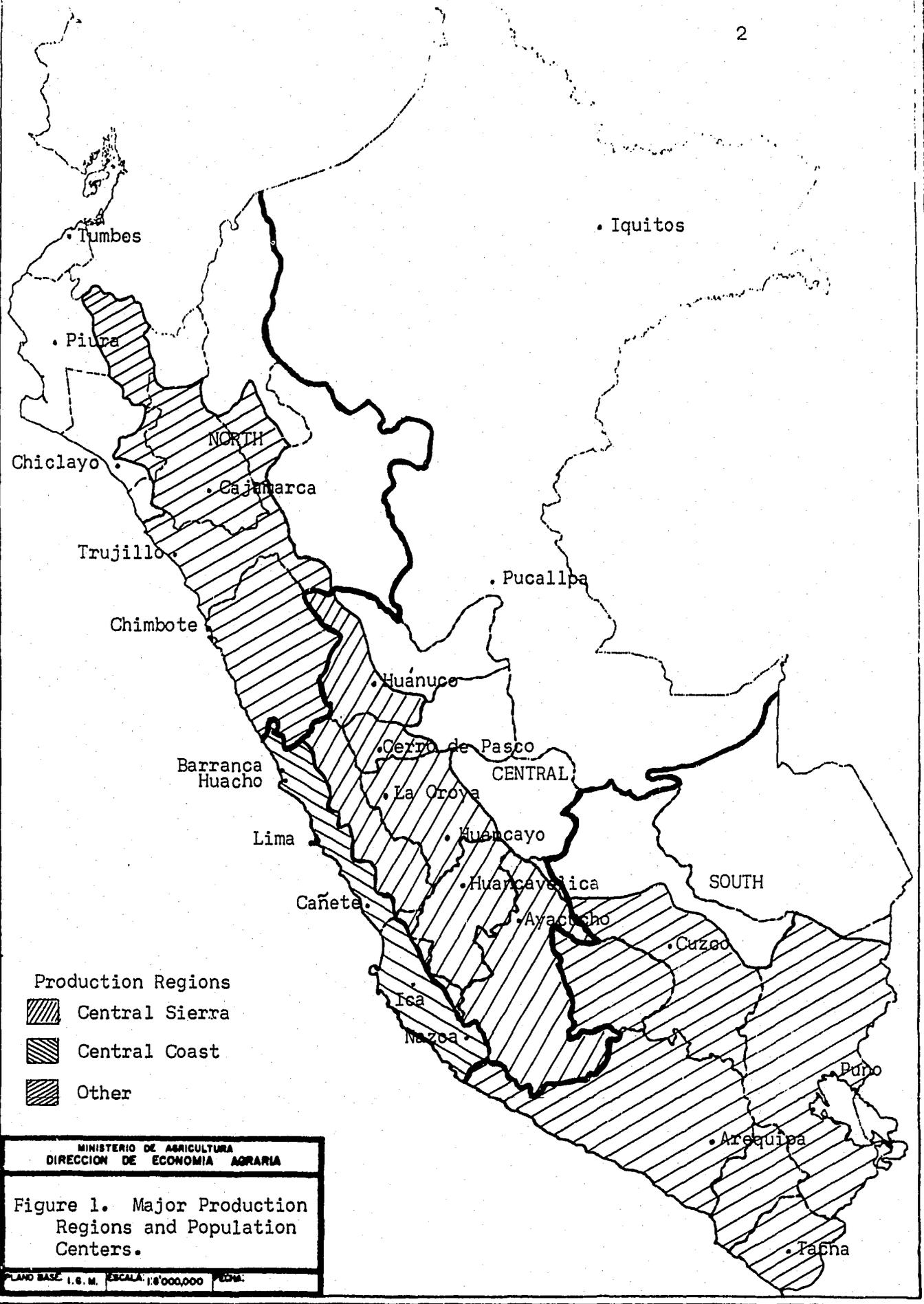


Table 1.1. Total, Sierra and Coastal Production by Region (North, Central, South): 1955-71.

Year	North Total ^a	North Sierra	North Coast	Central Total ^b	Central Sierra	Central Coast	South Total ^c	South Sierra	South Coast
(1,000 M.T.)									
1955	216.9	213.4	3.5	515.6	471.5	44.1	650.1	633.5	16.6
1956	290.2	286.0	4.2	379.5	335.1	44.4	363.2	347.6	15.6
1957	375.3	371.1	4.2	349.2	316.8	32.4	382.0	370.4	11.6
1958	326.3	322.0	4.3	351.8	317.9	33.9	544.3	531.4	12.9
1959	345.6	341.7	3.9	344.5	301.1	43.4	527.0	512.9	14.1
1960	329.7	326.0	3.7	375.8	325.2	50.6	409.7	392.6	17.1
1961	423.6	419.8	3.8	394.8	343.5	51.3	424.3	410.5	13.8
1962	404.3	401.2	3.1	430.1	360.3	69.8	397.6	384.5	13.1
1963	431.2	426.9	4.3	456.7	372.1	84.6	388.0	375.6	12.4
1964	447.3	436.1	11.2	637.1	556.1	81.0	446.8	434.9	11.9
1965	492.8	473.1	20.0	590.3	513.5	78.0	483.6	463.3	20.3
1966	482.8	478.2	4.6	592.0	506.7	85.3	365.7	343.6	22.1
1967	503.4	497.1	6.3	706.3	609.2	97.1	424.1	397.3	26.8
1968	456.0	447.7	8.3	735.8	630.6	105.2	334.4	307.8	26.6
1969	490.9	484.5	6.4	889.9	781.8	108.1	404.3	388.4	15.9
1970	482.7	478.7	4.0	970.8	827.2	143.6	476.3	460.5	15.8
1971	467.9	465.9	2.0	1,005.2	882.3	122.9	494.8	480.6	14.2

<u>Average Annual Rates of Increase</u>	<u>North Sierra</u>	<u>Central Sierra</u>	<u>Central Coast</u>	<u>South Sierra</u>
(1960-62)-(1969-71)	2.5	10.3	9.0	1.3
(1964-66)-(1969-71)	0.6	9.6	8.9	0.8

Source: Agricultural Statistics Office.

^aIncludes Ancash, La Libertad, Cajamarca, Lambayeque, Amazonas, and Piura.

^bIncludes Lima-Callao, Ica, Huancavelica, Huánuco, Junín, Pasco, and Ayacucho.

^cIncludes Arequipa, Moquegua, Tacna, Apurímac, Cuzco, and Puno.

Table 1.2. Regional Average Annual Potato Yields (North, Central, South): 1955-71.

Year	North Sierra	North Coast	Central Sierra	Central Coast	South Sierra	South Coast
(M.T./ha.)						
1955	6.1	7.6	5.7	9.6	5.8	8.1
1956	6.9	7.6	4.9	9.5	3.2	7.8
1957	7.8	7.5	4.7	7.6	3.8	7.7
1958	6.7	7.4	5.0	8.8	5.3	7.7
1959	6.5	7.8	5.1	9.0	5.0	7.5
1960	5.9	8.2	4.8	10.3	3.8	7.9
1961	7.6	8.2	5.1	11.2	3.9	7.8
1962	7.1	8.2	5.4	14.6	3.9	7.6
1963	7.2	7.6	5.5	18.8	3.6	8.6
1964	6.7	9.3	6.2	15.0	4.4	9.9
1965	8.1	10.0	5.6	15.0	5.1	10.5
1966	8.6	7.5	4.8	15.7	4.4	10.8
1967	8.5	7.9	5.5	14.7	4.9	10.8
1968	8.3	8.6	5.2	17.2	4.6	11.8
1969	7.4	8.5	5.6	16.8	5.0	9.6
1970	7.4	11.5	5.6	17.4	5.0	9.9
1971	6.9	9.6	5.7	19.7	5.4	10.5

Average Annual Rates of Increase	North Sierra	Central Sierra	Central Coast	South Sierra
(1960-62)-(1969-71)	0.6	1.1	4.4	3.2
(1964-66)-(1969-71)	-1.5	0.4	3.3	2.1

Source: Agricultural Statistics Office.

Table 1.3. Regional Population Estimates 1960 and 1970, Average Annual Rates of Population Growth, and Regional Population as Percent of Total Population in 1970.

Region	Estimated Population 1960 ^a	Estimated Population 1970 ^a	Average Annual Rate of Increase	Percent of Total Population 1970
	(1,000 persons)			
North	3,303.8	4,429.5	3.0	32.6
Central	4,539.6	6,516.9	3.7	48.0
Metropolitan Lima ^b	1,729.6	3,086.1	6.0	22.7
Other Central	2,810.0	3,430.8	2.0	25.3
South	2,181.2	2,639.9	1.9	19.4
Perú	10,024.6	13,586.3	3.1	100.0

Source: ^aBoletín de Análisis Demográfico, Special Publication, 1969, National Statistics and Census Office.

^bHypothesis 3, National Statistics and Census Office.

North includes: Amazonas, Ancash, Cajamarca, La Libertad, Lambayeque, Piura, San Martín, and Tumbes.

Central includes: Ayacucho, Huancavelica, Huánuco, Ica, Junín, Lima-Callao, Loreto, and Pasco.

South includes: Apurímac, Arequipa, Cuzco, Madre de Dios, Moquegua, Puno, and Tacna.

Experiment station technicians believe that serious damage may occur in other lower altitude production centers if the disease is not contained. There are no short-run solutions for eliminating bacterial wilt in infected areas as spores can live indefinitely in the soil. Research personnel are working with resistant clones, but it will be some time before new varieties and technical findings can be extended into the field.

1.1.3 Southern Regions

Statistics for southern departments are the least certain. Population of the southern areas has grown slowly at 1.9 percent per year. Production has increased at a slightly lower rate of 1.3 percent. The small, south coast areas may have experienced declines in production. Potatoes have been displaced to some extent by other vegetables. The Chilean potato industry normally ships some seed into this area, but in recent years, production in Chile has declined, and import restrictions on Chilean potato seed have caused seed shortages.

1.2 Seasonal Crops and Climate

Some potatoes are harvested throughout the year as shown by the following tabulations.

<u>Seasonal Category</u>	<u>Usual Time of Planting</u>	<u>Usual Time of Harvest</u>	<u>Approximate Percentage of National Production^a</u>
Sierra dry farmed	Sept.-November	March 15-July 30	77
Sierra irrigated	May, June-July	Nov. 1-Feb. 28	14
Coast	April-June, July	July 15-Jan. 15	9

^aBased on Ministry of Agriculture Statistics in Estadística Agraria 1969, 1970, 1971.

The dry crop is grown primarily on high sierra slopes (up to 3,800 meters) and is planted when the rainy season starts. Adequate, evenly-distributed rainfall and no abnormal cold spells are crucial for abundant harvests. The monthly distribution of rainfall over the period 1955-71 in Huancayo, located near important central sierra producing centers, are shown in Table 1.4. Total rainfall varies considerably from year to year. In dry years such as 1966, 1968, and 1969, total rainfall is less than 700 mm. annually. The rainy season usually begins in September or October.

The coldest months in the sierra are June and July. Most of the potato crop is normally harvested by then. Table 1.5 shows the

Table 1.4. Monthly Rainfall: Central Sierra-Huancayo (3,250 meters), 1955-71.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
(millimeters)													
1955	121.1	107.5	117.8	23.3	31.4	7.6	1.1	10.8	21.7	44.4	33.4	81.2	601.3
1956	122.9	202.6	61.9	41.2	12.8	0.8	22.4	6.1	37.5	38.2	44.8	71.5	662.7
1957	79.6	151.2	119.5	94.0	24.9	11.5	207.1	13.3	67.0	65.6	63.5	79.2	976.4
1958	141.7	137.1	65.1	44.9	35.4	8.5	4.9	2.3	23.0	88.6	66.4	85.7	703.6
1959	102.2	198.3	151.9	88.1	25.2	35.3	1.0	6.9	36.0	91.9	49.5	109.1	895.4
1960	88.4	112.5	39.1	66.6	16.4	0.3	10.1	20.6	31.4	49.8	115.1	51.0	601.3
1961	199.6	165.0	101.1	63.6	62.8	0.0	175.7	15.7	26.1	25.9	97.7	144.2	1,077.4
1962	92.2	110.4	140.9	63.1	38.0	0.5	4.3	1.8	29.0	68.3	71.0	99.8	719.3
1963	183.8	114.0	144.0	69.9	13.0	2.3	0.0	19.8	32.3	40.1	62.1	96.6	777.9
1964	99.0	74.8	127.4	50.2	39.3	0.0	1.3	26.9	71.4	124.6	93.5	99.6	808.0
1965	93.6	124.8	117.3	59.5	11.2	0.0	9.7	15.9	95.5	77.8	68.2	80.3	753.8
1966	102.2	42.5	67.8	24.9	42.4	6.1	0.0	4.3	46.9	99.5	64.8	112.3	613.7
1967	107.5	142.9	184.7	39.9	41.5	1.5	23.4	23.0	52.2	99.4	43.6	65.5	825.1
1968	152.2	93.8	118.3	40.9	1.5	3.9	20.6	68.0	18.8	57.3	42.2	65.0	682.5
1969	51.9	78.1	59.0	65.3	6.1	12.8	21.9	14.2	37.6	44.1	78.3	106.0	575.3
1970	178.4	121.0	69.5	40.9	25.3	5.5	4.0	1.0	67.7	69.6	37.5	115.2	735.6
1971	83.5	177.6	150.0	45.8	5.4	3.5	6.1	79.1	24.5	64.4	68.3	82.5	790.7

Source: Dirección General de Meteorología.

numbers of days per month experiencing freezing temperatures. The early cold spells in 1968 and 1971 caused problems with parts of the central sierra potato crop.

Table 1.5. Number of Days Per Month with Temperature at or Below 0°C. (7:00 a.m.): Huancayo (3,312 meters), 1955-71.

Year	Month				
	April	May	June	July	August
1955	-	-	-	2	2
1956	-	1	8	5	3
1957	-	-	7	11	1
1958	-	-	6	2	4
1959	-	-	1	-	-
1960	-	-	3	-	-
1961	-	-	3	4	4
1962	-	-	8	2	3
1963	-	4	14	11	1
1964	-	1	20	15	5
1965	-	7	4	7	1
1966	-	2	11	12	5
1967	-	-	7	9	1
1968	2	8	16	9	-
1969	-	-	5	10	3
1970	-	2	3	8	6
1971	1	7	8	20	5

Source: Dirección General de Meteorología.

Note: No temperatures below 0°C. in other months.

The sierra irrigated crop is planted mostly in lower valleys where it is sheltered from cooler climates prevalent over the middle and latter parts of the year. Most of the crop is planted in June and July, though in selected areas where ample irrigation water is available, it may be planted at any time. Some high altitude slopes with irrigation water and special shelter from prevailing winds are also planted.

The coastal crop (0-1,200 meters) depends entirely on irrigation water. Rains on the coast are unusual. Agronomically, the ideal time for potato plantings usually occurs during April, May, and June, after the warm summer months of December through March. Early and late plantings are practiced by some farmers who sacrifice expected yield for chances of higher seasonal prices. Prolonged warm spells with temperatures above 18°C. are harmful to the potato crop. This occasionally is a problem for coastal potato farmers.

Closely related to climate and altitude are problems associated with disease and pest control. Generally, higher altitudes and, hence, cooler climates afford more natural protection, and lowland climates provide less protection.¹

1.3 Production Organization

The sierra regions contain hundreds of deep, tortuous canyons, linked by very poor roads. Small farmers produce most of the potatoes in these areas. The 1961 agricultural census reported that of a total of 869,945 farms in operation that year, 291,142 (33 percent) grew some potatoes, and most of these were less than 1 ha. in size.²

Potato production is probably the largest source of agricultural employment in sierra regions. It has been estimated that 104.8 thousand man years were required for all sierra regions to grow and harvest the 1967 potato crop.³ This represented about 9 percent of the estimated 1,173,200 economically active rural sierra population.

Data presented in Table 1.6 illustrates the "traditional" nature of much of the sierra producing areas. It appears that about 38 percent of northern and central sierra potatoes and over 50 percent of the potatoes produced in the southern highlands never enter market channels. Coastal producers, on the other hand, market most of their potatoes.

Table 1.6. Total Production, On-Farm Consumption, and Percent of Total Production Consumed on Farms by Region: 1970.

Region	Total Production 1970	On-Farm Consumption ^a	Percent Consumed on Farm
	(1,000 M.T.)		
North	482.7	184.8	38.3
Central	970.7	317.1	32.7
Coast	143.5	2.4	1.7
Sierra	827.2	314.7	38.0
South	476.3	255.7	53.7
Perú	1,929.7	757.6	39.3

Source: Agricultural Statistics Office.

^aOn-Farm Consumption includes potatoes saved for seed and payment in kind to farm laborers as well as for home food consumption.

1.3.1 Central Sierra

The importance of potato production within the central sierra crop economy is illustrated in Tables 1.7 and 1.8. In 1968, potato production employed an estimated 120,700 ha. or about 27 percent of total land area planted in the region that year. In terms of value, potatoes represented 46 percent of gross farm value of crops (not including livestock) for 1968. The rapid expansion of potato production in the central sierra was noted previously. This was accompanied by a 16.4 percent annual increase in gross farm value of potatoes of which 6.8 percent was due to price increases during the 1964-71 period. Wheat, corn, and barley are also important staples in the diets of sierra peoples. Based on data from the Agricultural Statistics Office, it appears that 57 percent of the 201,200 M.T. of basic grains produced were consumed on farms. Over the 1964-71 period, production of basic grains expanded at about 3.1 percent per year. Associated with this expansion was a 16.8 percent rate of increase in gross farm value of which 13.7 percent was due to price increases. Relative to potatoes, basic grains appear to have become scarce and increasingly expensive at the farm gate. There are 44 important commercial potato production centers totaling about 60,000 ha. in the central sierra (Table 1.9). Their sizes range from about 100 ha. to 4,000 ha.

Producers: There are several types of farmers in these centers. Producers planting more than 25 ha. usually use mechanical energy in the farming operation. Most farmers, however, plant less than 1 ha. and rely solely on human and animal energy. Between these extremes are large numbers of medium-sized farmers.

Farmers in these production centers have been exposed to at least some modern technology. Many small potato farmers, most of the medium sized, and practically all of the large farmers use fertilizer and insecticides as well as improved seed. They do not employ optimum amounts of inputs and practices, however, due to lack of knowledge and lack of cash for expenditures. Average yields in many of these centers appear to be considerably higher than those reported in Table 1.2. White potato yields probably average around 8-10 M.T./ha. A few of the relatively new areas such as parts of Huánuco may average as high as 12 M.T./ha. for white potatoes.

Most farmers in these centers are market oriented. They save potatoes for their own needs (seed and food) and market the rest shortly after harvest. The land area planted to potatoes fluctuates from year to year, partly because of the timing of rains and availability of irrigation water and partly because of income changes. A low return on the previous year's crop, either because of low yields and/or low prices, usually reduces current plantings. A low return reduces the cash available for inputs and hired labor. Land not planted goes into fallow. Price expectations

Table 1.7. Agricultural Land Use and On-Farm Gross Value of Production by Crop: Central Sierra,^a 1968.

	Total Land	Percent	Irrigated Land	Dry Cropped Land	On-Farm Gross Value of Production	Percent
	(1,000 ha.)		(1,000 ha.)	(1,000 ha.)	(millions S/.)	
Available Agricultural Land	725.2	100.0	142.1	583.1	---	---
Land in Fallow	285.6	39.4	27.3	258.3	---	---
Total Land Farmed	439.6	60.6	114.8	324.8	---	---
Total Harvested Area ^b	448.1	100.0	121.0	327.1	3,302.0	100.0
Pasture and Tree Crops	58.1	13.0	42.1	16.0	718.3	21.8
Annual Crops	390.0	87.0	78.9	311.0	2,583.7	78.2
Barley	77.9	17.4	9.2	68.7	194.6	5.9
Corn	70.4	15.7	24.8	45.6	229.6	7.0
Wheat	51.3	11.4	12.7	38.6	147.5	4.5
Potatoes	120.7	26.9	13.6	107.1	1,520.7	46.0
Other tubers	16.6	3.7	1.4	15.2	136.1	4.1
Vegetables	16.6	3.7	10.1	6.5	222.4	6.7
Lentils, beans	26.3	5.9	3.5	22.8	111.0	3.4
Others	10.2	2.3	3.6	6.6	21.4	0.6

Source: Estadística Agraria - 1968, Ministry of Agriculture.

^aIncludes Huancavelica, Huánuco, Ica, Junín, Lima, Pasco, and Ayacucho.

^bAdjusted for double cropping.

Table 1.8. Comparison of Selected Production Statistics for Basic Grains and Potatoes: Central Sierra, 1964-71.

Year	Land Area	Yields	Production	On-Farm Gross Value of Production	Average Price
	(1,000 ha.)	(kg./ha.)	(1,000 M.T.)	(millions S/.)	(S/./kg.)
<u>Basic Grains^a</u>					
1964	186.2	942	175.5	299.3	1.71
1965	183.5	941	172.7	315.2	1.83
1966	192.5	777	149.6	324.6	2.17
1967	199.3	861	171.6	373.9	2.18
1968	199.7	871	174.0	571.7	3.29
1969	204.4	929	189.9	702.2	3.70
1970	200.0	1,006	201.2	715.9	3.56
1971	193.0	982	189.5	682.8	3.50
Avg. An. Rates of Increase (1964-66)- (1969-71)	1.2	1.9	3.1	16.8	13.7
<u>Potatoes</u>					
1964	90.4	6.2	556.1	813.8	1.46
1965	92.2	5.6	513.5	764.9	1.49
1966	104.5	4.8	506.7	1,012.0	2.00
1967	110.8	5.5	609.2	1,176.0	1.93
1968	120.7	5.2	630.6	1,520.7	2.41
1969	139.8	5.6	781.8	1,887.0	2.41
1970	148.3	5.6	827.2	1,847.0	2.23
1971	156.0	5.7	882.3	1,835.7	2.08
Avg. An. Rates of Increase (1964-66)- (1969-71)	9.2	0.4	9.6	16.4	6.8

Source: Agricultural Statistics Office.

^aIncludes wheat, corn, and barley.

Table 1.9. Principal Potato Production Centers: Central Sierra, 1972.

Location	Estimated Area (ha.)
Junín-Mantaro Valley Area	14,200
Comas	2,000
Sicaya	1,500
Huayucachi	2,000
Chupaca	1,600
Sta. Rosa de Ocopa	3,000
Other (3)	4,100
Junín-Tarma Area	9,460
Huasahuasi	4,000
Tarma	1,500
Other (7)	3,960
Huancavelica	14,700
Colcabamba	4,000
San Juan de Pillo	2,000
Huantaro	1,500
Huando	1,600
Mariscal Cáceres	1,500
Lircay	1,500
Paucará	1,600
Other (3)	1,000
Ayacucho-various (5)	1,050
Pasco-various (4)	2,250
Huánuco	17,440
Chaglla	3,540
Pampas	2,000
Llicllatambo	3,500
Huandobamba-Ichocán	3,000
Acobamba	3,500
Other (3)	1,900
Total	60,000

Source: National Potato Program, Tenth Agrarian Zone Office, Huancayo.

do not appear to be particularly important, except possibly in those centers that have cash production alternatives to potatoes.⁴

Cropping Patterns: Higher altitude production areas appear to be highly specialized to potato production. Other crops apparently do not do well or do not offer much in the way of cash return and when planted are usually for home consumption. Typically, potatoes are planted two and three years successively after which the land lies fallow for three to five years prior to planting potatoes again.

Lower altitude production areas, particularly valleys with ample irrigation water, appear to have other viable cash production alternatives, and rotation schemes are more varied. Corn, vegetables, habas, and wheat also are planted for commercial sale. Nevertheless, with the exception of vegetables in a few areas, potatoes appear to offer the highest return to farmers.

Agrarian Reform: Agrarian reform and land redistribution activities do not appear to have directly-affected central sierra potato production prior to 1972. Most of the program was located in very high altitude livestock zones. Beginning in 1972, some agrarian reform activity was directed toward medium and larger-sized properties located in valleys where potatoes are produced, but its effect on potato production was not obvious as of early 1973.

Varieties and Seed: Over 580 native cultivated varieties have been identified in the central sierra.⁵ Most of these are low in productivity, due to genetically small size of tubers, but new, higher yielding varieties are gradually being introduced.

The data presented in Table 1.10A indicate that nearly 44 percent of potato lands in 1971 were planted to the "Renacimiento" white potato. This potato is an improved hybrid developed by SIPA in 1949 and is grown by both large and small farmers. Over the years, its planting has become widespread, attesting to the ability of prior research and extension programs to reach large numbers of sierra farmers either directly or indirectly. The category, native potato types, includes 1,550 ha. of "Mantaro" potatoes (an older hybrid mainly planted in southern regions). Several native varieties such as the "Huasahuasi" are important commercial potatoes. The figures do not include about 1,000 ha. planted to newly developed varieties.⁶

The figures in Table 1.10B indicate that those farms employing "Renacimiento" seed in the central sierra regions in 1971 obtained average yields 19 percent higher than obtained from other seeds. There was considerable variability, ranging from 9.4 percent in Huánuco to 132.6 percent in Ayacucho. While 19 percent is a significant difference, the fact that the difference was not greater

Table 1.10A. Total Hectares Planted to Renacimiento and Other Potato Varieties by Department: Central Sierra, 1971.

Department	Total Hectares Planted	Renacimiento	Percent	Native Potato Varieties	Percent
	(1,000 ha.)	(1,000 ha.)		(1,000 ha.)	
Junín	67.8	40.9	60.3	26.9	39.7
Huánuco	29.5	8.2	27.8	21.3	72.2
Huancavelica	26.0	12.0	46.2	13.9	53.8
Ayacucho	10.0	1.7	17.0	8.3	83.0
Pasco	6.8	2.3	33.8	4.5	66.2
Lima (Sierra)	7.2	0.3	4.2	6.8	95.8
Ica (Sierra)	0.1	0.0	0.0	0.1	100.0
Central Sierra	147.3	65.5	44.5	81.8 ^a	55.5

^aIncludes 1,550 ha. planted to hybrid Mantaro variety, otherwise not specified.

Table 1.10B. Average Yields for Renacimiento and Other Potato Varieties by Department: Central Sierra, 1971.

Department	Total Average Yield	Renacimiento Average Yield	Native Varieties Average Yield	Difference in Average Yield
	(M.T./ha.)	(M.T./ha.)	(M.T./ha.)	(percent)
Junín	5.7	6.1	5.2	17.3
Huánuco	6.5	7.0	6.4	9.4
Huancavelica	4.7	5.7	3.9	46.2
Ayacucho	5.3	10.0	4.3	132.6
Pasco	6.0	6.7	5.6	19.6
Lima (Sierra)	6.1	12.7	5.9	115.3
Ica (Sierra)	4.0	--	4.0	--
Central Sierra	5.7	6.3	5.3	18.9

Source: Estadística Continua-Agrícola, Boletín 11-12, 1971, Agricultural Statistics Office.

reflects the highly degenerated state of most potato seed.⁷ Farmers employ seed successively year after year without proper replenishment and plant in fields that are worn out and infected with disease and pests.⁸

1.3.2 Central Coast

Estimates of land use by crop for the central coast in 1968 are contained in Table 1.11. Potato production occupied 2.6 percent of total planted hectares and resulted in 5.5 percent of gross on-farm crop value produced in the region.

Table 1.11. Agricultural Land Use and On-Farm Value of Production by Crop: Central Coast,^a 1968.

Land Use	Area (1,000 ha.)	Percent	On-Farm Gross Value of Production	
			(million S/.)	Percent
Available Agricultural Land	249.4	100.0	---	---
Land in Fallow	39.0	15.6	---	---
Total Land Farmed	210.4	84.4	---	---
Total Harvested Area ^b	238.9	100.0	4,129.4	100.0
Pasture and Tree Crops	39.7	16.6	932.4	22.6
Annual Crops	199.2	83.4	3,197.0	77.4
Cotton	94.3	39.4	1,553.3	37.6
Corn	38.5	16.1	550.3	13.3
Vegetables	17.0	7.1	278.3	6.7
Potatoes	6.1	2.6	225.7	5.5
Other Tubers	7.3	3.1	147.7	3.6
Lentils, beans	12.2	5.1	109.0	2.6
Sugar Cane	8.1	3.4	147.6	3.6
Forage	10.5	4.4	107.4	2.6
Others	5.2	2.2	77.8	1.9

Source: Estadística Agraria - 1968, Ministry of Agriculture.

^aIncludes Lima-Callao and Ica.

^bAdjusted for double cropping.

Producers and Organizations: The central coast potato crop is grown in eleven valleys, the most important of which is Cañete (Table 1.12). Most of the potatoes come from medium and large-sized farms specialized to potato production. With the exception of parts of the harvest, technology employed in production is machine intensive.

Table 1.12. Location of Central Coast Potato Plantings: 1971.

Location	Area (ha.)
Barranca	778
Huacho	174
Huaral	482
Lima-Puente Piedra	602
Lunín	58
Mala	44
Cañete	3,195
Chincha	295
Ica	376
Nazca	161
Acarí	16
Total	6,180

Source: Dirección General de Comercialización.

The privately-owned Cañete experiment station was an important source of technology for coastal potato producers. One of its notable achievements was the development of the "Ticahuasi" variety. Coastal farmers also have access to technical information developed in potato programs at the National Agrarian University-La Molina, the Catholic University and the Ministry of Agriculture Experiment Station at La Molina. Modern technology has resulted in average coastal potato yields equal to three times the national average.

Potato growers' associations on the coast are active in input distribution, dissemination of market-related information, and construction in 1963, of 3,000 M.T. of refrigerated potato storage capacity in Cañete. Establishment of name labels, introduction of potato sorters, and other cooperative marketing ventures have been tried but have never been particularly successful on a large scale. This will be discussed later in section II.

Cropping Patterns: The normal cropping pattern of potato farmers is cotton, corn, and potatoes. It is not uncommon to plant legumes between the corn and potato crops. Normal cropping patterns are changing, however, because worms left in the ground by corn tend to attack potatoes, and some types of wilt disease (not to be confused with bacterial wilt of the north) spread between potatoes and cotton. Larger coastal potato farmers frequently reduce potato plantings if returns from corn or cotton are

expected to increase.⁹ Smaller farmers near Lima do not plant cotton, but sweet potatoes, vegetables, beans, aji, and corn are production substitutes. Some of the smaller farmers, employing intensive technologies, harvest potatoes year after year on the same plot.

Agrarian Reform: Land ownership structure on the coast has been undergoing considerable rapid change since 1969, and most large farms are being cooperativized by agrarian reform. Numerous medium-sized farms (less than 150 ha.) are being affected also. The National Farmers Society (SNA) has been abolished as an institution, but many of its activities are being assumed by agrarian reform "Comites Especiales de Administración."

Statistics on these recent changes usually are not available. However, informed sources indicate the following changes have occurred in the Cañete potato industry. In the late 1960s, approximately 40 large landowners regularly accounted for nearly 1,800 ha. of potato lands, another 120 producers accounted for 1,200 ha., and a large number of small producers planted around 100-200 ha. For 1973, it is estimated that the 40 largest producers planted only 1,200 ha. while the agrarian reform "Comite Especial de Administración del Valle de Cañete" supervised 20 farms accounting for around 800 ha. of potato lands, and medium and small farms made up the remainder. These figures reflect the land ownership changes taking place on the coast.

Expropriated farms appear to plant less potatoes and more of other crops. Probably the most important reason for this is the increased difficulty in obtaining potato seed. Also, potatoes involve more risks because they require large input costs and skilled management practices relative to corn and other substitutes, and prices received at harvest can be unfavorable. Corn returns are less, on the average, but are more certain. New entrepreneurs just getting started may prefer the sure return of corn to the uncertainties and technical demands associated with potato production.

Varieties and Seed: The Ministry of Agriculture Potato Committee estimated that in 1972 nearly 77 percent of the central coast potato lands were planted to three white potato varieties as follows: Ticahuasi, 33 percent; Renacimiento, 30 percent; and Huasahuasi, 14 percent. The remaining 23 percent was made up of both white and colored varieties.

The Ticahuasi and Renacimiento are improved varieties while the Huasahuasi is a native sierra variety. Ticahuasi is relatively new and is increasingly popular with coastal producers because of its high yields, low unit costs of production, and short growing period (120-150 days). Numerous farmers obtain around 30 M.T./ha. (Avg. = 25 M.T./ha.) while a few are believed to have obtained close

to 50 M.T./ha. The tubers are usually very large, and restaurants find them ideal for french fried potatoes, although they are considered to be low grade eating potatoes because of their watery texture and tendency to form hollow centers. These problems could be partly alleviated with improved water management techniques.

Renacimiento is the most widely produced commercial potato in Perú. On the coast, its relative importance has been reduced with the increased planting of Ticahuasi. Its yields are lower (commercial farmers can get over 20 M.T./ha. (Avg. = 18 M.T./ha.)), and the time required to produce it is greater (around 160-180 days). However, its culinary qualities are better than those of the Ticahuasi variety.

The Huasahuasi (Chata Blanca) is native to the central sierra. It has been produced on the coast for many years but is diminishing in importance. Yields usually are below 16.5 M.T./ha., and the growing period is prolonged (165-190 days). It is, however, a very high grade eating potato.

The most popular colored variety produced on the coast is the Tarmeña. Its yields are low, around 12-15 M.T./ha., but it is an exceptional quality eating potato. Most other native colored varieties do not do well on the coast.

Most coastal farmers employ about 2 M.T. of seed per hectare (approximately double that of the average sierra commercial farmer), and it is estimated that about 40 percent of input expenditure are incurred during the planting period. The high altitude irrigated areas in the central sierra are the predominant sources of seed for the central coast. Normally, seed becomes available beginning in late December, and most of it is obtained in the months of January and February. Seed potatoes thus become available just when potatoes throughout Perú are in short supply, and the rainy season can make harvesting and transportation difficult.

Traditionally, coastal potato farmers or special assistants begin to travel to the sierra in late November to negotiate with seed producers. Personal contacts developed over the years are important to both parties because there are no organized seed markets.

Many potato farmers, particularly smaller ones, depend on a variety of market intermediaries for seed. These farmers either do not have the contacts with sierra producers, the technical abilities to judge seed quality, or the cash and time to travel to the sierra. A common procedure is to purchase what are thought to be seed potatoes in the La Parada wholesale market. Large farmers also purchase potatoes in the Lima market when their sierra seed sources experience temporary production difficulties. Seed acquired in this manner is seldom guaranteed. Most wholesalers do

not have the technical capability or interest in properly selecting and classifying seed. Obtaining seed is a major problem for new cooperatives because many of them do not have the necessary contacts.

Another source of seed, semilla criolla, is the previous coast harvest. Some farmers store October and November harvest potatoes in refrigerated facilities for early planting in March and April. Technically, use of semilla criolla is undesirable because yields are lower and variability of yield response greater.¹⁰ Furthermore, this seed cannot be employed successively a third time due to rapid seed degeneration in the relatively warm coastal climate. Coastal farmers, therefore, must replenish seed at least every other year. The semilla criolla seldom amounts for more than 15 percent of coastal plantings. Its principle attraction lies in speculative chances of obtaining high seasonal price associated with an early start in planting and harvest.

1.4 Potato Consumption

1.4.1 Consumption Statistics

Data on the consumption of potatoes are presented in Table 1.13. Prior to 1972, imports and exports of fresh food potatoes were not important and involved only small quantities in border trade with neighboring countries. In mid-1972, around 13,000 M.T. of fresh European potatoes were imported into Lima by the Public Agricultural Services Company (EPSA). Potato flour is imported, mainly by food processors and has never exceeded 18,000 M.T. After 1967, domestic substitutes (mainly corn starch) increased in importance, and potato flour imports fell to below 9,500 M.T.

Of the 1,938,900 M.T. of potatoes available in 1970, about 73 percent were used for food. There is very little commercial industrialization of potatoes, though many families in the sierra consume dried potatoes (chuño) prepared at home. Seed accounts for 17 percent of total apparent consumption. Shrinkage and marketing losses accounted for the remaining 10 percent. Annual per capita consumption during the 1960s averaged about 98 kg.

1.4.2 Nutrition and Substitutes

Table 1.14 presents statistics describing the average Peruvian diet in 1969. The average diet included 2,333 calories and 55.6 grams of protein per day. These consumption levels are slightly below the FAO recommended minimums of 2,410 calories and 65.1 grams of protein. The importance of potatoes in the diet is noted immediately. They provided just over 19 percent of the bulk, 9.5 percent of caloric intake, and about 8 percent of protein consumption. Only wheat and sugar were more important than potatoes as sources of calories. Potatoes and corn shared second place

Table 1.13. Potato Production, Potato Flour Imports, Total Consumption, and Per Capita Food Potato Consumption: 1955-71.

Year	Production ^a	Potato Flour Imports ^b	Total Apparent Consumption ^c	Shrinkage and Marketing Losses ^d	Seed Consumption ^e	Human Consumption ^f	Per Capita Consumption ^g
	(1,000 M.T.)						(kg.)
1955	1,382.6	6.9	1,389.5	139.0	224.3	1,026.2	116.7
1956	1,032.9	8.1	1,041.0	104.1	219.3	717.6	79.7
1957	1,106.4	9.6	1,116.0	111.6	217.7	786.7	85.2
1958	1,222.3	10.6	1,232.9	123.3	221.3	888.3	93.7
1959	1,217.1	10.2	1,227.3	122.7	254.0	850.6	87.3
1960	1,397.8	13.2	1,411.0	141.1	258.2	1,011.7	100.9
1961	1,492.3	12.7	1,505.0	150.5	252.8	1,101.7	106.8
1962	1,416.2	14.6	1,430.8	143.1	254.4	1,033.3	97.2
1963	1,426.9	15.7	1,442.6	144.3	261.5	1,036.8	94.6
1964	1,531.1	17.9	1,549.0	154.9	251.1	1,143.0	101.2
1965	1,568.2	15.2	1,583.4	158.3	245.6	1,179.5	101.1
1966	1,440.5	12.0	1,452.5	145.3	259.9	1,047.4	87.2
1967	1,633.7	13.9	1,647.6	164.8	250.9	1,231.9	99.5
1968	1,526.2	9.4 ^c	1,535.6	153.6	292.5	1,089.5	85.3
1969	1,785.1	8.3 ^c	1,793.4	179.3	315.2	1,298.9	98.6
1970	1,929.7	9.2	1,938.9	193.9	320.1	1,424.9	104.9
1971	1,967.9	NA	---	---	NA	---	---

^aSource: Agricultural Statistics Office.

^bSource: Customs NABALC 11.08.2.01 figures converted to fresh potato equivalents. 1 kg. of flour equal to 4.75 kg. of potatoes.

^cSource: Hoja de Balance de Alimentos 1968, 1969; includes small amounts of potato seed imports.

^dEqual to 10 percent of demand as reported in Hoja de Balance de Alimentos, 1969.

^eBased on 1 M.T. of seed per ha. planted in following year which allows for shrinkage and culling.

^fFeed for livestock and industrial consumption are believed to be insignificant.

^gBased on population estimates contained in Boletín de Análisis Demográfico, Special Publication, 1969, National Statistics and Census Office.

Table 1.14. Per Capita Consumption and Nutritional Contribution of Foods Consumed: 1969.

Food	Net Availability ^a (kg./yr.)	Calories (no./day)	Proteins (gr./day)
Potatoes	80.9	221	4.4
Wheat	48.0	489	13.4
Bananas	36.4	98	1.2
Sugar (96°)	30.7	319	--
Milk (cow)	28.5	68	3.5
Corn	23.3	204	4.4
Yuca	21.7	96	0.4
Rice	18.2	181	3.3
Oranges	10.7	12	0.2
Sweet Potatoes	8.0	25	0.3
Beef	7.5	48	3.7
Barley	6.0	57	1.5
Onions	5.9	8	0.2
Seafood	5.8	21	3.4
Vegetable Oils	4.4	106	--
Beans	4.0	34	2.0
Tomatoes	3.6	2	0.1
Apples	3.5	5	∅
Olluco	3.4	6	0.1
Pork	3.1	18	1.3
Other Foods	<u>69.1</u>	<u>315</u>	<u>12.2</u>
Total	422.7	2,333	55.6

Source: Hoja de Balance de Alimentos, 1969, Ministry of Agriculture.

^aEqual to apparent gross human consumption per capita less estimated table waste (18 percent for potatoes).

(4.4 grams per capita) as sources of protein. Wheat was most important and provided 489 calories per day and 13.4 grams of protein per capita.

There are important regional differences in potato consumption. About half of the population lives in the sierra regions where most of the potatoes are produced. Average per capita consumption is estimated to exceed 150 kg. per person in these regions, compared to 50-60 kg. on the coast. Per capita potato consumption is relatively low in the jungle regions.¹¹

Table 1.15 indicates the value of various foods in Lima in terms of soles spent for nutrients. From a nutritional viewpoint, potatoes appear to have been a fairly good buy. Reliance on potatoes in the average urban diet does not appear excessive. Potatoes have several advantages for urban consumers. They are consumed almost entirely in a fresh state and thus require very little expensive processing, as do grains. Furthermore, they do not spoil rapidly in market channels, and home storage and preparation are simple.

The dietary value of increased consumption of potatoes in sierra rural areas is questionable. Other foods such as wheat, corn, and barley, which are important in rural diets, have increased in availability in the central sierra. Grains, however, have become increasingly expensive, compared to potatoes. More emphasis on grain production would benefit rural consumers.

1.4.3 Income and Prices

Table 1.16 and Figures 2 and 3 contain retail price statistics for the Metropolitan Lima area. The consumer price index (CPI) increased from 59.9 in 1960 to 167.0 in 1972. Food and drink represent 51.8 percent of total index weight and usually have followed the CPI, except in recent years when food prices have tended to increase less rapidly than rents. White potatoes make up about 3.5 percent of the weight in the food and drink component. Potato prices usually have risen less rapidly than other foods. Retail price trends for beans, vegetables, cereals, and other tubers also are presented in Table 1.16. Even cereal prices, which to a large degree are subsidized, have increased more rapidly than potato prices.

A cross-section analysis of data from the 1964-65 Urban Household Consumption Survey indicates that expenditures for tubers in Lima (white potatoes make up 75 percent of the tuber index) was least for the lowest income groups studied (incomes less than S/.3,000 per capita) and increased steadily through the highest income groups (incomes greater than S/.17,000 per capita). Potatoes do not appear to be an inferior good. The percentage spent on tubers out of total food purchases was 4.9 percent for

Table 1.15. Prices and Nutritional Value of Selected Foods in
Lima: 1969-71.

Food	Price ^a	Proteins	Calories	Proteins	Calories
	(S./kg.)	(gr./kg.)	(no./kg.)	(gr./S/.)	(no./S/.)
Rice ^b	8.80	66	3,615	7.5	410.8
Chicken	55.44	182	2,080	3.3	37.5
Cow Milk	6.77	31	630	4.6	93.1
Eggs	33.25	121	1,520	3.6	45.7
Fresh Peas	9.25	71	1,060	7.7	114.6
Choclos	8.21	33	1,290	4.0	157.1
White Potatoes	4.21	20	1,000	4.8	237.5
Sweet Potatoes	1.94	12	1,160	6.2	597.9
Yuca	4.91	7	1,615	1.4	328.9
Dried Peas	18.91	215	3,465	11.4	183.2

Source: Hoja Balance de Alimentos 1969, Ministry of Agriculture.

^aAverage retail price 1969-71, ONEC.

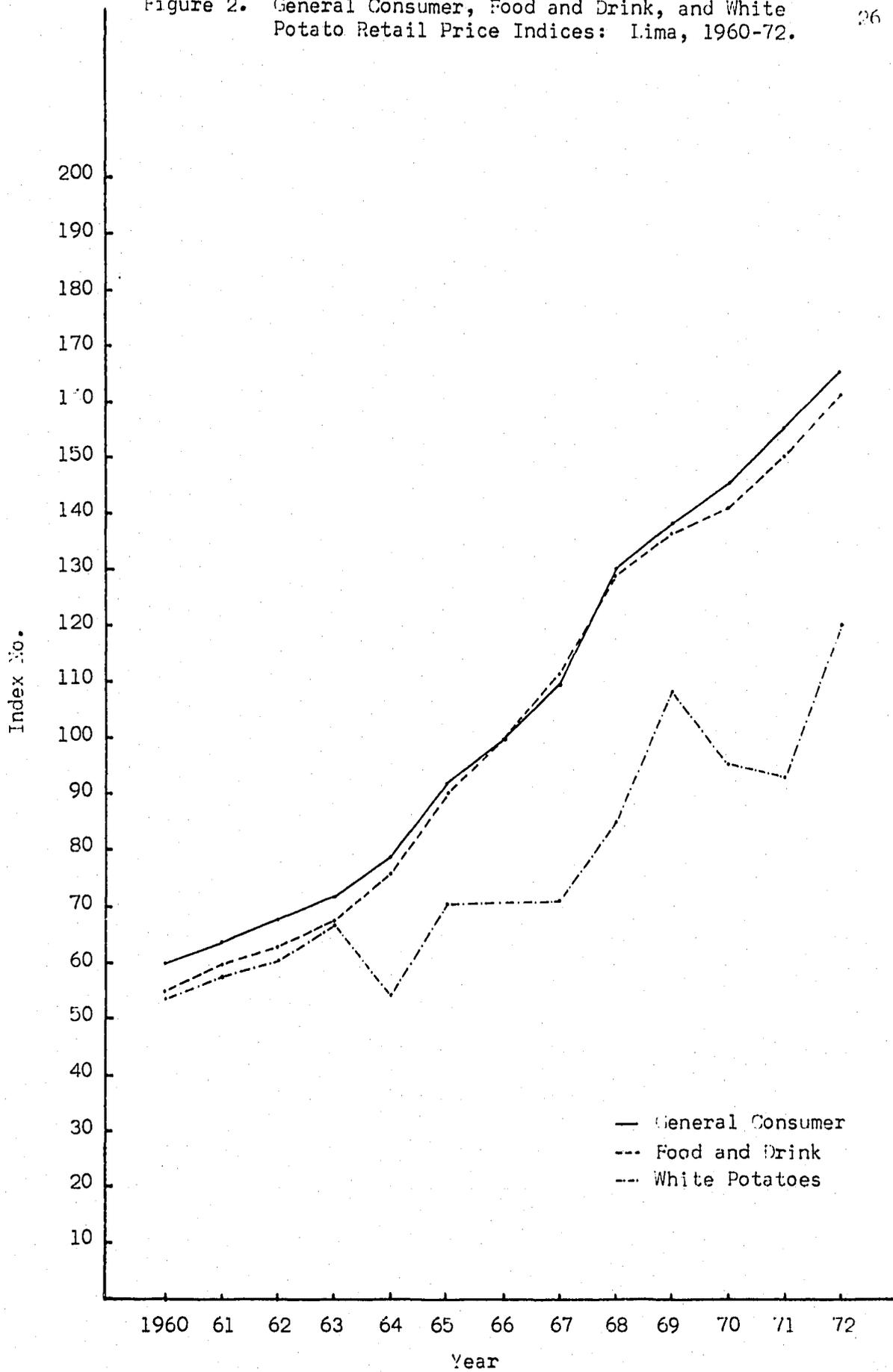
^bGovernment subsidized.

Table 1.16. Selected Retail Price Indices: Metropolitan Lima, 1960-72.

Year	Consumer Index	Food and Drink	White Potatoes	Cereals and Derivatives	Beans and Lentils	Vegetables	Other Tubers
(1966 = 100)							
1960	59.88	54.98	53.66	76.55	33.84	28.74	59.34
1961	63.56	59.65	57.21	77.28	53.13	31.05	61.65
1962	67.76	62.78	60.52	77.27	62.34	29.92	68.78
1963	71.84	67.56	66.90	84.33	60.18	48.84	70.98
1964	78.92	75.98	54.61	95.92	60.36	59.27	65.90
1965	91.84	90.38	70.92	98.69	88.38	89.73	82.84
1966	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1967	109.76	111.20	71.16	105.37	104.01	148.71	93.41
1968	130.74	129.96	85.58	129.33	126.34	122.41	181.86
1969	138.88	136.89	108.98	132.00	160.26	145.90	128.33
1970	145.85	141.14	95.98	132.03	145.78	156.31	119.60
1971	155.78	150.75	93.62	132.30	159.62	138.15	120.89
1972	166.98	161.88	120.81	133.33	177.99	226.41	158.93

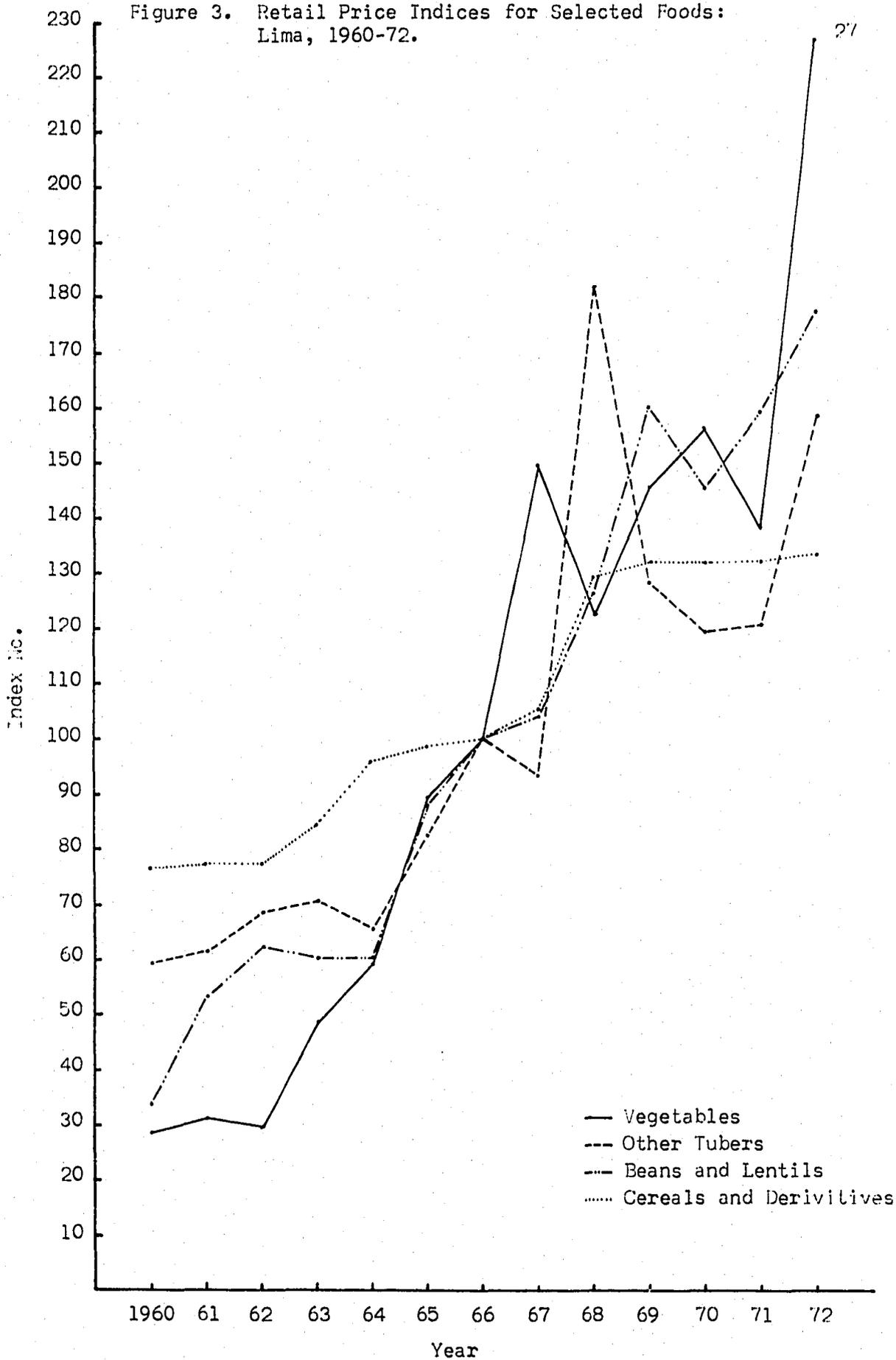
Source: National Statistics and Census Office.

Figure 2. General Consumer, Food and Drink, and White Potato Retail Price Indices: Lima, 1960-72.



Source: ONEC.

Figure 3. Retail Price Indices for Selected Foods:
Lima, 1960-72.



Source: ONEC.

the lowest income group, compared to 3.0 percent for the highest income group. Tubers had an average income expenditure elasticity of 0.48. The estimate for total food was 0.79. Only cereals ($e_y = 0.42$) and beans ($e_y = 0.43$) had lower income elasticities.

Several estimates of the price elasticity for potatoes are available. In a supply and demand study carried out by the Ministry of Agriculture in 1967, the direct price elasticity of potatoes was estimated to be -0.96 for urban areas while the cross price elasticity with vegetables was 0.51.¹² A study based on annual time series data for Lima for the period 1960-71 indicated that the average direct price elasticity for white potatoes was -0.49 and that the cross price elasticity with vegetables was 0.21.¹³ Both estimates suggest that vegetables and potatoes are substitutes.¹⁴

Yuca and sweet potatoes are low priced tubers considered to be close substitutes for potatoes as are bananas to some extent. None of these are consumed in as large quantities as are potatoes, and the nature of relationships between these and potatoes have not been fully explored.

1.5 Supply, Demand Projections, and Deficits

Table 1.17 contains supply and demand projections through 1985. The supply projections are based on recent trends; column (1) over the entire 1955-71 period and column (2) over the 1961-71 subperiod. The projections based on 1961-71 data are slightly higher than those based on the entire 1955-71 period. The projections indicate that supply will increase from approximately 2 million M.T. in 1975 and to more than 2.5 million M.T. by 1985. These projections are based on the assumption that a major productivity increasing program will not be initiated soon enough to significantly alter the supply picture during the projection period.

The demand projections of column (4) assume that food consumption demand will increase at a compounded annual rate of 3.1 percent, equal to the expected population growth rate. At this rate, the food demand for potatoes will be 1.5 million M.T. in 1975 and increase to about 2.1 million M.T. by 1985. Column (5) demand projections are based on a 4.0 percent annual growth rate and allow for income growth. These projections indicate that food demand for potatoes will increase from 1.6 million M.T. in 1975 to about 2.4 million M.T. by 1985.

Comparison of column (3) supply projections with column (5) demand projections indicate that the 1975 deficit of 91.4 thousand M.T. will increase to 494.2 thousand M.T. by 1985. Increases in international grain prices could cause the demand for potatoes to increase even more rapidly and hence contribute to even larger deficits. Rising potato prices, on the other hand, will tend to reduce deficits.

Table 1.17. Supply and Demand Projections for Potatoes: 1975-80-85.

Year	Supply		Demand			Deficit (3)+ (5)-(2)
	Trend ^a (1)	Trend ^b (2)	Seed and Losses ^c (3)	Hyp. 1 ^d (4)	Hyp. 2 ^e (5)	
	(1,000 M.T.)					
1975	2,039.8	2,077.4	560.9	1,526.6	1,607.9	91.4
1980	2,272.3	2,330.9	629.3	1,778.3	1,956.2	254.6
1985	2,504.8	2,584.4	697.8	2,071.9	2,380.8	494.2

^aLeast-squares trend line is $q = 1,481.8 + 46.5t$ where quantity (q) is in 1,000 M.T. and time (t) is in annual units with 1963 = 0.

^bLeast-squares trend line is $q = 1,621.1 + 50.7t$ where quantity (q) is in 1,000 M.T. and time (t) is in annual units with 1966 = 0.

^cEqual to 0.27 times column (2). See notes ^d and ^e, Table 1.12.

^dAssumes demand to increase at 3.1 percent annually which is the expected population growth rate. The base year is 1969.

^eBased on demand equation $d = p + E(y)$ where p = population growth rate (3.1 percent), E = income elasticity (0.47), and y = assumed rate of increase of real per capita income (2.0 percent).

Market potato flows into Lima increased at an average annual rate of about 9.0 percent during the 1960-71 period (see Table 2.2, section 2.1). Population growth rates, income changes, and relative retail price changes during the period accounted for average annual rates of growth in demand of 6.0 percent, 1.0 percent, and 1.5 percent, respectively. Increased exports out of Lima to provinces and, perhaps, stronger than average preferences of recent sierra migrants for potatoes in diets may have accounted for some additional increases in demand.¹⁵

1.6 Research, Extension, and Credit

1.6.1 Research

Technical research on potatoes has been conducted in Perú since before 1930. The Ministry of Agriculture, the National University System, the National Farmers Society, and the Catholic University have all made important contributions. During most of the 1960s, outside technical assistance was provided by the North Carolina Universities Mission to the National Potato Program. The International Potato Center (CIP) was established in 1971 with headquarters in Lima and by 1972 was partially staffed and already operating. Although the center is autonomous and international in focus, its research and findings will undoubtedly be of special importance for the future development of potato technology in Perú.¹⁶

In terms of current production possibilities, it is believed that available technologies, if promoted more actively, probably would at least double average yields. Research has provided new genetically improved varieties, and considerable information is available on cultural and fertilizer practices. Plant pathologists and nematologists have made considerable progress on disease and pest problems, and seed specialists have the basic seed needed for a multiplication program.

Research work conducted in the Peruvian sierra on improved high yielding varieties suggests that it may be possible to double the average protein content of potatoes grown in the sierra.¹⁷ If these new varieties prove to be acceptable and the potatoes are introduced in traditional areas, substantial dietary improvements should occur where most needed.

1.6.2 Extension

Two of the more serious constraints on potato extension programs are a) budget and personnel limitations, and b) unavailability of certified or good quality seed. The first is a question of priorities within agriculture and time needed to train personnel. Land redistribution appears to have absorbed increasingly larger portions of the Ministry of Agriculture's budget and manpower since 1969. This will undoubtedly change as Perú gradually

places greater emphasis on production.

A seed program to provide high grade improved seed for commercial potato producers requires several steps. The first involves the research and other activities needed to provide small amounts of basic seed stock. The next step is multiplication on foundation farms, followed by one or two additional multiplications on seed farms. Sanitation must be carefully controlled at each step. Technically, it is possible to expand a ton of foundation seed to provide a hundred tons of seed potatoes within two years.¹⁸

In 1967, the Ministry of Agriculture was supervising 103 seed producers with 769 ha. in various parts of the sierra. Some 4,700 M.T. of seed potatoes were produced for distribution. The Ministry's research and extension service (SIPA) also produced 1,384 M.T. of foundation seed in 1967, during the fourth year of its foundation program.

In 1972, no foundation seed was being produced by the Ministry. Disease problems in the north contributed to closing down one of three foundation farms, but budget and personnel limitations also were important factors. The National Potato Program personnel recognized that seed farmers could not obtain foundation seed of guaranteed high genetic quality and, therefore, proceeded to select and inspect regularly the best potato plots on commercial farms. Some 3,700 M.T. of seed were produced under this plan in the central sierra. Most of this effort was to assure sufficient seed supplies for coastal planting in 1973.

In the past, part of the annual seed crop has gone into food channels because many seed farmers cannot find purchase contacts at harvest time, due to the unorganized nature of seed markets. This occurs even when there are seed shortages in some areas. The 4th Agrarian Zone office helped small coastal farmers to contact sierra seed producers, and the Agricultural Development Bank (BFA) provides some credit for seed purchases. Occasionally, some seed potatoes have been forced into food channels in Lima by municipal authorities concerned with high potato prices.

A few seed producers produce high quality seed and receive premium prices for their seed potatoes. Most seed producers, however, do not practice proper rouging and selection techniques, and some traditional seed production centers are experiencing severe disease problems. Such is the case in Huasahuasi. The potato seed situation may become even more complex as agrarian reform programs expand in the sierra and begin to affect traditional seed producers, many of whom are not affiliated with Ministry of Agriculture seed programs.

A seed purchase and storage program is badly needed in Perú. The availability of seed is an important factor affecting production

stability. A seed marketing information program would also be useful, both to seed producers and purchaser. Further study of seed pricing policies should be undertaken.

1.6.3 Credit

Cotton, coffee, sugar cane, and rice have accounted for very large portions of the Agricultural Development Bank's (BFA) credit allocations in recent years. Yellow corn for feed and potato producers also were important recipients (Table 1.18). With the exception of potatoes, these products are produced almost exclusively in coast and selva regions.

Table 1.18. Agricultural Development Bank Credit Allocation to Major Crops: 1967-71.

Period	Total Credit	Crop Production (total)	Cotton, Coffee, Sugar Cane	Rice	Corn	Potatoes
		(millions of S/.)				
10/67-9/68	2,844.7	2,235.2	NA	NA	NA	154.2
10/68-12/69	4,731.3	3,532.8	1,654.4	1,009.1	254.1	251.2
1970	4,381.6	3,057.0	1,204.2	1,037.3	223.2	234.2
1971	5,324.9	3,975.8	1,821.3	1,246.4	332.6	165.1
1971*	558.1	261.5	0.0	67.8	52.1	42.2

Source: Banco de Fomento Agropecuario del Perú.

*Amount of loans made from Fondos en Fideicomiso. These are in addition to loans made from the bank's own funds (tabulated without asterisk). Data were not available for other years.

In addition to its own funds, the BFA makes loans from a special internationally provided trust fund (Fondos en Fideicomiso) for small farmers. Potato credit was allocated to 19,000 ha. and 13,900 ha. of potato lands in 1970 and 1971, respectively (Table 1.19). This is approximately 5 percent of total land in potato production. It appears that over half of central coast potato lands receive BFA credit, compared to 10 percent or less for commercial potato lands in the central sierra.¹⁹ Total loans to potato producers dropped from 294.3 million soles in 1970 to 207.3 million soles in 1971. The drop may have been partly reaction to the large surpluses produced in some regions during 1970.

Table 1.19. Potato Credit Allocation by Region: 1967-71.

Period	Total		Central Coast		Central Sierra		North		South	
	S/.	Ha.	S/.	Ha.	S/.	Ha.	S/.	Ha.	S/.	Ha.
	(millions of S/. and 1,000 ha.)									
10/67- 9/68	154.2	13.2	49.6	3.2	48.8	5.0	31.2	3.1	24.6	2.0
10/68- 12/69	251.2	18.9	59.4	3.3	102.9	8.4	46.7	4.3	42.2	2.9
1970	234.2	15.1	87.8	4.2	74.4	5.8	33.5	2.9	38.5	2.3
1970*	60.1	3.9 ^a	14.5	0.7 ^a	4.9	0.4 ^a	13.2	1.1 ^a	27.5	1.0 ^a
1971	165.1	11.1	68.7	3.7	50.2	4.1	14.3	1.3	31.9	2.0
1971*	42.2	2.8 ^a	10.3	0.6 ^a	2.3	0.2 ^a	6.0	0.5 ^a	23.5	1.5 ^a

Source: Banco de Fomento Agropecuario del Perú.

^aEstimated.

*See note to Table 1.18.

The distribution of BFA credit by crop use in five central sierra departments for 1971 is shown in Table 1.20. About 51 percent of the bank's total credit allocation to sierra areas went to potatoes, 38.8 percent to livestock and pasture, and 10.2 percent to corn and various food crops which may compete with potatoes. The latter are staples consumed in the area and only very small amounts reach coastal cities. Bank loans are made at 7 percent interest to small farmers and cooperatives and 9 percent to medium-sized and large farmers. These rates are low by commercial loan standards and, hence, potato producers using BFA credit are, in a sense, being subsidized.

Table 1.20. Agricultural Development Bank Credit Allocation in Five Central Sierra Departments by Crop: 1971.^a

Credit Use	Millions of S/.	Area (1,000 ha.)
Total Credit	678.9	---
<u>Sierra Products</u>		
Potato Production	50.2	4.1
Livestock Production-Marketing and Pasture Crops	38.1	---
Other Food Crop Production ^b	8.1	1.4
Corn	1.9	0.4
<u>Selva Products</u>		
Coffee Production-Drying and Marketing	550.5	15.9
Fruit Production	17.0	1.0
Rice Production	6.8	1.1
Various Crops	0.5	0.1
<u>Other</u>		
Equipment and Construction	5.9	---

Source: Banco de Fomento Agropecuario del Perú.

^aThe five departments are Ayacucho, Huancavelica, Huánuco, Junín, and Pasco. The figures do not include International Trust Funds (Fondos en Fideicomiso).

^bIncludes wheat, barley, lentils, and vegetables.

Although the available data do not permit an adequate analysis of credit policy for potatoes, several things should perhaps be studied in more depth. To some extent, annual credit allocations for potatoes are based on short-term production stabilization planning decisions. Unless carefully executed, this type of planning can contribute to undesirable income fluctuations on the parts of producers. Longer-term credit objectives could be more readily matched in a complementary nature with extension objectives.

II. POTATO MARKETING IN THE CENTRAL REGIONS

2.1 Interregional Potato Shipments and Prices

Information on interregional potato flows and potato price movements is presented in this section. The relationships between supply areas, the Lima market, and provincial markets are analyzed first. Later sections treat various aspects of potato marketing channels in the central regions.²⁰

2.1.1 Regional Potato Flows²¹

The geography of Perú and existing road network are such that interregional transportation occurs almost entirely along the coast on the Panamerican Highway which runs the entire length of the country from north to south. Important sierra cities are connected to this highway by roads of varying quality. The most important road into the interior is the central highway which leaves Lima and passes through La Oroya, Cerro de Pasco, Huánuco, and ends in Pucallpa in the selva. Iquitos is reached from Pucallpa by boat (about four days) or by air from various other cities. Direct travel between the central sierra and south sierra is difficult and between central sierra and north sierra is impossible. Travel within regions usually is easier, though each of the major regions defined in section I contain contiguous areas isolated from one another.

Both the road system and the large population of Lima help explain why Lima is Perú's most important potato market. Recorded shipments of potatoes moving into Lima averaged 205,000 M.T. for 1970 and 1971 (Table 2.1). White potatoes make up the major portion of the total flow. Table 2.2 contains estimated flows for the period by shipping region and rates of increase of supply for selected subperiods. Both sierra and coastal producers provided increasingly abundant supplies to the Lima market during the 1960s. About 55 percent of the total annual flow originates in sierra production centers. The large drop in white potato flows in 1972 resulted from production problems in supply areas and unusual government market programs.

Sierra and coastal flows are highly seasonal. Figure 4 illustrates the quarterly pattern of shipments during the 1964-72 period. The sierra ships mostly during the first and second quarters, always peaking in the second. Third quarter sierra shipments are greatly reduced as coastal potatoes become available in large quantities. The coast's peak shipments always occur in the fourth quarter.

These flows reflect harvest patterns in the production centers. They are highly complementary and provide a relatively uniform flow during the year. The upward trend of shipments to Lima

Table 2.1. Yearly Potato Shipments to Lima by Potato Type:
1959-72.

Year	White Potatoes	Yellow Potatoes	Other Potatoes ^a	Total
(1,000 M.T. per calendar year) ^b				
1959	73.1	2.6	NA	75.7
1960	75.9	2.4	NA	78.3
1961	81.1	2.4	NA	83.5
1962	77.1	1.5	NA	78.6
1963	82.9	1.8	NA	84.7
1964	124.7	4.5	NA	129.2
1965	126.1	2.3	NA	128.4
1966	126.7	1.2	NA	127.9
1967	149.5	1.2	NA	150.7
1968	142.7	1.2	NA	143.9
1969	162.5	3.0	NA	165.5
1970	187.1	4.6	NA	191.7
1971	203.7	9.8	28.5	242.0
1972	106.7 ^c	14.4	46.5	167.6

Source: Appendix Tables A.4-A.10.

^aIncludes numerous colored varieties. Potato marketing specialists believe that prior to 1970 flows of these were relatively small; perhaps about equal to the flows reported for yellow potatoes. Price controls on white potatoes have generally been more severe on white potatoes since 1969 than for colored potato types. There is evidence indicating that this has caused some commercial producers to switch from white to colored potato production. However, part of the reported annual increase in flows of these latter in recent years could be due to improved measurement starting in 1971. The 1971 and 1972 figures probably include large quantities of unspecified potato types. These could include some white and yellow varieties as well.

^bMost potatoes entering Lima are sold in the La Parada wholesale market. The data for 1959-70 reflect these flows. Thereafter, 1971 and 1972, the figures include shipments moving directly to other Lima markets and enroute to destinations outside of Lima. These shipments made up 6 percent and 4 percent of total shipments, respectively, in 1971 and 1972. Large portions of these were probably seed potatoes moving from sierra regions to coastal production centers. Shipments to Lima supermarkets also accounted for some.

^cAs of July 1973, information on EPSA's 1972 buying and selling operations was not fully available. The white potato figure for that year does not include EPSA's purchases in the supply areas. These probably were about 3,000 M.T. Also, the 1972 figure does not include potato imports. Total 1972 imports were 13,000 M.T., most of which probably remained in Lima.

Table 2.2. Yearly Regional Potato Shipments to Lima: 1959-71.

Year	Central Coast ^a	Total Sierra	Central Sierra ^b	North Sierra ^c	South Sierra ^d
(1,000 M.T. per calendar year)					
1959	37.5	38.2	36.8	1.2	0.1
1960	39.6	38.7	36.0	2.7	---
1961	39.5	45.0	40.5	4.5	---
1962	39.6	39.1	35.9	3.1	0.1
1963	34.1	50.5	47.5	3.0	0.1
1964	46.4	82.8	76.3	6.3	0.2
1965	47.4	81.0	70.4	10.5	---
1966	46.6	81.3	50.7	30.6	0.1
1967	59.4	91.3	67.1	24.1	---
1968	67.2	76.7	63.8	12.9	---
1969	70.6	95.0	74.3	20.4	0.3
1970	85.6	106.1	81.6	22.9	1.6
1971	105.3	136.7	123.7	12.8 ^e	0.3
1972	NA	NA	NA	NA	NA

Average Annual Rates of Increase for Selected Periods
(percent)

Period	Total	Coast	Sierra
(1959-61) - (1969-71)	9.7	8.4	10.7
(1964-66) - (1969-71)	9.2	13.2	6.6
(1959-61) - (1967-69)	8.6	6.8	10.1

Source: Appendix Tables A.4-A.10.

^aIncludes coastal portions of Lima and Ica.

^bIncludes Junín, Huánuco, Pasco, Ayacucho, Huancavelica, and Lima (Sierra).

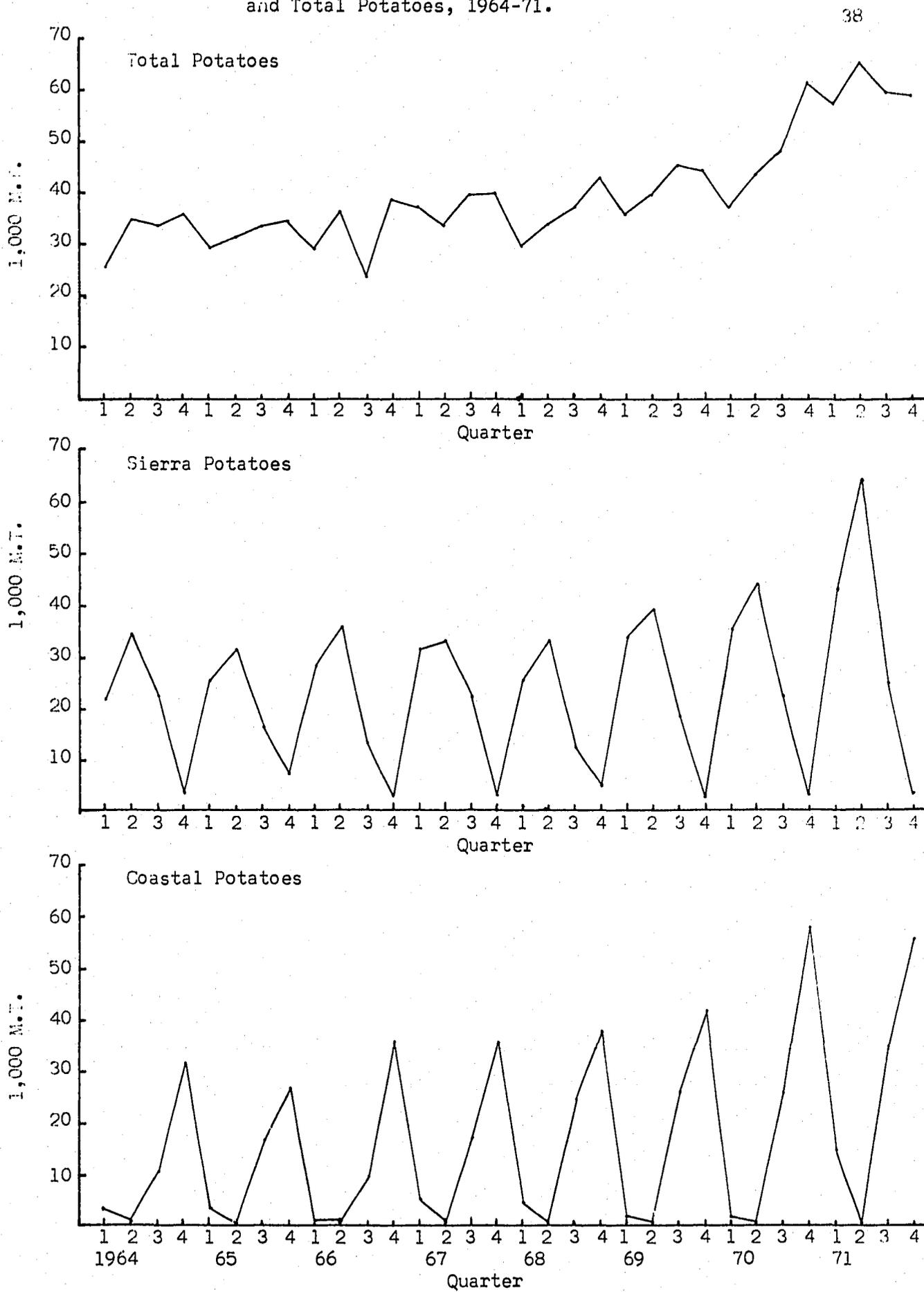
^cIncludes Ancash, La Libertad, Cajamarca, Lambayeque, Piura.

^dIncludes Cuzco, Apurímac, and Arequipa.

^eQuarantine of north begins.

--- = less than 50 M.T.

Figure 4. Lima Potato Supplies by Quarter for Coastal, Sierra, and Total Potatoes, 1964-71.



Source: Appendix Tables.

was noted above. As seen in Figure 4, much of the year-to-year fluctuation of supplies occurs in the first and third quarters. Sierra flows during the third quarter are occasionally reduced while coast flows remain normal. At other times, both flows have been reduced as occurred in 1966, 1972, or increased as in 1967. Just the opposite has occurred too. Occasionally, there are unusually large seasonal shipments from the coast early in the first quarter. This occurred in 1967, 1968, and 1971.

Shipments of storage potatoes during off-season periods has never occurred on a significant scale from either the coast or sierra. The small amounts that have been shipped to the Lima market generally arrive early in the first and third quarters. The estimated 14,640 M.T. of storage capacity near Lima is located as follows:

7,000 M.T.	La Oroya (sierra)	Government owned, built in 1969, designed for potato storage.
3,000 M.T.	Cañete (coast)	Privately owned, built in 1963, refrigerated, used to store both food potatoes and seed potatoes for coastal planting.
1,240 M.T.	Lima (coast)	Private, built prior to 1960, refrigerated, designed for both food and seed potato storage.
3,400 M.T.	Lima (coast)	Private owned, general purpose cold storage facilities, occasionally used for potato storage.
<hr/>		
14,640 M.T.	Total	

None of these facilities has been used to capacity regularly for food potato storage. The storage capacity figures do not include the numerous small deposits located mainly in the sierra where potatoes are gathered, sorted, and held for up to a month prior to shipment. These usually are not satisfactory for longer-term storage.

2.1.2 Lima Potato Shipments to Provinces

Only small portions of total flows into the Lima area are re-exported to provincial markets. These flows are highly seasonal. Some potatoes moving through the central coast area may bypass the Lima market entirely. This section is based on information from market intermediaries and Ministry of Agriculture potato specialists.

Central Coast Towns: During the January to July period, potato shipments increase from Lima to nearby cities, between Huacho (130 km. north of Lima) and Ica (300 km. south of Lima). Numerous buyers from these cities come to the wholesale market once or twice per week, but most do not purchase an entire truck load. Many of these buyers also purchase potatoes directly from the sierra production centers. From August through December, shipments from Lima to central coast towns are greatly reduced as locally produced potatoes become available.

Southern Regions: Production statistics in section I indicate that southern potato supplies were increasing less rapidly than the population during the 1960s. As a result, there are some important potato movements out of central regions to Arequipa (population around 300 thousand) and south coast cities.

Sierra producing areas near Arequipa and other coast towns harvest irrigated crops from late November through March. These harvests are small, and additional supplies are obtained from Cuzco and Puno. When supplies in the Lima market are exceptionally abundant, potatoes are likely to flow from La Parada to Arequipa. Lima wholesalers report that such shipments have increased in recent years, but they probably have not exceeded a few thousand metric tons in any given recent year. From March through July, Arequipa depends heavily on Cuzco and, to lesser extent, Puno for supplies.

Cuzco normally does not send supplies to Lima, but at times, government purchase programs in Cuzco for shipment to Lima distort normal flows. When this happens, Lima merchants may try to send supplies to Arequipa.

Starting in July, Arequipa merchants begin to buy in nearby coastal production centers. As the harvest season progresses, these merchants move northward to Ica and Cañete.

Northern Regions: Prior to the middle 1960s, some central sierra potatoes were shipped regularly to northern consumption centers during sierra harvest periods. These shipments ceased in the mid-1960s as the north began to export to Lima. Production data of section I indicate rapid production increases in northern areas in 1964 and 1965.

During the coastal harvest period, many potatoes flow northwards from Barranca and the Lima wholesale market. Some of the potatoes shipped from Lima could have been purchased directly in Barranca, but such shipments probably are not very large and merely reflect lack of market information by truckers.

Central Sierra and Selva: Potato shipments to the central sierra and jungle regions via the central highway normally begin to occur in September and extend on into December. These flows

have increased with the development of abundant supplies on the coast and increased demand by the mining communities of Cerro de Pasco and La Oroya. Available data (see Table 2.3) indicate that, for the peak months of October and November in 1971, flows going to the central sierra amounted to 460 M.T. and 477 M.T., respectively. The types of potatoes, although unspecified, probably were Ticahuasi, Huasahuasi, and Renacimiento varieties; all white potatoes widely harvested on the coast during these months.

Table 2.3. Central Region Potato Shipments by Origin, Destination, and Potato Type During October and November: 1971.

Potato Type	Origin	Destination	Oct.	Nov.
(metric tons)				
Not Specified ^a	Lima	Central Sierra	460 ^c	477 ^c
Yellow Potatoes	Mainly Huánuco	Lima	165	453
Other Potatoes ^b	Mainly Huánuco and Tarma	Lima	76	424
White Potatoes	Eight Different Supply Areas	Lima	68	78

Source: Servicio de Información de Mercadeo Agropecuario.

^a Mostly white potatoes, see text.

^b "Other" refers to a large class of colored varieties.

^c Source: Highway Control Station records, Dirección General de Comercialización. Most highway control stations underreport considerably. Data collected for the Central Sierra route starting in 1971 are believed to be considerably better and do exhibit some agreement with rural merchants' estimates.

October and November are sierra off-season months, though some potatoes are harvested throughout the year in irrigated areas. The data in Table 2.3 show that the central sierra sent 309 M.T. and 955 M.T., respectively, for these months to Lima. Some sierra varieties are specialty potatoes grown in specific regions which are of lower quality when planted on the coast. These are classified as "yellow" and "other" in Table 2.3. Negligible quantities of sierra white potatoes were shipped to the Lima market, and most were specialty varieties.

2.1.3 Prices

Price reports for white potatoes usually are for the top grade of the predominant variety available in the respective markets at the time of reporting. Thus, variety and grade differences

between markets and time periods are reflected in the monthly wholesale price series of Figure 5.²²

Potato prices in Arequipa usually were higher than those elsewhere during the 1969-72 period, averaging around a half sol above those for Lima. Although prices do not always move together, most of the price difference can be explained by seasonal affects and transportation costs.

A correlation analysis was applied to average weekly wholesale prices reported for 14 cities during the January 1, 1970 to March 1, 1971 period. Potato prices in the coastal cities and Huancayo were closely related ($r = 0.80$) which suggests that inter-urban shipments are adjusted to take advantage of favorable price opportunities. (Location of cities is shown in Figure 6.) Sierra communities (other than Huancayo), however, usually did not show high intercorrelations with each other and coast cities. The lower correlation coefficients reflect the isolation of sierra communities. Transportation to and from these towns is difficult throughout the year, and heavy rains can block transportation completely for a week or more. The city of Arequipa had low correlations with central coast towns ($r = 0.64$) and Cuzco ($r = 0.68$). These low coefficients may be attributed to occasional enforcement of price and other market controls and difference in potato types.

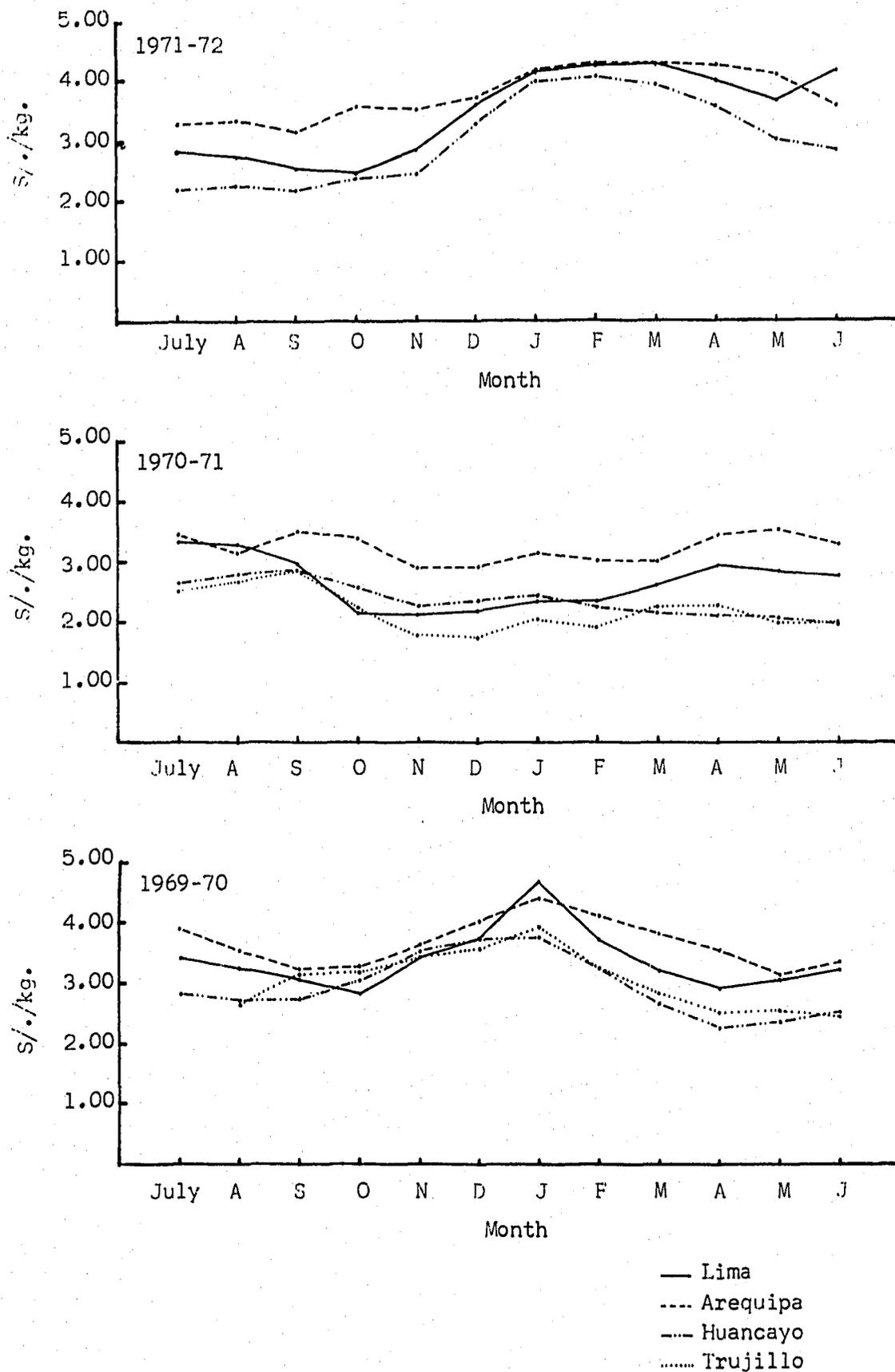
In Lima, seasonal prices usually are highest in the first quarter and lowest during the fourth quarter with year-to-year variation caused by differences in the start and finish of seasonal harvests. Potato price variations data for the Lima wholesale market during the 1961-71 period are summarized in Table 2.4. Monthly coefficient of variation figures (S/\bar{x}) indicate trend and cyclical variations.²³

2.2 The Potato Wholesale Sector²⁴

There were at least 234 potato wholesalers in Lima during 1971. All had their principal sales outlet in the La Parada market.²⁵ Wholesalers are classified in Table 2.5 into three groups according to volumes handled. Small merchants sold 63 M.T./month on average while the largest merchants averaged 411 M.T./month. Many potato wholesalers sell "ollucos" and "camotes" as sidelines, and some also sell "yuca."

A few potato wholesalers own trucks, and many have smaller auxiliary vehicles.²⁶ Some wholesalers own or rent temporary storage deposits in rural production centers which are used primarily for gathering and sorting purposes. Most wholesalers use little equipment other than a scale. On the average, small businesses employ 1.9 persons, medium-sized 2.4, and large-sized 3.4 persons on a permanent basis in their stalls (Table 2.6). A few wholesalers employ full-time rural buyers, and about a quarter of the

Figure 5. Average Monthly White Potato Wholesale Prices in Selected Cities, July 1969 - June 1972.



Source: Table A.13.

Figure 6. Weekly Wholesale Price Correlations for 14 Cities: 1970.

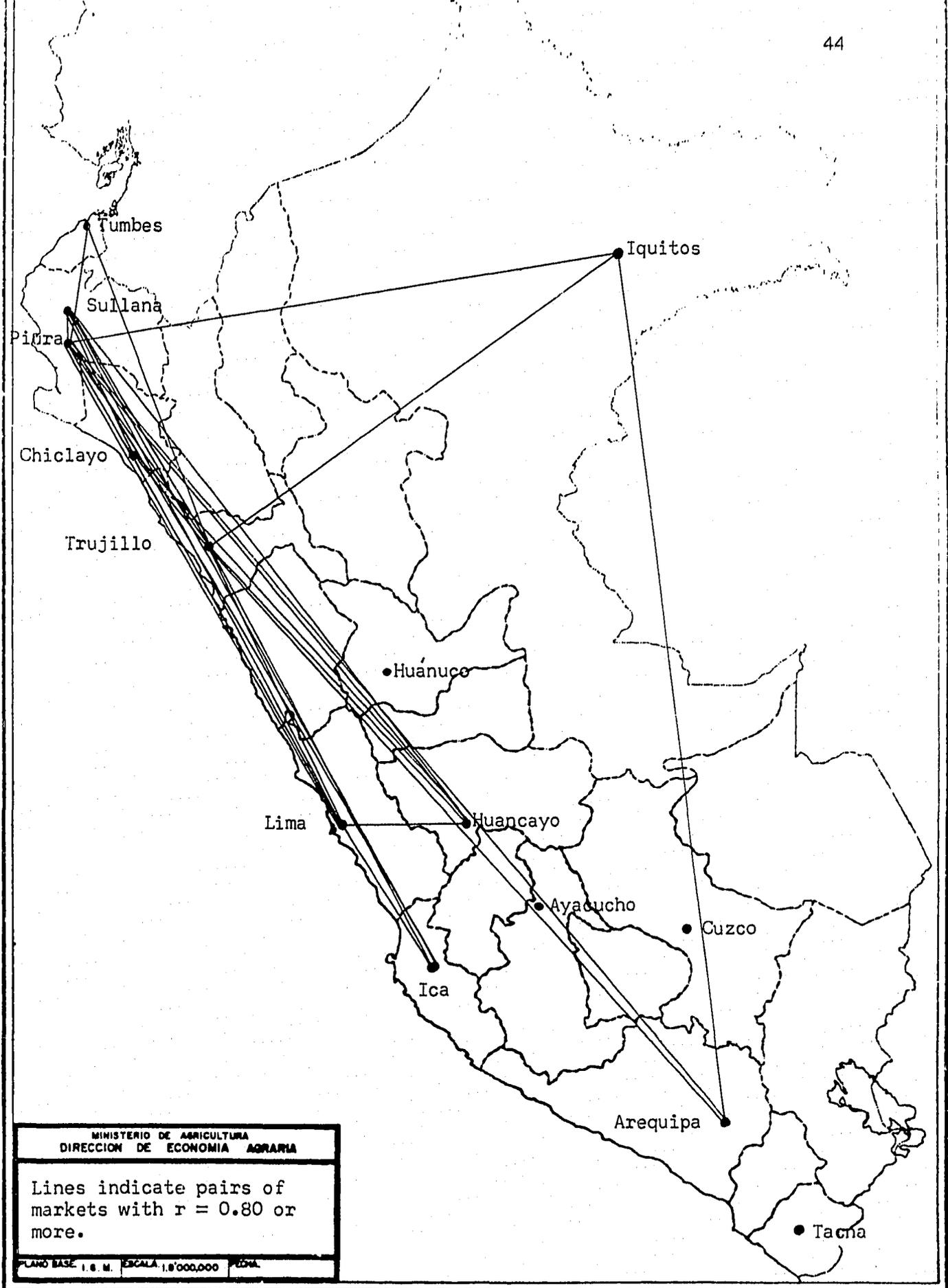


Table 2.4. Potato Wholesale Price Variations: Lima, 1961-71.

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
<u>White Potatoes</u>												
Average Price (\bar{x})	2.64	2.60	2.27	2.08	2.14	2.58	3.00	2.93	2.79	2.61	2.61	2.58
Seasonal Index	1.03	1.01	0.88	0.81	0.83	1.00	1.17	1.13	1.09	1.02	1.02	1.00
S/\bar{x}	0.31	0.35	0.32	0.34	0.36	0.33	0.33	0.29	0.27	0.29	0.31	0.29
<u>Yellow Potatoes</u>												
Average Price (\bar{x})	4.06	4.29	4.59	4.81	4.64	4.43	4.52	4.16	4.24	4.14	4.14	4.15
Seasonal Index	0.93	0.99	1.06	1.10	1.07	1.02	1.04	0.95	0.97	0.95	0.95	0.95
S/\bar{x}	0.28	0.31	0.29	0.26	0.24	0.23	0.27	0.26	0.22	0.22	0.24	0.26

Source: B. Julio Perea Espinoza, Análisis de Precios en Productos Agrícolas Caso: Tuberculos, Estudio 18, Misión Iowa, April 1973.

Table 2.5. Sizes and Numbers of Potato Wholesalers: 1971.

Strata	Size Class (M.T./mo.)	Number of Wholesalers ^a	Number of Wholesalers in Sample	Average Volume (M.T./mo.)	Range (M.T./mo.)
I	Less than 100	149	18	63	30- 94
II	100-240	67	17	149	100-206
III	More than 240	<u>18</u>	<u>8</u>	<u>411</u>	<u>245-700</u>
Total		234	43	155	30-700

Source: Potato Wholesaler Questionnaire 1972.

^aEstimates based on Market Administration data.

Table 2.6. Employment in Potato Wholesale Businesses.

	I	II	III	Total
Number of Wholesalers Responding	18	17	8	43
Regular Full-Time Personnel	35	40	27	102
Owners ^a	29	24	13	66
Employers ^b	6	16	14	36
Average No. of Persons Per Business	1.9	2.4	3.4	2.2
Average Employee Salary (\$/.)	2,750	2,907	2,918	2,805
No. of Part-Time Employees	5	4	2	11
No. of Businesses with No Hired Help	8	3	--	11

Source: Potato Wholesaler Questionnaire 1972.

^aTypically husband and wife.

^bDoes not include chauffeurs, rural employees, or employees engaged in retail sales.

merchants occasionally hire additional part-time help. Incoming trucks are unloaded by a syndicated stevedor union charging standardized fees.

Outside capital is usually obtained from friends and other wholesalers. Information on the financial status of wholesale businesses are not available, but the data in Table 2.7 reflect wholesalers' estimates of additional capital needed in 1972. Only half of the wholesalers surveyed indicated a need for additional capital. If made available, additional capital would be used to purchase more potatoes, provide loans to farmers, and to purchase transport equipment.²⁷ Other uses for capital did not appear to be important.

2.2.1 Rural Marketing Channels and Buying Practices

Most wholesalers work the entire year but must sell both sierra (December-July) and coast (July-January) potatoes in order to do so. Tables 2.8 and 2.9 summarize data on the relative importance of various buying practices in sierra and coastal market channels.

Buying on Farms: Many wholesalers travel in order to purchase potatoes on farms. During the sierra harvests, 44 percent of the wholesalers obtain some supplies in this manner while 10 percent obtain their most important volumes in this way. Although sierra farmers have usually done some sorting of potatoes for seed and other home consumption purposes, wholesalers frequently contract additional sorting and sacking.

During the coastal harvests, 61 percent of wholesalers obtain some supplies at the farm while 22 percent obtain their most important volumes in this manner. On the coast, wholesalers usually do all picking up, sorting, cleaning, and sacking while the farmer does little more than dig up the crop.

Wholesalers believe that it is particularly important to purchase at the farm when potatoes are in short supply. However, when prices in Lima are above official maximums and rigorously enforced, rural buying activities are severely curtailed. This was the case in 1972.

Producer Commissioned Shipments: Important shipments originate with sierra producers who over the years have become steady wholesaler clients and for whom wholesalers work on essentially a commission basis. Producers and wholesalers are often in close communication in these cases. Wholesalers send sacks from Lima, relay cleaning, sorting and sacking instructions, and schedule shipments. The wholesaler usually does not quote a minimum price but does provide expected price information. After sale to retailers in Lima, the wholesaler subtracts the cost of his services and the cost of any credit and farm inputs provided to the producer

Table 2.7. Potato Wholesalers, Unsatisfied Capital Needs: 1972.

Strata	Number of Respondents	Number of Wholesalers Desiring Additional Capital	Percent	Average Amount Desired S/.	Principal Uses for Additional Capital ^a		
					Increase Potato Purchases	Extend Credit to Farmers	Purchase of Truck
					(percent of wholesalers)		
I	18	12	66	77,142	50	25	25
II	17	6	35	93,750	34	66	--
III	8	3	38	116,666	--	100	--
Total	43	21	49	95,852	43	43	14

Source: Potato Wholesale Questionnaire, 1972.

^aRefers to most important capital needs. Investments of lesser priority included: increased extension of credit to retailers, investment in other businesses. No merchant reporting would invest in deposits or storage facilities nor would they use capital to increase purchases of other products.

Table 2.8. Potato Market Channels and Buying Practices: Central Sierra.

Strata	Respondents	Wholesaler Purchases at the Farm Gate ^a			Producer Commissioned Direct Shipment ^b			Nonconsigned Producer/Trucker Shipments ^c			Rural Assembler Shipments ^d			Wholesaler-Wholesaler Distribution ^e			Cooperative Shipments ^f		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
(percent of wholesalers)																			
I	17	30	70	3	99	1	26	72	28	15	86	14	15	77	23	41	6	94	--
II	17	50	50	14	84	16	53	57	43	6	100	--	10	61	39	17	6	94	--
III	8	87	13	19	96	4	81	53	47	--	78	22	--	14	86	--	28	72	--
Total	42	44	56	10	93	7	50	61	39	8	90	10	8	59	41	24	9	91	--

Source: Potato Wholesale Questionnaire, 1972.

Note: A = Percent of wholesalers who use a practice.

B = Percent of wholesalers who do not use a practice.

C = Percent of wholesalers who attribute primary importance to a practice.

^aWholesaler travels to production center and pays potato transportation and handling charges to market, wholesaler may also sort and pack. Cash payment usually is made on the farm with potato pick up.

^bWholesaler works basically on commission. Producers pay marketing charges. Wholesaler arranges sack delivery to farmer, timing of shipments, etc. Usual practice with steady producer contacts developed over the years.

^cShipments brought into the market by farmers and/or trucker. All contractual arrangements are made in the marketplace.

^dWholesaler works basically on commission. Intermediaries usually handle sorting, sacking, and shipping.

^eWholesaler acts as broker for other wholesalers.

^fOnly a few cooperatives are organized for potato marketing.

Table 2.9. Potato Market Channels and Buying Practices: Central Coast.

Strata	Number of Respondents	Wholesaler Purchases at the Farm Gate ^a			Producer Commissioned Direct Shipments ^b			Nonconsigned Producer/Trucker Shipments ^c			Rural Assembler Shipments ^d			Wholesaler-Wholesaler Distribution ^e			Cooperative Shipments ^f		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
(percent of wholesalers)																			
I	18	44	56	14	16	84	--	45	55	--	93	7	34	94	6	52	--	100	--
II	17	76	24	30	34	66	--	40	60	--	88	12	46	80	20	24	--	100	--
III	8	75	25	38	61	39	--	14	86	--	92	8	62	59	41	--	12	88	--
Total	43	61	39	22	32	68	--	37	63	--	92	8	48	85	15	30	2	98	--

Source: Potato Wholesale Questionnaire, 1972.

Note: A = Percent of wholesalers who use a practice.

B = Percent of wholesalers who do not use a practice.

C = Percent of wholesalers who attribute primary importance to a practice.

^aWholesaler travels to production center and pays potato transportation and handling charges to market, wholesaler always sorts and packs. Cash payment usually is made on the farm with potato pick up.

^bWholesaler works basically on commission. Producers pay marketing charges. Wholesaler arranges sack delivery to farmer, timing of shipments, etc. Usual practice with steady producer contacts developed over the years.

^cShipments brought into the market by farmers and/or trucker. All contractual arrangements are made in the marketplace.

^dWholesaler works basically on commission. Intermediaries usually handle sorting, sacking, and shipping.

^eWholesaler acts as broker for other wholesalers.

^fOnly a few cooperatives are organized for potato marketing.

from the actual market price and pays the farmer the remainder.

Many persons, particularly farmers, believe that this system results in farm prices which are "low" and wholesaler profits which are "unfairly" large. Without good margin information, it is impossible to determine the extent of actual abuse. There is, however, ample opportunity for differential treatment of farmers by wholesalers.

Ninety-three percent of the wholesalers handle commission shipments from sierra producers, and 50 percent consider these shipments to represent their most important volumes during the sierra harvest.²⁸ This type of arrangement is less important on the coast, and only 32 percent of the wholesalers receive supplies in this manner during coastal harvest periods.

Rural Assembler Shipments: About 90 percent of the wholesalers receive shipments from rural assemblers. However, only 8 percent of the wholesalers consider such shipments to be their most important source of supply during the sierra harvests. This figure is perhaps understated because some producers shipping directly to Lima also act as part-time rural intermediaries for small farmers.

Considerable reliance is placed on rural assemblers in times of coast harvest. Forty-eight percent of the wholesalers consider such shipments to represent their most important volumes. Most coastal potatoes come from large farms which produce more than can be handled readily by most Lima wholesalers. In the past, "hacendados" hired special agents to supervise harvest, sacking, and distribution to various Lima wholesalers. Over time, these agents developed their own businesses and distribute other products during the potato off season.

Wholesaler-Wholesaler Distribution: Securing potato supplies from other merchants in the marketplace is particularly important to small wholesalers who do not have sufficient capital or the steady business contacts required for extensive rural purchase activities. Small wholesalers frequently align themselves with one or several larger wholesalers and serve as distribution brokers to retailers. "Reparto" as this is called, is also an important supply mechanism for many larger wholesalers during periods when their rural sources are not shipping. A merchant receiving two or three truck loads in an evening usually assigns part of his supplies to competitors not receiving any.²⁹ Competitors are expected to return this favor later. This practice permits wholesalers to operate with minimal hired help. More importantly, a wholesaler experiencing protracted supply difficulties (e.g., because of crop failure in his region of specialization) is less likely to invade competitors territory if he can receive supplies through "reparto." Wholesalers recognize that many of their markets, particularly in

the sierra, are small, and that too much competition can reduce margins.

Estimates in Table 2.10 show the importance of wholesaler-to-wholesaler sales. Eighteen large merchants controlled 37.4 percent of total potato supplies entering the marketplace in 1971 while 67 medium-sized merchants controlled 38.1 percent and 149 small merchants 24.5 percent. On the other hand, the large dealers distributed an estimated 22 percent of total retailer supply. Medium-sized merchants distributed 32.3 percent of potatoes sold to retailers, and small merchants distributed 45.5 percent. During periods of relative abundance, all wholesalers are fully occupied while in times of shortage many smaller merchants are underemployed. Other tubers are not sufficiently abundant to avoid this.

Table 2.10. Estimated Volumes, Wholesale-Wholesale, and Wholesale-Retail Potato Distribution in La Parada Market: 1971.

Size Class	Numbers of Dealers	Estimated Shipments Brought in to Marketplace	Percent	Estimated Sales to Retailers	Percent
		(M.T./mo.)		(M.T./mo.)	
I	149	5,540	24.5	8,664	45.5
II	67	8,619	38.1	6,162	32.3
III	18	8,452	37.4	4,230	22.2
Total	234	22,611 ^a	100.0	19,056	100.0

Source: Potato Wholesale Questionnaire, 1972.

^aThe average monthly volume reported by SIMAP was 20,169 in 1971. High estimate may be due to tendency of smaller merchants to overstate rural shipments received.

Nonconsigned Producer/Trucker Shipments: Smaller wholesalers, in particular, are likely to wait at the market door for incoming shipments. They frequently pool their money to bid for a truck load. Larger wholesalers rarely use this practice during coastal harvest periods and only occasionally use it during sierra harvests. Only 8 percent of the smaller wholesalers consider this method to be their most important source of supplies during sierra harvest.

2.2.2 Potato Grading

Potatoes come to market in sacks of 80-110 kg. each. Sacks of colored varieties usually weigh less than sacks of white potatoes.

Wholesalers estimate that weight losses due to dehydration amount to 1-2 percent between the farm and retailer. Other losses are thought to be negligible. Wholesalers do little in the way of re-packing, selecting, or cleaning potatoes in Lima prior to distribution to retailers. These things are done mainly in rural areas and later at the retail level.

Grading standards are not well defined and vary from harvest to harvest, depending on the relative abundance of the crop. When market wholesale prices for top grades are above official levels; smaller, damaged, and dirty potatoes are mixed with better potatoes and sold at top grade prices. When supplies are relatively abundant, clean well-sorted sacks of top grade potatoes enjoy price advantages of about half a sol over second grade (smaller) potatoes. Poorly selected or unsorted lots are more difficult to sell. Farmers usually rely on wholesalers for grading and sorting instructions.

Most grading and sorting in rural areas is done by hand. Mechanical sorters are seldom used. Producers believe that the sorters cannot sort as accurately as hand labor and that they damage potatoes. Furthermore, mechanical sorters are difficult to transport, and farmers do not always know when and how much to sort. The current practice on the coast is for merchants to do most of the sorting by hand in the field. Contracts frequently specify that all potatoes be picked up in the fields by merchants for a uniform price regardless of grade. In this way, fields are left clean, and farmers are not left with smaller potatoes which are more difficult to sell.

2.2.3 Wholesale Distribution to Retailers

The number and types of potato retailers in Lima are estimated to be:

<u>Number</u>	<u>Type</u>
5,367	Permanent and semi-permanent vegetable and tuber stalls located in municipal markets, "mercadillos," and "paraditas" ^a
208	Small stores ^b
5,552	Street vendors specialized to vegetables and tubers ^b
24	Supermarkets (14 of which belong to EPSA) ^c
20 to 30	Special regulatory stalls supplied by EPSA for potato distribution in low income areas at official prices ^d

(Footnotes on following page.)

^aAida O. Espada, Estudio de la Comercialización en Lima Metropolitana, Informe 18, Min. Ag., Nov. 1971.

^bBustamante, Williams and Assoc., op. cit.

^cDirección General de Comercialización.

^dPrecise figures not available.

Food retailers usually specialize to one or two product lines. Approximately 92 percent of retailers specializing in tubers obtain their supplies daily or every other day at the La Parada market. Four percent of the retailers buy from other retailers, and 3 percent buy from nearby farms. The remaining 1 percent use other practices such as retail buying.³⁰

Since 1970, supermarkets have expanded very little, due to uncertainties about future government policies. Supermarkets were never particularly important outlets for fresh produce. Some supermarkets in the past have bypassed Lima wholesalers by receiving potato supplies directly from rural areas, especially coastal production areas. The 14 recently organized EPSA supermarkets obtained most of their potato supplies from EPSA wholesale operations in 1972.

EPSA established a number of small retail outlets in low income districts in late 1972 and early 1973. The EPSA potato outlets appear to operate on margins similar to traditional retailers. They are of about the same size, have the same types of facilities, and handle similar quality of product. Many probably do not enjoy transportation and time saving advantages in acquiring products because they must obtain their supplies from the EPSA warehouse in Callao.

Over half of the wholesalers report their normal sale is 2-5 sacks/client. Very few sell more than 6-10 sacks/client. Customers purchasing 10 sacks or more may obtain S/.10.00-S/.20.00 discount per sack of 100 kg. when buying from larger merchants. About 77 percent of the wholesalers believe that many of their clients are regular customers. Of these, 30 percent consider steady clients to represent 20 percent or less of their total sales, 40 percent of wholesalers consider 21-40 percent of their clients as steady, and 30 percent regard 41-80 percent of their clients as steady. Ninety-eight percent of wholesalers regularly extend short-term credit to customers. Credit usually is extended for a few days and sometimes up to a week.

Wholesalers believe that clients are attracted by their reputation for seriousness and honesty in business dealings and ability to stay stocked. Better than average credit terms, potato

quality, and lower prices were considered to be important by less than a third of the merchants. This is not surprising because merchants are in close contact with one another, and it would be difficult to differentiate product or services rendered. Prices appear to be fairly uniform throughout the market on any given day.

2.2.4 Margins³¹

It is often alleged that wholesalers practice price fixing. Wholesalers deny this. In times of shortage, some small merchants appear to base their pricing on minimum income needs and try to earn from S/.200.00-S/.400.00 per day. Margins, therefore, may be set according to how many sacks they have available.

Figure 7 and Table 2.11 summarize available margin data for coastal harvest periods during 1967-72. Farm, wholesale, and retail prices usually moved together. The monthly data indicate that during 1967-69 farmers received over 60 centavos per sol spent at retail on potatoes while in 1970-71 they received about 55 centavos.

Table 2.11. White Potatoes, Centavos per Sol spent by the Metropolitan Lima Consumer Received by Producers, Wholesalers, and Retailers during the Months of July-January (Central Coast Harvest Period): 1967-71.

Year	Producers on the Farm ^a	Wholesalers in La Parada-Lima	Retailers in Mun. Markets ^b	Total
1967	60	18	22	100
1968	71	11	18	100
1969	62	18	20	100
1970	54	8	38	100
1971	56	15	29	100

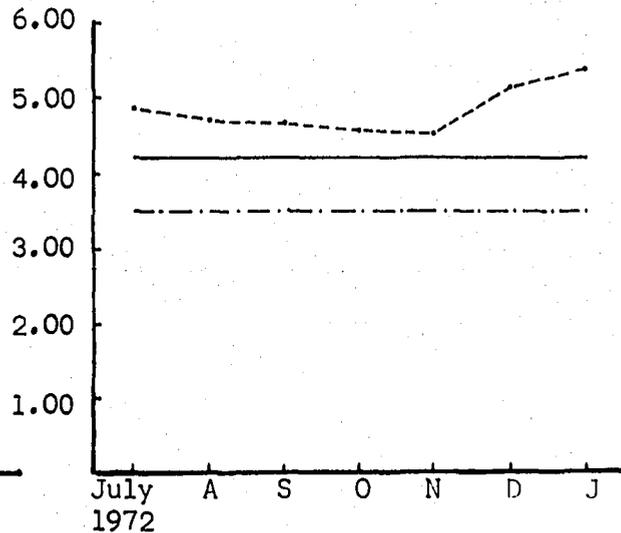
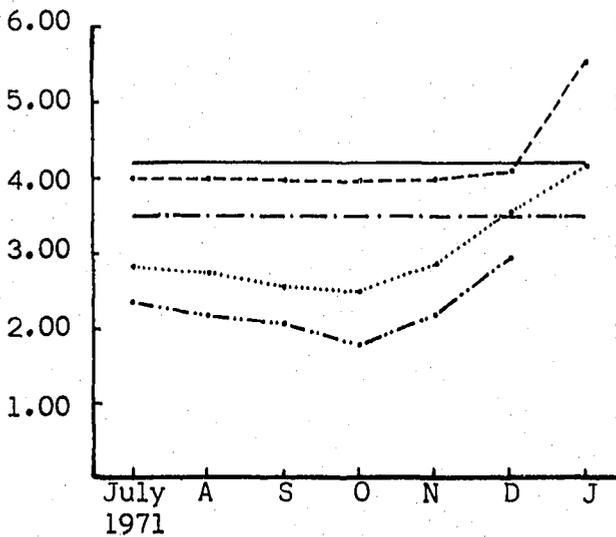
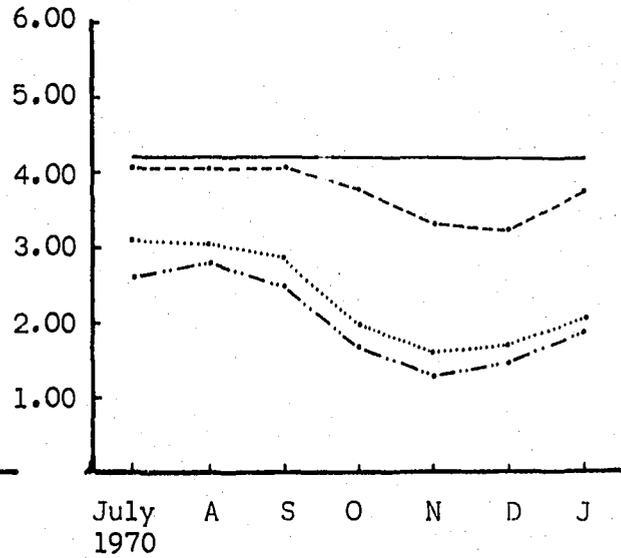
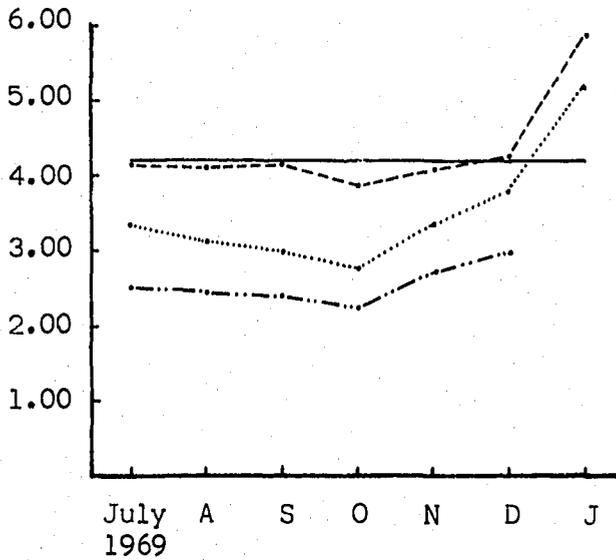
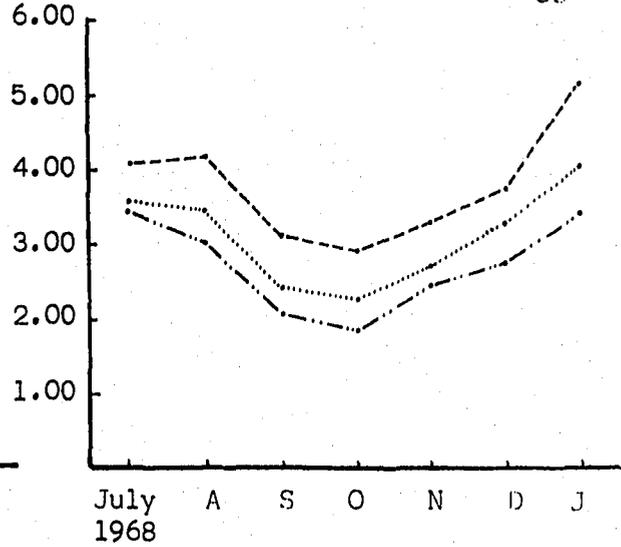
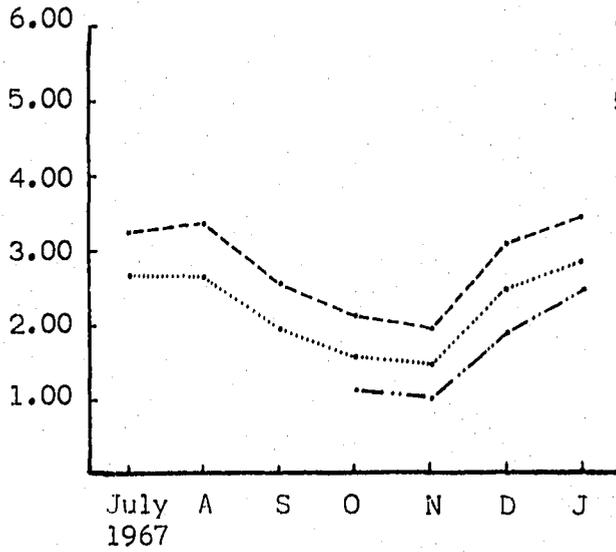
Source: Appendix Tables A.11, A.12, A.14.

^aCentral coast production areas (Lima, Cañete, Barranca).

^bDoes not include stores, supermarkets, nor street vendors.

Wholesalers appear to have received about 15 centavos per sol spent at retail. The year 1970 may have been an exception because potatoes were unusually abundant and accumulated in the marketplace with resulting losses for some central coast farmers and wholesalers. During 1967-69, retailers received about 20 centavos per sol spent by the consumer, compared to 30 centavos or more in 1970-71. The changes in relative margin appears to coincide with the establishment of an official maximum retail price in 1969. Much of the increase in retail margins may have resulted from increased losses at retail because of poorer sorting and cleaning at the farm level and

Figure 7. White Potato Market Margins (Central Coast on Farm, Wholesale, and Retail Prices): 1967-72.



---Retail Price — Official Retail

Source: Appendix Tables Wholesale Price -.- Official Wholesale

— On-Farm Price

may not represent higher retail profits.³²

In recent times, the retail margin has usually been more than a sol per kg. while the wholesale margin is around 60 centavos/kg. Prior to initiation of price controls, the wholesale margin was usually less than half a sol per kilo. In 1971, about S/.0.25-0.35 of the margin represented sorting, sacking, transportation, and handling costs.³³ The remainder represented overhead costs and profits of wholesalers and other rural merchants.

2.3 Government Participation in Marketing and Price Policy

Prior to 1972, the government occasionally participated in potato distribution but usually handled only small quantities. In 1967, for example, some 1,200 M.T. were purchased for sale in Lima in anticipation of unusually high seasonal prices. For a period of time, the government also operated a stall in the wholesale market but was unable to compete effectively with wholesalers because the stall was not regularly stocked, and potatoes were not sold on credit to retailers. The government has occasionally operated stalls in retail markets in order to provide potatoes at low prices to lower income groups.

2.3.1 The Public Agricultural Services Company (EPSA)³⁴

EPSA was an important government marketing agency in 1972. It handled around 27,000 M.T. of domestic supplies and imported 13,000 M.T. of European potatoes. The motivation for EPSA's sudden entry into potato marketing is attributed to the government's desire to maintain a low consumer price of S/.4.20/kg. for white potatoes which were in short supply. Private firms had to reduce their purchases because on-farm prices were regularly above the official wholesale maximum of S/.3.50/kg. EPSA undertook crash buying programs in rural regions, most of which resulted in government losses. Taxes were levied on producers' potatoes (paid for at official price levels) in transit to market, and some markets were blockaded to prevent flight of potatoes away from Lima.

The decision to import potatoes was made once it was apparent that the coastal harvest would be small. The import program reduced the upward pressure on consumer prices in Lima but encountered some difficulties. Nearly 2,700 M.T. of potatoes could not be unloaded in Callao because of disease problems and in transit spoilage. Port facilities and temporary storage were inadequate. CIF prices for imported potatoes were approximately S/.4.65/kg., and the government's distribution program, therefore, had to be subsidized. If large imports of potatoes continue, additional port facilities will be needed for handling and storing potatoes.

The government potato programs created an unusual price structure for potatoes in Lima during 1972. The EPSA supermarkets and

affiliated regulatory stalls sold potatoes at low official retail prices. Other supermarkets and some retailers subject to easy municipal inspection regularly went without potato supplies and/or sold potatoes of very low grade. Street vendors and other small retailers usually charged high "black market" prices. Potato imports were not sufficient to prevent this.

2.3.2 Special Distribution Programs and Stocking

Most of the EPSA potato program resources were used in the management and allocation of shortages in 1972 and early 1973. Many factors affecting production in 1972 were transitory, but if the supply and demand trends of section 1.5 hold, the shortage situation may become chronic in the future.³⁵ Government price policies will undoubtedly affect the domestic supply and demand situation, the need for future imports, and the distribution of potatoes to various income groups. More flexibility in the government's pricing policies would be possible if better information was available on the short-term supply and demand situation. Improvements in the efficiency of EPSA's rural purchase and urban distribution systems would increase its ability to help both small farmers and low income consumers. To the extent that special government programs directly benefit low income consumers, the need for general price controls in other markets may be reduced.

The type and size of stocking arrangement for special retail outlets is important.³⁶ If the EPSA wholesale stocking program can provide well-selected, clean, and bagged potatoes, it may succeed in reducing retail margins. By providing a regular distribution service, it may be able to reduce the transportation costs of its outlets and further reduce retail margins. The size of the program will depend on the numbers of consumers supplied by the outlets, the retail price to be charged, and the demand characteristics of the groups supplied.

The simplest way to secure steady supplies would be to buy in the wholesale market. If the government purchases from wholesalers and incoming trucks at free market prices for later resale at low consumer prices, it may have to absorb losses, but this should provide an incentive to improve the efficiency of the program. Placing levies on incoming trucks is another way of securing supplies. This may be justifiable where producers are obtaining special benefits from government production programs. Levies may reduce government losses and distribute them back toward producers, but they also reduce incentives to improve the efficiency of government distribution programs as well as producers' incentives to increase production. This type of program would benefit low income consumers more than small farmers. It would not make the private rural assemblers and Lima wholesalers more competitive. Rural purchasing programs could be developed gradually, however, and used to replace or supplement supplies being obtained in the wholesale market.

FOOTNOTES

1. Christiansen G., Jorge, El Cultivo de la Papa en el Perú, Editorial Jurídica, S.A., 1967.
2. Provisional results of the 1972 Agricultural Census indicate that the total number of farms had increased to 1,386,900.
3. Assumes 125.7 work days per hectare, 300 work days per year, and 250,000 ha. of potato lands. See "La Fuerza Laboral Agrícola Actual y Proyectada por Sexo y Grupos de Edad, por Provincia, Departamento y Regiones," May 1970 and "Requerimiento Mensuales de Mano de Obra para la Agricultura por Hectarea, por Cultivo, por Provincia y para la Actividad Pecuaria," November 1970; both by Convenio para Estudios Economicos Básicos, Lima, Perú.
4. This statement should be viewed as a hypothesis based on discussions with farmers and technicians in supply centers.
5. Cited in Moreno, Ulises, "Physiological Investigations on the Potato Plant with Special Reference to the Effects of Different Environments," unpublished Ph.D. thesis, Cornell University, 1970.
6. Descriptions of important varieties, their characteristics, and general areas of propagation can be found in "Variedades Nativas mas Difundidas," Circular de Extensión, April 1968 and Circular de Extensión No. 8-468, rev. 1971; both by Proyecto Nacional de Papa, Ministerio de Agricultura.
7. Reliable data which could be used in economic analysis of the on-farm net returns advantages are not available.
8. Descriptions of major disease and pest problems, their areas of incidence, and production damages can be found in various Extension circulars from April 1968 - December 1971, Proyecto Nacional de Papa, Ministerio de Agricultura. See also Christiansen, op. cit., Chapter 8.
9. See Miranda P., Aurelio, "Evaluación Económica de Algunos Aspectos del Mercadeo de Papa para Lima," Universidad Nacional Agraria La Molina, 1969, for an annual potato acreage response equation for Cañete during 1958-67. This includes as independent variables potato wholesale price, corn wholesale price, and river water discharge. Holding potato price and water variables constant, a one sol increase in corn price caused a 1,206 ha. decrease in potato plantings.

10. See Llosa D., J. Eduardo, "Comparativo Varietal de Semilla Serrana y Criolla en el Cultivo de Papa," thesis, Universidad Católica del Perú, 1965.
11. As of June 1973, the best summary of food consumption information was "Perú-Proyecciones a Largo Plazo de la Oferta y Demanda de Productos Agropecuarios Seleccionados: 1970-75-80," Grupo Oferta y Demanda, Convenio de Cooperación Técnica, 1969.
12. See Grupo Oferta y Demanda, op. cit.
13. Based on regression equation $q = 65.60 - 7.55x_1 + 12.39x_2$, where q = per capita potato consumption, x_1 = deflated retail price of white potatoes, x_2 = deflated index of fresh vegetable prices. It appears that annual vegetable price changes caused, at most, a 4 kg. per person change in potato demand, given constant potato prices. This would amount to nearly a 12,000 M.T. per year change in total demand. A description of the data employed are contained in "Consumption and Price Trends in Metropolitan Lima," working paper by the author, on file at the Iowa Mission, Lima, Peru.
14. With respect to the suggested simultaneous relationship with vegetables, there are several things which need to be looked into. It appears that nearby vegetable producing areas are being eliminated by urban expansion. This would be a factor tending to reduce supply response. The income elasticity of demand for vegetables appears to be high, around 0.84. Income changes would be more important in explaining change in vegetable demand than for potatoes.
15. Based on demand equation $q = p + E(y) + e(r)$, where p = population growth rate (6.0 percent), E = income elasticity (0.48), y = assumed rate of increase of real per capita income (2.0 percent), e = long-term price elasticity (-0.49), and r = rate of change of deflated retail potato prices (-3.1 percent).
16. For statements of current research priorities, past accomplishments, and problems, see The Peruvian Potato Program, Agricultural Research Service (DGIA), Ministry of Agriculture, Lima, 1972; also "A Study of the Status of the Potato Program," by R. L. Sawyer, North Carolina University-Agricultural Research Mission, 1965; also "Comentario Sobre La Ponencia: Producción de Semilla de Papa," by Ing. Agr. Teodoro Boza B., A. I. Gx. in Anales de la Mesa Redonda: Producción de Semillas, U.N.A.-Min. Ag., July 1970.
17. This was learned in a conversation with R. L. Sawyer, leader of the International Potato Center in June 1973. In Perú, there are an average of 20 grams of protein per kilo of potatoes. See Hoja de Balance de Alimentos, 1969.

18. Based on figures contained in "Documento Original Programa Nacional de Papa," PNP-1, (DGPA), Ministerio de Agricultura, Lima, Sept. 1972.
19. Assumes 60,000 ha. of commercial plantings in the central sierra.
20. The Ministry of Agriculture believes that potato marketing is unnecessarily inefficient. Consumers in many of the interior cities of Perú apparently buy produce which comes from Lima because most truck garden crops, including potatoes, harvested in the central regions are sold to intermediaries who ship the products to Lima rather than direct to retail store owners in the production areas. Middlemen, located in Lima, then reship back to the area where the products are produced. Another common problem is that some regional markets experience gluts and very low prices while at the same time others may have shortages and very high prices.
21. For an analysis of interprovincial potato flows, see Chavez T., Arturo, "Aspectos Especiales y el Grado de Integración Comercial a Nivel de Provincia en 5 Productos Agrícolas Básicos," thesis, 1971. This study is based on a sample of records from police highway control stations for 1968. The analysis was complicated by the unprecise nature of records. The study provides a matrix of the relative magnitudes of interprovince potato movements on an annual basis.
22. The "Renacimiento" variety is the most important commercial white potato and is found in markets throughout Perú. Most price reporting probably reflects prices for this type. The "Mantaro," "Ccompis," and "Imilla" potatoes enter southern markets in large quantities. The relatively new, though increasingly important, "Ticahuasi" is found mainly in central region markets and to less extent in northern markets. Only occasionally does it enter Arequipa. The "Huasahasi" potato is found almost exclusively in central region markets. There are scores of other white potato varieties which enter the various marketplaces, but in terms of volume, they are of less importance.

Potato variety, size, origin, water content, and texture are important characteristics distinguishing the various white potatoes in wholesale marketplaces. The latter two characteristics are closely associated with variety. Appearance (i.e., cleanliness and thoroughness of sorting) is also important, especially in times of abundance. In a survey, over a three-month period (August-October 1971) in Lima, SIMAP found consistent price differences to hold among three important white potato types as follows:

22. (continued)

<u>Variety</u>	<u>Origin</u>	<u>Market Denomination</u>	<u>Average Price</u> (S/./kg.)
Ticahuasi	Coast	Mejicana (Criollo)	2.20
Ticahuasi	Sierra	Mejicana (Serrana)	3.03
Renacimiento	Coast	Renacimiento (Criollo)	2.50
Renacimiento	Sierra	Renacimiento (Serrana)	3.06
Huasahuasi	Coast	Huasahuasi (Criollo)	3.04
Huasahuasi	Sierra	Huasahuasi (Serrana)	None on the Market

In general, fresh off-season sierra potatoes commanded around a half sol premium over like variety coastal potatoes. The coastal Renacimiento was around S/.0.30/kg. higher than the Ticahuasi, and the Huasahuasi was just over S/.0.50/kg. more than the Renacimiento. These prices were for top grades (largest size) and well-selected lots. When prices go above official maximums and municipalities or other government authorities try to enforce the maximums, market classification of potato types breaks down, the "best" potatoes are no longer found in the marketplaces, and what are normally considered to be lower grades command top grade prices. Thoroughness of sorting and cleanliness are also reduced. This was observed in 1972 and early 1973.

23. It was estimated that increased storage of about 2,000 M.T. in October and November, for sale in Lima in January and February, would have reduced seasonal price variations to the point of covering storage costs in nine out of ten years during the 1953-68 period. Losses would have resulted from such a program in one year. See Shepherd, G., Cossio, J., and Huayanca, A., "Almacenamiento para Productos Agrícolas en el Perú," Boletín No. 12, Iowa Mission, Dec. 1969.

Some farmers in interior sierra communities believe that a storage program would be of benefit to them because post harvest prices in nearby towns appear to rise substantially. This has not been studied.

24. This section is based on a questionnaire circulated to 43 wholesalers in 1972. For questionnaire details and additional data consult Dolorier C., Augusto, "Los Mayoristas de Papas," thesis.

25. Potato wholesaling does not appear to have occurred extensively outside of the market in the past. See Bustamante, Williams, and assoc., "Mercado Nacional de Alimentos," 1972, for information on physical and operating characteristics of the La Parada market; see "Investigaciones de la Distribución Mayorista de Productos Agrícolas en Lima," CONAP, 1967, for additional information on fresh produce wholesaling in Lima.
26. Of 43 wholesalers, 5 had 1 truck each, 1 had 2 trucks, and 10 owned smaller vehicles such as pickups or cars for use in their business.
27. It is important to distinguish between credit made available to farmers by wholesalers at early stages of the production cycle and credit made available just prior to harvest time. The former is known as "habilitation" while the latter is known as "guaranteeing purchase." Most wholesalers appear to make this distinction. Some may not. Of 43 wholesalers interviewed, ten claimed that they did not lend cash or make production inputs available to farmers. Thirty-three claimed to regularly "habilitate" farmers, and of these, 24 volunteered additional information. Twenty-four merchants habilitated 212 farmers, shipping an estimated 703 truck loads of potatoes in 1971. This represented an estimated 13 percent of their total rural shipments. About 85 percent of "habilitated" shipments came from the sierra. The amounts of "habilitation" vary from a few thousand soles per farmer and upwards. Loans are normally cancelled at harvest by adjusting prices.
28. See next section and Appendix B.
29. Some potatoes pass through three hands in the marketplace in times of shortage, but most supplies are handled by only two merchants.
30. See Bustamante, Williams, and assoc., op. cit.
31. Information contained in this section apply only to central coast regions. Similar price information for rural sierra areas are not available, and the situation for these may be different than for the coast. However, several larger farmers were found in sierra regions who are sure that wholesale commissions on supplies shipped to Lima normally are around S/.0.10-0.15/kg. There is no evidence that cooperatives would be boycotted by wholesalers. On the contrary, a cooperative establishing steady business relationships with merchants would probably become a prized client. The cooperative "problem" is in rural areas; not in the city.

32. These data are not ideal for margin analysis. Farm prices reflect averages for all qualities while wholesale and retail prices are for first-grade potatoes. It would be better to work with shorter-term data as well.
33. Based on S/.0.20/kg. for transportation (Cañete, Barranca) and S/.0.15 sorting, packing, and handling.
34. EPSA (Empresa Pública de Servicios Agropecuarios) was created in 1969. It engages in a wide variety of food programs, some of which were inherited from other agencies. The potato program represents a small part of its total activities. For a brief description of its programs, listing of general objectives, and a frank discussion of some important administrative and financial difficulties see "Informe de la Situación Actual," Empresa Pública de Servicios Agropecuarios, Lima, 1972.
35. Heavy rains in the sierra may have been somewhat unfavorable to yields while on the coast unusually warm weather did adversely affect yields. Credit allocated to potato production in 1971 for the 1972 sierra crop was reduced. This followed an unusually abundant year when some farmers were reported to have lost money on potato production. Credit allocation policy needs to be studied and, perhaps, modified to better assist in supply stabilization. Seed shortages were an important factor causing coast plantings to be low. These difficulties are in part transitory but could become longer-term in nature.

In the absence of good production cost data, it is difficult to know how much of a production disincentive the fixed price of S/.4.20/kg. has been. It is generally accepted that potato production costs per hectare have increased, though it is not known by how much. In the sierra, average yield data indicate little change in production per hectare, hence, per kilo costs have probably increased. On the other hand, coast yields have increased steadily. The fixed price in Lima would tend to discriminate against sierra producers more than coast producers because of larger transportation costs, everything else equal. The general increase in retail margins is consistent with a hypothesis that farmers feeling price control pressures have been sending inferior products to market. The evidence of increased tendency to market native colored varieties indicates that earnings on white potatoes are not as attractive relative to these. The reported tendency of some coast farmers to water heavily just prior to market in order to increase weight (but not quality) may be another undesirable feature of a low fixed price in times of relative shortage.

36. Affiliated stores may be better adapted to areas where customers require credit extension by retailers. For practical procedures to estimate the possibilities for different types of small multiproduct stores in low income areas, the reader may wish to refer to Long, D. L., "Supermarket Expansion Feasibility Study," USAID/Chile Report, May 1970.

APPENDIX A
STATISTICAL TABLES

Table A.1. Potato Production, Area, and Yield Statistics: Perú, 1955-71.

Year	Production	Area	Yield
	(1,000 M.T.)	(1,000 ha.)	(M.T./ha.)
1955	1,382.6	34.7	5.9
1956	1,032.9	22.3	4.6
1957	1,106.4	219.3	5.0
1958	1,222.3	217.7	5.6
1959	1,217.1	221.3	5.5
1960	1,397.8	254.0	5.5
1961	1,492.3	258.2	5.8
1962	1,416.2	252.8	5.6
1963	1,426.9	254.4	5.6
1964	1,531.1	261.5	5.9
1965	1,568.2	251.1	6.2
1966	1,440.5	245.6	5.9
1967	1,633.7	259.9	6.3
1968	1,526.2	250.9	6.1
1969	1,785.1	292.5	6.1
1970	1,929.7	315.2	6.1
1971	1,967.9	320.1	6.2

Source: Agricultural Statistics Office.

Note: Regional figures in Tables 1.1 and A.2 for years prior to 1964 do not sum to national totals because the latter were adjusted by the Agricultural Statistics Office.

Table A.2. Land Area Planted to Potatoes by Region: 1955-71.

Year	North Sierra	North Coast	Central Sierra	Central Coast	South Sierra	South Coast
(1,000 ha.)						
1955	35.2	0.5	83.0	4.6	109.3	2.1
1956	41.6	0.6	67.9	4.7	107.6	2.0
1957	47.7	0.6	67.6	4.2	97.6	1.5
1958	48.4	0.6	63.1	3.9	100.0	1.7
1959	52.4	0.5	59.2	4.8	102.5	1.9
1960	55.2	0.5	67.9	4.7	102.6	2.2
1961	55.1	0.5	67.1	4.6	106.1	1.8
1962	56.5	0.4	67.1	4.8	99.7	1.7
1963	58.9	0.6	67.3	4.5	103.2	1.5
1964	65.5	1.2	90.4	5.4	97.8	1.2
1965	58.4	2.0	92.2	5.2	91.4	1.9
1966	55.7	0.6	104.5	5.4	77.4	2.0
1967	58.3	0.8	110.8	6.6	80.9	2.5
1968	53.7	1.0	120.7	6.1	67.1	2.3
1969	65.7	0.8	139.8	6.4	78.2	1.7
1970	64.3	0.3	148.3	8.3	92.4	1.6
1971	67.1	0.2	156.0	6.2	89.2	1.4

Source: Agricultural Statistics Office.

Table A.3. Dry Crop and Irrigated Crop Production Statistics: Sierra Regions, 1966-71.

Region	Year	Dry Crop			Irrigated Crop		
		Production	Area	Yield	Production	Area	Yield
		(1,000 M.T.)	(1,000 ha.)	(M.T./ha.)	(1,000 M.T.)	(1,000 ha.)	(M.T./ha.)
Central	1966	427.4	91.0	4.7	79.3	13.5	5.9
Sierra	1967	541.8	98.1	5.5	67.4	12.7	5.3
	1968	550.8	107.0	5.1	79.8	13.7	5.8
	1969	694.4	126.8	5.5	87.4	13.0	6.7
	1970	719.7	133.6	5.4	107.5	14.7	7.3
	1971	764.4	140.6	5.4	117.9	15.4	7.6
North	1966	369.3	44.4	8.3	108.9	11.3	9.6
Sierra	1967	384.4	46.9	8.2	112.7	11.4	9.8
	1968	347.7	42.3	8.2	100.0	11.4	8.8
	1969	382.6	53.4	7.2	101.9	12.3	8.3
	1970	389.3	52.1	7.5	89.4	12.2	7.3
	1971	384.0	55.0	7.0	81.9	12.1	6.8
South	1966	272.2	67.5	4.0	71.4	9.8	7.3
Sierra	1967	321.0	69.8	4.6	76.3	11.1	6.9
	1968	253.1	59.6	4.2	54.7	7.5	7.3
	1969	320.4	70.2	4.6	68.0	8.0	8.5
	1970	384.0	83.1	4.6	76.5	9.3	8.2
	1971	397.5	79.2	5.0	83.1	10.0	8.3

Source: Agricultural Statistics Office.

Note: The Office of Economic Studies in the DGPA and SIMAP of the DGC both report monthly flow data by point of origin. Prior to 1971, their estimates were based on sack counts. Both agencies used a conversion factor of 100 kg./sack for coastal white potatoes. The DGPA used a conversion factor of 80 kg./sack for sierra white potatoes based on a 1953 SIPA study. SIMAP, which started reporting in 1966, used a conversion factor of 100 kg./sack for sierra white potatoes based on periodic checks in the marketplace. Different conversion factors account for most of the differences in reported figures by the two agencies since 1966. Both SIMAP and DGPA now report SENAMER data. Reported DGPA sierra flows for white potatoes were multiplied by 1.25 and adjusted figures appear in Tables A.4, A.5, and A.6.

Table A.4. Quarterly White Potato Shipments to Lima: Central Sierra, 1958-71.

Year	Quarter			
	I	II	III	IV
	(M.T.)			
1958	NA	NA	8,324	402
1959	8,986	17,655	6,993	576
1960	11,539	16,661	4,809	749
1961	12,380	18,508	6,926	528
1962	11,266	16,316	5,859	974
1963	12,990	20,827	9,387	2,518
1964	18,444	31,178	19,141	3,283
1965	23,131	28,266	10,715	6,084
1966	23,138	19,286	4,595	2,527
1967	26,498	24,417	12,335	2,801
1968	22,255	27,489	8,552	4,461
1969	29,258	28,279	10,793	1,861
1970	28,354	35,212	12,348	2,102
1971	31,228	50,115	16,138	1,013

Source: 1958-66 based on DGPA statistics.
1967-71 SIMAP.

Includes Junín, Huánuco, Pasco, Ayacucho, Huancavelica, Lima.

Table A.5. Quarterly White Potato Shipments to Lima: Northern Regions, 1958-71.

Year	Quarter			
	I	II	III	IV
		(M.T.)		
1958	NA	NA	94	0
1959	679	472	92	4
1960	1,359	882	296	53
1961	1,853	1,629	797	49
1962	1,650	779	642	35
1963	1,785	687	434	55
1964	2,336	1,615	2,247	94
1965	1,977	2,098	5,278	1,148
1966	5,172	16,322	8,956	169
1967	5,277	8,541	10,129	160
1968	2,920	5,716	3,883	308
1969	4,059	10,096	7,402	182
1970	5,566	7,938	8,944	267
1971	3,311	2,656	4,395	55

Source: 1958-66 DGPA statistics multiplied by 1.25. See Note on p. 69. 1967-71 SIMAP.

Includes Ancash, La Libertad, Cajamarca, Lambayeque, Piura.

Table A.6. Quarterly White Potato Shipments to Lima: Southern Regions, 1958-71.

Year	Quarter			
	I	II	III	IV
	(M.T.)			
1958	NA	NA	0	0
1959	115	0	0	0
1960	0	6	18	0
1961	23	0	0	17
1962	24	48	0	0
1963	94	8	4	0
1964	76	0	83	0
1965	0	0	34	3
1966	5	0	68	0
1967	20	0	0	0
1968	0	0	0	0
1969	0	192	69	15
1970	1,020	84	511	12
1971	10	76	142	24

Source: 1958-66 DGPA statistics multiplied by 1.25. See Note on p. 69. 1967-71 SIMAP.

Includes Cuzco, Arequipa, Apurímac.

Table A.7. Quarterly White Potato Shipments to Lima: Central Coast, 1958-71.

Year	Quarter			
	I	II	III	IV
	(M.T.)			
1958	NA	NA	10,111	19,209
1959	5,431	62	12,205	19,819
1960	4,111	43	14,972	20,405
1961	4,456	72	12,912	21,978
1962	3,607	231	14,965	20,715
1963	2,325	51	12,470	19,204
1964	3,461	445	10,661	31,607
1965	3,526	121	16,941	26,758
1966	801	232	9,857	35,593
1967	5,136	503	17,241	36,450
1968	4,495	552	24,404	37,654
1969	1,965	495	26,250	41,626
1970	1,563	544	25,337	57,249
1971	14,212	549	29,993	49,810

Source: 1958-66 DGPA.
1967-71 SIMAP.

Includes Lima and Ica.

Table A.8. Quarterly Yellow Potato Shipments to Lima: Central Sierra, 1958-71.

Year	Quarter			
	I	II	III	IV
		(M.T.)		
1958	NA	NA	699	218
1959	574	1,283	404	340
1960	763	993	288	202
1961	871	765	350	193
1962	521	480	264	212
1963	564	476	322	375
1964	1,087	1,476	1,111	604
1965	505	1,007	394	322
1966	185	448	232	246
1967	136	231	163	541
1968	111	154	294	502
1969	559	601	725	814
1970	558	1,137	679	1,201
1971	1,431	2,044	1,117	1,412

Source: 1958-68 DGPA.
1970-71 SIMAP.

Includes Junín, Huánuco, Pasco, Ayacucho, Huancavelica, Lima.

Table A.9. Quarterly Yellow Potato Shipments to Lima: Northern Regions, 1958-71.

Year	Quarter			
	I	II	III	IV
	(M.T.)			
1958	NA	NA	--	--
1959	--	1	--	--
1960	25	41	--	--
1961	101	12	13	--
1962	--	--	--	--
1963	--	--	--	--
1964	10	37	8	--
1965	--	5	10	--
1966	--	--	--	--
1967	10	12	11	--
1968	10	--	13	--
1969	20	34	3	--
1970	82	34	21	35
1971	300	197	147	27

Source: 1958-68 DGPA.
1970-71 SIMAP.

Includes Ancash, La Libertad, Cajamarca, Lambayeque, Piura.

Table A.10 Quarterly Yellow Potato Shipments to Lima: Central Coast, 1958-71.

Year	Quarter			
	I	II	III	IV
	(M.T.)			
1958	NA	NA	15	18
1959	--	--	17	11
1960	--	--	--	95
1961	--	5	22	19
1962	--	--	16	44
1963	--	--	7	21
1964	--	7	16	184
1965	--	--	10	21
1966	--	--	30	60
1967	--	--	33	57
1968	--	--	28	89
1969	--	2	115	106
1970	5	2	314	556
1971	360	9	1,004	1,800

Source: 1958-68 DGPA.
1970-71 SIMAP.

Includes Lima and Ica.

Table A.11. Monthly White Potato Retail Prices: Lima, 1958-72.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	(S./kg.)												
1958	2.10	2.30	2.10	2.00	1.90	1.80	1.90	2.10	1.80	1.50	1.50	1.50	1.88
1959	1.95	2.35	2.45	2.30	2.10	2.20	2.35	2.20	1.35	1.35	1.50	2.25	2.03
1960	2.40	2.45	2.25	2.10	2.30	2.30	2.60	2.60	2.10	2.10	2.00	2.05	2.27
1961	2.56	2.61	2.47	2.50	2.45	2.24	2.39	2.24	2.07	--	2.14	2.99	2.42
1962	2.65	2.78	2.81	2.29	2.23	2.22	2.32	2.52	1.76	1.88	2.18	2.87	2.38
1963	4.06	3.69	3.46	2.58	2.34	2.26	2.25	2.17	2.42	2.64	2.59	2.69	2.76
1964	2.99	2.78	2.47	2.55	2.45	2.37	2.32	2.64	2.10	1.71	1.73	2.24	2.36
1965	2.71	2.73	3.02	2.84	2.78	2.70	2.61	2.71	2.70	3.30	3.41	4.47	3.00
1966	4.38	4.42	4.53	4.21	4.21	4.07	4.47	5.13	3.99	3.93	3.81	3.64	4.23
1967	3.54	3.85	3.62	3.33	3.26	3.12	3.25	3.35	2.55	2.12	1.92	3.06	3.01
1968	3.44	3.61	3.87	3.71	3.74	3.81	4.07	4.18	3.11	2.89	3.29	3.76	3.62
1969	5.17	5.57	5.48	5.29	4.85	4.32	4.14	4.10	4.15	3.87	4.09	4.27	4.61
1970	5.87	4.24	4.04	4.06	4.09	4.05	4.04	4.04	4.03	3.76	3.30	3.24	4.06
1971	3.72	3.89	3.94	3.98	4.01	3.99	4.00	3.99	3.96	3.95	3.99	4.08	3.96
1972	5.51	5.56	6.94	5.42	4.38	5.59	4.82	4.71	4.66	4.63	4.49	4.63	5.11

Source: ONEC.

Table A.12. Monthly White Potato Wholesale Prices: Lima, 1953-72.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
(S./kg.)													
1953	1.38	1.58	1.34	1.29	1.20	1.19	1.31	1.20	0.92	0.99	1.15	1.21	1.23
1954	1.44	1.31	1.20	1.16	1.12	1.20	1.46	1.40	1.29	1.16	1.19	1.33	1.27
1955	1.39	1.51	1.56	1.27	1.20	1.20	1.23	1.14	0.88	0.80	1.78	1.02	1.16
1956	1.32	1.54	1.36	1.35	1.35	1.20	1.20	1.09	0.97	1.00	1.16	1.26	1.23
1957	1.62	1.93	2.23	1.72	1.32	1.26	1.48	1.90	1.54	1.43	1.48	1.57	1.62
1958	1.87	1.94	1.81	1.44	1.40	1.33	1.60	1.65	1.50	1.21	1.09	1.22	1.51
1959	1.67	1.94	1.83	1.75	1.58	1.54	1.65	1.55	1.06	1.16	1.33	1.71	1.56
1960	2.15	1.93	1.67	1.61	1.65	1.91	2.38	1.96	1.61	1.74	1.69	1.67	1.83
1961	2.18	2.07	2.00	1.97	1.88	1.85	2.07	1.57	1.26	1.12	1.14	1.28	1.70
1962	2.17	2.04	1.87	1.49	1.51	1.53	1.88	1.87	1.47	1.59	1.91	2.62	1.83
1963	3.17	2.94	2.42	1.84	1.62	1.73	1.74	1.77	2.08	2.22	2.18	2.23	2.16
1964	2.51	2.19	2.07	2.11	1.97	1.83	1.84	1.86	1.71	1.42	1.33	1.84	1.89
1965	2.01	2.12	2.57	2.36	2.22	2.10	2.23	2.31	2.35	2.50	2.75	3.63	2.43
1966	3.31	3.74	3.50	3.48	3.50	3.41	4.12	4.46	3.64	3.45	3.07	2.92	3.55
1967	2.85	3.02	2.72	2.58	2.54	2.41	2.65	2.63	1.96	1.55	1.45	2.47	2.40
1968	2.80	2.99	3.09	2.96	2.99	3.14	3.52	3.44	2.40	2.24	2.70	3.34	2.97
1969	4.06	4.54	4.42	4.01	4.00	3.50	3.35	3.11	2.98	2.77	3.33	3.79	3.65
1970	5.17	3.64	3.04	2.86	3.00	3.28	3.07	3.03	2.35	1.95	1.60	1.69	2.89
1971	2.04	2.08	2.27	2.43	2.85	2.89	2.80	2.73	2.52	2.49	2.85	3.62	2.63
1972	4.15	4.28	4.30	4.00	3.70	4.20							

Source: DGPA.

Table A.13. Monthly White Potato Wholesale Prices for Selected Provincial Markets: July 1969-June 1972.

	Huancayo	Arequipa	Cuzco	Trujillo	Huánuco	Chiclayo
	(S././kg.)					
1969 July	2.84	3.91	NA	NA	NA	2.54
Aug.	2.71	3.56	2.47	2.68	NA	2.72
Sept.	2.76	3.24	2.97	3.15	2.75	3.08
Oct.	3.05	3.30	2.88	3.19	3.17	2.91
Nov.	3.55	3.67	2.80	3.47	3.06	3.34
Dec.	3.75	4.05	2.86	3.57	3.05	3.45
1970 Jan.	3.79	4.44	3.82	3.96	3.65	3.43
Feb.	3.29	4.11	3.88	3.28	3.45	2.89
Mar.	2.70	3.84	3.26	2.86	2.81	2.65
Apr.	2.31	3.59	2.64	2.54	2.01	2.34
May	2.39	3.17	2.16	2.56	2.24	2.32
June	2.56	3.39	2.09	2.49	2.25	2.44
July	2.64	3.47	2.33	2.51	2.45	2.35
Aug.	2.80	3.15	2.35	2.67	2.43	2.61
Sept.	2.86	3.50	2.25	2.88	2.69	2.99
Oct.	2.60	3.39	2.16	2.25	3.05	2.13
Nov.	2.27	2.91	1.79	1.79	2.90	1.74
Dec.	2.37	2.93	2.52	1.76	2.55	1.69
1971 Jan.	2.44	3.15	2.92	2.07	2.26	1.79
Feb.	2.27	3.03	2.78	1.90	1.92	1.92
Mar.	2.16	3.02	3.03	2.28	1.69	2.03
Apr.	2.12	3.47	2.63	2.30	2.00	2.31
May	2.08	3.56	2.06	2.02	1.93	2.00
June	1.97	3.31	2.17	2.01	1.80	1.85
July	2.19	3.29	NA	NA	NA	NA
Aug.	2.27	3.34	NA	NA	1.95	NA
Sept.	2.20	3.14	NA	NA	2.00	NA
Oct.	2.37	3.57	NA	NA	2.29	NA
Nov.	2.45	3.51	NA	NA	2.92	NA
Dec.	3.30	3.73	NA	NA	3.25	NA
1972 Jan.	4.00	4.18	NA	NA	NA	NA
Feb.	4.09	4.30	NA	NA	NA	NA
Mar.	3.96	4.30	NA	NA	NA	NA
Apr.	3.60	4.28	NA	NA	3.75	NA
May	3.01	4.12	NA	NA	2.99	NA
June	2.86	3.60	NA	NA	3.03	NA

Source: SIMAP.

Table A.14. Monthly On-Farm White Potato Prices: Central Coast, 1967-71.

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
	(S./kg.)						
1967-68	NA	NA	NA	1.13	1.01	1.91	2.48
1968-69	3.42	3.01	2.03	1.81	2.42	2.75	3.41
1969-70	2.50	2.44	2.39	2.23	2.71	2.97	--
1970-71	2.60	2.79	2.45	1.64	1.28	1.43	1.85
1971-72	2.36	2.15	2.06	1.78	2.16	2.92	--

Source: Fourth Agrarian Zone Office, Lima.

Table A.15. Monthly Yellow Potato Retail Prices: Lima, 1959-72.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	(S./kg.)												
1959	4.20	4.20	2.50	3.00	3.00	2.65	2.85	3.00	3.00	3.00	3.25	3.90	3.21
1960	3.60	3.58	3.60	3.45	3.60	3.35	3.60	3.60	3.85	3.85	4.50	3.80	3.70
1961	3.45	3.52	3.66	3.92	3.53	3.43	3.45	3.35	3.55	3.61	4.68	4.73	3.74
1962	4.23	3.80	3.71	3.96	3.79	3.84	3.96	4.31	4.61	4.90	4.92	4.35	4.20
1963	4.36	4.18	4.08	3.98	3.84	3.75	3.71	3.69	3.87	4.56	4.65	4.20	4.07
1964	4.07	3.94	3.85	3.75	3.58	3.54	3.52	3.50	3.53	3.52	3.55	3.79	3.68
1965	4.56	3.91	4.46	3.24	4.19	4.14	4.13	4.31	5.90	7.14	6.39	5.17	4.89
1966	5.10	5.25	5.22	5.18	5.14	6.01	6.09	6.96	5.91	5.81	6.03	5.94	5.25
1967	5.25	5.68	5.81	5.48	4.91	4.87	5.22	5.94	6.16	6.19	6.45	6.12	5.67
1968	6.24	6.21	6.24	6.19	5.87	5.87	6.07	7.23	6.71	7.15	7.51	6.93	6.52
1969	6.07	6.37	7.10	6.91	6.25	6.13	5.74	5.97	6.69	6.59	6.71	7.35	6.49
1970	8.20	7.31	6.53	6.72	6.45	6.58	6.63	6.70	7.09	7.15	6.70	7.13	6.99
1971	7.41	7.08	6.86	7.00	6.73	6.53	6.62	7.05	6.65	6.52	6.79	6.86	6.84
1972	7.35	7.47	8.49	7.74	7.01	7.12	6.99	7.17	7.55	8.62	7.95	8.18	7.64

Source: ONEC.

Table A.16. Monthly Yellow Potato Wholesale Prices: Lima, 1956-72.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(S./kg.)											
1956	--	--	--	--	--	--	1.93	1.91	1.85	2.41	2.29	2.54
1957	3.27	2.82	3.81	2.22	1.99	1.94	1.98	2.29	2.49	2.52	2.95	3.07
1958	3.45	2.65	2.77	2.35	2.12	2.04	2.08	2.30	2.51	2.46	2.53	2.87
1959	3.34	2.67	3.04	2.47	2.21	2.15	2.28	2.55	2.58	2.56	2.67	3.43
1960	2.77	2.78	2.87	2.70	2.96	2.54	2.88	2.99	3.16	3.11	3.68	3.15
1961	3.14	3.58	2.97	3.21	2.65	2.72	2.89	2.60	2.84	3.26	3.71	3.82
1962	3.51	2.67	3.22	3.02	2.96	3.08	3.18	3.49	3.96	3.93	3.93	3.44
1963	3.50	3.31	3.25	3.22	3.17	2.96	3.14	3.03	3.05	3.61	3.45	3.23
1964	3.23	3.05	3.05	3.10	2.93	2.88	2.82	2.85	2.92	2.94	2.89	3.27
1965	4.01	3.23	3.58	3.45	3.39	3.19	3.31	3.60	5.35	5.96	5.01	4.34
1966	4.36	4.15	4.08	4.15	5.03	5.55	5.48	5.01	4.69	5.36	5.27	4.48
1967	3.87	4.05	4.51	4.26	3.62	3.93	4.25	5.08	5.76	5.14	4.66	4.84
1968	5.16	4.97	4.96	4.48	4.68	4.76	5.53	6.50	6.44	6.67	5.82	4.94
1969	4.59	5.15	5.13	5.06	5.16	4.93	4.74	4.98	5.11	5.42	6.05	6.26
1970	7.13	5.77	5.44	5.30	5.17	5.19	5.32	5.84	5.86	5.81	5.65	5.73
1971	5.93	5.30	5.20	5.40	5.32	5.11	5.75	5.65	5.05	5.05	4.68	4.93
1972	5.65	5.78	6.00	6.10	5.80	6.15	--	--	--	--	--	--

Source: DGPA.

Table A.17. Agricultural Development Bank Credit Allocation to Crops and Potatoes: 1964-71.

Period	Total Credit	Total Crop Production	Potatoes
	(millions of S/.)		
10/64 - 9/65	1,763.6	1,523.9	82.5
10/65 - 9/66	2,034.6	1,699.5	117.6
10/66 - 9/67	2,222.9	1,795.9	131.8
10/67 - 9/68	2,860.2	2,235.2	154.2
10/68 - 12/69	4,731.3	3,532.8	251.2
1970	4,381.6	3,057.0	234.2
1971	5,324.9	3,975.8	165.1

Source: Banco de Fomento Agropecuario del Perú.

Note: Does not include Fondos en Fideicomiso.

APPENDIX B

NOTES ON RURAL ASSEMBLY

The Huancayo Terminal

The city of Huancayo is considered to be the most important sierra terminal shipping supplies to Lima. There are five fairly large potato merchants located in the city. These dealers sell to Huancayo retailers, but most of their supplies are shipped to Lima. Their shipments represent only a small part of the local flow. In the production areas, these merchants compete with Lima wholesalers and numerous smaller truckers and rural collectors.

Ulcumayo

The road going east from Carhuamayo forks after about a 20-minute drive, one branch drops down into the Paucartambo valley and the other passes through Ulcumayo. The entire area is devoted to monocultivation of potatoes with the exception of some vegetables produced in lower parts of the valleys. These latter were for local consumption only. Paucartambo has around 650 ha. of potato lands while Ulcumayo contains around 500 ha. Intermediaries who work the area estimate that between 20-30 truck loads per day are exported at the harvest peak (late March-early June), seven to ten truck loads of which come out of Ulcumayo.

There are three important collection points where numerous footpaths converge in Ulcumayo. Each of the points (Ulcumayo, Cucho, and Tingo) contain around five deposits, with an average capacity of about one to two truck loads of potatoes. Most of the potatoes reaching the collection centers arrive in unsorted 60-70 kg. sacks packed on the backs of llamas or burros.

The dominant buyers in the area are four dealers residing in Carhuamayo. In addition, these dealers do some buying in the Yanahuanca area northeast of Cerro de Pasco and in nearby areas on the road to Huánuco. Two of the merchants handle large quantities of potatoes. They have many years experience, own two trucks each, own stores, and have deposits and large sorting spaces. Few Lima dealers own as much working equipment, and it appears that the Carhuamayo merchants are as large or larger than Huancayo dealers.

There are about five or six smaller collectors who reside in the Ulcumayo area. They appear to depend on Carhuamayo dealers to finance their buying activities. At least one, however, is independent and deals directly with the wholesalers in the Lima market. When the harvest is in full production, the total number of buyers increases to 12 or 15. Most of the additional buyers are

Lima wholesalers or their agents. Some come from mining communities. Several of the deposits in the area are the property of Lima dealers.

If these estimates are reasonably accurate, it takes the average buyer about two days to fill a truck. In addition, dealers must sort and repack the potatoes in 100 kg. sacks when shipping to Lima. Most of the farmers sell to intermediaries, only a few shipping directly themselves. Larger farmers usually sort and ship directly themselves. There is some evidence of multiple handling in the overall marketing process prior to arrival in Lima. This occurs primarily at the beginning and ending of the harvest season when smaller buyers experience difficulties in filling an entire truck. When this happens, they normally sell to one of the Carhuamayo dealers.

Price collusion among buyers would be difficult. Nevertheless, farmers complain about low prices and exploitation by intermediaries, most pointedly the Carhuamayo dealers. On the other hand, the dealers mention that farmers could earn much better prices if they would sort and pack the potatoes properly. The dealers take none of the risk involved in production activities. "Habilitation" credit for farmers from merchants is very limited. Some credit is available from merchants to cover harvest costs of some nearby farmers.

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