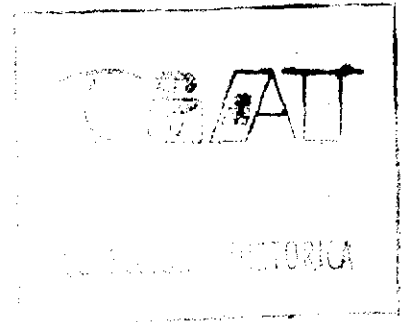


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LATIN AMERICA: TREND HIGHLIGHTS ON
BEANS, CASSAVA, BEEF, CORN, RICE, SWINE AND FERTILIZERS

Internal Document Econ 1.3
April, 1978

Centro Internacional de Agricultura Tropical
Cali, Colombia

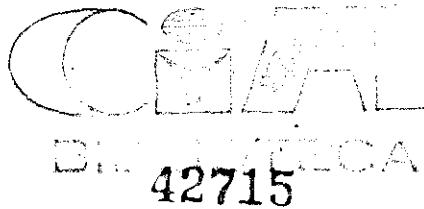
SERVICIOS REPRODUCCION DE Y FOTODUPLICACIONES

Rep.

PREFACE

This document is an updated version of Internal Document Econ 1.2. It has been prepared to provide some information and perspective on the market situation of CIAT's commodities.

The different sections were prepared by the Programs' economists, on the basis of more detailed background papers written at CIAT for beans, cassava, beef, maize, and fertilizers (see references). The compilation was done by G.A. Nores and L. Rivas. //



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1. BEANS

During the last decade dry bean production growth (0.27%) lagged substantially behind the population growth (2.8%). This has resulted in increasing imports and declining per capita consumption for the region¹ (see Tables 1.1 and 1.2). Increasing imports of beans can further aggravate balance of payments problems. Moreover, per capita consumption data indicate that beans are an important component of the diet in many Latin American countries. The nutrition of low income consumers is especially affected by the rapid increases in legume prices in Latin America².

The slight increase in production growth was made possible by area expansion since Latin American bean yields declined over the decade. Latin American trends are principally determined by conditions in Brazil and Mexico, which together are responsible for almost 82 percent of the production of beans (Tables 1.1 and 1.3). In Brazil, which is responsible for 56 of Latin American bean production, the yield decline has been especially rapid (-2.8%)³. Several countries, especially Mexico and Colombia, have had significant increases in yields (Table 1.4 and Figure 1.1). These yield increases appear to

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- ^{1/} Note that production data are for dry beans whereas trade data are only available for the pulses. Hence, it was necessary to assume here that the trends in beans and pulses are the same.
- ^{2/} For further detail see Sanders and Alvarez (1), pp.8-10. The authors estimate that the domestic demand for beans in Latin America has been increasing at an annual rate of 3.2 to 3.6 percent (1,p.9).
- ^{3/} According to the available literature this decline has resulted from increased disease pressure, especially Golden Mosaic, and from beans being forced into more marginal areas. For more detail see Sanders and Alvarez (1), pp.27-30.

be associated with investment in research and the consequent production of new varieties⁴. Nevertheless, Latin American bean yields are only approximately two-fifths those in the U.S., Canada, and Japan. In Chile and Argentina the yields are approximately 400 kg/ha higher than in the other Latin American countries. Latin American bean yields are not only low in an absolute sense but they also fluctuate substantially between years⁵.

⁴/ Sanders and Alvarez (1), p.23.

⁵/ The primary sources of yield variation between farms are diseases, insects, and weather. See Ruiz de Londoño, N. et.al. (2), pp.13-14.

TABLE 1.1

DRY BEANS: PRODUCTION OF LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

Country	1963/65		1973/75	
	Average of period	Percentage of total	Average of period	Percentage of total
	'000 tons	--- % ----	'000 tons	--- % ----
Brazil	2058	59.7	2246	56.2
Mexico	817	23.7	1023	25.6
Argentina	33	1.0	99	2.5
Colombia	42	1.2	71	1.8
Chile	85	2.5	71	1.8
Guatemala	39	1.1	71	1.8
Honduras	49	1.4	51	1.3
Nicaragua	36	1.0	48	1.2
Haiti	40	1.2	44	1.2
Paraguay	40	1.2	42	1.0
El Salvador	14	0.4	37	0.9
Peru	39	1.1	36	0.9
Venezuela	40	1.2	35	0.9
Ecuador	27	0.8	29	0.7
Dominican Rep.	22	0.6	28	0.7
Cuba	27	0.8	24	0.6
Bolivia	14	0.4	20	0.5
Costa Rica	15	0.4	12	0.3
Panama	5	0.1	4	0.1
Uruguay	4	0.1	2	0.0
Puerto Rico	2	0.1	2	0.0
Latin America	3448	100.0	3995	100.0

Source: See Sanders and Alvarez (1).

TABLE 1.2

PULSES¹: PRODUCTION, TRADE AND APPARENT CONSUMPTION OF LATIN AMERICA, BY COUNTRIES
AVERAGES FOR 1963/65 AND 1973/75

Country	Average for 1963/65				Average for 1973/75			
	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption
	-----	'000 tons	-----	- kg/year -	-----	'000 tons	-----	- kg/year -
<u>Exporting:</u>								
Argentina	85	-18	67	3	132	-58	74	3
Chile	106	-27	79	10	97	-25	72	7
Mexico	976	-23	953	23	1313	-12	1301	22
Honduras	49	-18	31	14	51	- 4	47	15
Colombia	91	+ 2	93	5	144	- 3	141	6
Peru	104	+ 2	106	9	88	- 2	86	6
Bolivia	21	+ 0	21	5	29	- 0	29	6
<u>Importing:</u>								
Cuba	27	+62	89	12	24	+93	117	13
Venezuela	46	+32	78	9	41	+30	71	6
Costa Rica	18	+ 1	19	13	14	+17	31	16
Brazil	2123	+ 8	2131	27	2333	+17	2350	22
Dominican Rep.	47	+ 5	52	15	64	+ 4	68	14
Panama	7	+ 3	10	9	5	+ 2	7	4
Guatemala	43	+ 2	45	10	74	+ 3	77	13
Uruguay	7	+ 2	9	3	5	+ 1	6	2
Nicaragua	36	- 2	34	21	48	+ 4	52	24
El Salvador	14	+15	29	10	37	+ 3	40	10
Paraguay	45	- 1	44	23	52	+ 0	52	16
Ecuador	65	+ 0	65	13	54	+ 0	54	8
Others	19	+23	42	5	16	+22	-38	4
Latin America	3929	+70	4042	17	4705	+91	4796	15

¹/ As defined by FAO (5).

Source: See Sanders and Alvarez (1).

TABLE 1.3

DRY BEANS: GROWTH RATES OF PRODUCTION, AREA AND
YIELDS OF LATIN AMERICA, BY COUNTRIES
1965-76

Country	Production	Area	Yields
	----- percentage -----		
Brazil	-0.89	1.92***	-2.81***
Mexico	0.99	-2.07*	3.05***
Argentina	16.17***	14.89***	1.28
Guatemala	4.21***	2.24***	1.97
Colombia	6.77***	3.26**	3.50**
Chile	-0.69	2.75*	-3.45***
Honduras	-0.54	0.88	-1.43
Nicaragua	1.93*	-0.77	1.16
El Salvador	8.79***	6.27***	2.52*
Peru	-3.80**	-2.04	-1.76**
Paraguay	2.04	6.65***	-4.61**
Venezuela	-3.76**	-1.67*	-2.00**
Dominican Rep.	3.41*	1.05	2.36*
Ecuador	-1.16	-0.48	-0.67
Cuba	0.35	-0.59	0.94
Costa Rica	-2.21	-4.25*	2.04
Panama	-5.83**	-4.01**	-1.82
Uruguay	-2.66	-0.65	-2.01**
Latin America	0.27	0.79**	-0.52

*(P<.1)

**(P<.05)

*** (P<.01)

Source: See Sanders and Alvarez (1).

TABLE 1.4

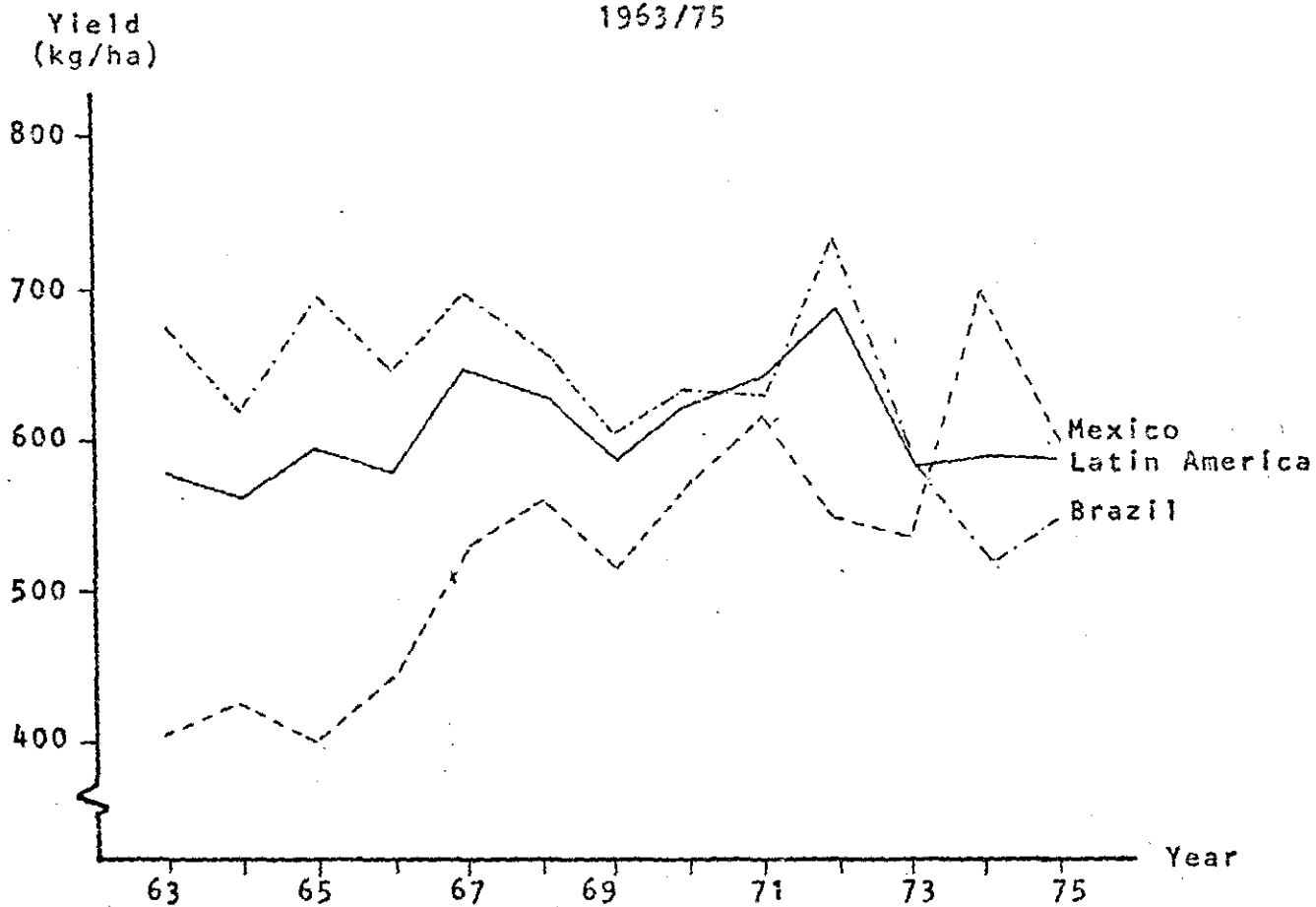
DRY BEANS: AVERAGE YIELDS IN LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

Country	1963/65	1973/75
	----- kg/year -----	
Brazil	665	563
Mexico	414	613
Argentina	997	928
Chile	1316	1019
Guatemala	459	689
Colombia	551	712
Honduras	643	699
Nicaragua	661	730
El Salvador	524	742
Peru	807	618
Venezuela	469	450
Ecuador	510	441
Dominican Rep.	644	820
Cuba	713	777
Costa Rica	309	340
Panama	267	328
Latin America	580	589
U.S.A.	1412	1384
Canada	1628	1411
Japan	1077	1429

Source: See Sanders and Alvarez (1).

FIGURA 1.1

DRY BEANS: AVERAGE YIELDS IN LATIN AMERICA AND
THE TWO MAJOR PRODUCING COUNTRIES
1963/75



Source: See Sanders and Alvarez (1).

2. CASSAVA

Cassava production in the 1963/75 period increased at an annual rate of 1.3 percent per year, well below the population growth rate (Table 2.1). Moreover, this increase in production was due to a more than proportionate expansion in area planted, as average yield levels in Latin America declined by 0.7 percent per annum in the period. These trends, however, are dominated by conditions in Brazil, which makes up 85 percent of Latin American production. Inter-country comparisons show that at least half the cassava growing countries in Latin America had production growth rates at least as high as population growth rates. These were principally the lower income countries. Over half the countries as well had increasing trends in yield levels.

Production of cassava in Latin America (on a dry basis) is about two-thirds of total wheat production. Though cassava is an important food source, production has not been growing at as fast a rate as grain crops. In the main producing countries of Brazil and Paraguay production reached a peak around 1970 and has since declined, although in Brazil this is still above 1963/65 levels. This trend was due in Brazil to a slight increase in planted area but declining yields and in Paraguay to reductions in both area and yields. Outside of these two countries production showed a consistent rising trend, especially in the Andean countries (Table 2.2).

Yields of cassava as compared to most other crops show only slight temporal variability (Figure 2.1). Between countries Brazil and the River Plate countries have the highest yields in the 13 to 15 ton/ha range while most other countries in Latin America average 7 to 9 ton/ha. The Andean countries and a few Caribbean countries have shown a slight increase in yields; but principally production has increased in these coun-

tries through expansion in area.

Consumption of cassava makes up only about 7 percent of the caloric requirements of the Latin American population (Table 2.3). Cassava can be considered a staple only in Brazil and Paraguay. In Brazil consumption is principally concentrated in the Northeast where it makes up about a quarter of total caloric requirements. In Paraguay cassava is also about a quarter of caloric intake.

The Brazilian National Alcohol Commission (CNAL), established in 1975, plans to replace 20 percent of gasoline consumption with alcohol by 1980. Current plans indicate that cassava will be a major raw material source. To date five cassava distilleries have been approved and expansion plans indicate the necessity for an additional one million hectares planted to cassava.

Trade in cassava products from Latin American countries is virtually non-existent. Brazil is the only major exporter but the volume is highly variable, depending on internal market prices. Exports reached a peak of 120 thousand tons in 1965. In the 1970's exports have been in the 20 thousand tons range. By comparison Thailand exported almost 3.5 million tons of cassava pellets to the European Community in 1976.

Prices for cassava products in Latin America are quite variable but suggest a rising trend through the 1970's (Table 2.4). Export prices to European markets have been increasing steadily but continue to remain below domestic prices in Latin American countries.

TABLE 2.1

CASSAVA: GROWTH RATES OF PRODUCTION, AREA AND
YIELDS OF LATIN AMERICA, BY COUNTRIES
1963/75

Country	Production	Area	Yields
	----- percentage -----		
Brazil	1.2*	2.1***	-0.9*
Colombia	5.4***	3.8***	1.6
Paraguay	-1.1	-0.7	-0.4
Peru	0.3	-2.1***	2.4***
Ecuador	7.4***	5.2***	2.2*
Venezuela	-0.4	4.6***	-5.1***
Argentina	0.7	0.9	-0.2
Cuba	2.5***	3.0***	-0.5**
Bolivia	5.0***	4.3***	0.7
Dominican Rep.	1.4*	2.6***	-1.2
Haiti	2.8***	1.3***	1.5***
Honduras	6.0***	3.6***	2.4***
Panama	8.2***	9.8***	-1.6
Jamaica	5.2**	-2.9	8.1**
Nicaragua	3.1***	2.4***	0.7
El Salvador	4.9***	1.9	3.0
Guyana	3.8***	0.0	3.8***
Costa Rica	-0.6	-3.3***	2.7**
Guatemala	3.1***	2.4**	0.7
Puerto Rico	-2.4**	7.6***	5.2***
French Guyana	-0.4***	3.5***	-3.9***
Guadalupe	-2.9	n.a	n.a
Martinic	0.0	n.a	n.a
Surinam	1.1	n.a	n.a
Barbados	0.0	n.a	n.a
Latin America	1.3**	2.1***	-0.7

*(P<.1)

**(P<.05)

*** (P<.01)

Source: See Lynam (3).

TABLE 2.2

CASSAVA: TOTAL AND PER CAPITA PRODUCTION IN
LATIN AMERICA, BY COUNTRIES
AVERAGES FOR 1963/65 AND 1973/75

Country	1973/75	1963/65		1973/75	
	Per-capita production	Total produc- tion	Percent of total	Total produc- tion	Percent of total
	-kilogram-	'000 tons	- % -	'000 tons	- % -
Brazil	245	23866	85.9	25986	84.3
Colombia	54	733	2.6	1353	4.4
Paraguay	446	1320	4.8	1117	3.6
Peru	32	461	1.7	479	1.6
Ecuador	57	215	0.8	396	1.3
Venezuela	25	318	1.1	301	1.0
Argentina	10	244	0.9	261	0.8
Cuba	25	180	0.6	234	0.8
Bolivia	45	143	0.5	233	0.8
Dominican Rep.	35	153	0.5	169	0.5
Haiti	29	111	0.4	144	0.5
Honduras	14	24	0.1	44	0.1
Panama	25	19	0.1	40	0.1
Jamaica	9	9	0.0	19	0.1
Nicaragua	8	13	0.0	18	0.0
El Salvador	4	9	0.0	15	0.0
Guyana	18	10	0.0	14	0.0
Costa Rica	5	10	0.0	10	0.0
Guatemala	1	5	0.0	7	0.0
Puerto Rico	2	6	0.0	5	0.0
French Guyana	69	6	0.0	4	0.0
Trinidad & Tobago	5	4	0.0	5	0.0
Guadalupe	9	5	0.0	3	0.0
Martinic	8	3	0.0	3	0.0
Surinam	5	2	0.0	2	0.0
Barbados	4	1	0.0	1	0.0
Latin America	126	27870	100.0	30863	100.0

Source: See Lynam (3)

TABLE 2.3
 CASSAVA: PER-CAPITA APPARENT CONSUMPTION IN
 LATIN AMERICA, BY COUNTRIES
 1964/66

Country	Production per-capita	Consumption per-capita	Calorie per day	Cassava as percentage of minimum calorie requirement
	----- kg/year -----			----- % -----
Paraguay	722	181	540	23.4
Brazil	298	105	274	11.5
Ecuador	23	15	41	1.8
Colombia	43	26	74	3.2
Bolivia	40	26	74	3.1
Dominican Rep.	43	28	82	3.6
Peru	41	30	88	3.7
Haiti	27	23	69	3.1
Cuba	26	22	65	2.8
Panama	16	11	35	1.5
Venezuela	34	25	68	2.8
Guyana	16	14	41	1.8
Honduras	11	11	31	1.4
Argentina	11	5	12	0.5
Jamaica	5	3	11	0.5
Nicaragua	9	8	21	0.9
Costa Rica	7	6	17	0.9
El Salvador	3	3	8	0.3
Puerto Rico	2	2	6	0.3
Guatemala	1	1	3	0.1
Latin America ¹	139	53	158	6.6

^{1/} Also includes Mexico, Uruguay, Chile, and Trinidad & Tobago

Source: See Lynam (3).

TABLE 2.4
 PRICES OF CASSAVA PRODUCTS IN SELECTED MARKETS
 1970/76

Year	Fresh cassava Colombia ¹	Cassava flour Brazil ²	Cassava pellets European community ³
----- U.S.¢ per kilogram -----			
1970	n.a	7.8	n.a
1971	n.a	11.0	6.6
1972	9.4	10.8	7.4
1973	7.9	10.8	9.0
1974	8.6	14.8	10.6
1975	10.4	21.5	11.9
1976	7.4	n.a	12.0

¹/ Average wholesale price, Llanera, Bogotá.

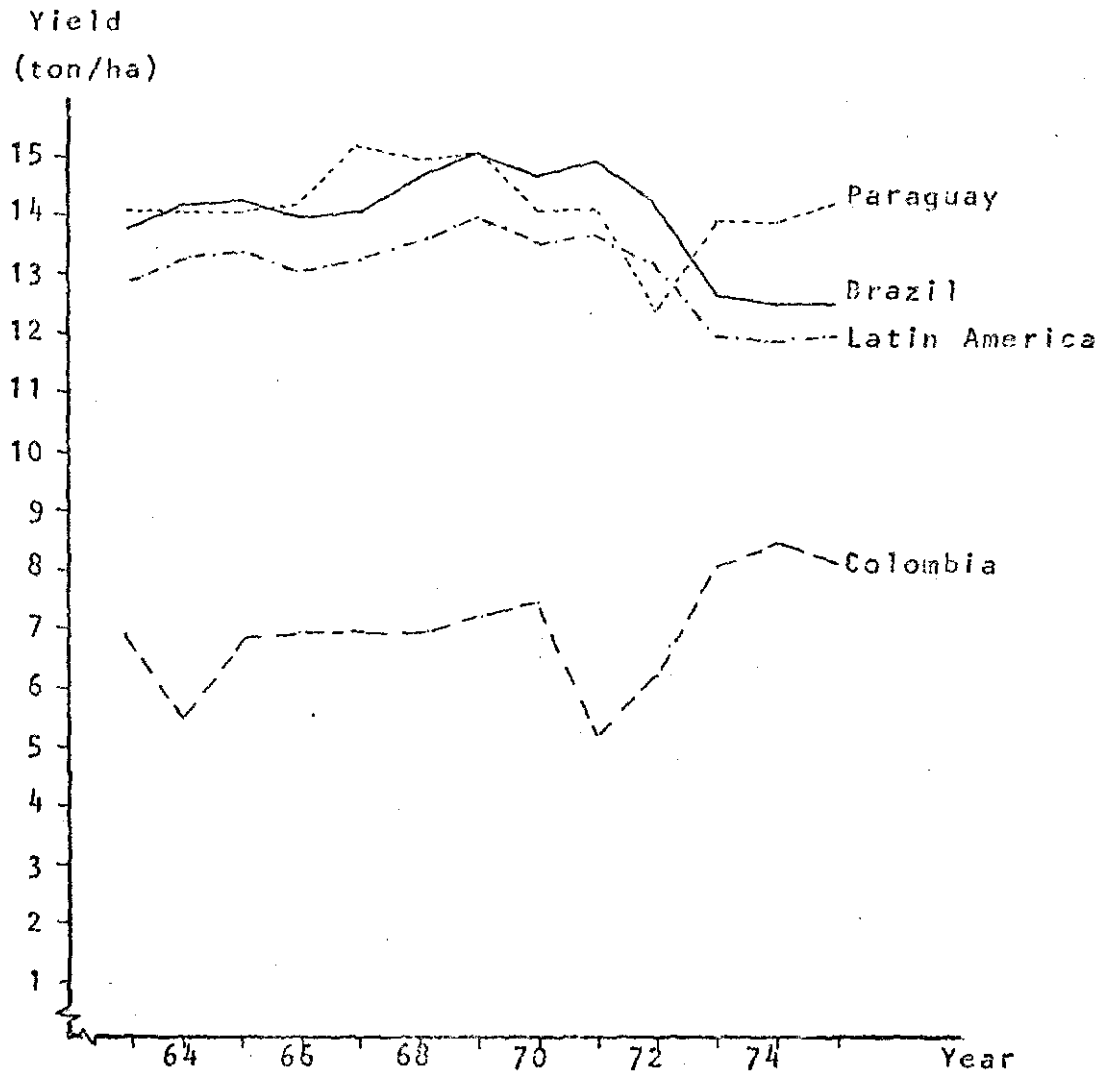
²/ Average wholesale price, flour, Sao Paulo.

³/ Thai native pellets, afloat, c.i.f. Rotterdam.

Source: See Lynam (3).

FIGURE 2.1

AVERAGE CASSAVA YIELDS IN LATIN AMERICA AND THE
THREE MAJOR PRODUCING COUNTRIES
1963/75



Source: See Lynam (3).

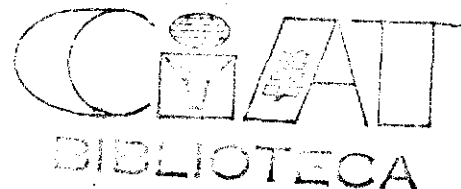
3. BEEF

Table 3.1 illustrates the differences among Latin American countries in terms of livestock inventories and output. In the period 1970/74, Latin America had 42 percent more cattle per inhabitant than the U.S. While the temperate subregion had 3 times the stock per inhabitant, the tropical subregion had only 18 percent more.

Within the tropical subregion, the relative cattle density varies considerably among countries from 0.15 head per person in some Caribbean countries to 1.9 head per person in Paraguay. In spite of these relatively high cattle densities, per capita production in tropical Latin America is substantially lower than in the U.S. and the River Plate area (Argentina, Uruguay, and Paraguay). This is mostly due to a low production efficiency as illustrated by the level of production per head in stock (Table 3.1, last column).

Since production in tropical Latin America increased in the 1960/74 period at a slightly higher rate than population, per capita production also increased slightly from 17 to nearly 18 kg/per capita/year (Table 3.2). However, per capita production declined in a few countries such as Colombia, Cuba, Paraguay, Peru, Bolivia, and El Salvador.

Beef is a major export commodity, and Latin America accounts for a significant part of world trade. In the decade 1960/64 to 1970/74, gross and net beef exports of Latin America increased by 44 and 42 percent respectively, mostly due to sharp increases in exports of Brazil, Colombia, and Central America (Table 3.3). Hence, in spite of the slight increase in per capita production, apparent per capita consumption declined



in tropical Latin America during that period¹. With the only exceptions of Venezuela and Ecuador (beef importing and oil producing countries), per capita beef consumption declined in all countries (Table 3.4).

However, both absolutely and relative to world trade, South American beef exports have declined drastically since 1974. Rising internal demand, together with a large decline in beef imports into the EEC, the United States and Japan, resulted in reduced exports in 1974 and further reductions in 1975 (see Table 3.3, column in parenthesis). A partial recovery was noted in 1976/77. Since the EEC, the United States and Japan account for nearly 75 percent of world beef imports, large fluctuations in their import demands, particularly in those of the EEC, have serious repercussions on the development of the beef sector in South America.

The export situation of the Central American countries (free of hoof and mouth disease) is different. These countries have access with refrigerated beef to the American, Canadian, and Japanese markets. Although the U.S. and Canadian "voluntary quota systems" set maximum import volumes by country of origin, in practice these quotas imply "warranted minimum import volumes" that increase through time as domestic production increases. Such market access implies that exports of some Central American countries may continue to grow more than production at the expense of per capita domestic consumption.

Available secondary data indicates that in most countries, domestic demand for beef has been growing at a faster rate than output (Table 3.5). Costa Rica, Nicaragua, and Honduras were the only exceptions. In tropical Latin America, the rate of increase in demand was 56 percent larger than the rate of growth

^{1/} Besides increases in exports, differences between per capita production and consumption are due to changes in stocks.

of beef output (5.6 and 3.6 percent, respectively). This has resulted in an increasing price of beef over the observed period. If such a gap between the rates of growth of demand (at constant real prices) and of supply persists in the future, prices will continue their upward trend. Since beef consumption of the low income groups appears to be rather sensitive to price variations, a negative impact in their protein intake could be expected as a consequence of the upward trend in beef prices.

In most of Latin America the area in crops is growing at a faster rate than the area in pastures (Table 3.6). In some countries the area in pastures appears to be decreasing. The strategy of CIAT's Beef Program appears to be appropriate since it aims to allow for the widening of the agricultural resource base of these countries in two ways: by incorporating new land into production, and by liberating more fertile areas presently used in grazing for crop production.

Using nutrition, production-demand growth gap, and land endowment for beef production as selection criterias (Tables 3.5 and 3.6), the priority countries would be Ecuador, Bolivia, Colombia, Dominican Republic, Guyana, Peru, and Brazil). In Central America, an exporting region with good access to the U.S. market, priority countries would be Honduras, Guatemala, and Panama.

TABLE 3.1

BEEF: STOCK BY COUNTRY AND PER INHABITANT, BEEF
PRODUCTION PER-CAPITA AND PER HEAD IN STOCK
AVERAGES 1970/74

Region and Country	Stock		Production ¹	
	Total	Per- capita	Per- capita	Per head in stock
	'000 heads	-heads	---- kg/year	---
United States	118803	0.57	51	90
Tropical Latin America ²	166241	0.67	18	27
Brazil	83797	0.84	23	28
Mexico	26328	0.49	14	28
Colombia	21190	0.91	21	23
Venezuela	8581	0.74	21	29
Cuba	7314	0.83	23	27
Paraguay	4583	1.90	50	26
Peru	4004	0.28	7	23
Ecuador	2536	0.39	10	25
Bolivia	2255	0.46	11	24
Central America	10185	0.58	16	28
Nicaragua	2346	1.14	32	28
Guatemala	2129	0.39	11	29
Costa Rica	1641	0.89	31	35
Honduras	1615	0.55	15	27
Panama	1276	0.84	29	34
El Salvador	1178	0.31	4	11
Caribbean	2820	0.22	6	28
Dominican Rep.	1432	0.32	12	38
Guyana	262	0.35	5	15
Other Caribbean ³	1126	0.15	3	18
Temperate Latin America	64506	1.72	76	44
Argentina	52362	2.11	100	47
Uruguay	9260	3.13	117	37
Chile	2884	0.30	15	51
Latin America	238061	0.81	26	32

1/ Includes slaughter and changes in stocks, excludes smuggling and exports on foot.

2/ Excludes Cuba only.

3/ Includes: Trinidad & Tobago, Haiti, Jamaica and Barbados.

Source: See Rivas and Nores (4).

TABLE 3.2

BEEF: PRODUCTION¹ PER-CAPITA IN LATIN AMERICA
FIVE YEAR AVERAGES 1960/74

Region and Country	1960/64	1970/74
	----- kg per-capita/year -----	
United States	44	51
Tropical Latin America ²	17	18
Brazil	21	23
Mexico	12	14
Colombia	23	21
Venezuela	19	21
Cuba	29	27
Paraguay	66	50
Peru	9	7
Ecuador	9	10
Bolivia	16	11
Central America	14	16
Nicaragua	21	32
Guatemala	11	11
Costa Rica	22	31
Honduras	10	15
Panama	26	29
El Salvador	9	4
Caribbean	5	6
Dominican Rep.	8	12
Guyana	5	5
Other Caribbean ³	4	3
Temperate Latin America	83	76
Argentina	102	100
Uruguay	133	117
Chile	19	15
Latin America	27	26

^{1/} Includes changes in stocks, equivalent carcass weight.

^{2/} Excludes Cuba only.

^{3/} Includes: Trinidad & Tobago, Haiti, Jamaica and Barbados.

Source: See Rivas and Nores (4).

TABLE 3.3

BEEF: OUTPUT, TRADE, TOTAL AND PER-CAPITA APPARENT CONSUMPTION OF LATIN AMERICA, BY COUNTRIES
AVERAGES FOR 1960/64 AND 1970/74

Country	Average 1960/64				Average 1970/74			
	Out-put ¹	+Imports ² -Exports	Apparent consump- tion	Apparent per-capita consumption	Out-put ¹	+Imports ² -Exports	Apparent consump- tion	Apparent per-capita consumption
	'000 tons		kg/year		'000 tons		kg/year	
<u>Exporting:</u>	4917	-783	4134	23	5854	-1127(-597)	4727	20
Argentina	2208	-528	1680	79	2225	-539(-266)	1686	68
Brazil	1376	-40	1336	18	2048	-215(-54)	1833	18
Uruguay	309	-112	197	75	314 ³	-133(-101)	181	61
Paraguay	114	-43	71	38	106	-56(-34)	50	21
Mexico	399	-37	362	9	406	-41(-14)	365	7
Nicaragua	32	-7	25	16	61	-33(-29)	28	14
Guatemala	39	-4	35	8	62	-23(-16)	39	7
Colombia	351	0	351	21	426	-22(-14)	404	17
Honduras	18	-3	15	7	42	-21(-22)	21	7
Dominican Rep.	25	-1	24	7	36	-7(-5)	29	6
El Salvador	21	0	21	8	24	-4(-3)	20	5
Costa Rica	25	-8	17	13	50	-31(-39)	19	10
Bolivia	55	+1	56	13	54	-2(n.a)	52	11
<u>Importing:</u>	492	+30	522	13	565	+57(+14)	622	12
Other Caribbean ⁴	24	+17	41	6	25	+20(n.a)	45	6
Chile	148	+8	156	19	151	+28(+5)	179	18
Peru	84	+3	87	8	97	+8(+9)	105	7
Venezuela	140	+1	141	17	230	+1(n.a)	231	20
Ecuador	38	0	38	8	58	0(n.a)	58	9
Guyana	3	0	3	5	4	0(n.a)	4	5
Latin America	5409	-753	4656	21	6419	-1070(-583)	5349	18

^{1/} Slaughters in carcass weight equivalent.

^{3/} Data from Central Bank of Uruguay.

^{4/} Includes Jamaica, Haiti, and Trinidad & Tobago.

^{2/} Beef and veal and canned meat trade in equivalent carcass weight. Excludes fat, offals and live animals. Figures in parenthesis corresponds to year 1975.

Source: See Rivas and Mores (4).

TABLE 3.4

BEEF: TOTAL AND PER-CAPITA APPARENT CONSUMPTION¹
FIVE YEAR AVERAGES 1960/74

Region and Country	1960/64		1970/74	
	Total	Per- capita	Total	Per- capita
	'000 tons	kg/year	'000 tons	kg/year
Tropical Latin America	2623	14	3303	13
Brazil	1336	18	1833	18
Mexico	362	9	365	7
Colombia	351	21	404	17
Venezuela	141	17	231	20
Paraguay	71	38	50	21
Peru	87	8	105	7
Ecuador	38	8	58	9
Bolivia	56	13	52	11
Central America ²	113	10	127	8
Nicaragua	25	16	28	14
Guatemala	35	8	39	7
Costa Rica	17	13	19	10
Honduras	15	7	21	7
El Salvador	21	8	20	5
Caribbean	68	6	73	6
Dominican Rep.	24	7	29	6
Guyana	3	5	4	5
Other Caribbean ³	41	6	45	6
Temperate Latin America	2033	64	2046	51
Argentina	1680	79	1686	68
Uruguay	197	75	181	61
Chile	156	19	179	18
Latin America	4656	21	5349	18

^{1/} Apparent consumption = Output + (Imports-Exports). Trade includes beef and veal and canned meat in equivalent carcass weight.

^{2/} Excludes Panama.

^{3/} Only includes Jamaica, Haiti, and Trinidad & Tobago.

Source: See Rivas and Nores (4).

TABLE 3.5

BEEF: ANNUAL GROWTH RATES OF DOMESTIC DEMAND,
OUTPUT AND PRICES IN LATIN AMERICA
PERIOD 1960/74

Region and Country	Average protein intake ¹ g/day	Annual Growth Rate of:		
		Demand ²	Output ³	Real price ⁴
		----- percentage -----		
Tropical Latin America		5.6 ⁵	3.6	n.a
Venezuela	62	6.9	5.1	5.7
Brazil	67	6.0	3.9	8.8
Bolivia	47	4.9	0.0	n.a
Ecuador	43	7.5	4.2	7.7
Mexico	61	5.3	5.2	n.a
Peru	62	4.7	1.4	n.a
Colombia	50	5.2	2.0	2.9
Paraguay	70	3.1	-1.1	n.a
Surinam	n.a	6.2	0.0	n.a
Central America		5.2 ⁵	5.8	n.a
Guatemala	58	5.6	4.6	0.6 ⁶
Costa Rica	63	5.2	7.1	-1.8
Nicaragua	69	5.2	6.7	5.7
Panama	62	5.9	5.3	n.a
Honduras	53	4.6	8.3	n.a
El Salvador	51	4.8	1.8	n.a
Caribbean		4.5 ⁵	2.3	n.a
Dominican Rep.	50	5.8	3.7	n.a
Guyana	56	4.1	2.6	n.a
Jamaica	67	4.4	0.4	n.a
Haiti	39	3.3	1.2	n.a
Temperate Latin America		2.0 ⁵	0.3	n.a
Argentina	95	1.7	0.5	4.8
Uruguay	98	1.3	-1.2	12.3
Chile	77	3.0	0.2	5.6
Latin America	66	5.1 ⁵	2.2	n.a

^{1/} Total protein intake, average 1971/73.

^{2/} For real price constant, estimated as: $d = p + \epsilon_y \hat{y} + \epsilon_y p_y$
where:

d = growth rate of demand

p = growth rate of population

\hat{y} = growth rate of real income per capita

ϵ_y = income elasticity of demand.

^{3/} Slaughter only.

^{4/} Period 1967/74.

^{5/} Averages weighted by population.

^{6/} Period 1967/71.

Source: See Rivas and Nores (4).

TABLE 3.6

AREA IN ANNUAL AND PERMANENT CROPS, AND IN PERMANENT PASTURES,
AND THEIR RESPECTIVE ANNUAL GROWTH RATES
1961/65 - 1974

Region and Country	Annual and Permanent Crops ¹		Permanent Pastures ²		Annual Growth Rates	
	1961/65	1974	1961/65	1974	Crops	Pastures
	----- 1000 ha -----				--percentage--	
Tropical Latin America	82245	97284	322773	355555	1.54	0.88
Brazil	30254	36060	131880	160900	1.61	2.16
Mexico	24968	27290	73820	67500	0.87	-0.81
Bolivia	1503	3217	28353	27200	7.16	-0.38
Peru	2351	2880	27677	27120	1.86	-0.28
Colombia	5051	5090	17662	17300	0.07	-0.20
Venezuela	5185	5179	14229	16920	-0.01	1.59
Paraguay	852	970	13800	15000	1.19	0.76
Cuba	2230	3720	2349	2700	4.76	1.27
Ecuador	2655	4324	2200	2200	4.53	0.00
Central America	4627	5259	7223	8090	0.78	1.04
Honduras	821	870	2000	2000	0.53	0.00
Nicaragua	865	960	1710	1800	0.95	0.47
Costa Rica	484	501	969	1570	0.31	4.48
Panama	560	555	899	1150	-0.08	2.26
Guatemala	1442	1700	1039	900	1.51	-1.30
El Salvador	655	673	606	670	0.25	0.92
Caribbean	2429	3195	4260	4625	2.52	0.75
Guyana	402	845	2544	2380	6.99	-0.60
Dominican Rep.	860	995	1020	1450	1.33	3.25
Haiti	765	905	430	560	1.54	2.43
Jamaica	233	260	256	220	1.00	-1.37
Trinidad & Tobago	139	157	6	11	1.11	5.66
Barbados	30	33	4	4	0.87	0.00
Temperate Latin America	34083	42024	170119	169000	1.92	-0.06
Argentina	28098	34420	146500	143800	1.86	-0.17
Uruguay	1779	1852	13769	13600	0.42	-0.11
Chile	4206	5742	9850	11600	2.87	1.50
Latin America	116328	130300	492892	524555	1.65	0.57

1/ As defined by FAO: Arable land and permanent crops, includes annual fallow land.

2/ Native and improved permanent pastures as defined by FAO.

Source: See Rivas and Nores (4).

4. RICE

Rice production in Latin America increased in the 1963/75 period at an annual rate of 2.8 percent, equal to the population growth rate (Table 4.1 and 4.2). Moreover, production increased at a faster rate than population in most countries, with the exceptions of Brazil, Honduras, El Salvador, Panama, and Chile. Since Brazil's participation in total production of the region is high (69%), its slow production growth (1.2% per annum) dominated the overall trend thereby compensating for the high growth rates in the majority of the countries.

In general, only one third of the increases in production could be attributed to increases in yields (Table 4.2). The remaining two thirds are attributable to area increases. This, however, varies from country to country. In Colombia, Ecuador, Panamá, Belize, Haiti, and Trinidad & Tobago, most of the increases in production were due to yield increases. In contrast, the increases in production of Brazil, Cuba, Argentina, Bolivia, Paraguay, and Guatemala, were mostly due to area increases. In all of these countries except Cuba and Argentina, most of the production increase apparently relied on area expansion of non-irrigated rice. Production increases in the remaining countries were due to different combinations of both factors.

During the period 1963/65 to 1973/75, gross imports expressed as a percentage of regional apparent consumption remained at around 4 percent. However, if Brazil is excluded, gross imports during that period declined from 12.2 to 8.6 percent of regional apparent consumption, indicating a slight trend of improvement in the importing countries. Gross regional imports have still increased by 22 percent (from 386,700 to 472,000 tons). As a result of the increase in exports of some countries, mainly Colombia, Venezuela, Uruguay, and

Surinam, net regional imports have remained at around 150,000 tons.

Cuba is by far the largest importer of rice, followed by Peru, the Dominican Republic, Chile, Mexico, Trinidad & Tobago, and Ecuador, countries in which import trends show persistence. Uruguay, Colombia, Guyana, Surinam, Argentina, and Venezuela are the main exporting countries. Brazil, formerly the largest exporter, has become an importer of rice.

Per capita rice availability (for consumption and other uses) varies considerably among countries. In five countries, Guatemala, Honduras, El Salvador, Chile, and Mexico, apparent per capita consumption is below 10 kg per annum (see Table 4.4). In these countries average yields are rather low and have been increasing at a low pace, or even declining as it is the case of Honduras. Hence they could be considered as problem countries in terms of rice production and technology. In addition, energy deficient countries which have low per capita availability of rice are Haiti, Bolivia, and Paraguay (Table 4.5). Moreover, problem countries are also Cuba, Peru, Dominican Republic, Trinidad & Tobago, Ecuador, and Brazil. These countries are either importing large volumes or show stagnant (Peru) or declining average yields (Paraguay and Brazil).

In terms of regions where imports account for a high percentage of total availability, the problem countries could be ranked as follows: Trinidad & Tobago (62%), Cuba (38%), Chile (38%), Belize (14%), Dominican Republic (12%), and Peru (12%).

TABLE 4.1
RICE: PRODUCTION OF LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

Country	1963/65		1973/75	
	Average of period	Percentage of total	Average of period	Percentage of total
	'000 tons	--- % ----	'000 tons	--- % ----
Brazil	6555	69.2	7108	57.1
Colombia	590	6.2	1435	11.6
Mexico	301	3.2	522	4.2
Peru	304	3.2	437	3.5
Cuba	138	1.5	398	3.2
Dominican Rep.	144	1.5	341	2.8
Venezuela	166	1.8	323	2.6
Argentina	212	2.2	309	2.5
Ecuador	172	1.8	277	2.3
Guyana	239	2.6	214	1.7
Panama	130	1.4	173	1.4
Surinam	88	0.9	167	1.3
Uruguay	71	0.7	161	1.3
Costa Rica	71	0.7	117	0.9
Haiti	37	0.4	102	0.8
Bolivia	42	0.4	88	0.7
Nicaragua	31	0.3	83	0.7
Chile	86	0.9	56	0.4
Paraguay	19	0.2	43	0.3
El Salvador	30	0.3	35	0.3
Guatemala	17	0.2	29	0.2
Honduras	24	0.3	17	0.1
Trinidad & Tobago	10	0.1	17	0.1
Belize	2	0.0	8	0.0
Latin America	9479	100.0	12459	100.0

Source: FAO (5).

TABLE 4.2

RICE: ANNUAL GROWTH RATES OF PRODUCTION, AREA AND YIELDS
OF LATIN AMERICA, BY COUNTRIES
1963-75

Country	Production	Area	Yields
	----- percentage -----		
Brazil	1.18*	1.72***	-0.53
Colombia	8.47***	0.67	7.80***
Mexico	4.92***	2.79***	2.13***
Peru	3.99**	3.45*	0.54
Cuba	14.07***	10.79***	3.28*
Dominican Rep.	4.57***	0.05	4.52***
Venezuela	5.18***	1.60	3.58**
Argentina	5.02***	4.72***	0.30
Ecuador	4.13**	-1.15	5.28***
Guyana	-1.13	-0.04	-1.09
Panama	2.16**	-1.35	3.52***
Surinam	5.94***	3.95***	1.99**
Uruguay	8.19***	5.16***	3.03**
Costa Rica	4.12***	1.67	2.45
Haiti	11.52***	4.10**	7.42***
Bolivia	7.32***	5.94***	1.38
Nicaragua	9.07***	1.68	7.39***
Chile	-4.17*	-5.38***	1.20
Paraguay	10.59***	12.94***	-2.35**
El Salvador	0.65	-1.64	2.29*
Guatemala	6.70**	4.79***	1.91
Honduras	-4.36**	-1.00	-3.36***
Trinidad & Tobago	4.44***	-1.49	5.93***
Belize	16.21***	6.47***	9.74***
Latin America	2.85	1.92	0.93

*(P<.1)

**(P<.05)

*** (P<.01)

Source: Estimated from FAO (5).

TABLE 4.3

RICE: AVERAGE YIELDS IN LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

Country	1963/65	1973/75
	----- kg/ha -----	
Brazil	1570	1478
Colombia	1964	4229
Mexico	2176	2796
Peru	3965	4152
Cuba	1543	2043
Dominican Rep.	2238	3444
Venezuela	1841	2774
Argentina	3655	3660
Ecuador	1501	2698
Guyana	2090	1842
Panama	1092	1574
Surinam	2870	3747
Uruguay	3057	3873
Costa Rica	1374	1182
Haiti	1100	2243
Bolivia	1385	1686
Nicaragua	1314	2976
Chile	2698	2947
Paraguay	2524	1985
El Salvador	2406	2866
Guatemala	1646	1776
Honduras	1622	1209
Trinidad & Tobago	1722	2945
Belize	833	2186
Latin America	1689	1869

Source: Estimated from FAO (5).

TABLE 4.4

RICE: PRODUCTION, TRADE AND APPARENT CONSUMPTION OF LATIN AMERICA, BY COUNTRIES
AVERAGES 1963/65 AND 1973/75

Country	Average for 1963/65				Average for 1973/75			
	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption
	'000 tons			kg/year	'000 tons			kg/year
<u>Exporting:</u>	1617	-137	1480	26	3025	-330	2695	36
Uruguay	71	-19	52	19	161	-67	94	31
Colombia	590	-1	589	33	1435	-63	1372	55
Guyana	239	-82	157	253	214	-61	153	193
Surinam	88	-19	69	214	167	-47	120	292
Argentina	212	-22	190	9	309	-36	273	11
Venezuela	166	-6	160	18	323	-35	288	24
Nicaragua	31	+7	38	23	83	-9	74	34
Costa Rica	71	+2	73	51	117	-7	110	57
Panama	130	+3	133	111	173	-4	169	104
Paraguay	19	+0	19	10	43	-1	42	17
<u>Importing:</u>	7862	+239	8151	46	9434	+472	9906	42
Cuba	138	+252	390	52	398	+249	647	71
Peru	304	+47	351	31	437	+59	496	33
Dominican Rep.	144	+25	169	43	341	+48	389	81
Chile	86	+11	97	12	55	+33	88	9
Mexico	301	+6	307	7	522	+31	553	10
Trinidad & Tobago	10	+29	39	43	17	+28	45	47
Ecuador	172	+2	174	35	277	+15	292	42
Guatemala	17	-1	16	4	29	+2	31	5
Haiti	37	+1	38	10	102	+2	104	21
Brazil	6555	-83	6472	81	7108	+1	7109	67
Belize	2	+2	4	35	8	+1	9	68
Honduras	24	+1	25	11	17	+1	18	6
Bolivia	42	+0	42	10	88	+1	89	17
El Salvador	30	-3	27	9	35	+0	35	9
Latin America	9479	+152	9631	41	12459	+142	12601	41

Sources: Production, Trade data from FAO (5) and (6).
Population data from USDA (7).

TABLE 4.5

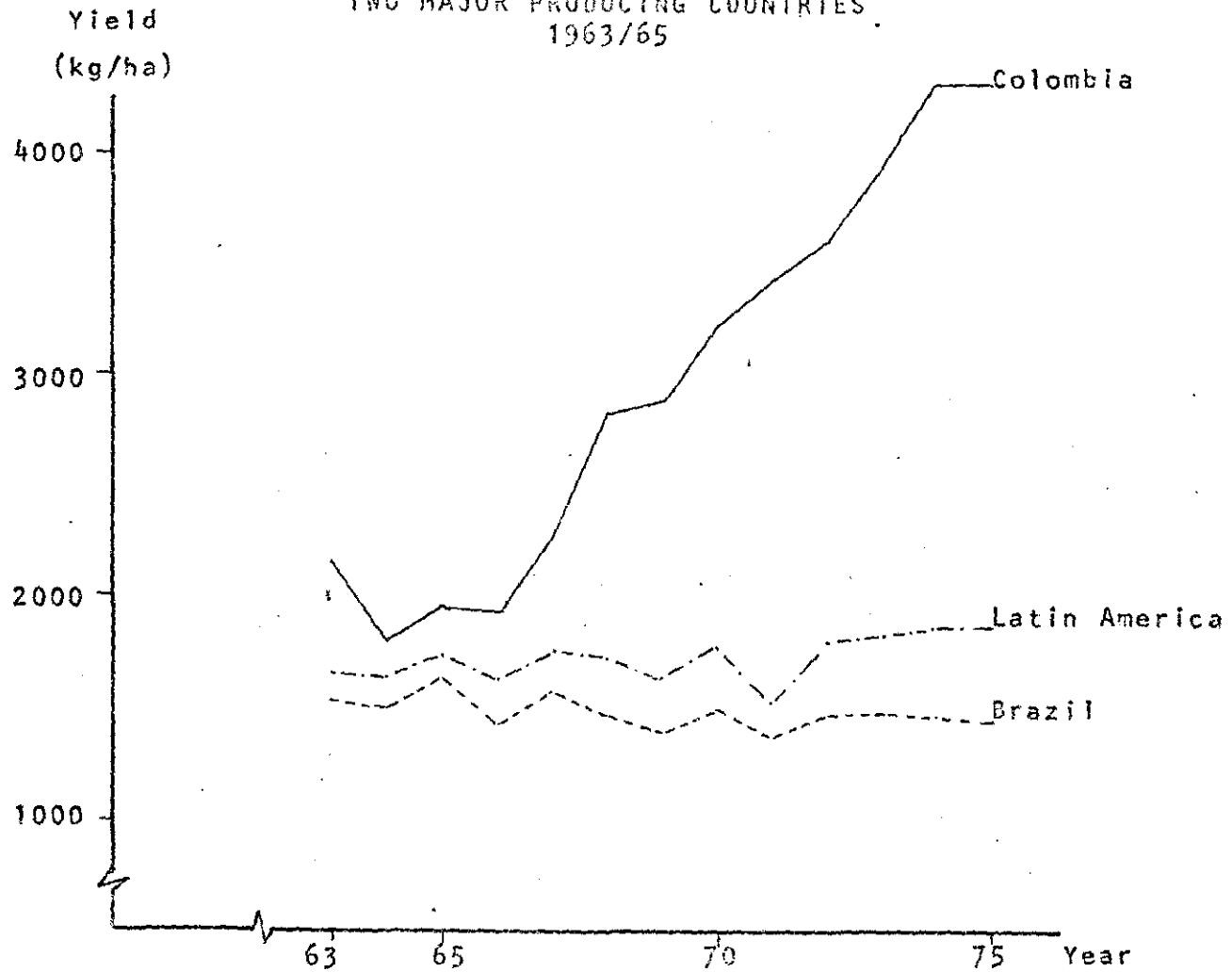
RICE: INDEX OF APPARENT INTAKE OF ENERGY, AND INDICES OF YIELDS, PER CAPITA PRODUCTION, APPARENT PER CAPITA AVAILABILITY AND OF NET EXPORTS OF RICE IN LATIN AMERICA BY COUNTRIES, AVERAGES 1973/75

Country	Apparent intake of energy as percentage of requirement	Index of:			Net exports as percentage of total production	Net imports as percentage of total availability
		Average yields	Per capita production	Apparent per capita availability		
					----- percentage -----	
Surinam	(n.a)	201	998	706	28	-
Guyana	112	99	662	467	29	-
Panama	111	84	262	252	2	-
Dominican Rep.	92	164	173	194	-	12
Brazil	115	79	164	162	0	-
Costa Rica	114	63	148	137	6	-
Belize	(n.a)	117	144	166	-	14
Colombia	94	226	142	133	4	-
Uruguay	115	207	131	76	41	-
Cuba	108	109	107	172	-	38
Ecuador	84	144	97	101	-	5
Nicaragua	110	159	93	82	10	-
Peru	101	222	71	79	-	12
Venezuela	99	148	64	57	11	-
Haiti	79	120	50	50	-	3
Trinidad & Tobago	90	158	43	115	-	62
Paraguay	108	106	42	41	2	-
Bolivia	85	90	42	42	-	1
Argentina	122	196	30	26	12	-
Mexico	115	150	22	23	-	6
El Salvador	83	153	21	21	0	-
Chile	114	158	13	21	-	38
Honduras	93	65	13	14	-	5
Guatemala	93	95	12	13	-	7
Latin America	112	100	100	100	3	4

Source: Estimated from FAO (5) and USDA (7).

FIGURE 4.1

RICE: AVERAGE YIELDS IN LATIN AMERICA AND THE
TWO MAJOR PRODUCING COUNTRIES.
1963/65



Source: FAO (5).

5. MAIZE

Latin American corn production has increased at a faster rate (2.93%) than population growth (2.8%). Production is concentrated in Brazil (41%), Argentina (23%), and Mexico (22%) (Table 5.1).

Demand for corn has been growing even faster than supply growth within Latin America. Over the decade, Latin American corn exports increased from 3.7 to 5.3 million tons and imports increased from almost 0.4 to 3.1 million tons. While exports increased by 43 percent corn imports increased by a staggering 675 percent (Table 5.2). Mexico shifted from the third largest exporter (379 thousand tons) to the largest importer (1.7 million tons). Corn prices have been increasing rapidly, hence the increased imports have put further balance of payments pressures on many countries. The rapid import increase in spite of reasonable production growth appears to indicate a structural shift toward increasing use of corn as a feed especially for poultry¹ in Latin America.

Two of the three principal corn producers have obtained reasonable yield increases (Tables 5.3 and 5.4). Area has increased rapidly in Brazil but has declined in Mexico. The introduction of new technology is often associated with area expansion if prices do not decline because the activity becomes more profitable. The yield increases appear to be associated with the introduction of hybrids².

^{1/} Modern poultry technology is a self-contained package requiring little adaptation. During the last decade the real poultry price has been falling in Latin America and the demand for poultry has increased rapidly as poultry has been substituted for other types of animal protein.

^{2/} Alvarez (8), pp.22-24.

The yield gap between the Latin American countries and the developed countries with the highest yields is still extremely large. Whereas Latin American average yields are 1.5 tons/ha, yields in the U.S. are 4.8 tons/ha and several other countries have obtained substantially higher yields than the U.S. Within Latin America yields in the temperate countries, Chile and Argentina, are substantially higher than those in the rest of the continent.

TABLE 5.1

MAIZE: PRODUCTION OF LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

Country	1963/65		1973/75	
	Average of period	Percentage of total	Average of period	Percentage of total
	'000 tons	--- % ----	'000 tons	--- % ----
Brazil	10666	38.66	15961	40.75
Argentina	4950	17.94	9100	23.24
Mexico	7397	26.81	8633	22.05
Colombia	874	3.17	806	2.06
Guatemala	636	2.31	723	1.85
Peru	515	1.87	614	1.57
Venezuela	475	1.72	509	1.30
El Salvador	201	0.73	380	0.97
Chile	192	0.70	330	0.84
Honduras	339	1.23	301	0.77
Bolivia	253	0.92	276	0.70
Ecuador	169	0.61	259	0.66
Paraguay	222	0.80	257	0.66
Nicaragua	157	0.57	233	0.59
Uruguay	120	0.44	203	0.52
Cuba	129	0.47	125	0.32
Panama	82	0.30	59	0.15
Costa Rica	70	0.25	49	0.12
Dominican Rep.	42	0.15	47	0.12
Jamaica	4	0.01	9	0.02
Others ¹	21	0.08	36	0.09
Latin America ²	27593	100.00	39160	100.00

^{1/} Includes: Barbados, Belize, Guadalupe, Puerto Rico, Guyana, and Surinam.

^{2/} Includes Haiti.

Source: See Alvarez (8).

TABLE 5.2

MAIZE: PRODUCTION, TRADE AND APPARENT CONSUMPTION OF LATIN AMERICA, BY COUNTRIES
AVERAGES FOR 1963/65 AND 1973/75

Country	Average for 1963/65				Average for 1973/75			
	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption	Production	+Imports -Exports	Apparent consump- tion	Apparent per-capita consumption
	'000 tons		- kg/year -		'000 tons		- kg/year -	
<u>Exporting:</u>								
Argentina	4950	-2862	2088	94	9100	-4520	4580	179
Brazil	10667	- 440	10227	127	14703	- 780	13923	132
Paraguay	222	- 7	215	109	257	- 5	253	101
Uruguay	120	+ 20	140	52	203	- 1	202	67
Ecuador	169	- 1	168	34	259	- 1	258	37
<u>Importing:</u>								
Mexico	7337	- 379	7017	170	8633	+1667	10300	178
Cuba	129	+ 164	292	39	125	+ 327	452	50
Peru	515	+ 8	523	26	614	+ 273	887	59
Venezuela	476	+ 67	543	61	509	+ 263	772	63
Chile	192	+ 4	196	24	330	+ 114	444	44
Jamaica	4	+ 22	26	15	9	+ 111	120	59
Guatemala	637	+ 11	647	145	723	+ 59	782	136
Colombia	851	+ 6	857	50	893	+ 59	952	38
Dominican Rep.	42	- 10	42	12	47	+ 45	91	19
El Salvador	201	+ 38	239	85	380	+ 33	413	103
Costa Rica	70	+ 7	77	54	49	+ 32	81	42
Nicaragua	157	+ 6	163	103	233	+ 16	249	114
Honduras	339	- 46	293	133	302	+ 12	313	101
Panama	82	+ 5	87	73	59	+ 7	66	41
Bolivia	253	0 ¹	253	63	276	0 ¹	276	54
Others ²	21	+ 40	61	10	37	+ 107	143	20
Latin America	27593	-3337	24234	101	39160	-2182	36978	113

^{1/} Less than 50 ton.

^{2/} Includes: Barbados, Belize, Guadalupe, Puerto Rico, Guyana, and Surinam.

Source: See Alvarez (8).

TABLE 5.3

MAIZE: ANNUAL GROWTH RATES OF PRODUCTION, AREA
AND YIELDS OF LATIN AMERICA, BY COUNTRIES
1963-75

Country	Production	Area	Yields
	----- percentage -----		
Brazil	3.41***	2.30***	1.11***
Argentina	4.86***	1.48*	3.38***
Mexico	1.26*	-1.27**	2.53***
Colombia	0.64*	-1.29*	1.93***
Guatemala	1.64***	2.26***	-0.62
Peru	1.70***	0.48	1.22*
Venezuela	0.79	0.47	0.32
El Salvador	5.84***	2.03***	3.81***
Chile	4.24*	0.55	3.69**
Honduras	-1.36	1.13**	-2.49**
Bolivia	0.73*	0.35	0.38
Ecuador	4.95***	-0.29	5.24**
Paraguay	1.78	4.73***	-2.95*
Nicaragua	2.99**	2.34**	0.65
Uruguay	4.95	-1.26	6.21**
Cuba	-0.29	-0.02	-0.27***
Panama	-4.40***	-4.04***	-0.36
Costa Rica	-3.61***	-3.41**	-0.20
Dominican Rep.	1.45*	-0.39	1.85**
Jamaica	7.84***	6.19*	1.65
Others ¹	5.59***	4.39**	1.20
Latin America	2.93***	0.80**	2.13***

^{1/} Includes: Barbados, Belize, Guadalupe, Puerto Rico, Guyana, and Surinam.

*(P<.1)

** (P<.05)

*** (P<.01)

Source: See Alvarez (8).

TABLE 5.4

MAIZE: AVERAGE YIELDS IN LATIN AMERICA, BY COUNTRIES
1963/65 AND 1973/75

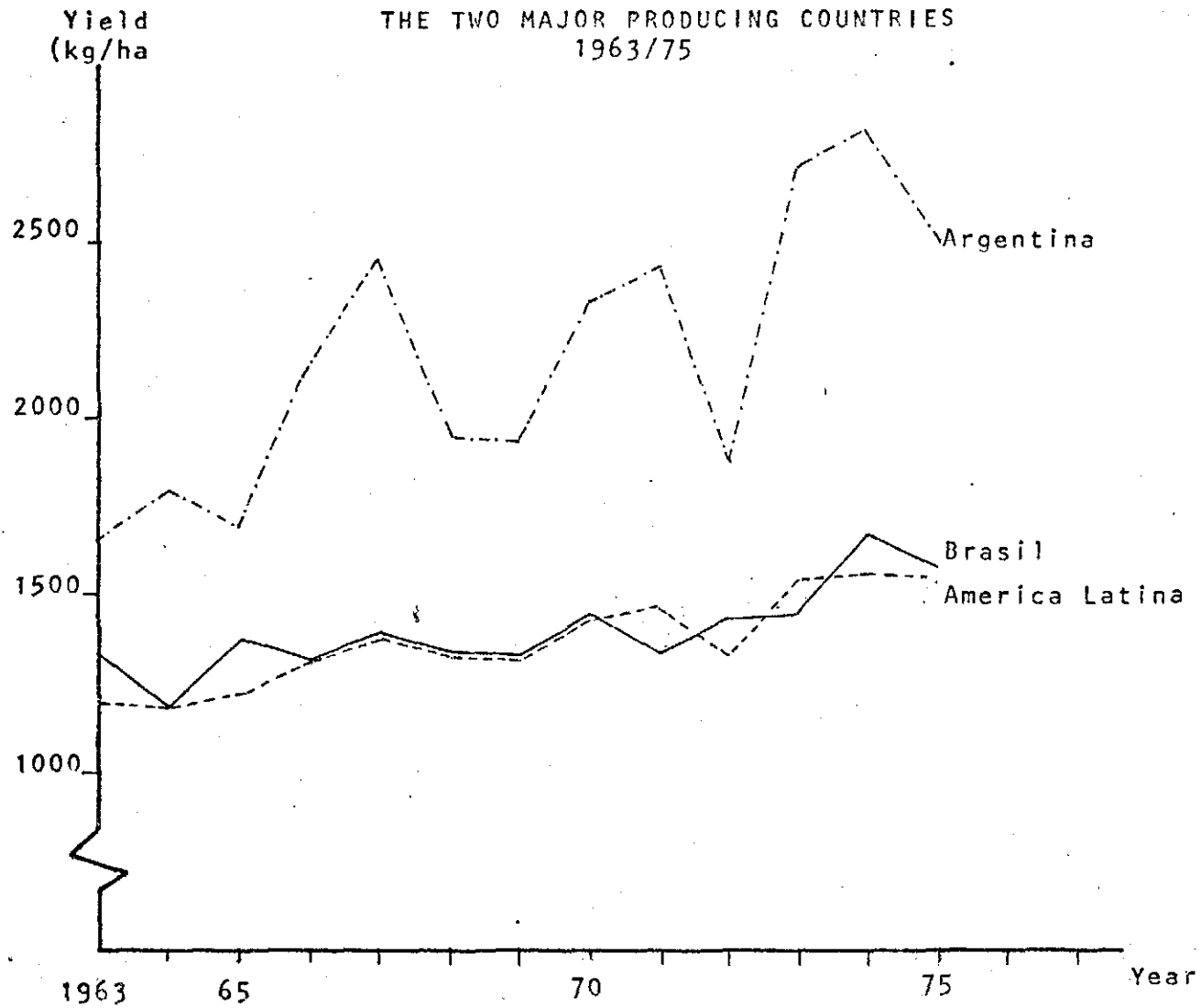
Country	1963/65	1973/75
	----- kg/ha -----	
Brazil	1286	1438
Argentina	1709	2624
Mexico	1001	1307
Colombia	1101	1333
Guatemala	926	833
Peru	1502	1666
Venezuela	1069	1085
El Salvador	1660	1743
Chile	2213	3472
Honduras	1185	936
Bolivia	1165	1248
Ecuador	603	988
Paraguay	1736	1191
Nicaragua	887	1049
Uruguay	582	1067
Cuba	982	962
Panama	822	805
Costa Rica	1059	936
Dominican Rep.	1496	1746
Jamaica	944	1120
Others ¹	1337	1450
Latin America	1197	1517
U.S.A.	4286	4812
New Zealand	5226	7642
Italy	3404	5413
Austria	4286	4812

^{1/} Includes: Barbados, Belize, Guadalupe, Puerto Rico, Guyana and Surinam.

Source: See Alvarez (8).

FIGURA 5.1

MAIZE: AVERAGE YIELDS IN LATIN AMERICA AND
THE TWO MAJOR PRODUCING COUNTRIES
1963/75



Source: See Alvarez (8).

6. SWINE

While the region has twice as many head of beef cattle as the U.S., the number of pigs is about the same. Due to a comparatively larger population, the number of pigs per inhabitant is only three fourths that of the U.S. (Table 6.1). Moreover, due to a number of factors such as breeds, animal quality, health conditions, feeding and management practices, production efficiency is rather low. Extraction rate, measured as output per pig, is only 25 kg/year, which is substantially lower than the 98 kg/year obtained in the U.S. Although the efficiency gap is still rather wide, production efficiency appears to be improving over time, particularly in Brazil, Venezuela, and Colombia [see CIAT (11), Table 21].

Although per capita production varies among countries, it is quite low. Per capita regional output is around 6 kg per annum, or about one fifth of that in the U.S. because of a lower stock per inhabitant and low production efficiency. Mexico and Nicaragua are the only countries that showed a strong increase in production per capita (Table 6.2). Brazil, Ecuador, Venezuela, the Dominican Republic, Argentina, and Chile showed a slightly increasing trend. In the remaining countries, per capita production either was stagnant or decreased during the period 1960/74.

TABLE 6.1

SWINE: STOCKS BY COUNTRY AND PER INHABITANT, OUTPUT PER HEAD IN STOCK AND AVERAGE DRESSED WEIGHT IN LATIN AMERICA AVERAGE 1970/74

Region and Country	Stocks		Average dressed weight ¹ kg/head	Output per head in stock kg/year
	Total '000 heads	Per Inhabitant -- heads -		
United States	61454	0.29	73	98
Tropical Latin America ²	58485	0.32	62	23
Brazil	33120	0.33	67	20
Mexico	10463	0.19	64	34
Colombia	2210	0.09	50	40
Ecuador	2103	0.32	50	14
Peru	1868	0.13	60	25
Venezuela	1674	0.14	64	28
Cuba	1460	0.17	40	26
Bolivia	1001	0.20	30	19
Paraguay	621	0.26	60	40
Central America	2935	0.17	33	15
Guatemala	869	0.16	30	11
Honduras	686	0.23	32	10
Nicaragua	580	0.28	31	28
El Salvador	413	0.11	32	27
Costa Rica	214	0.12	37	33
Panama	173	0.11	46	23
Caribbean	2490	0.19	49	14
Dominican Rep.	510	0.11	45	29
Guyana	93	0.12	51	11
Other Caribbean ⁴	1887	0.25	52	10
Temperate Latin America	6202	0.17	80	47
Argentina	4780	0.19	82	49
Chile	1017	0.10	66	39
Uruguay	405	0.14	82	52
Latin America	64687	0.22	51 ³	25

^{1/} Slaughter only.

^{3/} Simple average.

^{2/} Excludes Cuba only.

^{4/} Includes: Trinidad & Tobago, Haiti, Jamaica, and Barbados.

Source: Estimated from USDA (7).

TABLE 6.2

SWINE: TOTAL AND PER-CAPITA OUTPUT¹
 IN LATIN AMERICA, BY COUNTRIES
 FIVE YEARS AVERAGE 1960/74

Region and Country	Average 1960/64		Average 1970/74	
	Total Output	Output per-capita	Total Output	Output per-capita
	'000 tons	kg/year	'000 tons	kg/year
United States	5424	26	6004	29
Tropical Latin America ²	874	5	1368	6
Brazil	444	6	660	7
Mexico	171	4	361	7
Colombia	65	4	89	4
Ecuador	18	4	30	5
Peru	42	4	46	3
Venezuela	27	3	47	4
Cuba	41	6	38	4
Bolivia	16	4	19	4
Paraguay	21	11	25	10
Central America	42	3	55	3
Guatemala	8	2	10	2
Honduras	7	3	7	2
Nicaragua	8	5	16	8
El Salvador	11	4	11	3
Costa Rica	5	4	7	4
Panama	3	3	4	3
Caribbean	28	3	36	3
Dominican Rep.	8	2	15	3
Guyana	1	2	1	1
Other Caribbean ³	19	3	20	3
Temperate Latin America	215	7	294	8
Argentina	169	8	233	9
Chile	22	3	40	4
Uruguay	24	9	21	7
Latin America	1089	5	1601	6

^{1/} Slaughters only, carcass weight.

^{2/} Excludes Cuba.

^{3/} Includes: Trinidad & Tobago, Haiti, Jamaica, and Barbados.

Source: Estimated from USDA (7).

7. FERTILIZERS

Fertilizer consumption has been increasing rapidly in Latin America (10.2% and 12.4% for N and P respectively) with production of P increasing even faster (16.4%). Nitrogen production increased at a 8.9 percent rate over the decade (see Tables 7.1 and 7.2). Consumption of both major nutrients, nitrogen and phosphorus, approximately tripled during the decade in Latin America. Brazil and Mexico are the principal consumers of fertilizers with 61 percent of the nitrogen and 75 percent of the phosphorus. World prices of these two principal nutrients (N and P) have fallen from their 1973/75 levels but have not returned to the 1969/72 lows (Figure 7.1).

One of the most rapid rates of increase of consumption and production of fertilizers have been in Brazil. Brazil has not only stimulated domestic production of fertilizer through low interest loans and other fiscal devices but has also provided a large subsidy to reduce the purchase price of fertilizer in the years of extremely high world prices. Fertilizer production has also increased very rapidly in Argentina but consumption has not.

Compared with many other developed countries fertilizer consumption per hectare in Latin America is still low (see Table 7.3). However, a few of the countries with heavy population densities and limited arable land area, such as El Salvador, Jamaica, and Costa Rica, have much higher per hectare consumption than the rest of Latin America. Apparently, fertilizer is substituted for area expansion when the land price is sufficient high to justify this substitution investment¹.

^{1/} For empirical evidence of this phenomenon in the U.S. and Japan see Y. Hayami and V.W. Ruttan (9), pp.118-136. The production of new varieties by making fertilizer use more profitable often increases the demand for fertilizer.

TABLE 7.1

FERTILIZERS: CONSUMPTION OF NITROGEN AND PHOSPHORUS
IN LATIN AMERICA
AVERAGES FOR 1965/66 AND 1975/76

Country	Nitrogen			Phosphorus (P ₂ O ₅)		
	1965/66	1975/76 ¹	Annual growth rate	1965/66	1975/76 ¹	Annual growth rate
	----- tons -----	----- tons -----	- % - -	----- tons -----	----- tons -----	- % - -
<u>Producers:</u>						
Mexico	263.500	833.000	10.55	67.133	220.000	10.39
Brazil	70.569	410.137	19.79	86.751	914.800	25.34
Chile	31.794	38.600	4.44	63.001	47.000	0.50
Trinidad & Tobago	3.813	4.342	4.22	907	339	-7.49
Colombia	45.000	130.900	13.59	55.800	46.500	1.97
Venezuela	17.000	64.822	13.87	8.000	40.877	17.07
Argentina	25.000	28.000	3.86	10.000	22.000	4.55
Costa Rica	10.000	33.600	9.62	4.500	15.000	12.42
Peru	64.157	82.000	6.67	14.091	11.500	-1.28
El Salvador	19.608	65.000	12.61	8.279	20.200	10.48
Cuba	90.000	156.000	0.38	80.000	62.000	-6.34
Guatemala	7.301	29.500	11.31	4.864	15.300	5.31
Jamaica	7.510	9.000	4.59	2.115	4.500	6.99
Ecuador	4.894	20.109	9.02	7.095	12.689	2.45
Uruguay	8.310	11.238	5.31	21.480	28.000	2.29
<u>Non-Producers:</u>						
Honduras	8.000	11.400	4.94	1.000	3.700	8.26
Nicaragua	15.014	16.500	4.75	10.387	2.400	-4.88
Haiti	100	1.200	16.72		.600	
Paraguay	267	300	10.14	1.152	536	-9.75
Dominican Rep.	10.000	40.900	16.02	1.000	22.600	40.91
Bolivia	500	1.600	16.66	500	1.500	13.60
Panama	8.000	13.416	3.75		5.051	
Others ²	17.542	24.103		9.412	13.244	
Latin America	727.879	2025.667	10.20	456.560	1510.336	12.44

1/ Preliminary information.

2/ Includes Surinam and the Caribbean islands not included above.

Source: See Alvarez (10).

TABLE 7.2
 FERTILIZERS: PRODUCTION OF NITROGEN AND PHOSPHORUS
 FERTILIZERS IN LATIN AMERICA
 AVERAGES FOR 1965/66 AND 1975/76

Country	Nitrogen			Phosphorus (P ₂ O ₅)		
	1965/66	1975/76 ¹	Annual growth rate	1965/66	1975/76 ¹	Annual growth rate
	----- tons -----	----- tons -----	- % - -	----- tons -----	----- tons -----	- % - -
Mexico	134.000	581.000	13.09	67.478	220.000	13.46
Brazil	14.445	160.295	35.77	61.056	509.600	21.70
Chile	178.844	115.570	-3.63	4.773	12.562	14.76
Colombia	39.000	100.000	11.21	8.033	48.100	28.30
Cuba		82.000		15.000	14.700	-1.63
Trinidad & Tobago	37.847	57.500	5.10	n.a.	n.a.	n.a.
Venezuela	17.000	50.000	5.18	8.000	24.261	7.80
Peru	43.416	35.000	-2.00	19.408	4.500	-18.20
Costa Rica	10.000	30.000	10.45	n.a.	n.a.	n.a.
Argentina	4.000	18.000	19.01	1.000	6.000	25.50
Netherlands Antilles	n.a.	6.300	n.a.	n.a.	n.a.	n.a.
El Salvador	4.000	5.300	0.40	n.a.	2.400	n.a.
Guatemala	n.a.	5.000	n.a.	n.a.	2.000	n.a.
Jamaica	n.a.	3.000	n.a.	n.a.	n.a.	n.a.
Ecuador	n.a.	1.726	n.a.	n.a.	4.824	n.a.
Uruguay	n.a.	n.a.	n.a.	7.000	10.000	5.46
Latin America	510.552	1250.691	8.94	191.748	858.947	16.38

^{1/} Preliminary data.

Source: See Alvarez (10).

TABLE 7.3

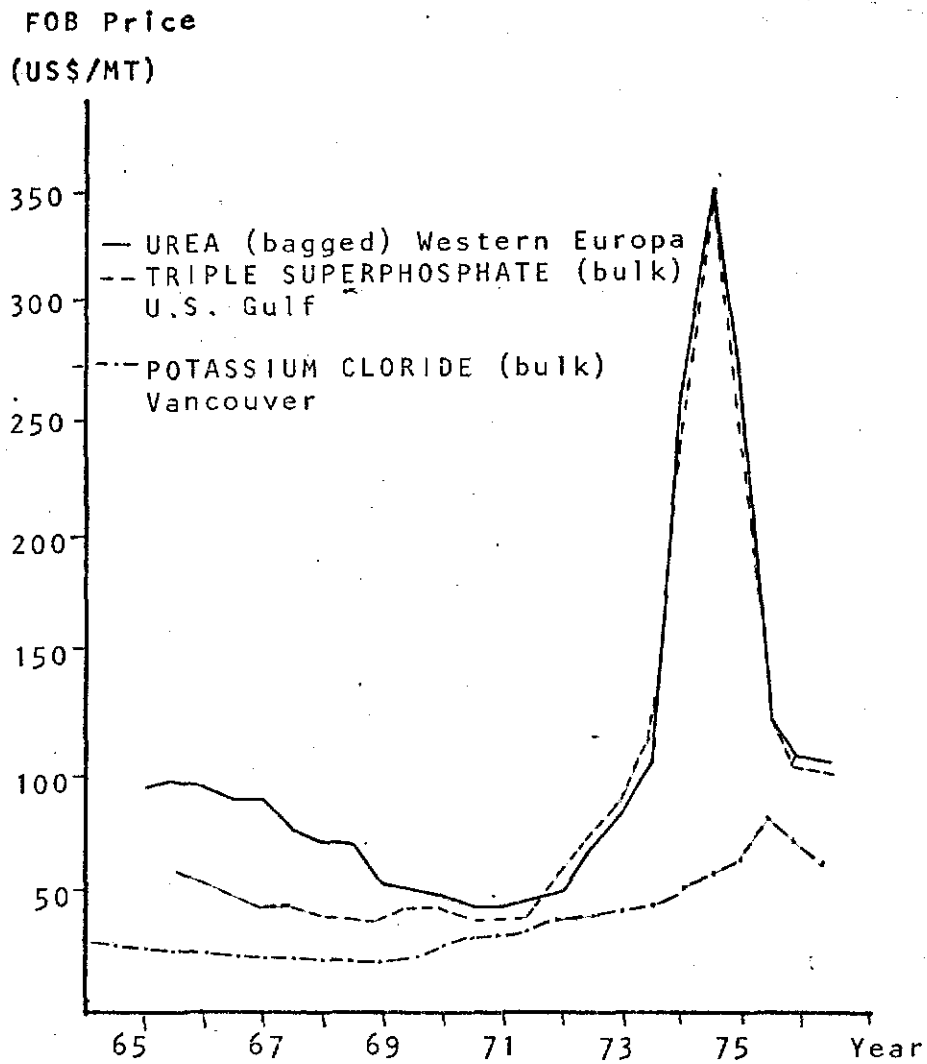
FERTILIZER: PER HECTARE¹ CONSUMPTION FOR NITROGEN
AND PHOSPHORUS IN LATIN AMERICA
1965/75

Country	Nitrogen			Phosphorus		
	1965	1970	1975	1965	1970	1975
	----- kg/ha -----					
<u>Producers:</u>						
Mexico	10.0	16.0	29.0	3.0	5.0	7.9
Brazil	2.0	8.0	11.0	3.0	11.0	25.0
Chile	7.0	8.0	7.0	14.0	18.0	8.1
Trinidad & Tobago	24.0	42.0	28.0	7.0	4.0	2.2
Colombia	9.0	13.0	26.0	11.0	10.0	9.1
Venezuela	3.0	5.0	12.0	2.0	3.0	7.7
Argentina	1.0	1.0	1.0	0.0	1.0	0.6
Costa Rica	21.0	76.0	66.0	9.0	12.0	29.6
Peru	24.0	24.0	25.0	5.0	5.0	3.6
El Salvador	30.0	72.0	100.0	12.0	20.0	31.0
Cuba	33.0	61.0	50.0	29.0	35.0	19.9
Guatemala	5.0	19.0	17.0	3.0	7.0	8.8
Jamaica	31.0	37.0	35.0	9.0	12.0	17.3
Ecuador	2.0	5.0	5.0	2.0	3.0	2.9
Uruguay	5.0	7.0	6.0	12.0	17.0	15.0
<u>Non-Producers:</u>						
Honduras	10.0	18.0	13.0	1.0	2.0	4.0
Nicaragua	17.0	18.0	17.0	12.0	8.0	3.0
Haiti	0.0	0.0	1.0	n.a	0.0	1.0
Dominican Rep.	12.0	16.0	41.0	1.0	10.0	23.0
Panama	14.0	28.0	24.0	n.a	6.0	9.0
Bolivia	0.0	0.0	1.0	0.0	0.0	1.0
Paraguay	0.0	3.0	0.0	1.0	4.0	1.0
Latin America	6.0	10.0	14.0	4.0	6.9	11.0
U.S.A.	27.0	38.0	45.0	19.7	23.0	23.0
Israel	60.0	78.0	85.0	29.7	35.0	45.0
Belgium	156.0	194.0	207.0	138.8	159.0	164.0
West Germany	106.0	140.0	152.0	99.1	113.0	97.0
Holland	321.0	467.0	537.0	118.6	126.0	94.0
New Zealand	9.0	10.0	12.0	433.9	383.0	427.0

^{1/} Land area was defined as arable plus land under permanent crops.

Source: See Alvarez (10).

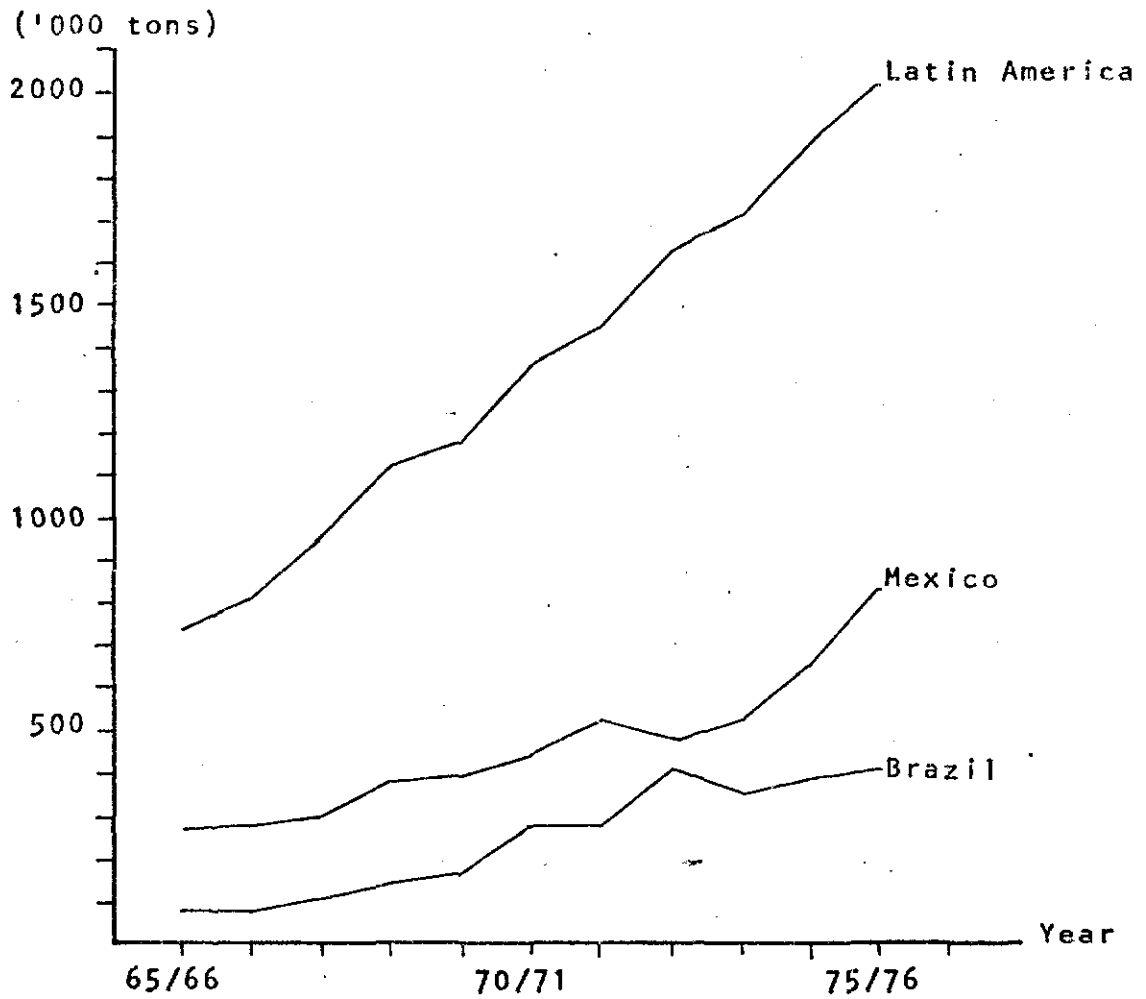
FIGURE 7:1
FERTILIZER EXPORT PRICES
1965/75



Source: USDA (3) and (5).

FIGURE 7.2

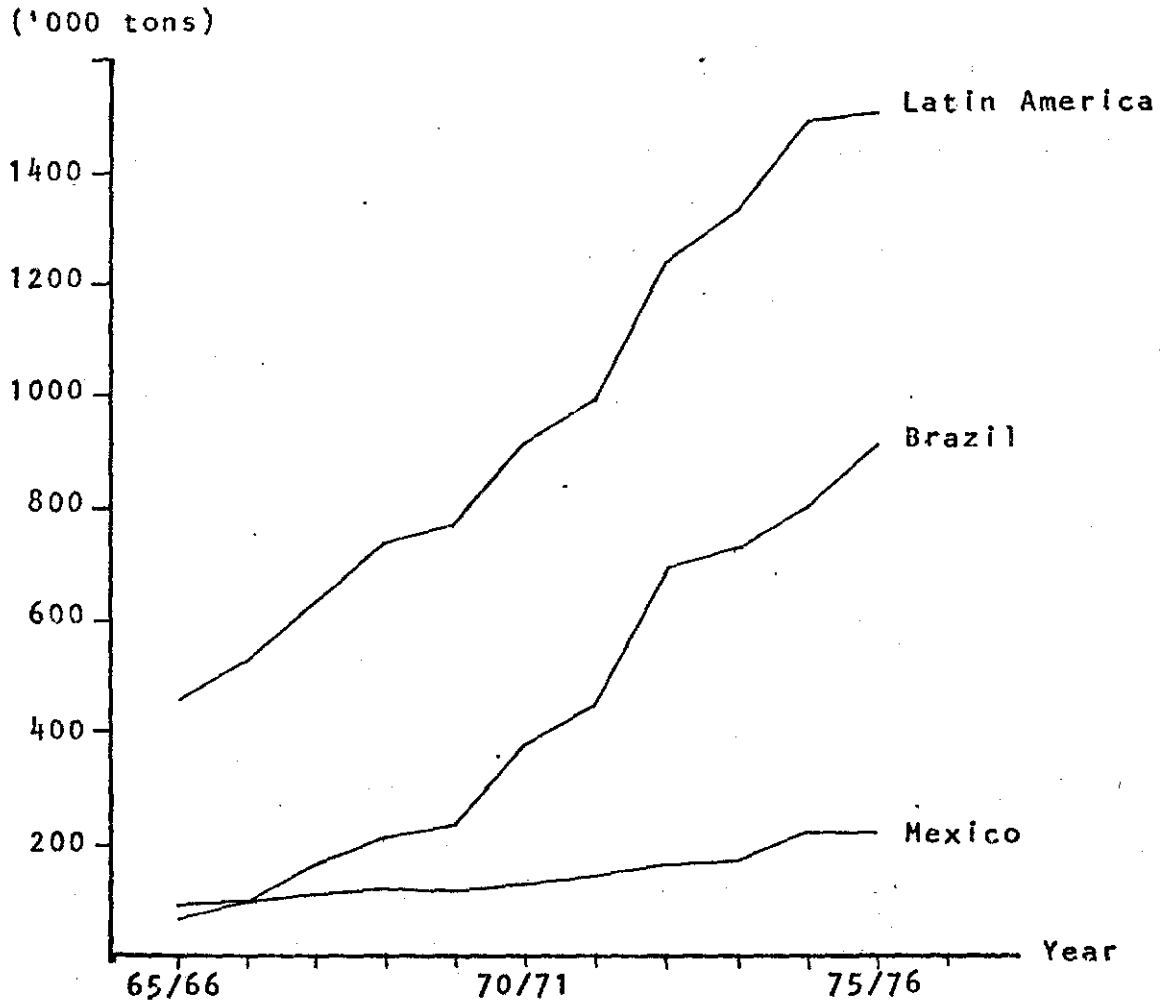
FERTILIZERS: CONSUMPTION OF NITROGEN FERTILIZERS IN
LATIN AMERICA, MEXICO AND BRAZIL
1965/66 - 1975/76



Source: See Alvarez (10)

FIGURE 7.3

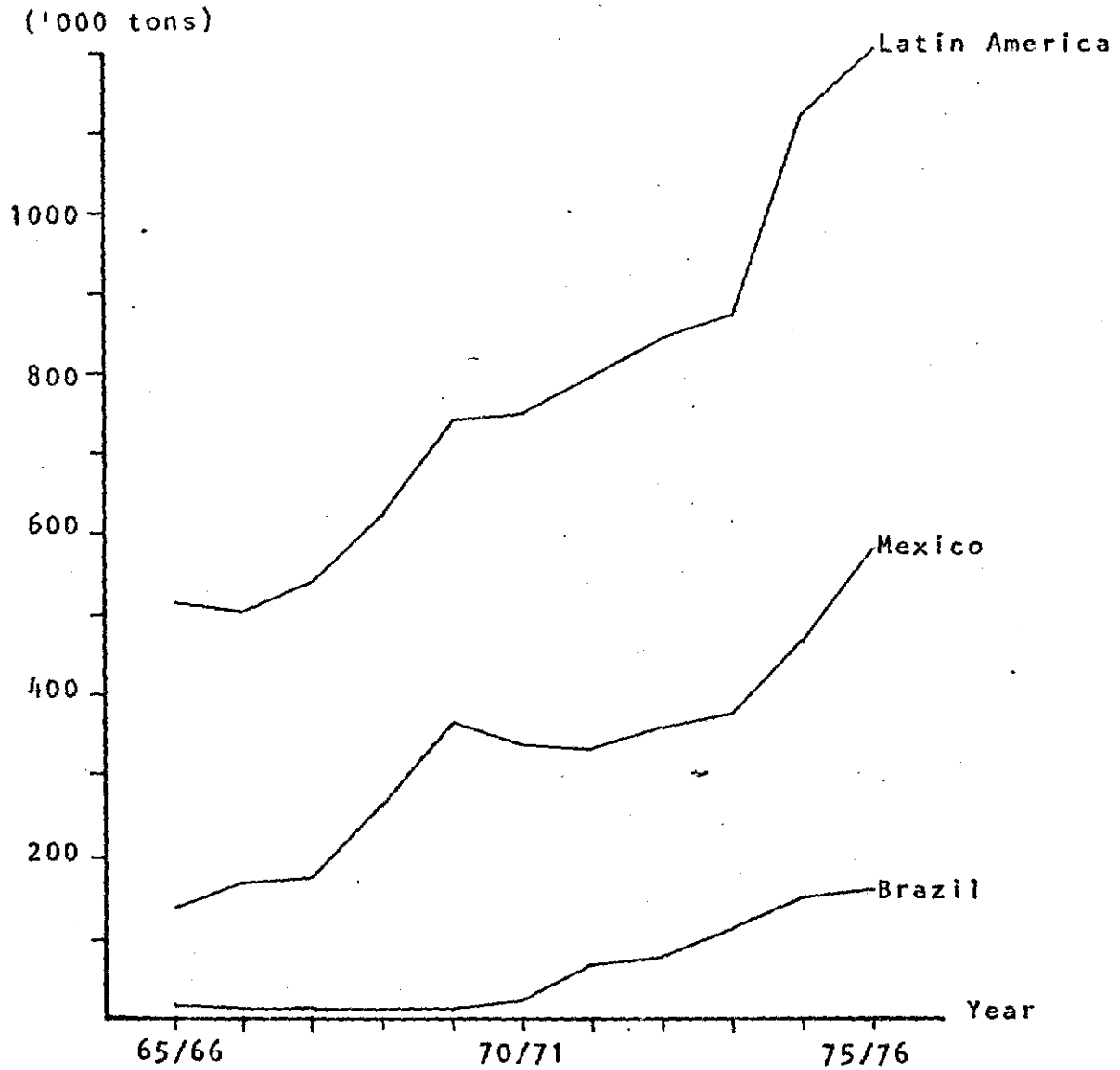
FERTILIZERS: CONSUMPTION OF PHOSPHORUS FERTILIZERS IN
LATIN AMERICA, MEXICO AND BRAZIL
1965/66 - 1975/76



Source: See Alvarez (10)

FIGURE 7.4

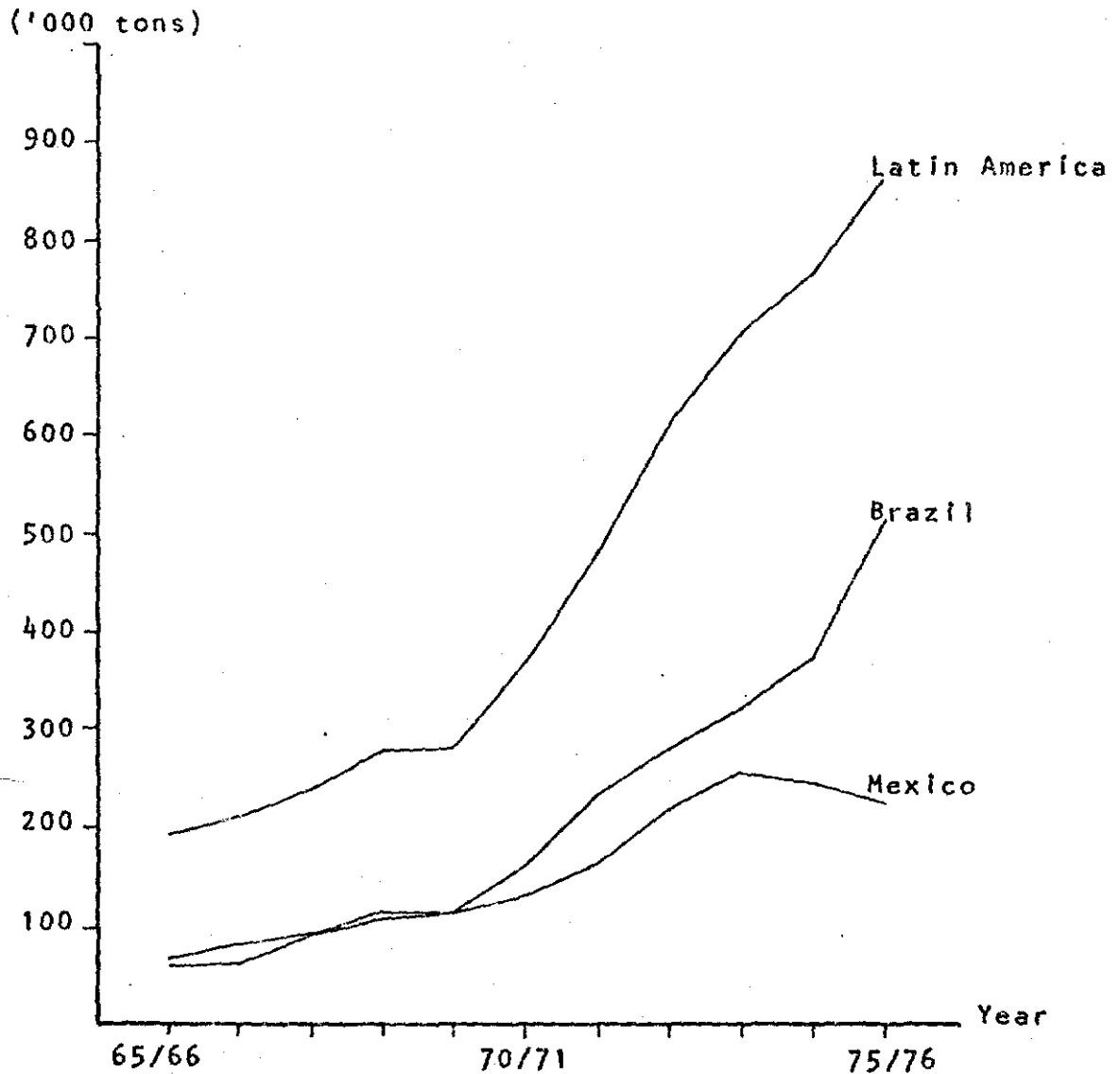
FERTILIZERS: PRODUCTION OF NITROGEN FERTILIZERS
IN LATIN AMERICA, BRAZIL AND MEXICO
1965/66 - 1975/76



Source: See Alvarez (10).

FIGURE 7.5

FERTILIZERS: PRODUCTION OF PHOSPHORUS FERTILIZERS
IN LATIN AMERICA, MEXICO AND BRAZIL
1965/66 - 1975/76



Source: See Alvarez (10).

SOURCES AND REFERENCES

- (1) SANDERS, J.H. and C. ALVAREZ P., "Evolución de la Producción de Fríjol en América Latina durante la Última Década", CIAT, Cali, Colombia (mimeo). Abril, 1978.
- (2) RUIZ DE LONDOÑO, N., P. PINSTRUP-ANDERSEN, J.H. SANDERS, and M. INFANTE, "Limitantes a los Incrementos de Productividad de Fríjol a Nivel de Finca en Colombia", CIAT, Cali, Colombia (mimeo). Marzo, 1978.
- (3) LYNAM, J.K., "Cassava Trends in Latin America", CIAT, Cali, Colombia (mimeo). April, 1978.
- (4) RIVAS R., L. and G.A. NORES, "Evolución de la Ganadería Bovina en América Latina, 1960-1974", CIAT, Cali, Colombia (mimeo). May, 1978.
- (5) FAO, Production Yearbook, Rome, Several issues.
- (6) FAO, Trade Yearbook, Rome, several issues.
- (7) USDA, ERS, FDCD, "Working Paper-Agriculture in the Americas - Statistical Data", April, 1976.
- (8) ALVAREZ P., C., "Evolución de la Producción de Maíz en América Latina en la Última Década", CIAT, Cali, Colombia (mimeo). Diciembre, 1977.
- (9) HAYAMI, Y. and V.W. RUTTAN, Agricultural Development: An International Perspective, Johns Hopkins Press: Baltimore, 1971.
- (10) ALVAREZ P., C., "Los Fertilizantes Nitrogenados y Fosfatados en América Latina, 1965-1975", CIAT, Cali, Colombia (mimeo). Septiembre, 1977.
- (11) CIAT, "Latin America: Trend Highlights on Beans, Beef, Pork, Cassava, Rice and Corn", Internal Document Econ 1.2, December, 1976.