AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

1. SUBJECT CLASSIFICATION

A. PRIMARY
Agriculture AE70-0000-G512

B. SECONDARY
Distribution and marketing--Bolivia

2. TITLE AND SUBTITLE
A preliminary estimate of the long-run demand for agricultural products in Bolivia

3. AUTHOR(S)
LeBaron, A. D.; Wennergren, E. B.; Whitaker, M. D.; Aitken, P. G.; Lloyd, P. H.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1971	19 p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Utah State

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

9. ABSTRACT

This paper reports efforts made at Utah State University to project Bolivian demands for selected agricultural products to 1975 and 1985. The purpose of such a forecast is to allow planners to determine those commodities likely to be in surplus. Import requirements or export possibilities can thus be translated into foreign exchange balances. Because long-run forecasting is based on extrapolations of past trends, and because Bolivian agricultural statistics are incomplete, the estimates presented are rough. Production, consumption, and supply/demand data for 24 commodities as of 1975 and 1985 are presented in tables. The projections show surpluses for sugar, coffee, rice and plantains.

10. CONTROL NUMBER
PN-RAA-034

11. PRICE OF DOCUMENT

12. DESCRIPTORS
Agricultural products
Bolivia
Demand

13. PROJECT NUMBER

14. CONTRACT NUMBER
CSD-2167 Res.

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

71-A405P

Progress Report

A PRELIMINARY ESTIMATE OF THE LONG-RUN DEMAND FOR AGRICULTURAL PRODUCTS IN BOLIVIA

Dr. Allen LeBaron
Dr. Boyd Wennergren
Dr. Morris Whitaker
Percy Aitken
Phillip Lloyd

U T A H S T A T E U N I V E R S I T Y

CUSUSWASH/Ut/Econ. P5

AID/csd 2167

A PRELIMINARY ESTIMATE OF THE LONG-RUN DEMAND FOR AGRICULTURAL PRODUCTS IN BOLIVIA

FOREWORD

This paper reports efforts made at Utah State University to project Bolivian demands for selected agricultural products to 1975 and 1985. The work has been partially financed under contract USAID/csd 2167 between U. S. Agency for International Development and Utah State University. The main bulk of the basic data was developed under the direction of Miss Carmen Deere, USAID, Bolivia. The remaining bibliographic needs were met by Percy Aitken, Research Associate in Economics, U.S.U. Phillip Lloyd, graduate assistant, U.S.U., developed the statistical results.

The aims of long-range domestic forecasts can be simply stated: estimates of future domestic demands allow planners to determine, given knowledge of future supply (which must also be estimated), those commodities likely to be in surplus. Import requirements or export possibilities can thus be translated into foreign exchange balances. Various import substitution, marketing, infrastructure and colonization programs require the same estimates.

The better the data, the better the estimates. Nevertheless long-range forecasts of agricultural production quantities are always indicative. They cannot make allowance for good or bad harvests or other natural phenomena. No amount of data refinement, availability, or manipulation can remove these uncertainties. However trends and magnitudes are highlighted and made explicit.

It should be borne in mind that the results presented are preliminary, not merely because Bolivian agricultural statistics are not the best, but because the authors require some additional time to analyze other available data that may permit certain necessary refinements.

Logan, Utah

10 April 1971

Allen LeBaron
Boyd Wennergren
Morris Whitaker
Percy Aitken
Phillip Lloyd

SOME FORECASTING METHODS

Good forecasts of future surpluses or import needs are not easy to make. It is true that our desire may be only to estimate units or weights in isolation, but both production and demand respond to signals from the marketplace; there is always interrelationships between prices and quantities. If we are to estimate future quantities demanded, some thought must be given to the treatment of future price expectations.

If prices rise, how much will demand change?

What about the effect that prices have upon quantities supplied?

How can these circular relationships be analyzed?

The best known way is to estimate parameters for "equilibrium models." Such models predict the future prices that will harmonize supplies and demands (or vice versa). These results can then be modified through a sub or side calculation to allow for expected effects due to changes in consumer taste, production technology, etc.

If future world influenced prices are forecast, the model will be unlikely to stay in "equilibrium;" gaps between projected demands and supplies will be evident. Thus the magnitude of necessary government price action to restore domestic equilibrium will be indicated if the government does not anticipate price action, the indication will be in the form of the expected quality of imports/exports.

Equilibrium models are not conceptually difficult, but the emperical requirements are formidable. Price and quantity data for both demand and supply of the product in question must be adequate to support statistical estimates of demand and supply curves. For example, it is necessary to be able to forecast campesino supply responses to market price changes. This is a difficult task even in situations or countries which have adequate statistics available.

Other statistical difficulties could be mentioned, but this brief description provides the basis for an intuitive understanding of why simpler forecasting methods are usually adopted. A typical convention is to introduce the notion that, for long-range forecasts, price effects upon quantities demanded will be far outweighed by the effect of increases in real per capita incomes (because the projections can be conceived in terms of constant prices for the base year). Moreover, food consumption, in the aggregate, is linked closely to population growth, which in the case of Bolivia, may be 55 percent by 1985.

Thus we arrive at the system most commonly emphasized in long-range supply demand studies. For convenience, we may title it the "Engel method" to distinguish it from the "econometric" method just described.[1] The particular data requirements under the Engel system are more readily met. There is no need for a theory of price movements or for technical response functions.

Estimates of future demand are based on population growth, income growth and the income elasticity of demand for various food products. Estimates of future supply are usually based on changes in harvested area and crop yields. Separate supply and demand projections are made based on an equilization or harmonization of supply/demand data in a chosen "benchmark" year.[2] The results must be converted into common units of raw

---

[1]Engel's law states that as households (or per capita) incomes rise there is less than proportional increase in food consumption. Actually this is somewhat over simplified. At very low food consumption levels, an increase in income can generate a more than proportional increase in food consumption, and it is conceivable that a "saturation" level of food consumption could be achieved. Indeed, for individual commodities, saturation might easily be reached; further increases in income would lead to negative increases in consumption.

[2]The Engel system requires several steps: a) calculate income elasticities for food products (ordinarily a household budget survey, rural and urban, provides the data); b) compute future domestic consumption (continues)

agricultural products. The usual practice is to make these demand forecasts both for urban and rural consumers because of differing rates of population and per capita income growth as well and differences in measured income elasticities for the same individual agricultural product. Except for mere coincidence, the two projections will diverge thus creating an indicated gap as of the selected time horizon date. For planning purposes this gap (±) is taken to be a reflection of potential exportable surpluses or import requirements. No direct indication of possible government price policy magnitudes is obtained.

The forecast import/export gaps will help government planners to select a particular agricultural product which should receive detailed policy and program inspection. Priorities can be set for feasibility studies.

The simplest or least sophisticated long-run forecasting technique is based on extrapolations of past trends. National time series data on production, by crop, is the basic variable. This can be adjusted for net imports, seed and animal feed requirements, carry over stocks and waste in order to estimate the trend of apparent human consumption.

Another modification of method is to estimate per capita nutrition requirements, in terms of calories, protein, etc., in the horizon year.

---

[2] (continued)

($C_1 = c_o\ [Y_1/Y_o]^n\ P_1$, where c_o = per capita consumption of a product in base year, Y_1 = estimated per capita income in projection year, Y_o = per capita income in base year, n = income elasticity coefficient, P_1 = population projection year); c) estimate future agricultural supplies by considering the potential producing regions of the nation in the light of technical possibilities ($C_1 = \sum_k q_{ki}$ [1 + technical change] + Y^* (A^*_{ki}), where q_{ki} is average current production of the kth crop in the ith production zone and Y^* and A^* are the yields and hectarages estimated for any planned land development); d) increased crop residues and animal feed must be converted into potential livestock and livestock product increases. Obviously, both population and national income growth must also be projected.

When the results are combined with projected population growth, and converted back to basic food equivalent, some notion of future demand for foods of various types can be obtained.

In summary, various projection techniques can be employed. The actual choice depends upon the length of the projection period, the level of reliability desired and the suitability of available data. At minimum, it is necessary to have time series on past production and apparent consumption. Reliable information about cultivated hectarages, and crop yield statistics are also important. Estimates of future population and trends in national income are required in every case. Rural and urban household budgets surveys which provide a cross-sectional estimate of income elasticities provide the latitude for more extensive analysis. In general, procedures employing extensive price interrelationships exceed the data capacities of less developed nations.

BOLIVIAN DATA

1. Consumption of Agricultural Products

The primary function of household budget surveys is to obtain accurate information about changing consumption patterns and total amounts consumed at the family level. The sum of these values may be compared with the apparent consumption derived by netting exports/imports, seed stocks, waste, animal/industrial consumption and carry overs from national crop and livestock production figures.

As yet only part of the 1967 family expenditure data obtained in the La Paz marketing survey has been published [1]. As a consequence, in this initial long-range forecast, only apparent consumption data (derived from crop production estimates) have been used.

The fundamental agricultural statistics were obtained from a working paper resulting from a joint study of the Budget and Planning office of the Ministry of Agriculture and the Rural Development and Economic Division of USAID/Bolivia [2].

These statistics are merely estimates, in some cases based on sample surveys; there has never been an agricultural census in Bolivia. Many of the time series estimates of agricultural production have been tied to a sample survey of major crops conducted by the Interamerican Agricultural Service (SIA) in 1958. Subsequent sample surveys in 1967-1969 suggest that the 1958 estimates were quite high [2]. More recently the official series of statistics have been revised and the 1958 survey generally disregarded [2].

2. Income Elasticities

Little information on income elasticities exists for Bolivia. Estimates by FAO are all that can be located.[2]. It seems likely that these have been estimated on the basis of FAO experience for, as far as is known by the authors, Bolivian expenditure surveys have not resulted in publication of such elasticities. The 1967 La Paz marketing survey contains the necessary family expenditure information but the survey results have been used for other purposes thus far [1].[1]

Other than the FAO estimates the only income elasticity estimates appear in a preliminary study of Bolivian and Ecuadorian time series data [3]. This source only covers six major crops and the results are judged to be unreliable. For example three of the six coefficients are negative, only one (flour) is significant at the 10 percent level (table 1).

---

[1]Our colleagues at Michigan State University have provided a full computer tape of their La Paz survey questionnaires in order that Urban income elasticities may be computed at Utah State University. Unfortunately the transcription process is just getting underway and the data to compute elasticity coefficients are not yet available.

Table 1. Benchmark per capita consumption of agricultural products and assumed income elasticities, Bolivia, 1968.

Commodity	Total apparent consumption MT	Per capita consumption Kg	Income elasticity FAO	USU*	USAID [7]
Wheat	261,406	55.83	.6	.6	—
Flour	—	—	—	—	.15
Barley	55,342	11.82	—	.6	—
Quinoa	9,261	1.97	—	.6	—
Rice	40,535	8.62	—	.4	.56
Corn	293,847	62.78	.5	.7	—
Yuca	194,211	41.49	—	.2	-.76
Potatoes	508,034	108.55	.2	.4	—
Beans	37,453	8.00	.5	.6	—
Fats & Oils	31,927	6.82	.9	.8	—
Edible Oils	5,757	1.23	1.2	1.1	—
Animal Fats	26,168	5.59	.8	.7	—
Beef	34,516	7.37	—	1.2	-.35
Mutton	3,441	.74	—	1.0	—
Pork	4,344	.94	—	.7	—
Onions	35,827	7.62	.4	.8	—
Tomatoes	72,420	15.47	.4	.8	—
Oranges	54,240	11.58	.6	1.8	—
Bananas	192,251	41.07	.6	.6	—
Plantains	92,302	19.72	.6	.6	—
Grapes	10,974	2.34	.6	.6	—
Almonds	5,000	1.06	.5	.5	—
Peanuts	11,295	2.41	.5	.5	.38
Sugar	94,590	20.21	.5	.4	—
Coffee	6,484	1.38	.6	.5	-1.29
Cacao	1,300	.27	.6	.5	—

*Adjusted as described in text.

Sources: 2, 3, 6, 7

The only possibility is to place most reliance on the FAO estimates. However some modifications have been introduced on the basis of two sets of income elasticities available for Peru, one by FAO and the other by the Economic Research Service, USDA [8].

The ERS Supply/Demand study involved field research in Peru and should be the most accurate estimates available for that country. The coefficients differ from those employed by FAO. We have adjusted some of the FAO Bolivian elasticities in the same direction that the Peruvian ERS study deviates from the Peruvian FAO study (table 1). In addition we have compared the final coefficients with those reported in other household budget studies [9] Separate sets of rural and urban coefficients are not yet available.

3. Population and National Income

Bolivian gross domestic product dropped following the 1952 revolution. Over ten years were required for recovery in real terms. It is assumed that by 1968 a long run trend had been re-established to the point where Engel consumption function can be employed. Due to the probability of incorrect apparent consumption estimates, an average of the 1967, 1968, and 1969 per capita consumption is chosen for the benchmark quantities for each product.

Personal income estimates are available in a 1970 Ministry of Planning publication. They are shown on a rural and an urban basis [4]. In the absence of any growth model of the Bolivian economy or any special study, a quadratic function is fitted to the time series of average per capita income and projected to 1975 and 1985.[1] Per capita incomes in the

---

[1] National personal income trend:

$$Y = 4.17197 + 0.10495x + 0.0018x^2$$

where: Y = population
x = year = 1964 - .5

two projection years are obtained by dividing personal income by projected population (table 2).

The Ministry of Planning has projected population to 1980 [5]. The time series projection was made with a quadratic function.[1] The same function is used to extend the estimates to 1985. For the present only national totals can be employed due to lack of urban/rural break down in per capita consumption and elasticity estimates.

The last Bolivian census was made in 1950, prior to the revolution. Since that time various attempts have been made to estimate the growth of the population of La Paz. From the original 1950 estimate of 321,000 the Census Bureau reported 328,000 in 1963, while the Ministry of Planning estimated 443,000. An effort to overcome this discrepancy lead to a joint Census Bureau-Michigan State University study in 1967. Their estimate was 441,000. In the same year the ministry of planning estimated 490,000. Our conclusion is that there is reason to believe that the population figures used in this report are somewhat high.

If this is true, the per capita income figures are too low. But this bias tends to be cancelled when the individual demand are summed over the "high" estimates of population. This effect is one of the advantages of making projections of food demands on a per capita basis.

Table 2. Estimated personal income and population, Bolivia, 1975-1985

Year	Personal income	Population	Per capita income	Y_1/Y_0
	b$		b$	
1968	4,911,000,000	4,680,000	1,049	---
1975	7,697,000,000	5,630,000	1,367	1.207
1985	13,477,000,000	7,335,000	1,837	1,751

Source: 4

[1] National Population trend:

$$Y = 4.17197 + 0.10495x + 0.00180x^2$$

where Y = population, x = year = 1964 = .5

RESULTS OF LONG RANGE PROJECTIONS

1. Engel Method

Table 1 contains the benchmark per capita consumption data. The national values to obtain the ratio of estimated growth in per capita income are shown in table 2.

If it is assumed that the best estimate of family consumption functions (Engel curves) is,

$$\ln c_t = \ln c_o + \eta \ln \frac{Y_1}{Y_0}, \quad \text{where}$$

c_o = initial consumption
c_t = consumption in projection year,

and that,

$$c_t(P) = C^*, \quad \text{where}$$

P = population in projection year
C^* = total projected demand,

the results in table 3 are obtained.

2. Trend Projections

A rough cross-check on the Engel method can be created by extrapolation of time series trends of domestic apparent consumption. The necessary data are contained in table 4.

Projections are only simple line regressions. Other functions have been tested, but in better than 75 percent of the cases, the coefficient of determination was on the order of .85 to .99 with simple linear functions. Even in the cases where R^2 was low, the results were due to variations from year to year rather than to deviations from a straight line.

This is what would be expected in official data that is not based on a reliable and adequate agricultural statistical reporting service. The

Table 3. Estimated demand for Bolivian agricultural products, 1975-1985

COMMODITY	PER CAPITA CONSUMPTION 1975 (KILO)	TOTAL APPARENT CONSUMPTION 1975 (MT)	PER CAPITA CONSUMPTION 1985 (KILO)	TOTAL APPARENT CONSUMPTION 1985 (MT)
WHEAT	65.54	368,990	78.16	573,304
BARLEY	13.54	76,230	16.16	118,534
QUINOA	2.31	13,005	2.76	34,915
RICE	8.99	50,614	10.08	73,937
CORN	75.55	425,347	92.92	681,568
YUCA	43.74	246,256	46.41	340,417
POTATOES	20.50	678,415	135.80	996,093
BEANS	9.38	52,809	11.19	82,079
FATS & OILS	8.43	47,461	10.68	78,338
EDIBLE OILS	1.65	9,290	2.28	16,724
ANIMAL FATS	6.73	37,890	8.27	60,661
BEEF	10.12	56,976	14.43	105,844
MUTTON	.96	5,405	1.30	9,536
PORK	1.10	6,193	1.36	9,976
ONIONS	9.45	53,204	11.97	87,800
TOMATOES	18.87	106,238	23.90	175,307
ORANGES	18.64	104,943	31.74	232,813
BANANAS	48.13	270,972	57.48	421,616
PLANTAINS	23.11	130,109	27.60	202,446
GRAPES	2.74	15,426	3.28	24,059
ALMONDS	1.21	6,812	1.37	10,049
PEANUTS	2.75	18,748	3.12	22,885
SUGAR	22.47	126,506	25.28	185,428
COFFEE	1.58	8,895	1.79	13,130
CACAO	.31	1,745	.35	2,567

Table 4. Time series of apparent consumption, Bolivian agricultural products

COMMODITY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
WHEAT	—	—	—	142,236	193,070	207,936	201,045	198,830	208,993	223,857	249,425	255,413
BARLEY	53,211	—	—	—	—	—	—	54,650	52,045	52,724	—	57,960
QUINOA	7,680	7,895	8,348	8,294	9,138	12,449	10,395	6,140	7,354	6,741	8,608	—
RICE	28,764	30,415	28,810	27,402	34,306	29,298	31,895	35,006	37,532	38,445	43,841	—
CORN	—	—	—	234,225	242,750	251,097	259,338	267,372	274,019	283,854	294,241	303,500
YUCA	—	—	118,800	146,025	133,650	136,620	138,600	148,500	158,400	178,200	198,000	206,433
POTATOES	444,980	418,640	338,502	374,612	386,111	400,897	411,894	430,921	414,267	403,482	446,873	—
EDIBLE OILS	1,899	2,940	2,286	2,253	3,612	2,559	3,332	3,350	3,500	3,500	4,402	3,666
BEEF	—	—	14,813	20,751	24,337	27,365	29,654	34,195	30,961	32,189	35,440	32,235
MUTTON	—	—	813	926	1,189	1,162	1,216	1,529	—	—	—	—
PORK	—	—	439	575	710	731	837	952	—	—	—	—
ONIONS	—	—	—	26,200	26,400	26,400	27,500	30,700	32,342	33,424	34,618	—
TOMATOES	—	—	—	51,000	50,000	54,200	58,100	62,200	66,790	72,048	77,977	—
ORANGES	—	—	—	41,900	43,300	44,800	46,300	47,800	49,181	50,624	52,500	53,980
TANGERINES	—	—	—	13,900	14,500	14,900	15,400	15,900	16,400	17,000	17,500	18,013
BANANAS	—	—	99,540	105,100	122,600	140,100	157,600	165,500	173,800	182,500	192,000	212,833
PLANTAINS	—	—	32,600	33,000	41,500	50,000	57,865	65,628	74,944	86,305	93,000	—
SUGAR	—	56,144	59,440	61,860	64,880	67,184	70,490	77,600	83,460	89,910	94,590	—
ALMONDS	—	—	—	2,833	3,117	4,305	4,067	4,633	4,986	5,000	—	—
PEANUTS	—	—	—	4,568	4,834	5,225	5,615	6,095	6,691	6,886	—	—
COFFEE	2,523	2,699	2,695	3,159	2,959	3,432	5,095	3,509	5,394	6,121	6,555	6,777
CACAO	—	—	—	1,068	1,078	1,201	1,195	1,268	1,215	1,353	1,308	—

Sources: 2,3

Table 5. Time series of production of Bolivian agricultural products

COMMODITY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
WHEAT	—	—	—	42,812	50,257	70,202	79,942	57,503	68,483	76,634	109,462	108,737
BARLEY	57,120	57,750	58,800	59,900	60,500	55,500	55,500	58,600	55,500	49,600	53,700	—
QUINOA	8,450	8,700	9,250	9,200	10,200	13,500	11,300	6,800	8,000	7,400	9,600	—
RICE	18,240	22,620	23,300	24,000	27,000	30,000	33,000	35,900	35,200	42,500	45,900	58,300
CORN	—	—	—	301,400	312,200	322,900	334,500	343,800	352,400	365,000	378,300	390,000
YUCA	—	—	120,000	147,500	135,000	138,000	140,000	150,000	160,000	180,000	200,000	205,333
POTATOES	592,000	562,000	528,000	516,000	531,000	546,000	561,000	575,000	549,000	519,000	597,600	—
EDIBLE OILS	—	—	—	—	—	—	—	—	325	800	945	—
BEEF	—	—	14,721	20,622	19,573	22,597	23,405	30,737	31,200	30,974	—	—
ONIONS	—	—	—	26,200	26,400	26,400	27,500	30,700	32,000	33,200	34,500	—
TOMATOES	—	—	—	51,000	50,000	54,200	58,100	62,200	66,400	71,700	77,400	—
ORANGES	—	—	—	41,900	43,300	44,800	46,300	47,800	49,300	50,900	52,500	53,980
TANGERINES	—	—	—	13,900	14,500	14,900	15,400	15,900	16,400	17,000	17,500	18,013
BANANAS	—	—	99,540	105,100	122,600	140,100	157,600	165,500	173,800	182,500	192,000	212,833
PLANTAINS	—	—	32,600	33,000	41,500	50,000	58,500	66,100	76,000	87,400	93,000	—
SUGAR	15,500	17,544	24,485	41,152	49,183	68,672	93,642	85,964	101,296	96,989	—	—
ALMONDS	—	—	—	2,833	3,117	4,305	4,067	4,633	4,986	5,000	—	—
PEANUTS	—	—	—	5,000	5,300	5,700	6,100	6,600	7,200	7,600	—	—
COFFEE	3,100	3,300	3,500	4,000	4,000	4,400	7,400	4,700	7,700	8,200	9,500	9,950
CACAO	—	—	—	1,070	1,080	1,080	1,090	1,090	1,100	1,200	1,300	—
MUTTON	—	--	--	--	--	--	--	--	--	--	--	--
PORK	--	--	--	--	--	--	--	--	--	--	--	--

Sources: 2,3

same general results are obtained for production trends (table 5).

A comparison with the demand projections in table 3 may be made by means of the official trends of demand shown in table 6.[1]

Table 6 also lists the long-range supply projections based on trends in production data. A great deal of further effort is required before adequate supply estimates will be available in Bolivia. Some kind of reliable benchmark production figures are necessary. The obvious solution is to undertake a throughgoing agricultural census. Another possibility is to work back from a really good consumption benchmark. At the very least, this would require a large rural survey of expenditures or of nutrition.

3. Tentative Long-run Supply/demand Balance

Table 7 contains the differences between the two sets of projected demands and the trend projection of production (supply). Positive and negative signs indicate surpluses and shortages.

Any surplus shown must be reduced by estimated seed, waste, livestock feed, and annual carry-over before an exportable surplus can be expected. This same negative items must also be added algebraically to the negative indicated import requirements, thereby contributing to the overall magnitude of the potential shortage.

[1]Although FAO estimated income elasticities for most Latin American nations, actual projections [6] were not made in every case; Bolivia is one of those cases.

Table 6. Tentative Long-run Projections of Bolivian Agricultural Production and Apparent Consumption - 1975-1985. (Based on Trends)

Commodity	1975 Production	1975 Consumption	1985 Production	1985 Consumption
Wheat	147,556	295,904	221,336	386,164
Barley	49,273	56,511	43,173	58,911
Quinoa	8,569	7,814	7,949	7,274
Rice	67,973	49,215	98,393	62,525
Corn	453,627	353,102	562,757	438,382
Yuca	248,995	248,610	336,055	336,510
Potatoes	559,986	428,951	566,256	443,901
Edible Oils	3,170	5,262	6,270	7,092
Beef	51,730	48,183	75,650	67,223
Mutton		2,712		3,972
Pork		1,905		2,865
Onions	43,615	44,065	56,955	57,755
Tomatoes	103,121	104,141	142,881	144,721
Oranges	63,039	62,886	78,219	77,956
Tangerines	21,038	21,038	26,138	26,138
Bananas	284,747	284,747	408,167	408,167
Plantains	149,603	148,162	231,253	228,832
Sugar	199,508	121,944	311,998	164,894
Almonds	8,278	8,278	12,048	12,048
Peanuts	11,117	10,233	15,577	14,353
Coffee	13,355	9,054	19,915	13,248
Cacao	1,409	1,593	1,679	1,963

Table 7. Tentative long-run supply/demand balance, agricultural products, Bolivia - 1975-1985

	1975		1985	
	Engel Projection	Trend Projection	Engel Projection	Trend Projection
Wheat	-221434	-148348	-351968	-164328
Barley	- 26957	- 7238	- 75361	- 15738
Quinoa	- 4436	755	- 26966	675
Rice	17359	18758	24456	35868
Corn	28280	100525	-118811	124375
Yuca	2739	385	- 4362	- 455
Potatoes	-118429	131035	-429837	122355
Edible Oils				
Vegetable	- 6120	- 2092	- 10454	- 822
Animal	—	—	—	—
Beef	- 5246	3574	- 30194	8427
Mutton				
Pork				
Onions	- 9589	- 450	- 30845	- 800
Tomatoes	- 3117	- 1020	- 32426	- 1840
Oranges	- 41904	153	-154594	1081
Tangerines		0		0
Bananas	13775	0	- 13449	0
Plantains	19494	1441	29307	2421
Sugar	73002	77564	126570	147104
Almonds				
Peanuts	- 7631	884	- 7308	1224
Coffee	4460	4301	6785	6667
Cacao	- 336	- 184	- 888	- 284

BIBLIOGRAPHY

1. Latin American Studies Center, Michigan State University. *Market Processes in La Paz, Bolivia*, July, 1969.

2. Carmen Diana Deere. *Estimates of Agricultural Production, 1958-1970*, USAID/Bolivia, May, 1970.

3. Ministry of National Economy, Department of Commerce, Statistical Section. "Production and Consumption of Necessities and Fruits, 1960-1967".

4. Ministry of Planning and Coordination. *Review of Planning and Development (Cuentas Nacionales)*, La Paz, Bolivia, July, 1970.

5. Ministry of Planning and Coordination, "Projections of the Population of Bolivia by States, State Capitals, and Rural Areas for the years 1950, 1960 to 1980".

6. Food and Agriculture Organization of the United Nations. *Agricultural Commodities-Projections for 1975 and 1985, Vols. I and II*, Rome, 1967.

7. Morris Whitaker. "Initial Estimates of Price and Income Elasticities of Major Agricultural Commodities for Bolivia and Ecuador from Time Series Data", Progress Report to USAID, CUSUSWASH/Ut/ Econ P2, January, 1971.

8. "Peru, Long Term Projection of Demand for and Supply of Selected Agricultural Commodities Through 1980." Universidad Agraria, Lima, Peru.

9. Economic Research Service, USDA. Long Run Supply and demand Studies for Venezuela (1963) and Brazil (1968).