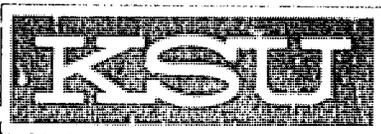


Postharvest Grain Systems R&D

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POLICY ALTERNATIVES FOR THE PRODUCTION  
AND MARKETING OF WHEAT IN BOLIVIA



KANSAS  
STATE  
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AND MARKETING OF WHEAT IN BOLIVIA

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## LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

AADAA	Administración Autónoma de Almacenes Avvaneros
ADIM	Asociación de Industriales Molineros
ANAPO	Asociación Nacional de Productores de Oleaginosas
BAB	Banco Agrícola de Bolivia
CESAT	Centro de Servicios y Asistencia a la Producción Triguera
CIAT	Centro de Investigación Agrícola Tropical
IBTA	Instituto Boliviano de Tecnología Agrícola
JUNAC	Junta de Acuerdo de Cartagena
MACA	Ministerio de Asuntos Campesinos y Agrícolas
MICT	Ministerio de Industria, Comercio, y Turismo
NWC	National Wheat Council
PAIRUMANI	Centro de Investigaciones Fitoecogénicas de Pairumani
PL 480	Public Law 480
PROMASOR	Asociación Nacional de Productores de Maíz y Sorgo
UDAPE	Unidad de Análisis de Políticas Económicas
USAID	United States Agency for International Development
qq	Quintals
\$B	Peso Boliviano
MT	Metric Ton
ha	Hectare
Quintal	100 pounds (45.5 kilograms)
Metric Ton	1.000 kilograms (2204 pounds)

## EXECUTIVE SUMMARY

### Statement of the Problem

Over the past several decades, bread and noodles have become an important component of the Bolivian diet. To satisfy the demand for flour and miscellaneous uses, approximately 330,000 MT of wheat are required annually. Wheat production in Bolivia has remained essentially flat over the same time period at approximately 60,000 MT annually, of which roughly 10,000 MT are sold off-farm and the rest being consumed on the farm. The difference is made up by commercial and concessionary imports as well as donations of wheat and flour.

The wide disparity between the production of national wheat and consumption levels is of major concern to the Government of Bolivia (GOB) and the United States Agency for International Development (USAID). This discrepancy can be attributed to the following major factors.

First and foremost, consumer-oriented price policies have over the years subsidized the consumption of wheat products, that is bread. These policies led to increased annual demands for wheat, while at the same time production of national wheat was being discouraged by farm gate prices and market conditions which failed to generate sufficient production incentives.

Second, the absence of a well-developed market infrastructure and national transport system coupled with the lack of appropriate price incentives not only discouraged the production of wheat and other agricultural commodities but also restricted their movements across the country from surplus to deficit areas and contributed to the high cost of doing so. Also interstate custom duties discouraged a distribution much beyond the immediate needs of a given production area. This combination encouraged regional rather than national development activities.

Third, except for some limited areas in the Altiplano, the climatic and soil conditions make it very difficult to achieve high yields in wheat production. Commercial wheat production has recently been introduced as a complementary crop to soybeans and other summer crops in the Santa Cruz area, however relatively little support or encouragement has been provided in this area of high production potential.

Fourth, lack of a well-financed and sustained research program in wheat production including farming practices, and use of production inputs, coupled with the absence of an effective extension or outreach program has led to little improvement in production yields. Also, the high cost of agricultural inputs, the inopportune and erratic availability, and improper application have discouraged production and diminished yield potentials.

Fifth, a number of auxiliary production, marketing, processing, distribution and consumption functions are either weak or have yet to be developed and implemented. Without them, it is very difficult to facilitate the movement of large volumes; to reassure buyers and sellers through adequate norms and measures; to have information in order to make sound production, marketing, processing and consumption decisions; and to obtain financing which allows risk distribution and balancing of the production and consumption cycles.

## Objectives of the Study

The objectives of the study were to review the production, marketing, processing and distribution of Bolivian wheat, imported wheat, and flour in order to explore policy options to:

1. Provide the basis for future decision-making concerning additional wheat sales to Bolivia under PL-480.
2. Formulate recommendations concerning the content and implementation of a national wheat policy, taking into consideration the effects on all major factors.
3. Develop a consensus among key decision-makers concerning a national wheat policy which maximizes the incentives provided to local producers.

## General Approach

Three basic approaches were used to undertake this study. First, a thorough literature review was undertaken to gain further familiarization with the topic and update our knowledge since our previous KSU report of 1981 (33).

Second, interviews and meetings were held with officials from the Bolivian and U.S. governments, researchers in private and public institutions, industry representatives, wheat producers, market participants, and officials from other donor agencies.

Field trips to different parts of the country were useful to substantiate and strengthen the information obtained from the literature and interviews and personally observe the different links of the wheat food system in Bolivia.

## Conclusions

Wheat can play a more productive and larger role in increasing farm incomes, enlarging the national agri-business base, and contributing to foreign exchange savings in Bolivia. Higher yields, production levels and marketing volumes are possible, if appropriate policies and action programs are implemented.

## Recommendations

The recommendations are made in two broad categories: Wheat Policy and Action Programs. A well-defined national wheat policy is the first priority. A second set of recommendations provides action programs which can assist in the implementation of a national wheat policy by strengthening selected link components of the wheat system in Bolivia.

National wheat policy. A national wheat policy involves planning based upon certain beliefs, values, and goals, taking into account the resources that are available, and the costs and benefits to be achieved as a result of the policy. In definitive terms, a national wheat policy should include specific goals and timetables, with commitments of resources to achieve the policy goals or overcome the constraints to achieving the goals. For Bolivia, these policy goals seem achievable, subject to modification after a more thorough

investigation of the physical and economic constraints: (1) achieve national commercial wheat production levels that are 25 percent of national commercial consumption by 1992, and 50 percent by 1997, (2) produce wheat domestically at costs no greater than 25 percent above world market prices by 1992, and 10 percent by 1997, (3) increase the quality and variety of wheat based products available to consumers, (4) maintain a viable flour milling industry that is capable of providing for the total domestic demand for flour and wheat by-products, and (5) utilize imports as a means of supporting national wheat production by providing wheat for blending with national wheat to achieve desired product characteristics, and to supplement shortfalls in domestic production.

Action programs. A Wheat Policy Analysis Unit should be created to address the relevant issues and coordinate the formulation of national policies. At present, the responsibility for all aspects of wheat production, imports, and utilization is widely dispersed within the GOB. A national wheat policy must be derived from a consensus of all entities involved. A National Wheat Council (NWC) with regional counterparts has been proposed to provide forums for policy creation. Policy creation must be supported by adequate information and skilled analysis of the technical and economic aspects of the wheat sector.

From this level, attention is focused on the provision of agricultural production inputs to achieve national production goals. Improved wheat varieties and seed availability is central to the effort, with emphasis on research and distribution to built upon the solid foundation left by the recently phased out seed improvement project. Provision of an efficient and opportune credit program for production credit is another essential input element. Fertilizer and agrochemicals represent the third input element which lacks a national industrial base, calling for a serious long-term assessment and planning effort for its development.

The next link is production, with the creation of effective producer organizations to assure that all inputs are in place to assure a bountiful harvest. In some places, it will be possible to build upon existing organizations; in others, it will be necessary to build literally from the ground up.

While the harvest may be plentiful, it is within the marketplace where the battles are won or lost, and incentives are obtained to repeat the cycle. For these reasons, wheat marketing must be fully supported by organization, infrastructure, auxiliary functions, credit, and research. The reactivation of the wheat purchase centers within the private sector can play a vital role.

Milling is the next critical component in the wheat system. From a position of privileged and sheltered existence to one suddenly battered by shifting economic forces, the flour milling industry is seeking answers. The needs in this link can largely be fulfilled by information, training and strategies for coping with the new situation. The milling industry must remain strong and flexible as a market for increased wheat production. Bread, pasta making, and flour distribution are coming in for more attention as previously subsidized consumption can no longer be taken for granted. Import competition has opened eyes and tastes to the possibilities, and the industry is beginning to seek

new ways. The baking industry has much in common with flour milling, and some joint actions are proposed.

The final link in the systems approach is wheat importing. Imports were deliberately placed last to emphasize the need for a change from a nation dominated by imports, to a national wheat policy supported by imports. Many of the current import problems can be overcome by information, training and improved logistics. In the longer term, technical and economic analysis can assist in guiding the nation's import policies to a position of selecting import quantities and qualities to complement national production.

## SECTION I

### THE ROLE OF WHEAT IN THE BOLIVIAN DIET

#### A. Introduction

Wheat was introduced to Bolivia during the early stages of the colonial period and eventually became a major staple in the Bolivian diet. Today, wheat is the fourth most important agricultural product after potatoes, maize, and barley, if ranked by total area under cultivation. Total annual supply of wheat increased from 103,704 MT in 1950 to 310,415 MT in 1986 (Table 1), which more than doubled the per capita availability of 30.82 kg/yr in 1950. However, less than 20 percent of the annual wheat supply is produced in Bolivia, and due to a combination of circumstances, it is doubtful that the wheat flour produced in the country was, until recently, totally consumed in Bolivia.

Since 1950, there have been several well-documented attempts to stimulate wheat production in Bolivia (33,42). The list of laws, decrees, institutions, programs, projects, and campaigns designed to achieve higher production levels and even wheat self-sufficiency is long (38,88,89). The issue of cereal self-sufficiency itself, has always been an all-encompassing catchword used in more than one context depending on the political situation of the moment. More recently, several position papers have promoted the idea of not only reaching self-sufficiency, but also to produce wheat for export (35,38,62).

The stark reality is that Bolivia's wheat production during this time period has not kept up with population growth. The reasons for this situation are varied and complex, including technical, agronomic, geographic, social, economic, political, and aspects of wheat production which are represented in policy decisions.

The first part of this section reviews the historic wheat supply patterns and trends which have now culminated in a situation of serious concern to the GOB and USAID/La Paz in regard to the current status of national wheat production, imports, marketing, milling, and consumption. In the second part, a systems approach is used to analyze the individual links making up the wheat food chain. The most salient constraints of each link which contributed to this undesirable situation are highlighted and put into perspective. This section then serves as a basis for a review and understanding of the policy issues which constitute the most fundamental reasons for this situation (Section II), suggested policy framework (Section III), and action recommendations (Section IV).

#### B. Wheat Supply Patterns, Trends, and Potentials

The wheat supply patterns and trends are contained in Table 1. The total annual supply of wheat is composed of national production and imports. The second component is made up of wheat and flour imports. A milling factor of .72 was used to convert flour imports into wheat equivalent. While the reliability of these basic numbers as well as other data used in this report is subject to question, what is important is the trend and composition of the total annual supply of wheat over the 35 years time period.

TABLE 1

## Wheat Supply Trends in Bolivia

Year	Area (ha)	Production (MT)	Yields (kg/ha)	Imported Wheat (MT)	Imported Flour (MT)	Total Imports (MT)	Total Annual Supply (MT)	Imports as Percentage of Supply (%)
1950	84,709	45,658	539	33,881	17,399	58,046	103,704	56.0%
1951	84,700	45,658	539	32,487	32,927	78,219	123,877	63.1%
1952	80,000	40,000	500	73,725	16,414	96,522	136,522	70.7%
1953	65,200	31,200	479	71,570	11,210	87,139	118,339	73.6%
1954	65,000	31,200	480	58,792	19,357	85,677	116,877	73.3%
1955	70,000	35,000	500	34,387	21,913	64,822	99,822	64.9%
1956	74,000	37,000	500	13,192	14,781	33,721	70,721	47.7%
1957	75,200	37,500	499	54,722	63,047	142,287	179,787	79.1%
1958	70,000	35,000	500	3,351	64,192	92,507	127,507	72.6%
1959	70,000	35,000	500	14,336	71,902	114,200	149,200	76.5%
1960	70,000	35,000	500	6	77,584	107,762	142,762	75.5%
1961	70,000	35,000	500	4,514	101,503	145,490	180,490	80.6%
1962	80,000	40,000	500	21,487	94,400	152,598	192,598	79.2%
1963	106,150	55,200	520	18,984	103,015	162,060	217,260	74.6%
1964	109,245	57,900	530	4,725	96,126	138,233	196,133	70.5%
1965	63,635	35,000	550	15,622	108,582	166,430	201,430	82.6%
1966	74,545	41,000	550	15,109	107,820	164,859	205,859	80.1%
1967	45,000	27,000	600	26,563	127,837	204,114	231,114	88.3%
1968	75,000	45,000	600	54,193	109,927	206,869	251,869	82.1%
1969	76,500	53,200	695	40,603	109,834	193,150	246,350	78.4%
1970	63,130	44,190	700	45,673	161,949	270,602	314,792	86.0%
1971	59,910	47,100	786	46,283	171,283	284,176	331,276	85.8%
1972	64,310	53,590	833	82,752	139,549	276,570	330,160	83.8%
1973	68,860	57,000	828	68,303	84,544	185,725	242,725	76.5%
1974	73,570	62,460	849	85,723	137,521	276,724	339,184	81.6%
1975	76,860	61,750	803	65,430	154,583	280,129	341,879	81.9%
1976	80,815	69,815	864	97,410	69,389	193,784	263,599	73.5%
1977	73,415	48,085	655	160,000	75,000	264,167	312,252	84.6%
1978	79,900	59,925	750	243,218	77,351	350,650	410,575	85.4%
1979	98,070	67,755	691	204,256	37,500	256,339	324,094	79.1%
1980	100,370	60,140	599	251,839	5,556	259,556	319,696	81.2%
1981	95,955	66,620	694	295,552	11,111	310,984	377,604	82.4%
1982	96,422	66,000	684	170,000	13,889	189,290	255,290	74.1%
1983	70,507	40,347	572	331,267	20,883	360,271	400,618	89.9%
1984	88,810	68,456	771	273,478	62,500	360,284	428,740	84.0%
1985	93,125	67,730	727	214,907	20,000	242,685	310,415	78.2%

Sources: (9), (33), (42), (66), (70), (81)

Notes: 1. Total Annual Supply = Production + Imported Wheat + Imported Flour/.72

1. Total Annual Supply. Total annual supply of wheat has more than tripled since 1950. This increase represents an annual growth rate of 4 percent during the last 35 years, while the population growth rate for the same period was 1.7 percent. Also, during the same time period, the average per capita consumption sustained an annual growth rate of 2.1 percent. The difference between the population and consumption rates implies that either consumers had reason to increase their consumption of wheat and wheat derivatives at a faster rate than the population growth rate, and/or wheat was reexported as wheat flour to neighboring countries (9, page 44). It appears that both events took place, especially in the 1980s, however the relative proportions of consumption increases and reexports are difficult to assess on an annual basis. Section II discusses the policy and economic reasons and impacts of this observation.

The composition of the total annual supply of wheat reveals another important trend. The participation of national production in the total annual supply of wheat decreased from 56 percent in 1950 to less than 20 percent in the mid 1980s. In other words, while imports more than quadrupled from 58,000 MT to over 200,000 MT, national wheat production managed an increase in output of only 22,000 MT over the same time period. Again, Section II will discuss the policy and economic reasons behind this disappointing performance of national wheat production.

2. National Production, Yields, and Area. Domestic production of wheat, as a function of land area and yield, has not been encouraging at all. Total wheat production in 1950 was 45,000 MT. Since then it has increased at a very slow rate to 67,000 MT, a growth rate of less than one percent annually.

Wheat yields, which nationally averaged 500 kg/ha during the 1950s and the early 1960s, increased to between 800 and 900 kg/ha during the mid 1970s, but have since declined to around 700 kg/ha. This surge in yield levels was due to the first serious program in Bolivia in the mid 1960s to improve the wheat seed stock. Improved varieties were imported from Mexico, multiplied and distributed to farmers (61, page 3). The project, however, was terminated before it had a chance to become fully integrated and self-financing. The program lacked an effective marketing component to handle the produced farm surpluses and related quality issues. As support was withdrawn, the impact of this program was diluted and wheat production reverted to its subsistence conditions in the traditional areas.

Finally, land area under wheat cultivation has increased only marginally since 1950. The two bulges found in the data series in 1963-64 and 1979-80 were due to shortlived politically motivated campaigns to increase wheat production using price incentives.

From a historical perspective, the most encouraging development in wheat production is the proven potential for increasing yields per unit of production (9,42,72). Bolivian wheat yields are the lowest in the region. Neighboring countries such as Peru, Argentina, Paraguay, and Brazil produce wheat in areas with similar growing conditions, yet each has higher production yields than Bolivia.

3. Wheat Production by Area. Since 1970 wheat production information has been made available by department. This information is contained in Table 2.

TABLE 2

## Wheat Production by Area and Percentage of Nontraditional Area

1970 - 1985

Year	<u>Traditional</u>			<u>Nontraditional</u>			Nontraditional	
	Area (ha)	Yield (Kgs)	Production (Mt)	Area (ha)	Yield (Kgs)	Production (Mt)	Percent of Area	Production
1970	61,455	698	42,870	1,675	788	1,320	2.65%	2.99%
1971	57,920	789	45,690	1,990	709	1,410	3.32%	2.99%
1972	61,740	845	52,190	2,390	669	1,600	3.73%	2.97%
1973	64,690	841	54,390	4,170	626	2,610	6.06%	4.58%
1974	68,050	846	57,600	5,520	880	4,860	7.50%	7.78%
1975	70,430	791	55,700	6,430	941	6,050	8.37%	9.80%
1976	74,530	845	62,955	6,285	1,091	6,860	7.78%	9.83%
1977	78,380	622	48,755	6,785	1,010	6,855	7.97%	12.33%
1978	80,455	631	50,760	7,200	810	5,830	8.21%	10.30%
1979	90,070	668	60,155	8,000	950	7,600	8.16%	11.22%
1980	92,070	616	56,670	8,300	900	7,470	8.27%	11.65%
1981	88,495	685	60,620	7,460	766	5,715	7.77%	8.62%
1982	85,922	670	57,600	5,250	800	4,200	5.76%	6.80%
1983	69,061	558	38,545	723	1,246	901	1.04%	2.28%
1984	87,232	768	66,998	8,578	986	8,458	8.95%	11.21%
1985	91,664	719	65,875	8,461	1,047	8,855	8.45%	11.85%

Sources: (33, Page 86), (43, B-4), (61, Table No. 12)

Again, the salient points are the historical trends and distribution of wheat production among departments, that is traditional and nontraditional areas. In the traditional area, wheat production increased by 23,005 MT from 42,870 MT in 1970 to 65,875 MT in 1985. This increase, however was a result of more land area being put under wheat cultivation which compensated for the decreasing yield levels registered after the effects of the first seed multiplication program diminished in the mid 1970s. Land area under wheat cultivation increased by 30,209 ha from 61,455 ha in 1970 to 91,664 ha in 1985. Yields, which increased from 698 kg/ha in 1970 to 845 kg/ha in 1976, decreased to 719 kg/ha in 1985.

In the nontraditional areas, wheat production has shown a very respectable annual increase of 12.63 percent, increasing from 1,320 MT in 1970 to 8,855 MT in 1985. The 1986 crop was estimated to yield 12,000 MT which, however, was reduced severely. An attack of rust depressed yields and forced farmers to leave many fields unharvested. Nevertheless, the increased production has been a combination of area and yields, with land area being the dominant variable.

Nontraditional land area under wheat cultivation increased by 6,786 ha from 1,675 ha in 1970 to 8,461 ha in 1985 and an estimated 10,000 ha in 1986. Average yields have increased from 788 kg/ha in 1970 to approximately 1,047 kg/ha in 1985. Nevertheless, yields went through a similar cycle as occurred in the traditional areas.

From the 1970 levels, yields alternated between high and lows in cycles lasting three, eight, and four years respectively. Wheat from non-traditional areas now accounts for about 12 percent of national production, a figure which is likely to increase.

4. Utilization of National Wheat. Another interesting and telling trend is summarized in Table 3. Three independent observations show the significant change in the utilization pattern of the national wheat production. The most striking shift is associated with the inverse relationship between the percentage of wheat sold off the farm and the percentage consumed on the farm.

In 1979, approximately 30 percent of the wheat production was sold to the flour milling industry and 19 percent was on-farm consumption. By 1986 that relationship had suffered a complete reversal, when only 19 percent is sold off-the farm and 42 percent represents on-farm consumption. This shift is the one that most dramatically demonstrates the negative impact on wheat production of the consumer-oriented government policies that existed up to August 1985. Why and how this happened is explored in the next section.

The general yet important deduction that can be made from this observation is as follows. In 1979, wheat production in the nontraditional area represented 11.2 percent of national production. In 1985, this participation had increased slightly to 11.9 percent (see Table 2). The implication is that, while more commercial wheat was grown as a function of favorable crop cycles in the nontraditional areas, wheat production in the traditional areas increased as a function of land area but was held back for on-farm consumption due to lack of incentives and market outlets at remunerative prices.

TABLE 3

## Utilization Of National Wheat Production

<u>Utilization</u>	<u>1979</u> (a)	<u>1983</u> (b)	<u>1986</u> (c)
Flour Milling Industry	30.0%	21.0%	19.3%
Small Rural Mills	31.0%	10.0%	12.8%
Chicha Production	7.0%	17.0%	
On Farm Consumption	19.0%	40.0%	42.5%
Seed	13.0%	12.0%	10.0%
Other 1.			<u>15.4%</u>
Total	100.0%	100.0%	100.0%

Sources: (a) (35, page 16)  
 (b) (67, page 5)  
 (c) (72, page 45)

Notes: 1. Not specified and losses. When added to Chicha production, the 1986 observation conforms with previous observations.

The other significant trend in Table 3 shows the decreasing amounts of wheat being either sold to or custom-processed by small rural mills. Since documented facts about the workings of small rural mills is minimal, the trend is difficult, if not impossible, to interpret. Nevertheless, the decline must have impacted negatively on rural employment and income generation.

5. Wheat Production Potential. At least on paper, the potential land availability for wheat production in Bolivia seems "endless". The latest available estimate of this potential is contained in Table 4. With some exceptions, a review of the literature shows a continuous increase of the land potential itself as each new study is undertaken and published. By now the total land potential suitable for wheat production is estimated to be 421,755 ha. While there is some room for expansion in wheat production in the traditional areas of the Altiplano, the greatest potential is contained within the nontraditional area of Santa Cruz where apparently 170,000 ha are "suitable" for wheat production.

The question that goes begging, of course, is why in view of this potential, wheat production in Bolivia has had such dismal record. The rest of this chapter will attempt to answer this question by looking at each link of the wheat food system in Bolivia and addressing the technical, agronomic, economic and marketing characteristics and constraints which have prevented Bolivia from reaching this "apparent" production potential. Many of the constraints should be viewed as symptoms or results of inadequate policies or lack of them rather than intrinsic. The next chapter will look at the more fundamental policy issues which contributed to this situation.

### C. The Wheat System Characteristics and Constraints

It is useful to conceptualized the food production and distribution segments of developing economies in ways that help us understand the functions, key activities, interrelationships and linkages which will have to be changed through time if development goals are to be achieved. The total complex of production, marketing, processing and distribution functions for wheat can be viewed as a "commodity system" of linked steps through which the product flows to the final consumer, extending from the development of technical farm inputs to the utilization of the food product for human consumption (see Figure 1). It demonstrates that each function is dependent upon the others and that the total chain can be no stronger than its weakest link, be it farm production, marketing or one of the other linked functions (91, page 32). This chain is assisted by a series of auxiliary functions which are provided to strengthen each link and make them more efficient and effective. Finally, the whole system operates under a policy umbrella which provides sound guidelines, regulations and incentives to every participant within the chain. In order to plan effective development it is necessary to understand the total production-distribution complex for wheat. Balanced development of the complete system is desired so that the component parts mesh together for an efficient delivery of food products in the form, time, and place demanded by consumers.

1. Production Inputs. The segment representing production inputs is composed of two major links, namely input development and production, and input supply. Agricultural production in Bolivia has failed to reach its potential, due to either a lack of key production inputs or insufficient and/or inefficient supply. If the following three components of this first link are strengthened and streamlined, wheat production in Bolivia will be greatly enhanced.

TABLE 4

## Wheat Production Potential by Area

Departments	Traditional Area (ha)	Non Traditional Area (ha)	National Total (ha)
Chuquisaca	40,832		40,832
Cochabamba	58,844		58,844
Potosí	78,079		78,079
Tarija	19,000	22,000	41,000
Santa Cruz	4,000	170,000	174,000
La Paz	7,500		7,500
Oruro	1,500		1,500
Beni		20,000	20,000
Total Potential	209,755	212,000	421,755

Sources: (42, page 34)

a. Seed. Good seed stock is one of the most important components of modern grain production. Research in Bolivia has demonstrated that improved wheat varieties alone can increase yields up to 30 percent (42).

(1) Availability and Quality. It is apparent that the greatest short-term impact on wheat production in Bolivia can be achieved by improving the varieties of wheat and the quality of seeds, and making them available to farmers in an opportune and competitive manner. While improved wheat seed is available in Bolivia, the majority of the wheat planted is a selection of grain from the previous crop which was kept for the next planting. This traditional method of supplying seed has the advantage of being dependable and economical for the producer - but it also has many disadvantages such as loss of purity, vigor, decreasing yield potential, increased susceptibility to diseases, and inadequate commercial qualities.

In the last 7 years, however, great strides have been made towards overcoming these shortcomings under a USAID-sponsored seed project (GOB/AID 511- 059-008-HCC between MACA and Chemonics). This project laid down a sound technical foundation for the production of certified wheat seed in the Departments of Tarija, Chuquisaca, and Santa Cruz. The impact of this project is clearly evident by the increased production yields and better uniformity and commercial quality of the wheat produced in Santa Cruz, where all the available certified wheat seed is being utilized. Actual demand for certified seed in Santa Cruz alone exceeds supply by a ratio of at least 3 to 1, while in the traditional areas, where over 80 percent of the national wheat is grown, the farmers have yet to benefit from this development.

(2) Research and Development. At this stage, there are many private and public institutions engaged in wheat research, including MACA, CIAT, PAIRUMANI, CORGEPAI, and others. Unfortunately, each institution is pursuing its own agenda with little regard to what the others are doing. No apparent overall strategy is in place to guide these individual efforts towards a common goal.

Informal agreements exist among these institutions to share seed for testing purposes. While MACA has turned over its seed plants to the Regional Seed Councils, it still undertakes basic wheat research at different experiment stations. MACA also certifies seed through the Regional Seed Councils.

CIAT has a process of testing 800 new lines each year which after 5 years of selection are reduced to between two and five new varieties which are then available for multiplication and commercial distribution. CIAT also engages in seed production, processing, storage, and marketing.

PAIRUMANI, with its own foundation support, tests new varieties, and approved releases are commercialized by its own farm. One flour mill has organized and funded a 3-year study to look into the issues of varietal adaptation in a potential supply area. CORGEPAI carries out wheat seed research at Abapo-Izozog under irrigation.

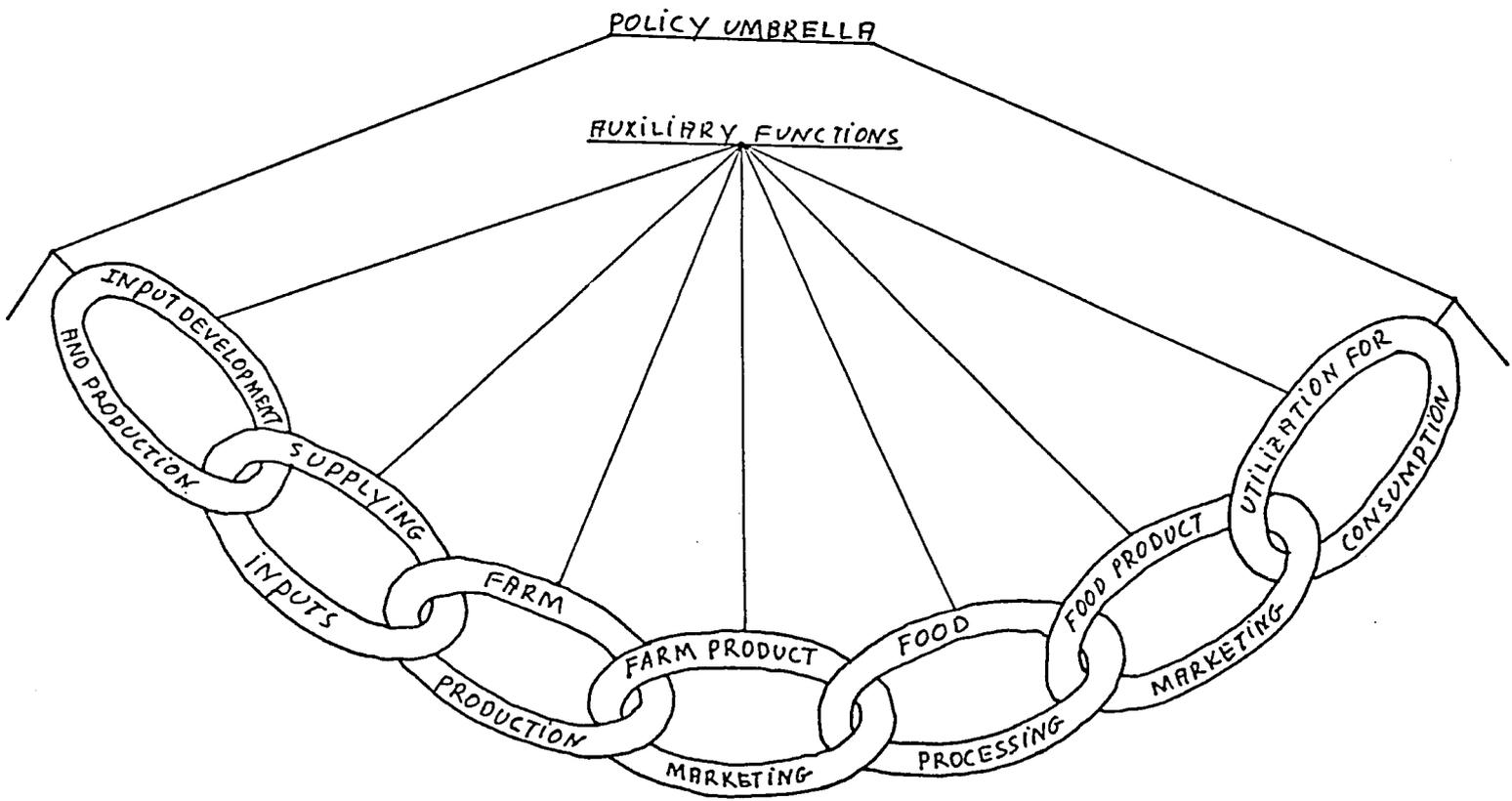


FIGURE 1. Production-Distribution Chain For Food Products

All these institutions carry out their research at the field or agronomic level. No efforts could be identified for quality requirements at the user level, that is research aimed at analyzing the quality of end products derived from the new varieties and translating these quality requirements backwards into the selection process. Further, no genetic or quality improvement research of varieties is being carried out. In other words, wheat seed research in Bolivia amounts to screening imported varieties and selecting a few promising new lines every year for long-term testing and eventual commercialization.

(3) Personnel and Funding. Except for PAIRUMANI, all research facilities visited were underfunded, understaffed, and insufficiently trained in many areas. For example, CIAT has the "luxury" of having two full-time researchers on wheat. These two gentlemen have bachelor degrees in agronomy and 6 months of training in seed research at CIMMYT, Mexico. On the other hand, CIAT has been criticized for devoting "too many" resources to wheat at the expense of research in rice, corn, and soybeans. Only one field entomologist is employed at CIAT, who has to share his time among all crops researched. While the facilities at PAIRUMANI could serve as an example of what a seed research facility should look like, personnel salaries are deliberately kept equal to salaries at public institutions. This makes it very difficult to retain the brightest and the best for any long periods of time. This handicap, of course, also applies to all public institutions.

b. Fertilizers and Agrochemicals. The second component of a modern and technified system of grain production consists of fertilizers (including green fertilizers) to increase yields and agrochemicals for weeds and pest control. Their opportune and judicious application carries with it the potential to increase yields and improve product quality within economically acceptable ranges. This potential, however, is hard to achieve unless a thorough knowledge of the farming system environment is at hand before these production inputs are introduced.

(1) Availability. It is truly remarkable that Bolivia, with all the necessary raw materials at hand, imports all the fertilizers and agrochemicals used in agriculture. The current import and distribution system for these inputs is fraught with inefficiencies, inopportune timing, and high costs. On the other hand, Bolivia exports natural gas and oil to neighboring countries, both basic inputs for fertilizer production. Deposits of phosphates and other minerals are naturally available in Bolivia, from which fertilizers can be manufactured. Several of the documents reviewed suggest that a fertilizer plant sized for Bolivia's needs is either uneconomical or unavailable. The authors could not find any technical and economic analysis that would substantiate these views. While economies of scale are important in the production of fertilizers, other associated variables such as import substitution, export potentials, employment creation, alternative production policies through input subsidies, etc., should be part of such an analysis.

(2) Application. Another well documented production issue is the total lack of fertilizer application in wheat cultivation. In the Altiplano, some wheat benefits from residual fertilizer when planted as a rotation to potatoes. In Santa Cruz, wheat and soybean production could both benefit from inoculation, however, this is not yet practiced. The only agrochemical application documented was the recent application of fungicides to the wheat crop in Santa

**Cruz.** The results were less than satisfactory. Establishing optimum composition and application of fertilizers and agrochemicals in both production areas is still a wide open area for applied research in Bolivia.

c. Credit. Ample, opportune, and fairly-priced production credit is another indispensable input for the development of a market-oriented agricultural sector, including wheat production. Achieving this, especially in the traditional areas, is not an easy task. The total demand for this type of credit exceeds availability (41), a situation which is further complicated by the lack of credit institutions in rural areas, the excessive collaterals required to secure a loan, the cumbersome system for credit application, and lack of opportune disbursement when available (9,42). In the 5 years before 1984, total production credit given to wheat producers amounted to less than 1 percent of the total credit given to the agricultural sector (9, page 10).

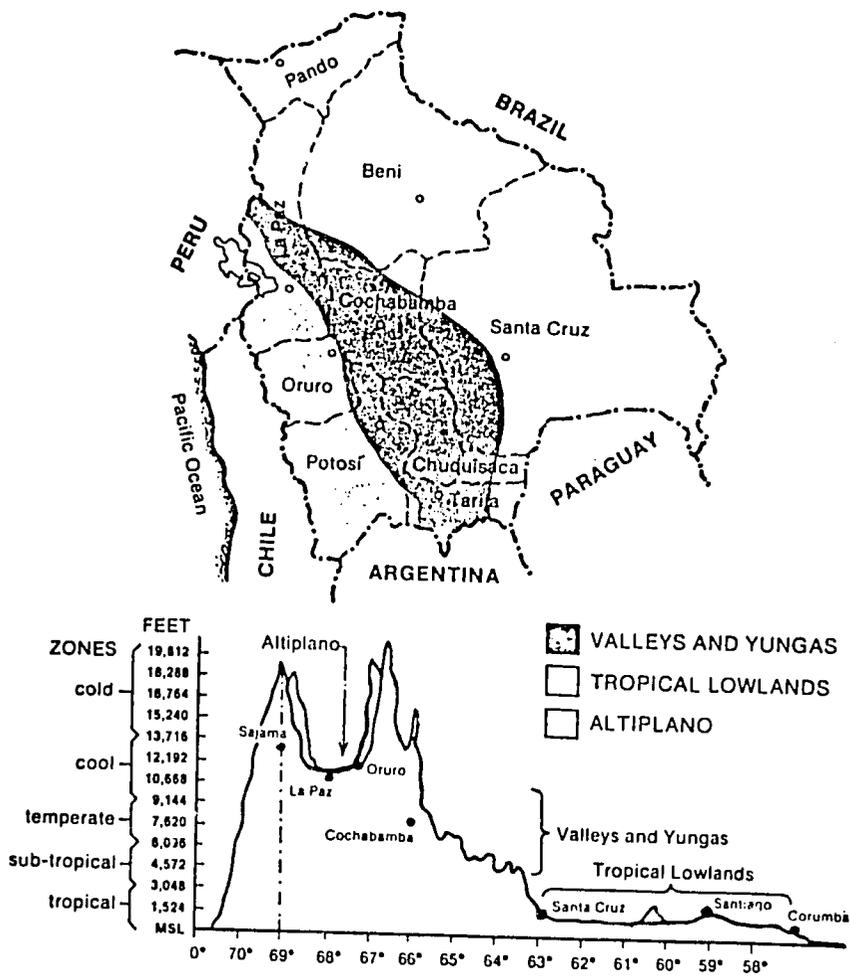
The need for and method of disbursing credit will require additional study. This is a nagging question in the traditional areas of wheat production. Included in the needed research are analyses of farming practices, cost of production, and alternative marketing scenarios. Some successful credit programs have been implemented under the PL 480 program which could serve as guides.

2. Wheat Production. Wheat production is the most documented link of the wheat food chain in Bolivia. This is clearly evident from the literature reviewed for this study, of which about three-fourths deals only with this subject. This information, however, is not always based on statistical validated results of surveys, experiments, and research. Frequently, "personal knowledge" and experience are presented as facts and extrapolated into inappropriate situations.

A geographic profile of Bolivia is presented in Figure 2 which shows the dramatic differences in altitude and temperatures between the Altiplano and the tropical lowlands which represent the traditional and nontraditional areas of wheat production, respectively. Both areas have certain characteristics which are not favorable for growing wheat.

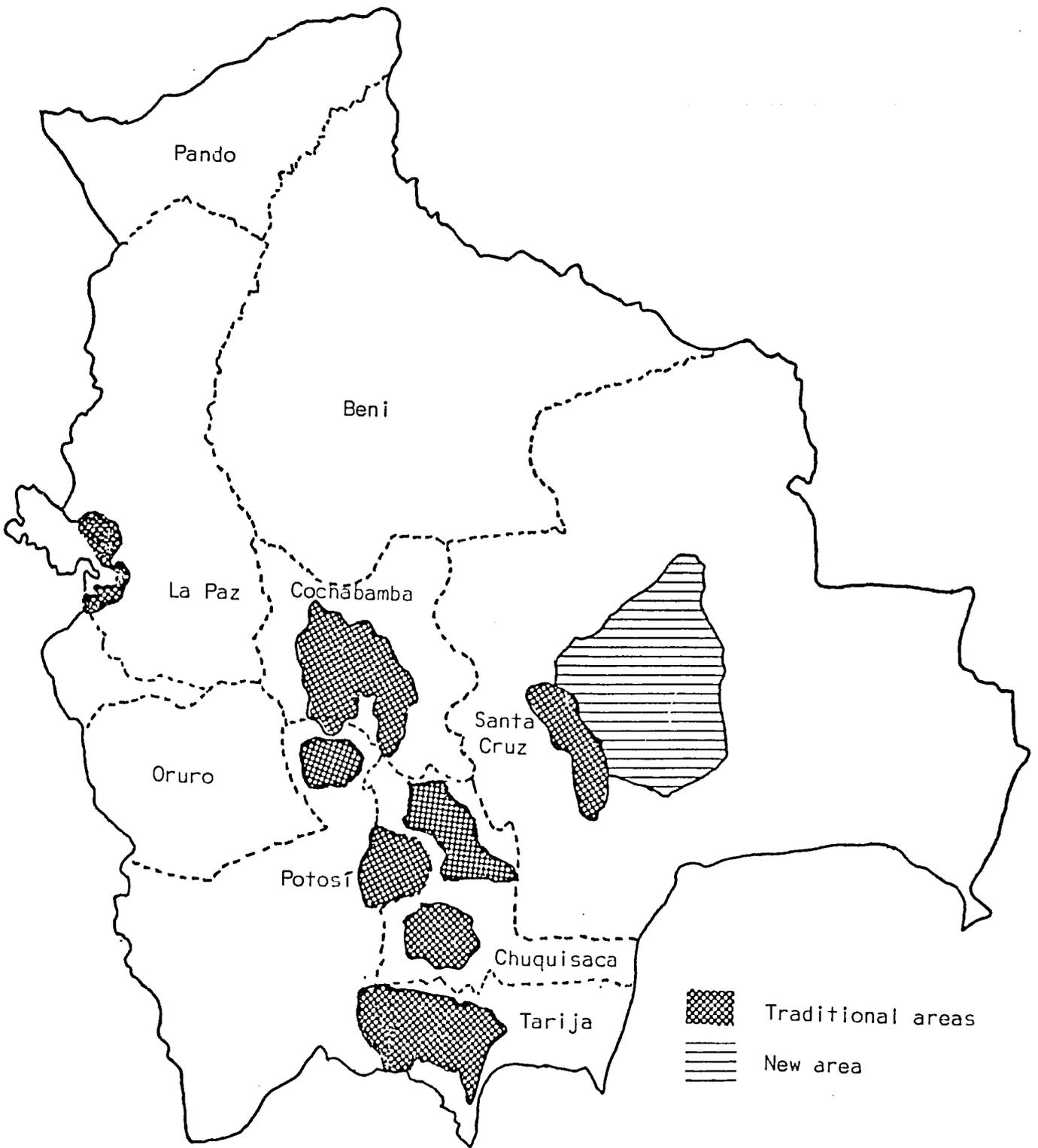
a. Traditional Areas. Wheat has been traditionally cultivated at relatively high altitudes in the departments located in the Altiplano of Bolivia. As shown in Figure 3, these traditional areas do not extend throughout these departments, but are limited to relatively small flat areas called "pampas" and marginal lots on the side of the mountains (33, page 3). The growing of wheat in the traditional areas is characterized and constrained by a number of climatic/topographic, land tenure, technical/agronomic, postproduction technologies, and organizational factors. These factors, which are listed below, were obtained from the literature reviewed, discussions with knowledgeable persons, and personal site visits to production areas.

(1) Climate and Topography. In general, wheat production is undertaken in valleys and flat areas (pampas) which range in altitude between 1,800 and 3,400 m above sea level. At these altitudes, the crop is subject to severe changes in weather conditions which impact on yields, and therefore on production levels. Freezing weather, hail, and droughts affect the crops considerably, especially at the higher altitudes. Precipitation ranges from 400 to 1,200 mm/year, however, its distribution is very irregular, especially during the growing season (9, page 3).



Source: E. Boyd Wennergren and Morris D. Whitaker, *The Status of Bolivian Agriculture* (New York: Praeger, 1975), p. 20.

FIGURE 2. Geographic Profile of Bolivia



Source: Wheat Marketing Division, MICT.

FIGURE 3. Wheat Production Areas in Bolivia

The topography of the traditional areas represents another serious constraint to agricultural production. The rough terrain, steep slopes and barrenness make it very difficult to access, cultivate, and practice soil conservation. Again, this not only impacts on productivity, but also on cost of services associated with pre-and post-production activities.

(2) Land Tenure. One of the outcomes of the land reform act of 1952 was the Minifundio. While the land is privately owned, the inheritance laws and population pressures have developed a trend towards an increasing proportion of land being held in smaller farm units (9, page 5). This development is totally in opposition to wheat production which is characterized by its extensiveness.

Currently, 75 percent of all farm households have 10 ha or less, which are fragmented into many small and widely-dispersed plots or "parcelas". Most households manage at least 20 plots, and 30 or more is not uncommon. This type of land tenure perpetuates subsistence-type agriculture. While these widely dispersed production plots act as an insurance against total crop loss due to weather-related factors, an inordinate amount of time is wasted going from one plot to the next (31).

(3) Technical/Agronomic Factors. Subsistence farming in the Altiplano is constrained by many technical and agronomic factors which are not easily removed or improved. These factors in turn are conditioned mostly by economic variables beyond the farmer's control and associated with risks which they can ill afford to take. The realization by the small subsistence farmer that wheat is less profitable than other crops (issue of comparative advantage discussed at length in other studies by Thompson, Chemonics, Torrico, and CIAT) has brought about the relegation of wheat cultivation to marginal land and to lots on steep mountainsides which are unsuitable for mechanization. Therefore, wheat farming practices developed over hundreds of years have not been able to benefit from the application of improved farming practices and postharvest technologies.

Generally, land preparation is still undertaken with animal traction; wheat is wind-sown, using seed retained from the previous crop; no fertilizers or agrochemicals are used to improve yields, control pests and weeds; the wheat is harvested by hand and threshing and winnowing is done with animal power and by hand, respectively. What little mechanization is used, is limited to some land preparation and threshing in the pampas.

(4) Product Quality and Postproduction Technologies. Wheat farmers in the traditional area, unlike those in the nontraditional areas, are faced with a dilemma related to the type of wheat and its marketing qualities. The type of wheat preferred by the rural population is a soft wheat with quality characteristics suitable for their own multiple end uses. This domestic wheat, however, is not highly regarded by the commercial milling and baking industries. They prefer the harder wheats which are more suitable for baking. The primary difference between the soft and hard wheats is the gluten content which affects the baking qualities of the flour. Thus the fundamental problem remains unresolved as these farmers have not been able to evaluate the risk of changing varieties in order to satisfy the commercial market (11, page 8).

However, in order to satisfy the commercial market and obtain the best possible price for his product, the subsistence farmer will have to offer a product of uniform quality, consistency and appearance. This is a feat that cannot be easily accomplished, given the current wheat varieties and postproduction technologies being used.

Current harvest, threshing, cleaning, drying, storage and handling technologies will have to be improved considerably if wheat farmers in the traditional areas are going to satisfy the quality requirements of the market. This is in addition to the production and marketing constraints which need to be overcome.

(5) Organizational Factors. As a remnant from their old traditions, farmers in the traditional areas of wheat production still join forces when undertaking certain production-related activities. However, this collaboration does not extend back to the purchasing of production inputs or forward to the selling of their products. Typically, a monopolistic situation exists in which thousands of individual farmers are facing few and dominant suppliers of production inputs. A few organizations exist such as CESAT in Cochabamba and Cooperativa Integrada de Servicios Cochabamba, Lmt. which could serve as models to organize farmers and improve their input and output marketing position and thus their bargaining power.

b. Nontraditional Areas. In the 1950s farmers started to grow wheat in non-traditional areas located in the Department of Santa Cruz, see Figure 3. This region is subtropical to tropical in climate. The land is flat and suitable for mechanized agriculture. Sizable land areas have been opened to agriculture by Mennonite, Japanese, and Bolivian farmers (33, page 3). Because of historical and social developments as well as geographic and climatic conditions, the characteristics of wheat production and constraints are very different in this area.

(1) Climatic Factors. For climatic reasons wheat is cultivated as an alternative winter crop to corn, cotton, and soybeans which are grown during the summer months. Only during this time period are temperature and moisture conditions such that wheat production can take place. Average yields, however, are only one-third to one-half of those in other Latin American countries.

(2) Economic Factors. For economic reasons related to cost of production and expected benefits, wheat is considered a complementary crop to the primary production of soybeans, corn, or cotton. Wheat would be unprofitable if the producer allocates overhead costs to variable production costs. Therefore, unless relative prices and/or yields are increased substantially, wheat acreage will likely remain a function of the land area used for the primary crops. Studies conducted in the 1960s and 1970s concluded that wheat prices would have to be increased to totally unrealistic levels to obtain a minimal increase in production (26,67).

(3) Agronomic Factors. Apparently, farming practices in Santa Cruz are as varied as there are farmers (3). There is ample room for improving crop rotations, planting dates, cultivation techniques and practices (issue of over-tillage, for example), application of fertilizers and chemicals, soil conservation, etc. Improvements in all these factors should lead to increased wheat yields.

(4) Organization. Unlike the wheat farmer in the traditional area, the farmers in Santa Cruz are well organized and represented by ANAPO. While this organization does not include all the farmers in the area, its negotiations with the millers for product price and delivery conditions affect all wheat producers. ANAPO's experience in price negotiations is relatively short and it is gaining in realism. In short, ANAPO's presence has given the local farmers more bargaining power in the market place for their products.

3. Wheat Marketing. Wheat marketing is the fourth link in the chain connecting producers and consumers through intermediaries, processors, and distributors. Since less than ten studies can be related to grain or wheat marketing in Bolivia, this link is one of the least researched and therefore understood element of the wheat food chain in Bolivia (33, Appendix I). Not surprisingly, this void has been filled with many opinions, judgments, and misconceptions including the conventional wisdom that licentious intermediaries are taking advantage of the situation of the farmers. This link is characterized by unique circumstances in Bolivia. Lack of infrastructure and mountainous terrain divides the country into a series of regional and local markets, without corresponding national markets.

a. Market Structure, Channels, and Organization. The regional fragmentation is further complicated by the oligopsonistic market structure for wheat marketing, a market situation in which each of a few buyers exerts a disproportionate influence on the market.

Under these market conditions, commercial wheat producers in the major production areas will be faced with at best two or three millers who can utilize their product. Being the final market outlet for commercial wheat, they dominate the bargaining process for price and conditions of sale as well as the delivery process and payment schedules. Their hand is further strengthened by the total absence of regulatory and auxiliary marketing functions (see below). On the other hand, the millers themselves are under constraints from changes in national policies and competition from imported products. Thus marketing in each area will depend on (1) the regional demand for flour and wheat subproducts, (2) the financial strength, including credit lines, of the flour mills, and (3) actual or potential competition from imported wheat and flour products.

Wheat is also marketed through intermediaries who buy wheat at regularly-scheduled market days, called ferias, or arrange to buy the crop at the farm based on informally-agreed forward contracts linked to previous informal credit given in kind or in cash to the farmers. Again, this avenue of wheat marketing is very regional and even local in nature with little consequence or impact beyond its radius of influence. Subsistence farmers who come to sell a quintal or two of wheat are faced with a few buyers who are better attuned to the general market situation and outlook for wheat and thus are in a better position to set sales conditions and therefore prices. Little else is known about this marketing segment, except that it is the only channel available to subsistence farmers when they want to sell wheat.

No recent literature was found which reviewed and analyzed the marketing channels serving the regional and local market structures. Critical information needed for improving marketing efficiency and effectiveness is thus lacking. This information would include seasonal price and volume movements,

market participants and their characteristics, working capital and credit requirements, margins, costs, value added, and informal commerce rules and regulations.

Since there are no "central markets" in the conventional use of the term, price discovery is achieved during the negotiation process between buyers and sellers. While commercial farmers in the Santa Cruz area have been able to improve this bargaining process through their producer organization (ANAPO), subsistence farmers in the Altiplano are, with few exceptions, still very much on their own. Even ANAPO, in its relative isolation, is still constrained in its ability to obtain higher market prices for its members. The 1985/86 bargaining agreement was abrogated in less than 2 weeks after negotiating a marketing agreement for nearly twice the imported price of wheat.

b. Market Infrastructure. The term market infrastructure used here refers to the technologies and equipment used or needed to change the form (value added) and time (storage and quality preservation) utilities associated with wheat marketing.

From a purely commercial point of view, current technologies and equipment used to harvest, thresh, clean, dry (if needed), and store wheat for commercial purposes in the traditional areas of production could stand considerable improvement. Additional observations are contained in Appendix D. Moreover, while the magnitude of the grain losses and the quality deterioration is not known, their occurrence can have a substantial impact on the welfare of subsistence farmers. While suggestions for improvements are contained in this report, the specific degree and area of improvement, being a function of its commercial return, will have to be analyzed in more detail from a technical, social, and economic point of view.

The same assessment holds true for the nontraditional areas of wheat production, however the technologies, equipment, and postharvest management are different due to the commercial nature of the farm enterprises and the climatic conditions. Improving calibration of combines and adding low-cost postharvest handling and storage technologies would result in improved product quality and returns. Again, specific improvements will need to be researched and evaluated as a function of the commercial returns and their marginal costs.

The known and registered off-farm infrastructure suitable to change form and time utilities of wheat is contained in Table 5. A total of 83,586 MT of storage is available, which is more than enough to store all marketed wheat surpluses. Of this storage capacity, the wheat mills account for 75,090 MT and the "wheat purchase centers" for 8,496 MT. According to a recent study (67), there is no shortage of handling or storage capacity for wheat in the Santa Cruz area, even with substantially increased production levels, should they occur. However, wheat marketing and storage need to be synchronized with other crops that can utilize the storage facilities at other times of the year.

The wheat purchase centers were built for the purpose of progressively changing the existing forms and methods of domestic wheat marketing in order to obtain: (1) guarantees of adequate marketing outlets for the small farmers' wheat through cash payments on delivery of all wheat, (2) restriction

TABLE 5

## Wheat Storage Capacity (MT)

State	Location	Mills a.	Purchase Centers b.	Total
La Paz	La Paz	20,510		20,510
Cochabamba	Cochabamba	13,850		15,082
	Totora		616	
	Cliza		616	
Chuquisaca	Sucre	2,000		3,848
	Yamparaez		616	
	Tomina		616	
	Redención P.		616	
Oruro	Oruro	17,010		17,010
Potosí	Potosí	3,250		5,066
	V. Talavera		1,200	
	Betanzos		616	
Tarija	Tarija	600		1,800
	Junacas		1,200	
Santa Cruz	Santa Cruz	17,870		20,270
	Cotocha		1,200	
	A. Izozog		1,200	
Total		75,090	8,496	83,586

Sources: a. (61, Table No.13)

b. (35, page 23, adjusted)

of the monopolistic and speculative influence of the intermediary, (3) concentration of large volumes of wheat and guarantees of adequate storage, (4) improvement in the classification of the small farmers' wheat, guaranteeing delivery of good wheat at premium prices to the mills, and (5) provision of price and marketing incentives to the producer in order to encourage him to increase production and marketing of his wheat (33, page 25).

A complete locational analysis and technical assessment of the centers is contained in Report No. 84, Food and Feed Grain Institute, Kansas State University. Since these centers have not changed since last inspected in 1981, the recommendations contained in this report regarding the centers are complemented with those contained in Report No. 84.

The government essentially abandoned its domestic wheat marketing intervention in 1983, after establishing the Wheat Marketing Board (Consejo Nacional de Trigo) and unsuccessfully operating the "Centros de Acopio" constructed in the mid to late 1970s. During the years 1977-1983 the centers purchased a total of 195,843 qq., or only 2.2 percent of total production. This amount was incapable of creating further production incentives (9, page 11). The most important reasons for the center's failure include (1) the consumer-oriented subsidy policies, (2) the deteriorating macroeconomic conditions, (3) facility design and technical and management deficiencies, (4) inefficient project management, and (5) inadequate marketing incentives and infrastructure.

c. Transportation. Transportation is another primary constraint to agricultural development in Bolivia. The nation's rail system was constructed in the 1800s and early 1900s to serve the mining industry. The railroad system is divided into the Western and Eastern system, with a dearth of interconnections. Bolivia is thus divided in its access to the sea for purposes of importing and exporting. Wheat imported under PL 480 is distributed to mills served by the Western railroad system, while wheat from Argentina is restricted to the Eastern system. Occasionally, wheat from Argentina is shipped via sea to Chilean ports, and thence via rail to western mills.

The total road network of Bolivia is less than 40,000 km of which 20 percent are primary highways (38). The lack and condition of the road system is reflected by freight rates which are among the highest in the world, ranging from US\$0.09 to US\$0.15 per MT per km. Table 6 presents some representative costs of transport for agricultural commodities by rail and truck between different origins and destinations. The freight charged by both modes of transportation is extremely high when compared to similar systems in Argentina or the United States. Until Decree 21060 in August 1985 there was a system of internal tariffs in the guise of road tolls or municipal taxes. In the 1970s there was one custom office for each 52 km of primary highway.

No doubt one of the primary reasons for these high transportation costs is the sad state of affairs of the national railroads and highways, as well as secondary and penetration roads. An excellent example of the impact of the road network on wheat marketing was encountered during the field work for this study. In Santa Cruz Mennonite farmers were bringing their wheat with their tractors because the roads were impassable to trucks. Thus a roundtrip of 90 km required 7 hours, an inordinate amount of time and expense to deliver a

TABLE 6

## Comparative Transportation Costs for Grain

## A. Ferrocarril Belgrano - Argentina - Full Wagon

Origin	Destination	Distance (kms)	Freight (US\$T)
Pocitos	Rosarios	1,582	25.59
Pocitos	Buenos Aires	1,887	29.82
Estimate		600	11.51

## A. Enfe - East Bolivia - Full Wagon

Santa Cruz	Puerto Paila	43	8.12
Santa Cruz	San Jose	266	21.35
Santa Cruz	Robore	401	29.49
Santa Cruz	Quijarro	651	43.45

## B. Enfe - West Bolivia - Minimum Condition 28.6 Tons

Antofagasta	Ollague		31.62
Ollague	Oruro		31.62
Ollague	Cochabamba		46.65
Ollague	Viacha		42.02
Ollague	La Paz		45.49
Ollague	Potosi		33.93
Ollague	Sucre		48.96
Ollague	El Alto		44.34
Arica	Charana		24.80
Charana	La Paz		21.22
Charana	Viacha		17.75
Charana	El Alto		20.06

## C. Truck Transport - Full Truck

Santa Cruz	Guabira	55	5.35
Santa Cruz	Camiri	300	53.83
Santa Cruz	Villamontes	480	90.08
Santa Cruz	Yacuiba	600	90.20
Santa Cruz	Comarapa	300	35.25
Santa Cruz	Cochabamba	500	48.79
Santa Cruz	Oruro	728	70.51
Santa Cruz	La Paz	910	82.26

Sources: (64, Page 40)

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low-margin commodity such as wheat. In the Altiplano, the conditions of secondary and penetration roads are such that they no doubt contribute to a reduced lifespan of trucks, increased repair costs, and thus to higher transportation charges.

d. Auxiliary Marketing Functions. Auxiliary marketing functions are provided to increase the efficiency and effectiveness of this link. They provide parameters which facilitate the movement of large volumes; fair and equitable norms and measures to reassure buyers and sellers; information to improve production, processing, marketing, and consumption decisions; and financing which allows for a more even buying and selling process, risk distribution, and increased market participation.

There is ample room to improve the existing auxiliary marketing functions now being used in Bolivia for grain marketing in general. The most important ones are summarized below.

(1) Grades and Standards. Official grades and standards exist for wheat marketing in Bolivia (92). They need to be reviewed in terms of their contents and how they are applied in the industry. The current standards may not be adequate for today's marketing requirements and incentives to farmers, nor do they necessarily reflect end users' needs. Current standards are not being applied uniformly from one mill to the next. Many mills are not equipped to analyze the milling and baking characteristics and values of wheat being delivered.

A particular source of confusion arises when attempts are made to apply Bolivian standards to imported wheats. The major difficulty comes in comparing test weight and protein content without standardizing moisture content. This is not to say that Bolivia should adopt the standards used by its international suppliers, or import on the basis of its domestic grades. Standards should be developed in ways meaningful to those using them. Care is needed in the application of the standards, and in educating all concerned in their utilization.

(2) Weights and Measures. Another characteristic of the regional and local wheat markets is reflected in the myriad of weights and measures being used (15). As the marketable surpluses increase, standard weights and measures are needed to efficiently move these volumes, standardize equipment, simplify reporting, etc. It simply is more effective and easier if everybody involved understands and uses a common set of weights and measures.

Most mills do not have truck scales, or if they have do not use them. Weighing is accomplished internally in the mills. The wheat purchase centers do not have truck scales and depend totally on small sack scales for the weighing.

(3) Information. Market information is another auxiliary function which is essential for an active and responsive grain marketing system. This type of information ranges from the most fundamental volume and price numbers to crop forecasts, international situation, consumption, stocks, utilization, and outlook reports. Such information is provided to farmers, intermediaries, processors, distributors, consumers, and any other entity involved in wheat production, processing, marketing, and consumption. Adequate information increases

the competitiveness of markets by equalizing knowledge of market conditions. The individual interpretation of information is what makes market's function. Information is disseminated to all in an opportune and effective fashion through various means.

(4) Credit. Adequate credit volume and lines for marketing activities form an essential element of a developed marketing system. Such credit is needed to finance a working inventory of raw materials, product in process, finished inventory, and sales. Since August 1985, the milling industry in Bolivia is adjusting to a new reality in regard to this type of credit. Such credit has not been available in the traditional areas of production, except for the informal credit provided to farmers by intermediaries.

This auxiliary marketing function will require thorough analysis and strengthening through formal credit channels in order to facilitate the marketing flow of nationally-produced wheat.

4. Flour Milling Industry. The wheat milling industry forms the fifth link in the wheat food chain. This industry is now adjusting to the radical yet salutary changes introduced by the Supreme Decree No. 21060 of August 1985. The policy reasons and resulting developments which culminated in the current status of this industry have been reviewed in many of the documents contained in the bibliography and is summarized in Section II of this report. Except for a summary, this section will limit itself to addressing the constraints now being faced and which need to be overcome in order to keep a strong and viable milling sector in Bolivia.

Table 7 contains a brief historical trend of the changes in the milling capacity and its utilization. In 1975, the milling sector had a capacity of 500 MT/day and an unused capacity of 62 percent. Increased milling requirements reduced this excess capacity by about half by 1977-78. However, as a lagged response to a series of Supreme Decrees which established increasingly higher levels for farm support prices and subsidies provided to the mills, milling capacity more than doubled by 1980, resulting in an unused capacity of 45 percent. The continuation of these policies maintained this trend, resulting in a current milling capacity of 2,600 MT/day and an unused capacity of 66 percent.

The new challenges faced by the milling industry in Bolivia are related to the competitive market conditions created by Supreme Decree 21060. In the past 18 months, the flour milling industry has had to adjust to (1) elimination of subsidies on wheat imports, (2) reduced demand from an apparent declining per capita consumption and loss of "export" markets, (3) increased competition from legal and contraband flour imports, (4) a change in credit terms for buying wheat imported by the government, and (5) a law mandating the manufacture of composite flours. The sudden shift from a sellers to a buyers market has not been accompanied by a complete freedom of action; some regulations and controls still exist (see Section III), but the trend is toward a freer and more competitive industry. In order to remain competitive over the long run, the milling industry will have to confront the following challenges.

a. Product Quality and Pricing. The flour quality standards in the Bolivian markets are now being set by imported Argentine flour. This will require the freedom for competitive adjustments by the Bolivian flour milling industry if it expects to survive and compete. This will involve changes in milling practices, improved mixing capabilities and quality control measures, etc.

TABLE 7

Installed Wheat Milling Capacity  
Expansions and Utilized Capacity

(MT/Day)

<u>State</u>	<u>1975</u> a.	<u>1977</u> a.	<u>1980</u> b.	<u>1985</u> b.
La Paz	145	190	775	925
Cochabamba	90	120	180	470
Oruro	170	170	386	544
Tarija	17	17	27	27
Potosí	18	35	80	109
Sucre	10	20	20	27
Santa Cruz	<u>50</u>	<u>50</u>	<u>285</u>	<u>500</u>
Total	500	602	1753	2602
Unused Capacity	61.8%	28.6%	45.0%	66.2%

Sources: a. (46, page 42)  
b. (35, page 20,22)

b. Product Diversification. Product diversification is now a critical need. This will require utilization, consumer and market research studies to develop appropriate specialty and custom flours, sizing and packaging alternatives, product differentiation, demand creation, etc.

c. Byproduct Utilization. By products were previously disposed of "as-is" on local markets as supplemental animal feed. Millers were prohibited from directly engaging in animal feed production, and only a small proportion of the total byproducts were utilized by feed mills and integrated poultry producers. One-fourth of all wheat is byproduct which has a wide range of food and nonfood uses in industrialized countries. New avenues for byproduct utilization need to be explored to expand the market for these products.

5. Baking and Pasta Manufacturing. Bread-baking in Bolivia is essentially a "cottage industry" with hundreds of small bakeries supplying the "pan de batalla" for street vendors and small retailers. Because of its nature and utilization of baking ingredients, the final product leaves much to be desired. A few commercial bakeries exist that supply an estimated 25 percent of the total baked goods. These bakeries combine more modern baking technology with skilled labor, resulting in a considerably improved product. The baking industry utilizes 75 percent of the the total flour supply (see Table 8).

Pasta manufacturing utilizes about 21 percent of the flour supply, but pasta has received scant attention in government wheat policies. One enterprise manufactures approximately 65 percent of the total pasta supply.

6. Consumption. The final consumption of wheat (except for traditional uses) takes place in the form of breads, pasta, cookies, cakes, and other minor uses. The apparent consumption of wheat flour in Bolivia for 1980-86 is given in Table 9. What this table really shows is the vast improvements that can yet be achieved in data collection, analysis and dissemination. It is simply impossible to relate these numbers to annual production and import figures for wheat and flour. Distortions are created by illegal imports and exports when it still was profitable to do so. The lack of beginning and ending inventories distorts the numbers since it is assumed that all wheat produced and imported during a year is milled into flour and consumed the same year.

What is important and can be clearly seen in Table 9 is the trend started in 1985. Wheat milling and thus flour production has fallen by 28 percent since 1984, however the corresponding decrease in the per capita consumption is questionable since illegal flour imports are not accounted for. Therefore, it is possible that consumers are reacting to changed market conditions and are adjusting their purchasing patterns.

In a general sense, what these trends tend to show is that there are market stratifications, consumer preferences, tastes, and habits which adapt themselves to changing market conditions. This observation is strengthened by the fact that new "semi-automated" bakeries have been recently constructed or will be in the near future in such major cities as La Paz, Santa Cruz, and Sucre. Their line of products does not consist of the "pan de batalla" alone but is quite diversified and creative, showing clear responsiveness to consumer demands.

TABLE 8

## Wheat Flour Utilization

Uses	Quantity	Rate	Extraction Years
Bread	75.0%	76.0%	1980-1984
		80.0%	1984-1985
		72.0%	1985-
Pastas	21.0%	76.0%	1980-1984
		72.0%	1984-1985
Cakes, Cookies, other	4.0%	76.0%	1980-1984
Total	<u>100.0%</u>	72.0%	1984-

Sources: (35, page 31)

TABLE 9  
 Apparent Wheat Consumption  
 1980 - 1986 (MT)

Year	Flour Production	Imported Flour	Total Supply	Per Capita Consumption (in Kilograms)
1980	210,878	13,500	224,378	40.07
1981	243,085	7,000	250,085	43.45
1982	200,905	10,000	210,905	35.65
1983	230,349	0	230,349	37.87
1984	223,802	48,066	271,868	43.48
1985	192,482	20,000	212,482	33.05
1986	160,191	30,000	190,191	28.76

Source: (47, page 44)

This consumer reaction and lagged response by the baking industry epitomizes the window of opportunity which now exists in Bolivia for its national wheat to achieve a more prominent role. This last link contains all the derived opportunities for wheat. Unlocking and making full use of them, however, will require in-depth, continuous, and special studies and analyses on every link of the wheat food chain in Bolivia as well as its policy umbrella. This must then be followed by appropriate technical assistance programs, training, and financial assistance at every link of the wheat food chain in order to improve their weakest components. In order to be successful, such a massive project must be undertaken under a sound policy umbrella and over a period of time long enough for it to become self-driven and sustainable.

7. Import Facilities. The major complaint about imports arriving through Chilean ports is the amount of dirt and foreign matter received in shipments at Bolivian mills. The source of the foreign matter is in dispute, but an inspection tour of the ports of Antofagasta and Arica revealed these probable sources.

1. The edge of the wheat piles are either undefined, or the wheat is held in place by filled grain bags. The bags either fall down, or grain spills over the top into roadways. Street sweepers put the accumulated sand, trash, and spilled wheat back on the wheat pile.
2. The prevailing winds at the port can carry sand, coal, sulfur, and copper ore dust into the wheat.
3. The inordinate length of time wheat is at the ports before it is hauled to Bolivia exposes it to contamination caused by the huge flocks of pigeons that feed on the grain.
4. Ship unloading and railcar loading systems contribute to the problem by concentrating the impurities. The ports use "clamshell" carriers for transporting the grain from the ship's holds to the dock. When the clamshell is opened above the wheat pile, a sifting process takes place, with heavy impurities rolling to lower levels, and lighter materials concentrated on top. The prevailing winds further concentrate wheat chaff into pockets. At Antofagasta, the Vacuvator intake used in railcar loading is near ground level. As the wheat pile shrinks, the Vacuvator tends to suck up larger quantities of sand and impurities from the port surface.
5. At Arica, an endloader is used for transporting grain from the ship to a storage area 200 to 300 m distant. The end loader also is used to fill a makeshift railcar loading hopper. The endloader's scoop leaves grain on the cement surface to a depth of about 1/2 inch. Dock workers sweep the scattered grain up into piles that the endloader can pick up. In the process, sand and other contaminants enter the grain. The manager of the stevedoring company explained that the accumulated piles of mixed wheat and foreign materials contained wheat that Bolivia had paid for and was entitled to receive, and that the mills could clean it. Hence the last few railcars of any shipment always contained the port sweepings.

## SECTION II

### REVIEW OF BOLIVIAN WHEAT POLICIES

#### A. Introduction

Bolivia is a nation that has seldom been able to achieve food self-sufficiency, and food security remains a top priority of government (35,55). In the 1920s, 10 percent of the nation's imports were food, and the figure had increased to 19 percent by the 1950-52 period (37). After the land reform of 1952, agricultural production and marketing fell to very low levels, and there was a threat of food shortages in the urban areas. Food imports were needed to fill the gap and by 1953, 43.8 percent of total imports were food products (88).

Bolivia thus became the first South American country to receive support under PL 480. The food assistance received not only aided the nation in passing through the period of agricultural dislocations, but also provided funds for road construction, social services, and development of the Santa Cruz region (37). In some respects, the development strategy paid off as Bolivia's index of per capita food production (based on 1961-1965 = 100) grew from 66 in 1953 to 110 in 1971 and 124 by 1976. By way of contrast, neighboring Peru rose from 100 in 1953 to 102 in 1976, while Chile's per capita food production index declined from 102 to 92 in the same time span (38).

#### B. Agricultural Development and Price Policies

Bolivia's past development policies have been strongly biased towards extraction of natural resources (tin, silver, and petroleum), with a resulting neglect of agriculture as measured by government's spending priorities. Furthermore, agricultural development efforts have been seriously handicapped by a proliferation of institutions and projects designed to appease regional and special-interest groups without regard to a national development plan or to costs or losses of productivity and efficiency (90). Over the years, Bolivia has accumulated a series of agricultural production and price policies on a commodity-by-commodity basis. Table 10 contains selected cases of the form of market interventions existing prior to August 1985.

1. Policy Implementation. By 1984 there were 22 agencies implementing 160 projects, and while MACA and the Ministry of Planning are empowered to issue guidelines and coordinate programs, they have been unable to develop effective working teams. The reorganization of MACA to increase its effectiveness was specifically supported by a PL 480 Title III project in the PL 480 agreement of 1978, however very little progress had been made when the project was evaluated and support for this effort was terminated. However, MACA has since developed a very ambitious reorganizational program under the general concept of "Agropoder" and may yet achieve some of the original objectives of improving the delivery of services to rural areas (45).

2. Other Factors Affecting Policy. Donor assistance programs have often compounded the problem by pressing ahead upon their own perceptions of development priorities. In the late 1970s, it was estimated that over 400 technical assistance projects were underway, with over 1,000 foreign advisors in varying capacities (90).

TABLE 10

## Forms of Market Intervention

<u>Product</u>	<u>Producers</u>	<u>Consumers</u>	<u>Government</u>
1. Barley *	Some are organized through cooperatives.	None.	None.
2. Beef **	Through the two producers associations, prices are negotiated with the Government	No explicit intervention.	MICT controls beef exports. Determines the prices at producer, wholesale and retail level.
3. Cotton **	Through ADEPA, prices are negotiated with consumers, (textile plants). Price based on international prices.	Negotiate prices with ADEPA.	CORDECRUZ owns a textile plant which consumes 58% of domestic cotton production. It behaves, however, as a private corporation. The Government intervenes to orchestrate agreements between cotton producers and the textile industry and allocates import/export quotas.
4. Coffee **	ANPROCA negotiates prices with coffee processors.	Coffee processors fix internal price together with MICT.	(1) Through Cobolca, the state allocates Bolivian ICO quota among exporters; (ii) through MICT, dictates consumer prices. In the past, MICT tied export allocations to sales in the domestic market.
5. Maize ***	In Santa Cruz, through PROMASOR prices are negotiated with the MICT and MACA, together with animal feed plants representatives.	Processing plants. Participate in price negotiations.	MICT and MACA dictate producer prices (ex-factory). MICT/MACA authorizes exports.
6. Milk **	Through APL in Cochabamba and ADEPLE in Santa Cruz, prices are negotiated with CBF and MICT.	CBF participates in price negotiations.	MICT dictates the price at consumer and producer levels. CBF milk processing plants purchase 80% of domestic production. CBF also imports dried skimmed milk and butter oil to produce fluid milk.
7. Rice ***	FENCA theoretically negotiates prices with MICT. FENCA, is relatively weak.	ENA and private millers participate in price negotiations.	MICT sets prices at consumer and producer levels. ENA, however, does not have the financial resources necessary to sustain producer prices. Also exports of rice are only allowed if authorized by MICT and are handled through ENA.
8. Soya **	ANAPO participates in price negotiations.	The private plants and CBF participate in the price negotiations.	MICT sets prices of soya edible oil at the consumer level, prices of soya at the producer level, allows exports of soyabean meal, and imports of soya.
9. Sugarcane **	FECA participates in the negotiations to fix prices.	The processing plants participate in price negotiations.	MICT fixes sugarcane producer price; sugar consumer and wholesale prices, distributes export quotas to the refineries. CBF participates in marketing and processing of sugar. The Central Bank extend credit.
10. Wheat ***	In Santa Cruz ANAPO negotiates prices with MICT.	Millers negotiate costs of milling.	MICT fixes producers prices for wheat, and consumer prices for wheat derivatives: flour, bread, noodles, etc. MICT also intervenes in the marketing of wheat, although in a very limited way. Finally, MICT handles imports of wheat, and sells them to millers.

- \* = producer prices are market determined.  
 \*\* = producer prices fixed by MICT and enforced.  
 \*\*\* = producer prices fixed by MICT and not enforced.

The situation as described by Torrico (38) in 1978 thus seems to be little changed at the present time:

There was no goal for integrated agricultural development neither in terms of a well thought out plan or budgeted resources. To be sure, efforts were directed to research, extension, and marketing, but the shortcomings of the institutions mentioned above, in combination with the lack of a centralized and coordinated direction from government, did not permit them to perform their assigned roles in the scheme of agricultural development. Political considerations played an important role in policy formulation and, as a consequence, policy measures reflected a bias in the favor of the politically powerful commercial farming and agribusiness interests.

Thus, in spite of the rapid development of an institutional structure, the government relied on three policy instruments for agricultural growth and political objectives. First, through the CBF (Bolivian Development Corporation) and some public institutions, they developed a capacity for food processing. Second, the government utilized pricing policies for many agricultural products. Depending upon the product, these were devised to benefit the producer and/or the consumer. Third, the government utilized control over credit to allocate resources in agriculture.

### C. Wheat Policies

While overall agricultural development policies have generated some successes for agricultural exports and import substitution (sugar, rice, cotton, soybeans, and beef), wheat policies remain a notable exception.

1. Policies Prior to 1985. Wheat policies for the period prior to 1985 are discussed according to their objectives, results, and impact on various sectors of the economy.

a. Policy Objectives and Implementation. Past Bolivian wheat policies have focused on subsidizing the consumption of wheat products. These were conscious decisions by successive governments in favor of the urban population. A very abbreviated review of the policy development follows in order to provide an understanding of the impact on producers, consumers, national markets, and ultimately on the rate of national development. The economic framework for this analysis is contained in Appendix A.

The GOB accomplished its objectives by (1) requiring bakers and millers to produce standardized products in terms of weights, milling yields, and raw materials used, (2) negotiating processing margins with the bakers and millers, (3) subsidizing wheat imports to millers, and (4) fixing domestic prices of wheat and bread products.

b. Policy Results. To implement a consumer-oriented subsidy policy, the government used its resources to lower the price of wheat products to make the consumer better off. However, in the short run, when consumers gained, domestic wheat producers lost because of the lower price and demand for domestic wheat, tubers, and other grains. Facing a lack of demand for its own products, a

depressed rural sector tended to remain or revert to subsistence agriculture. In effect, a consumer-oriented wheat subsidy policy represented an income transfer from producers to consumers. The resulting socioeconomic effects of these policies contributed to an ever-increasing income gap between rural and urban population, and to a decreasing productivity rate in the rural sector.

As national wheat production failed to keep pace with growing annual demand, the government in order to keep the urban population pacified, increasingly relied upon imports to make up for the shortfall. Import decisions were facilitated by readily-available foreign supplies on concessionary credit terms and/or donations. This is clearly the case in Bolivia, where wheat production has remained relatively stable over the years, while imports of wheat and wheat products have risen dramatically.

The results of pre-1985 wheat policies can be seen in Figure 4. The basic data and problems with data consistency have been noted in previous sections and need not be repeated here. Figure 4 should thus be viewed for indications of trends and the interrelationship of the components, rather than for the quantitative content.

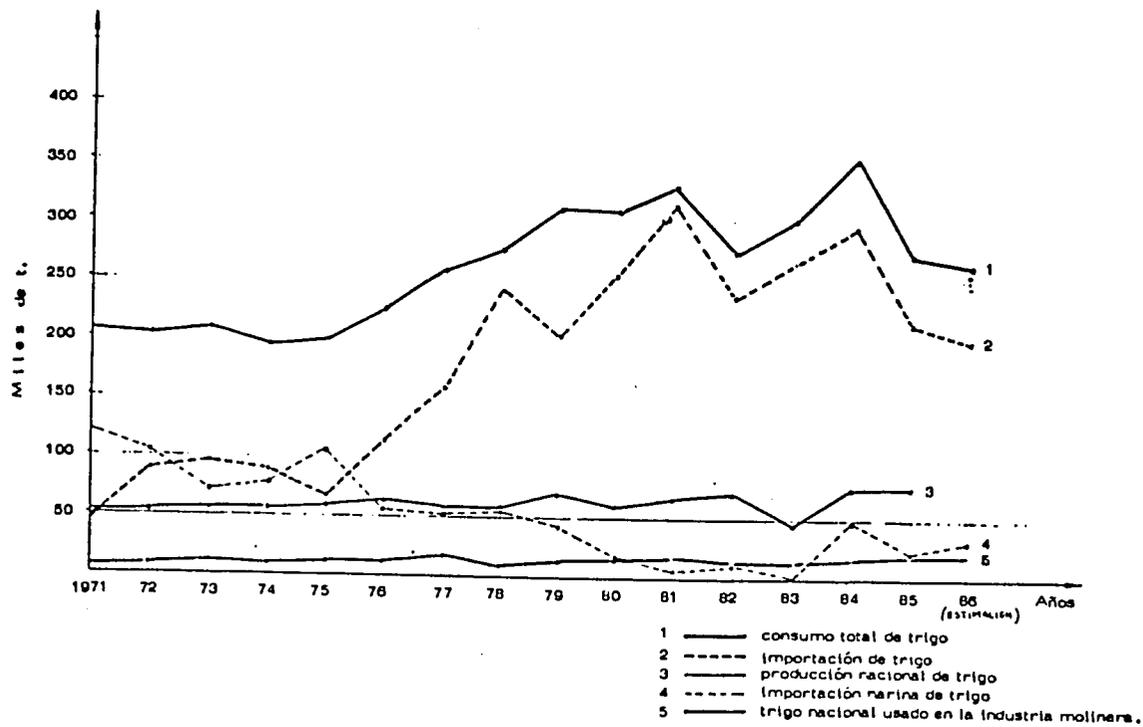
Wheat policies were not solely responsible for the trends depicted in Figure 4. The extraordinary sharp rise in consumption during the 1980s and subsequent rapid decline could be attributed to the period of hyperinflation in which large quantities of flour were exported to neighboring countries. The change of government policies in 1985 quickly reversed the situation, as is shown by the decline in wheat imports and concurrent increase in flour imports.

c. Impact on Producers. Thompson argues that for the most part, domestic wheat prices have been reasonably in line with the prices of other crops such as corn, rice, and soybeans, but domestic wheat producers have been severely disadvantaged by the magnitude of the subsidies provided to the flour millers using imported wheat (67). This is a view with which the authors concur.

One method of comparing the impact of a nation's pricing policies upon the producer is to use "border prices". Border prices are the prevailing international market prices at a nation's port of entry. In the usual context, when producers receive prices higher than the border price, the general presumption is that producers are being subsidized by consumers, either directly through higher than necessary domestic product prices, or indirectly through direct or import taxes.

The opposite is also true. When imports are subsidized to consumers, there is a presumption of an income transfer from the producer to the consumer in the form of lower than necessary prices for the primary commodity, plus income lost from sales of products displaced by the increased demand for the imported product. In Bolivia, this burden was borne more heavily by the small-scale producers of grains, tubers, and other crops whose consumption is displaced by low-cost wheat flour products (90).

Table 11 presents the relationship of domestic wheat prices to border prices, and the consumer price index. As indicated by the above table, wheat prices for producers were generally held above import prices during the 1970s, and into the 1980s. However, wheat prices did decline for producers in terms of purchasing power beginning in 1978.



Source: MICT

FIGURE 4. Production, Consumption, And Import Trends

TABLE 11

Producer Prices for Wheat as a Share of Border Prices  
at Official Exchange Rates and in 1970 \$B Index

Year	Prevailing Border Price (Percent)1/	Bolivian Subsidized Import Cost (Percent)2/	1970 \$B Index
1971	100	108	86
1972	59	71	144
1973	68	150	168
1974	80	161	130
1975	76	89	125
1976	104	100	130
1977	130	193	130
1978	111	149	125
1979	89	152	107
1980	69	183	87
1981	146	153	92
Average	95	136	
Coefficient of variation	29	29	22

Source: (90)

1/ Wheat valued at border prices

2/ Wheat valued at cost for Bolivia, including grants

Even though national wheat prices were established at levels higher than border prices, the fixed prices established during the 1970s and early 1980s were either not high enough to offset the very high domestic wheat production costs, and/or markets were not available for most producers. Wheat produced in the traditional areas was highly variable in terms of quality, uniformity, and milling characteristics. Producers in the traditional areas sold only in small quantities to market intermediaries who heavily discounted the grains for quality factors and transportation costs to the mills. The government itself withdrew from the market in 1983 after several years of ineffective efforts.

Producers in the nontraditional areas sell directly to the flour mills or through an association such as ANAPO. Quality discount schedules apply and transportation costs are very high as cited in Section I. In addition, nontraditional producers were impacted more directly by the import policies. The government required that flour millers buy all national wheat presented to them when the official price was less than the import price. The government's import policies and negotiations with the flour milling industry provided little incentive for the mills to buy national wheats. This will be discussed in the following section.

d. Impact on Flour Milling. Approximately 85 percent of the cost of flour milling is wheat. Government policies encouraged the rapid expansion in flour milling capacity as noted in Section I. The government imported wheat and established the specifications for the flour products that could be produced from it. The government also extended credit for imported wheat purchases and negotiated milling margins for flour with ADIM, and allocated imported wheat supplies by regions.

ADIM divided the regional allocations into shipments for specific mills, negotiated with the railroads over delivery schedules, and consulted with the government over freight costs, import expenses, quality specification of imports, milling yields, and other matters. ADIM collected the wheat and freight costs from the mills and periodically passed the funds on to the railroads and government. The practical effect of all the foregoing is that the government essentially owned the flour until it was sold, and was paying processors for their milling services.

The mills were thus relieved of the necessity of providing much of their own fixed and working capital, due to smaller investments in storage facilities and inventories. The general emphasis on the expansion of processing that existed in the 1970s, the ready availability of domestic and foreign credit, when coupled with the "natural monopoly" conferred by the Bolivian topography and lack of infrastructure, set the stage for the massive expansion in milling capacity cited in Section I. Expansionism was further fueled by the prospect of flour exports to neighboring countries.

e. Impact on Baking and Flour Utilization. The government's objective was to achieve low bread prices and maximum availability. Bread sizes and formulations were prescribed and prices controlled. Most municipal governments were very active in enforcing these regulations.

The baking industry had little latitude for product innovation, and creation of any type of consumer preference. Competition was largely restricted to consumer services such as delivery, or being available in a convenient location. With input costs and margins defined, the bakers could survive only by being cost efficient. For the thousands of self-employed bakers and vendors, this meant subsistence on whatever remains after paying the out-of-pocket costs for ingredients, fuel, wholesale bread costs, and transportation.

The higher-quality pasta is made from durum wheats, but in Bolivia, pasta-makers were required to use bread flours. The facilities available for importing wheat and limited volumes required does not permit the segregation of wheat in transit and storage by quality or type.

There are already indications of change. Competition from imported flours and pastas are making the baking and pasta industries more quality- and consumer-conscious. During this study, new bakeries were encountered which were having flours made to specification by local millers or were using imported flours. Some flour millers spoke of present and future plans for providing customer assistance, and strategies to capture specialty markets. This type of development needs assistance and encouragement.

f. Impact on Consumers. The subsidization of wheat imports has resulted in a high level of dependency on wheat products in the Bolivian diet. Bread has become both a political and emotional issue, and it is said that Bolivian governments have fallen over the price of bread.

While precise consumption and expenditure data are lacking, some indications of the importance of wheat in the diet are illustrated in Figure 5. When the nation is divided roughly into the Altiplano, valleys, and tropical areas, wheat products as percentage of the total diet is 25 percent, 13 percent, and 19 percent, respectively. Wheat is most important as an energy source, and contributes substantially to the protein requirements of the population.

The basic data for Figure 5 are contained in Table 12. Wheat is presented as related with other major food groups, and ranks first or second in all categories presented.

Prior to late 1985, Bolivian consumers were thus faced with a limited choice of standardized products at fixed prices, produced and distributed under less than ideal circumstances. In the rural areas, the bread makers were the consumers as well, given the scarcity of fuel. Households commonly baked all the bread that could be made from a 100-lb sack of flour at one time, then sold their surplus in local markets. Any margins received went toward purchasing another sack of flour, and more bread until sufficient fuel was accumulated to repeat the baking cycle (30).

2. Policy Development Since 1985. Supreme Decree 21060, August 29, 1985, will undoubtedly be recorded as landmark of Bolivian history. The Decree contains eight titles and 169 articles detailing fiscal and monetary reforms that will profoundly affect the Bolivian economy for generations to come. Three key provisions are of immediate interest, although future wheat policies will have to conform to the total provisions of the act. These are (1) adoption of a flexible exchange rate adjustment mechanism, (2) tariff reform, and (3) price decontrol.

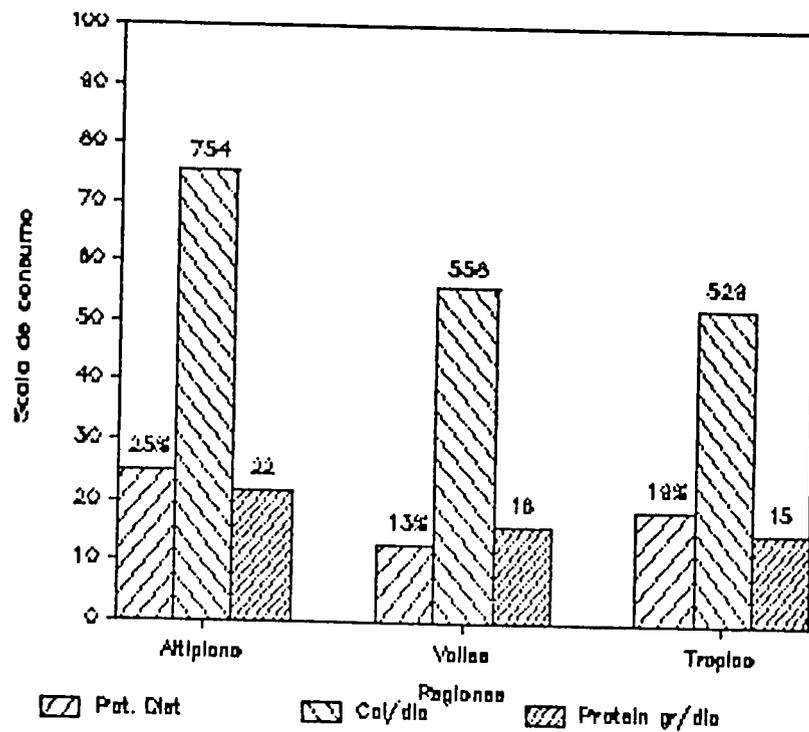


FIGURE 5. Importance of Wheat in Consumption

TABLE 12

## Importance of Types of Food Consumed

(In Percentages)

	Altiplano	%	Valleys	%	Tropics	%
	Pota & Chuno	27.0	Pota & Chuno	30.0	Wheat & Div.	19.0
	Wheat & Div.	25.0	Wheat & Div.	13.0	Rice	17.0
	Sugar	7.0	Corn	8.0	Meat (Beef)	14.0
	Meat (Beef)	5.0	Yuca	5.5	Sugar	9.0
	Milk	<u>4.0</u>	Milk	<u>5.0</u>	Milk	<u>8.0</u>
	Total 5 Prod.	68.0		61.5		67.0
By Quality Consumed (g/day)	Pota & Chuno	223	Pota & Chuno	431	Wheat & Div.	145
	Wheat & Div.	207	Wheat & Div.	153	Rice	133
	Sugar	59	Corn	100	Meat (Beef)	113
By Caloric Contribution (cal/day)	Pota & Chuno	754	Pota & Chuno	557.8	Wheat & Div.	528.6
	Wheat & Div.	226.2	Wheat & Div.	403.4	Rice	133
	Sugar	208.7	Corn	363.6	Meat (Beef)	275.7
By Proteic Contribution (g/day)	Pota & Chuno	21.8	Pota & Chuno	16.1	Wheat & Div.	15.2
	Wheat & Div.	8.0	Wheat & Div.	11.7	Rice	21.1
	Sugar	5.7	Corn	8.6	Meat (Beef)	9.4

Source: Interministry Technical Commission (MPC-MDCA-MICI-SEGIN) Seminar on the National System for Food Security

The maintenance of fixed exchange rates in the face of rapidly-rising domestic price levels created an anomalous situation in which the official fixed prices for commodities lagged far behind their open market values in Bolivia and neighboring countries. The demand for flour increased rapidly and substantial evidence exists that much of the flour produced was exported to Chile and Peru by traders who purchased the flour at official prices. These "unofficial" exports came to an abrupt halt as a result of Decree 21060, as illustrated in the dramatic break in wheat imports and flour consumption in Figure 4.

Tariff reform opened the borders to all imports including wheat and flour, provided a 10-percent import duty and variable tax amounting to 10 percent of the previous tariff rate were paid. The import duty and ad valorem rates replaced with a flat 20 ad valorem rate in August 1986. The government "temporarily" exempted its wheat imports from the import duties, and no action has been taken to restore them. Flour imports increased rapidly as the exchange rate realignment made foreign flours lower in cost than the domestic product.

a. Impact on Producers. The major change from prior years consisted of allowing producer groups and the millers to bargain over wheat prices in the absence of government guidelines.

ANAPO negotiated with the flour millers over the market price of wheat, based upon the end value of flour and wheat by-products (see Appendix B). While the results of the negotiations were announced with much fanfare, the actual results have been far less encouraging.

The 1985-86 contract price of \$214/MT broke down in less than 2 weeks after the agreement was signed under the weight of wheat and flour imports at approximately half the price. The millers ultimately liquidated some of their debts to producers by payments of flour in kind. Producers eventually realized about \$120/MT for their wheat.

The 1986-87 ANAPO/millers agreement of September 20 calls for \$170/MT, but producers are reportedly unhappy over the terms which call for payments of one-half on delivery, plus 25 percent of the balance due in 45 and 90 days. Some millers are reported to be having difficulty meeting this schedule due to lower than anticipated flour sales, and wheat deliveries to the flour mills have fallen to less than one-half of the anticipated 12,000 MT. As noted above, disease problems at harvest reduced yields in the Santa Cruz area, but it is not inconceivable that some producers have adopted a "wait and see" attitude and withheld their production from the market (68).

b. Impact on Flour Milling. In the past, Bolivian flour millers have been less than enthusiastic about using domestic wheat due to quality, volume, and financial reasons. During the course of this study, some flour millers were contacted who now possess the equipment, trained personnel, and knowledge required to produce high-quality flour by blending domestic and imported wheats. These millers expressed confidence in their ability to produce flours comparable in quality to imported flours. Thus a large obstacle to increasing the domestic market share of domestic wheat has been removed. Imports will still be required to offset shortfalls in national production and provide the complementary physical characteristics of wheat necessary for blending domestic wheat into competitive end products.

Price decontrol spelled the end of consumer subsidies. With one stroke of the pen, the foundations upon which the Bolivian flour milling industry had existed were suddenly removed. The millers had to adjust to (1) paying full costs for imported wheat, (2) withdrawal of credit for wheat purchases, (3) removal of guaranteed processing margins, and (4) elimination of fixed selling prices. The flour market shifted from a seller's to buyer's market almost overnight, and competition from imported flours became intense.

The flour mills in Bolivia are currently operating at less than one-third of their rated capacity. The millers are searching for ways to adjust to the new environment, including product innovation, quality improvements, customer services, and vertical integration. Employees are being hired or sent abroad for training in technical skills not currently available. Different milling strategies are being employed. Some mills produce only the quantities that can be sold on a daily basis, with very little finished product inventories. Other mills produce at full capacity for a limited period to build flour inventories sufficient for a predetermined volume of sales.

Mills are also paying additional attention to the utilization and sales strategies for by-products which were formerly "dumped" on the market. Only a very limited number of flour mills have the capability of producing animal feeds, and previous regulations all but prohibited this activity. Some mills are now exploring the potential of animal and poultry feeds, while others have or are potentially moving into baking and pasta making.

c. Impact on the Baking Industry. Pressures are building for fundamental changes in the baking industry. As previously cited, new and innovative bakers are appearing in the urban areas. One new baker estimated about 20 percent of the cottage-type bakers in his community had gone out of business in the few months since his operations began. According to this entrepreneur's calculations, he had reached his annual volume projections in about 3 months, and had ordered equipment to double output. Other examples could be cited in different urban areas, and inquiries were made of the authors as to sources of information and training available for commercial baking.

The theme that clearly is emerging is quality and variety. The commercial baker cited above rejected flour shipments by a Bolivian mill on several occasions and threatened to import from Argentina. Another local mill is now working with the baker to meet his specifications. Other examples could be cited, and in a few cases, flour millers are exploring importing specialty flours.

d. Impact upon Consumers. The impact of the foregoing upon consumers has been twofold. Higher wheat and bread prices have apparently caused a shift in bread consumption habits although precise data are not available. Some consumers are apparently shifting to alternative foods such as rice, potatoes, and corn based products. Consumers are also apparently enjoying the ability to choose among innovative products as noted by the success of the baker in the previous section, and the observation of several new and apparently successful bakeries and bakery products now being offered in the urban areas. The existence of Argentine flours in the markets at prices above domestic flours indicates a willingness of consumers to pay for what they perceive to be differences in quality or convenience.

The picture for consumers, bakers, and flour millers has been somewhat clouded by the actions of certain government entities, particularly municipalities, who insist that bread and flour prices remain subject to controls. A news release issued by MICT in October assured consumers that flour supplies were adequate for a forthcoming national holiday and that any increase in bread prices was clearly unwarranted (80). Thus moral suasion and public opinion are being mobilized to replace former regulations. Some firms are hesitant to make changes until the situation is clarified.

e. The Argentine Influence. Argentine wheat and flour imports will be the dominant factor in establishing domestic wheat and flour prices unless offset by effective new wheat and flour policies. Argentine prices are largely determined by international prices. At this writing Argentine wheat could be delivered to Santa Cruz for approximately \$110/MT with the strong probability of prices trending lower in the months ahead.

A fairly sophisticated network for the informal importation of flour from Argentina has come into existence as well as increasing imports through normal commercial channels. The network grew at first in response to the favorable combination of exchange rates among the US dollar, Argentine austral, and the Bolivian peso. Argentina has a system of export taxes on agricultural commodities, including flour, and a two-tier pricing system in which Argentine domestic prices are lower than official export prices.

In the time-honored Latin tradition, the existence of pricing and exchange rate discrepancies presented opportunities rather than obstacles if one were able to circumvent the tedious rules and regulations on both sides of the border. Means were found to such an extent that more or less standardized fees were developed for border clearing operations and specialists in flour buying, transportation, and packaging appeared in the border areas (Leigue, 39).

In late 1986, Argentina reduced its export taxes on wheat to 5 percent and flour to 8 percent, virtually eliminating the distinction between export and domestic prices in that country. The original incentives for the informal imports have been reduced, however, the focus has shifted.

Argentine flour is now widely distributed throughout Bolivia on the basis of quality, brand recognition, and consumer packaging. The Argentine "tres 0" or "tipo 000" is the acknowledged standard by which flour is now measured in Bolivia. Argentine flour mixes containing salt and baking powder (of the "Bisquick" type) are also rapidly making inroads in Bolivian markets whereas domestic millers had previously been prohibited from producing such products.

#### D. Summary

Past Bolivian wheat policies discouraged national wheat production and failed to contribute to rural income generation. These policies were swept away in tumultuous macroeconomic and political events that preceeded Supreme Decree 21060. In the nearly 16 months since that time, the major preoccupation of the Bolivian government has been getting its monetary and fiscal structures in order. Accomplishments in these areas have been such that consideration of wheat as an item in economic revitalization programs and as a savings in government expenditures is now in order.

## SECTION III

### FRAMEWORK FOR A NATIONAL WHEAT POLICY

#### A. The Need for a National Wheat Policy

The economic crisis of the early 1980s forced an abrupt change in overall policies related to monetary and fiscal management, exchange rates, import and export controls, resource management, and other macroeconomic aspects. The Supreme Decree 21060 of August 29, 1985, with few exceptions, liberalized national and international trade conditions for all goods and services (Articles 41-49). The change toward a more liberalized market economy is clearly evident, in which market forces are now allowed to set "fair" market prices for goods and services produced and traded.

All subsidies were eliminated, including those associated with wheat imports and the milling industry. Internal tariffs and customs between provinces were also eliminated, encouraging a free flow of goods within the country. The wheat production interests, flour milling and baking industry, and consumers are in the process of adjusting to the new realities, but the "rules of the game" have yet to be formulated to clearly set forth conditions that are compatible with the spirit of the new law.

Policy analysis and formulation will assist in establishing the objectives and goals, rules and regulations, and assist in resource mobilization so that wheat production, marketing, processing, distribution, and consumption can be planned and implemented in an orderly and balanced fashion.

#### B. Foundations for a National Wheat Policy

A national wheat policy consists of a series of public actions that can be taken by the government to influence the allocation of resources employed in delivering wheat in the time, form, and place demanded by consumers. In most cases, the elements of wheat policy have more than one implication for policy objectives and a consensus of opposing forces must be attained for economic, social, and political stability.

Policy involves planning and action based upon certain beliefs, values, and goals, taking into account the resources that are available, and the costs and benefits to be achieved as a result of the policy. The elements of policy involve (1) a fundamental definition which establishes the reason and framework for action, (2) beliefs and values that the majority of the population is willing and able to support, (3) the goals that may be established, (4) the means that may be used to reach the goals, (5) the implements such as organizations or agencies that create and control the means, and (6) the constraints that are applied to the plan or program (27).

1. Policy Defined. Policy is a deliberate course of action followed by a government, private entity, family, and/or individual. Policy implies a definitive plan created through thought and reason.

Bolivian wheat policy may thus be defined as the full range of public decisions that will influence individuals and firms to decide how wheat shall be produced, marketed, processed, distributed, and consumed.

2. Beliefs and Values. In order for any policy to be successful over the long term, it must be based on certain beliefs and values which are adhered to and supported by the citizens through their government. The following are set forth in fulfillment of this second element.

1. Wheat is a basic food in the Bolivian diet.
2. Wheat is a crop that can be produced in Bolivia in an ecologically sound manner.
3. The Bolivian government has an obligation to its producers, consumers, and processors to achieve higher levels of self-sufficiency in wheat production.
4. The Bolivian government has the resources available to achieve greater self-sufficiency in wheat, and that wheat production will be given high priority in the economic revitalization program.
5. Bolivian wheat producers and flour millers will respond positively to incentives for increased national wheat production.

3. Policy Goals. Goals need to be established as reference points or benchmarks in order to have something definitive to strive for, assess developments, and adjust future planning and resource allocation. The following goals are considered achievable within reasonable socioeconomic bounds, given the resource base available:

1. National wheat production. To achieve a national wheat production level that is 25 percent of national commercial requirements by 1992, and 50 percent by 1997, with annual increments of 15,000 to 20,000 MT thereafter.
2. Cost and producer income. To produce wheat domestically at costs no greater than 125 percent of world market prices by 1992, and 110 percent by 1997.
3. Consumer benefit. To increase the quality and variety of wheat and wheat products available to consumers, with consumer expenditures for wheat products as a percent of income comparable to other Latin American countries.
4. Domestic industry. To maintain a flour milling industry that will provide viable markets for national wheat production, and to provide adequate supplies of flour and wheat by-products for the domestic market.
5. Subordination of imports. To utilize imports as a means of supplementing national wheat production by providing wheat for blending with national wheat to achieve desired final product characteristics, and to make up for shortfalls in domestic production.

No doubt these will be changed as a definitive national wheat policy takes shape and final plans of action are drawn.

4. Policy Means and Implements. The means and implements to achieve the policy goals consist of the human and financial resources, systems and processes, and the organization and agencies available to implement the policies. In the context of wheat in Bolivia these include:

1. Integration of existing government programs on wheat production, agricultural research, extension (MACA), credit (BAB and others), and marketing, tariffs, and imports (MICT) into unified programs that will meet the wheat policy objectives.
2. Elimination of price controls on bread and technical controls over the milling and baking industry to permit market competition to regulate the quality and price of bread and flour products.
3. Regulation and control of imported wheat and flour products until national wheat production, marketing, and processing are capable of operating at world market prices.
4. Development of an information and analysis system to guide wheat policy decision-makers, and institutionalizing the wheat policy decision-making processes.
5. Utilization of donor assistance to meet policy goals by requesting the resources and accepting only commodities and/or services that will assist in meeting policy goals, including projects funded under PL 480 Title III.
6. Redirection of some existing government resources in agriculture to strengthen research and extension activities to support wheat production programs, as well as making existing wheat marketing facilities available to producers through sale or lease.

5. Constraints. Any national wheat policies adopted will have to negate or minimize a number of constraints in order to increase wheat production. The following list of constraints, if removed or minimized, would allow for a greater role of wheat in the national economy.

1. Lack, scarcity, and high cost of inputs required for wheat production.
2. Low yields and high cost of production.
3. Lack of basic infrastructure in the areas with highest wheat production potentials.
4. Lack of a national marketing system for wheat.
5. Availability of lower cost imported wheat and flour products from Argentina and other donor sources.
6. Loss of donor revenues from wheat sales for the GOB.
7. Insufficient skills, equipment, facilities, personnel, and financing.

### C. Application of Policy Analysis

A number of pressing issues now confront government with regard to wheat production, imports, and wheat product utilization. Some of these issues should be resolved immediately, others should be addressed in an intermediate short-term period, while still others will require further long-term studies and analysis.

1. Immediate Policy Issues. These remnants of past wheat policies need to be addressed immediately. The further the final change is delayed, the more difficult the competitive position of the national wheat milling industry will become. Policy statements outlining government policies in accordance with Decree 21060 and the economic revitalization program are needed to eliminate the following constraints to market development.

a. Pricing of Final Product. As a carryover from past subsidies policy, the current government is still setting a price for bread products, and indirectly, mill prices for wheat flour. The bread price policy is applied through a combination of moral suasion and tradition of industry cooperation and controls to standardize products and product weights. By limiting bread prices, the government restricts the ability of bread producers to pay for flour. Not only does this policy contradict the new law, but it handicaps flour millers and bakers in meeting competition from imported flours and wheat products. Imported Argentine flour is currently setting the market standards. The MICT recognized this by abolishing the 80-percent extraction flours, and settled on a 72-percent extraction rate to enable millers to produce a product equivalent to the Argentine "Tipo 000".

As long as a liberal trade economy is allowed, market forces will frustrate any "fixed prices" within the national system. Some new baking enterprises seem to be defying both law and tradition by offering products of less than the standard 65 g per piece weight, and consumers are readily accepting their products. As the older baking firms feel the competitive pressures, they too will adopt varying weights.

In view of the long down trend in world wheat prices, the government may have fewer reasons to fear uncontrolled or unjustified rises in bread prices if price controls are completely abolished. Competitive pressures are building in the flour milling and baking industries. With readily-available imported flour and flour products, domestic prices cannot rise beyond equivalent imported costs.

b. Milling Yields and Product Quality. The government still requires national mills to extract wheat at a 72-percent rate to provide a uniform flour quality. While technically this might have been an acceptable extraction rate under the subsidy policies, changing market conditions now require that extraction rates and product quality be market-determined. This is not to say that certain quality and health standards should not be maintained and required for both national and imported flour, but the national wheat milling industry must have the flexibility to adjust the extraction rates and flour composition to market demand if it is going to compete successfully with imported flour and flour products.

2. Short- to Intermediate-Term Policy Issues. These short- to intermediate-term policy issues need to be resolved before the next wheat harvest, and before the negotiations for next year's PL 480 and Argentine wheat imports are finalized and set in motion.

a. Wheat Import Subsidies. While not explicitly contained in the new law, it is apparent that the government exempts itself from the 20-percent import duty. Such an exemption is supposed to last one year and be subject to review. This exemption reflects the continued preoccupation of the GOB with consumer subsidies of certain basic food items. On the other hand, reactivating the agricultural sector, especially wheat production, is also an expressed government policy initiative.

This anomalous situation needs to be resolved in the near future since the continuation of special treatment for wheat imports is sending conflicting signals to producers and the milling and baking industry. To promote wheat production in Bolivia, adequate "border prices" will have to be established to maintain a level of incentives high enough to provide a "pull" for national wheat production. Current import costs of about US\$180/MT (FOB La Paz) might be sufficient if domestic producers could be assured of receiving that price. On the other hand, a higher artificial "border price" might be needed to provide the degree of protection needed from foreign competition, given the current world wheat situation.

b. Wheat Import Conditions and Credit Terms. The import conditions and credit terms for the next PL 480 and Argentine wheat imports are being debated. Again, based on the policy decision to increase national wheat production, the import conditions and credit terms should not be biased toward imported wheat. At best these conditions should be neutral, or slightly biased toward the purchase of national wheat by millers. Sufficient credit for working capital requirements with appropriate incentives will generate demand for national wheat purchases. Such conditions coupled with an appropriate border price for imported wheat will create the right price signals to Bolivian wheat farmers, who will respond with increased levels of production. Suggested terms for a credit program are presented in Table 14, in the following section.

c. PL 480 Procurement Procedures. The cumbersome processes and costs involved in securing PL 480 imports have been documented in several internal USAID/La Paz studies (Urquidi). A recent case study of PL 480 shipments noted that it was 259 days from the opening of PL 480 negotiations until a shipload of grain departed the United States (Hernan Munoz). Add in ocean transit times, plus port time and rail transit from the Chilean ports to Bolivian flour mills, and the elapsed time from the original PL 480 negotiations to consumable products in Bolivia can easily exceed one year.

Many of the current difficulties with imports through the Chilean ports of Arica and Antofagasta can be attributed to the PL 480 processes wherein several shipments arrived almost simultaneously to assure deliveries within the current fiscal year. The time lag will also impede recommended efforts to better utilize national wheat production effectively by purchasing imported wheats for blending to complement the characteristics of national wheat production. Some misunderstandings exist among Bolivian government officials, ADIM, and USAID/La Paz personnel on the types and qualities of grains that can be purchased under PL 480 agreements, the application of US grades and standards, and export procedures.

In any event, the processes of negotiating PL 480 agreements and purchasing grain need to be thoroughly reviewed to shorten the processes involved, and to give the purchasing authority much greater flexibility in the qualities and timing of incoming shipments. Training on these matters is needed, and responsibility for managing the purchasing procedures needs to be more clearly defined. Included in this recommendation is a system for monitoring the qualities and quantities to be purchased, and a system for checking the physical characteristics of grains arriving at the Chilean ports.

3. Long-Term Policy Issues. Following is a brief enumeration of other important policy issues which must be addressed and resolved. This list is by no means inclusive and other policy issues will emerge as policy alternatives and implementation procedures are explored. Some issues are broader than wheat and flour products, but must be put in the proper context to gain an understanding of the commodity issues involved.

a. Basic Information

- (1) Where and how should basic information on the functioning of the national food production and marketing systems be collected and analyzed?
- (2) Where and how should price and policy developments in bordering countries be monitored for the assessment of the impacts on Bolivian markets and existing national policies?
- (3) What are the prevailing attitudes toward the functioning of the private enterprise system and market competition?
- (4) What constitutes true "food security" for Bolivia, and what measures should the government employ to achieve it?

b. Production Inputs

- (1) Where and how should wheat seed development, production, and marketing be organized? There are many public and private entities involved which need better coordination.
- (2) Where and how should basic research in genetic research be introduced in existing research efforts?
- (3) A long-term feasibility study for fertilizer production should have priority. Bolivia has the raw materials needed, but imports all fertilizer needs.

c. Wheat Production

- (1) What is the maximum economical level of wheat production that the nation could expect to achieve with present and foreseeable levels of technology?
- (2) Where and how should farming system analysis be carried out to improve traditional and nontraditional systems of wheat production, harvesting, postharvest handling and storage?
- (3) What types of long-term incentives need to be offered to stimulate national wheat production?

d. Wheat Marketing

- (1) To what extent should Supreme Decree 21060 be modified to restrict imports of flour and wheat to protect producers and processors?
- (2) What market and financial mechanisms can be used to encourage domestic mills to utilize a greater proportion of national wheat?
- (3) Should the government continue to be the sole importer of wheat under PL 480, other donor assistance programs, and formal contracts with Argentina?
- (4) How should wheat marketing be organized, considering the lack of a national marketing system and infrastructure to facilitate interregional grain transfers?
- (5) Where and how should the facilitating functions such as grading, standardized weights and measures, market information, and credit be organized?
- (6) When and where should postharvest support systems and research be organized?

e. Wheat Milling and Flour Consumption

- (1) What assistance should be provided to the flour milling industry to deal with competition from imported flour products?
- (2) What assistance, if any, should be provided to the flour milling industry to deal with existing overcapacity?
- (3) What type of research studies should be undertaken to assess the market potential for differentiated bread and pasta products?
- (4) What training and/or assistance should be provided to the baking and pasta manufacturing industries for improvement of product quality and utilization of different flours?
- (5) What type of research should be undertaken to identify consumer groups that might be adversely affected by changes in bread pricing policies and/or targeted for special nutrition programs?
- (6) Should the utilization of composite flours be mandated by law or become a matter of private initiative? Because of the importance and potential impact of this issue, further policy thoughts are contained in Appendix C.

D. Preconditions for Policy Success

Many well-intentioned development initiatives for improving the cereal food system in Bolivia have been abandoned or fallen short of their targets because they were undertaken in political and socioeconomic environments lacking essential elements for success. Settling the current policy issues and implementing the action recommendations contained in this report will not be sufficient to turn the national wheat production and marketing situation around.

In order to achieve a sustained and increasing wheat production and marketing program in Bolivia, certain basic political, macroeconomic, and administrative elements must be in place and functioning in a viable manner. The most important elements in terms of the scope of work and action recommendations are briefly elaborated below.

## 1. Political Elements

a. Political (Functional) Stability and Will. The most fundamental precondition for long-term policy success is political (functional) stability and will. While governments may change, functional stability for "continuity" and will for "adjusting" policy programs are essential.

This precondition can be achieved through a civil service structure capable of transcending political (government) changes, and endowed with the necessary resources for maintaining and improving its infrastructure and technical staff. Since governments may differ on how food systems development should be carried out, political will, in this context, reflects the courage, strength, and determination to "continue" implementing sound long-term policies and programs started under previous administrations and/or "adjusting" those which do not appear to be sound. This, however, cannot be carried out without functional stability and adequate administrative and technical capacities.

b. Definitive Objectives and Targets. The fundamental criteria by which development of the national food system is carried out is given by a set of definitive objectives, namely efficient economic growth, a more equitable distribution of income, nutritional well-being, and food security. Unless a radical sociopolitical change takes place, these definitive objectives should be quite stable from government to government. These objectives deal with the fundamental issues of growth and equity and are balanced out within a national welfare context. Broad macroeconomic targets are set for these objectives and budget, fiscal, and monetary policies are used to reach these targets. Again, this can only be achieved through sustained functional stability and administrative and technical capacities in the public sector.

c. Secure Borders. As a land-locked country, surrounded by five countries of which four have powerful economies, Bolivia needs secure borders. In this context, secure borders implies having the management capacities and integrity to monitor and control movements of goods to and from Bolivia. This element has now increased importance in view of the liberalized trade policy and regulations adopted by the current government. Constant monitoring and control of border prices (see below) is now critical for any national program designed to increase wheat production and marketing in Bolivia.

## 2. Macroeconomic Elements

a. Stable Foreign Exchange Rates. The foreign exchange rate for any country establishes the value of its own currency relative to the currency of any other country. This value can be established in three different ways, namely in the international currency markets, pegged to the currency of a major trading partner (usually the US dollar), or set by the government (93).

The effects of an overvalued monetary unit can be very detrimental to the development of a national food system. An overvalued exchange rate will lead to undervalued goods and services that are traded internationally (e.g. wheat). Consumers of grains and other traded goods are thus subsidized indirectly because of the artificially low prices for these items. Consequently, farmers producing and selling the same crops receive less income than they would if the exchange rate were market-determined. Hence an overvalued exchange rate acts as an implicit tax on agriculture. Continued overvaluation tends to divert the flow of purchasing power to the urban areas, thus subsidizing the real income of civil servants and urban dwellers, which is politically popular. The depressed rural incentives cause low growth in agricultural output and little gain in rural employment. Finally, since domestic food production is depressed and foreign exchange is cheap, food imports tend to expand considerably.

A devaluation by itself will not solve the problem due to the differential inflation rates among trading partners. It must be accompanied by fiscal and monetary policies that reduce inflation by cutting aggregate demand and lowering domestic expenditures. This is sometimes politically very difficult to implement. In any case, discussions of domestic food price policy that do not include the role of an equilibrium exchange rate miss the most pervasive aspects of policies biased against agricultural production and rural income generation.

b. Border Prices. Since wheat is internationally grown and traded, a program for increasing production and marketing of national wheat will require equilibrium border prices relative to international market prices for wheat of equivalent quality. Since a market-determined border price may not offer sufficient incentives to increment national wheat production, an artificial border price may have to be established and adjusted in a timely fashion to changing world supply and demand conditions. However, an artificial border price cannot be too far out of line with the market-determined border price since this would result in legal and illegal imports of wheat and flour to Bolivia, thus voiding any incentives to increase national wheat production. If required, an artificial border price should be stable enough to provide the right price signals to farmers, yet flexible enough to accommodate world market conditions for wheat. In any case, constant analysis of international market trends over the short-, medium-, and long-term will be needed to determine the appropriate border price for national wheat during a crop season.

### 3. Administrative Elements

a. Information and Data Base. To a high degree, the power to make sound food policy decisions rests on the quality of basic information available and its opportune analysis and interpretation by policymakers. As an increasing urban population becomes more dependent on a food system to deliver its daily food intake, the system itself becomes more "depersonalized", complex, and long. Basic agricultural commodities travel longer distances and undergo many form, place, possession, and time utility changes before their final use. The type of basic information needed to track events along each link of the system becomes more complex and its quality more important.

Part of this information will be needed at regular intervals (daily, weekly, monthly, etc.) while other will be required at irregular time intervals or as needed for particular uses. In any case, the information is gathered and analyzed in an opportune fashion to assist in the generation of sound policies for continued food system development.

Finally, the basic information gathered is assembled as a data base for easy access and retrieval when needed. The data base management system manipulates and organizes the basic information according to the needs of different users.

b. Administrative Capacity. A well-organized information and data base system will not accomplish much for the development of the food system unless the administrative capacity and skills are in place to analyze, implement the results of the analysis, monitor its development, and control the outcomes of policy initiatives on a daily basis. The current government policy of free trade for basic food grains and subproducts in either direction requires little bureaucratic effort to implement, but it might not be very helpful in furthering the development of a national cereal food system because of the extreme instability that can be transmitted into the domestic economy.

As domestic prices diverge more and more from the international opportunity cost in either direction, the administrative task of keeping the country's cheap grain and subproducts at home or keeping out the international market's cheap grain becomes much more difficult. At present, no one entity of government has the jurisdiction, skills, or capacity to investigate the complex set of relationships surrounding wheat production and consumption. Yet for the benefit of all concerned, skilled analysis of the factors surrounding wheat and flour policies must be made, with realistic alternatives presented to policymakers for consideration.

An incentive-based policy to increase wheat production in Bolivia, without the bureaucratic, administrative, and technical resources, wherever they may be placed, to implement, monitor, and control policy application, will be circumvented and ultimately frustrated by market forces.

## SECTION IV

### ACTION RECOMMENDATIONS

#### A. Overview of Recommendations

This chapter views wheat production, processing, importation, marketing, and consumption as a system. In this way, action recommendations are focused on each link, its particular problems and policy issues, rather than on institutional capabilities.

The systems approach begins with a global concern for a national wheat policy that is based on reliable information, solid analysis, and broad participation in its formulation. The policy itself is set within a number of fundamental preconditions applicable to all government policies (see Section III). Subsequently, recommendations are offered for actions and programs in each link of the Bolivian wheat system.

1. National Wheat Policy Analysis Unit. A Wheat Policy Analysis Unit should be created to address the relevant issues and coordinate the formulation of national policies. At present, the responsibility for all aspects of wheat production, imports, and utilization is widely dispersed within the GOB. A national wheat policy must be derived from a consensus of all entities involved. A National Wheat Council (NWC) with regional counterparts has been proposed to provide forums for policy creation (42). Policy creation must be supported by adequate information and skilled analysis of the technical and economic aspects of the wheat sector.

2. Action Programs. From this level, attention is focused on the provision of agricultural production inputs to achieve national production goals. Improved wheat varieties and seed availability are central to the effort, with emphasis on research and distribution to build upon the solid foundation left by the recently phased-out seed improvement project. Provision of an efficient and opportune credit program for production credit is another essential input element. Fertilizer and agrochemicals represent the third input element which lacks a national industrial base, calling for a serious long-term assessment and planning effort for its development.

The next link is production, with the creation of effective producer organizations to assure that all inputs are in place to assure a bountiful harvest. In some places, it will be possible to build upon existing organizations; in others, it will be necessary to build literally from the ground up.

While the harvest may be plentiful, it is within the marketplace where the battles are won or lost, and incentives are obtained to repeat the cycle. For these reasons, wheat marketing must be fully supported by organization, infrastructure, auxiliary functions, credit, and research. The reactivation of the wheat purchase centers within the private sector can play a vital role.

Milling is the next critical component in the wheat system. From a position of privileged and sheltered existence to one suddenly battered by shifting economic forces, the flour milling industry is seeking answers. The needs in this link can largely be fulfilled by information, training, and strategies

for coping with the new situation. The milling industry must remain strong and flexible as a market for increased wheat production.

Bread, pasta making, and flour distribution are coming in for more attention as previously subsidized consumption can no longer be taken for granted. Import competition has opened eyes and tastes to the possibilities, and the industry is beginning to seek new ways. The baking industry has much in common with flour milling, and some joint actions are proposed.

The final link in the systems approach is wheat importing. Imports were deliberately placed last to emphasize the need for a change from a nation dominated by imports, to a national wheat policy supported by imports. Many of the current import problems can be overcome by information, training, and improved logistics. In the longer term, technical and economic analysis can assist in guiding the nation's import policies to a position of selecting import quantities and qualities to complement national production.

Using the framework for a national wheat policy outlined in the previous section, the remainder of this section contains detailed recommendations in support of each link of the wheat food system in Bolivia. A chart illustrating the relationship of each component of the recommendations, a tentative budget and resources required are contained in Appendix E.

## B. Implementing Action Programs

1. Wheat Policy Analysis Unit. The Wheat Policy Analysis Unit (WPAU) will consist of professionally-trained and oriented personnel capable of presenting factual information and reasoned judgments in an impartial manner. The size of the WPAU, its composition, and operational costs will depend in large measure upon whether it can be created from existing organizations or if an entirely new unit is needed.

a. Composition of the WPAU. The WPAU approach will be multi-disciplinary, representing both the technical and economic dimensions of the issues to be studied. As a minimum, the WPAU should have expertise available in macro- and microeconomics, statistics, marketing, finance, agronomy, grain quality, milling and baking technology, international trade, and consumer economics. This does not necessarily mean that the WPAU would directly employ a person in each of the above-mentioned disciplines, but rather that the WPAU have ready access to these skills as needed.

A core professional staff would probably consist of a senior economist, agronomist, marketing economist, and statistician, one of whom would serve as team leader and coordinator. Supporting or auxiliary staff could be designated from among existing institutions having particular skills or facilities on a part-time or contractual basis.

b. Functions of the WPAU. The following represents an initial listing of the functions and activities of the WPAU. Its duties may change over time as administration and technical personnel become more knowledgeable in the performance of their tasks, and as the national wheat production program takes effect.

(1) Formulation of Policy Objectives. Wheat production and consumption involve many conflicting objectives among and between the participants. The

WPAU must be able to synthesize the opinions and desires of the government, producers, millers, and consumers into quantifiable objectives.

(2) Research and Development of Alternatives. The research efforts employed at both the physical and economic levels will develop alternative means of reaching the policy objectives. Each alternative must be distinctly stated, with an objective assessment of the costs, benefits, and advantages and disadvantages for the concerned parties.

(3) Implementation of Policy. Once the alternatives are developed, it becomes the task of the policymakers to select an alternative, and develop implementing procedures. The WPAU can research the effectiveness of implementation procedures and make recommendations.

(4) Assessment of Policy. Once a policy is established, there is need for a continual evaluation of the policy in reaching stated objectives. The WPAU will monitor policy performance and regularly report to the policymaking body.

c. Activities of the WPAU. The following are examples of the activities needed to carry out the functions of the WPAU. The WPAU may elect to contract the actual performance of some activities to existing organizations where the capabilities exist, or could be developed at minimal cost.

(1) Information and Statistics. One of the primary tasks of the policy analysis unit will be to maintain data bases and reference sources on all subject matters relevant to the wheat sector. The majority of data will be from secondary sources, and the policy analysis unit will work with existing organizations and data collection sources to assure the proper collection and publication of relevant materials.

(2) Economic Situation Analysis and Reporting. The WPAU will analyze available data and issue regular reports on subjects of concern to policymakers, producers, processors, and consumers of wheat products. These include (1) Bolivian wheat and flour balance sheets, (2) domestic and international prices for wheat and subproducts, (3) crop forecasts by region, (4) import activities and schedules, (5) international developments affecting Bolivian imports and import prices, (6) research results and product developments, (7) government regulations and activities, and (8) donor assistance programs.

(3) Technical Analysis and Reporting. As a counterpart to the economic policy analysis, the WPAU would have the technical capacity to investigate the physical aspects of wheat production, milling, and flour and by-product utilization. This capability is absolutely essential in that the economic parameters reflect the physical dimensions of wheat production and marketing systems. In a similar manner to the economic analysis and reporting, the technical activities will provide complementary information. Some examples are (1) continual analysis of domestic and imported wheats, flour, and flour products to assure that national standards are maintained, (2) assessment of milling properties of new wheat varieties to screen the most promising candidates for further testing and seed multiplication, (3) monitoring the qualities of wheat being produced by each region to assist in marketing, (4) advice on the qualities of imports needed to blend with national wheats, and (5) support for the economic analysis of current industry issues such as the extraction rates, utilization of composite flours, and utilization of subproducts.

(4) Special Studies. Policy formulation often requires detailed knowledge of the impacts of a particular action upon producers, consumers, processors, and/or the implementing agency. The WPAU must be prepared to conduct special studies, or have the ability to contract for studies to organizations with proven expertise. Areas for special studies may include household and institutional consumption studies, technical aspects of milling and baking processes for wheats of differing compositions, alternative contracting and financing arrangements for imports, and impact of major exporting countries' policies on Bolivian imports and national wheat production.

d. Location of the WPAU. The WPAU must be located where it has access to all relevant policymaking groups, sources of information, and facilities for proper performance of its assignments. As recommended, the WPAU is ideally suited to the support needs of the proposed NWC (43). However, the need for a start on a national wheat policy is immediate and the WPAU must be placed in an existing organization or created as an independent agency.

(1) Location of Economic Analysis Activities. It is therefore recommended that the WPAU be placed in the PL 480 Secretariat to be later transferred to the NWC when that organization becomes a viable entity. The existence of a WPAU may provide the incentive to speed up the creation of the NWC by giving support to the organization from its inception.

The PL 480 Secretariat is the first choice for organizing and temporary placement of the WPAU for the following reasons. The Secretariat's independence from governmental units, and its role in financing many activities to be implemented under a national wheat policy were the primary reasons for its selection. Furthermore, seven of thirteen projects currently administered by the PL 480 Secretariat could be utilized for the support of programs for domestic wheat production and marketing (see Table 13).

If part of these allocations can be used directly to support national wheat policy programs, and with direction and coordination toward agreed objectives and modification in future PL 480 agreements, the need for new funding sources to support a national wheat program should be minimal.

Several other locations were considered as potential sites for the WPAU, including UDAPE, MACA, MICT, and the NWC. The second preference for locating the WPAU would have been in UDAPE. UDAPE possesses the analytical capabilities, however UDAPE's functions are broader in scope than required for wheat policy analysis, and UDAPE itself would have to create a WPAU subunit. Additionally, UDAPE is scheduled to be absorbed into the Ministry of Planning.

A third alternative would be to form an inter-ministry wheat policy committee, with the leadership in MICT. This is the least desirable alternative because it would require considerable time and effort to see that the ministerial counterparts have the requisite skills, that their technical resources and personnel are adequate, and that resources are not diverted to other activities. Having the policy development centered in ministries could also create frictions and delays due to personnel turnover and the seeking of political advantages by various factions.

TABLE 13

## Title III Linkages to Proposed Policy Recommendations

Title III Project	FY 1986 Financing (\$ 000)	Support for National Wheat Policy Area
Wheat Production and Marketing	1,000	Production, Marketing
Strengthening Producer Associations	1,000	Inputs, Production, Marketing
Small Farmer Agricultural Production and Livestock Production and Marketing Credit	5,000	Inputs, Production, Marketing
Support to Research and Extension Systems	500	Inputs, Production
Agroindustrial Credits to Small & Medium Enterprises	3,000	Inputs (production of equipment for cleaning, threshing, land preparation using appropriate technology) Also for milling and baking technology
Training	1,000	Inputs, Production, Marketing
Policy Analysis Unit	<u>1,000</u>	National Wheat Policy
Total	\$12,500	

The fourth and final alternative, the NWC, cannot be considered at this time since it does not exist. Once in place, it would provide the best possible permanent location for the WPAU.

(2) Location of Technical Analysis Activities. The rationale for location of the technical analysis activities of the WPAU parallel those of the economic analysis. The laboratories of either MICT or MACA might be utilized. However, the governmental laboratories are presently poorly maintained and lacking in qualified personnel. The PL 480 Secretariat and the WPAU could review these laboratories and their management to determine if some investments should be made to bring the laboratories and personnel up to the standards required for the WPAU's purposes.

Some alternative arrangements might be made, such as leasing government laboratories for specific time periods, contracting the highly specialized portions of the program to qualified private or university laboratories, and/or using short-term consultants for specific tasks.

e. Management of the WPAU. While under the management of the PL 480 Secretariat, the WPAU would be directed by an advisory board composed of representatives of organizations that will eventually compose the NWC.

(1) Advisory Board. The advisory board will suggest and approve plans of work, request special studies, and assist the WPAU in securing the participation of the public and private entities affected by WPAU activities. The advisory board will also present WPAU findings to their respective organizations, and convey the research and policy concerns of those organizations to the WPAU.

(2) PL 480 Secretariat. The Secretariat would be responsible for selecting and employing personnel, providing logistical support, and operating funds, until such time as the NWC becomes operative. The Secretariat will also assist in implementing policy recommendations through appropriate Title III projects.

f. Long-Term Financing. While a WPAU can be initiated with available funding, another source of funding must be considered as the programs and activities become established.

A national tax or "checkoff" for wheat research and development could be utilized. The tax could be administered in a manner similar to the checkoff ANAPO now has with the flour millers in Santa Cruz. The amount currently is 1 percent of the net market value of the product delivered by the producer. Such a checkoff, levied either at the marketing stage, or per MT of flour produced, could assist in providing financing for the National and Regional Wheat Councils, which would in turn allocate the funding to research, the WPAU, and/or producers organizations.

2. Action Programs. The recommended action programs are designed to strengthen those elements in each link of the Bolivian wheat system which were identified as having the greatest potential to contribute to increased national wheat production and marketing levels. Under a realistic policy umbrella, these specific action recommendations would help mobilize the needed resources to carry out the required programs and activities in order to achieve stated policy goals and objectives.

a. Identified Components

(1) Production Inputs. In the long run the efficient and opportune delivery of all variable production inputs is essential to sustain a healthy agricultural production sector. In the short run, however, disbalances, shortages, or total lack of certain inputs can occur which hinder a smooth development of the sector and a sustained increase in productivity. As a result, the largest short-term productivity gains can be achieved by improving the availability of those inputs which have the greatest immediate potential for increasing yields. While there are many components in the production input link which could be improved, three stand out, namely seed, credit, and fertilizer and agrochemicals.

(a) Wheat Seed. It is apparent that the greatest short-term impact on wheat production in Bolivia can be achieved by improving the varieties and quality of the seed stock. An excellent foundation for seed production has been provided by the recently-terminated seed project. This foundation should be strengthened and broadened until a viable seed production and distribution industry is established.

(b) Production Credit. Production credit is the second input component of wheat production which can have an immediate beneficial impact. The total demand for this type of credit exceeds availability, a situation which is further complicated by the lack of credit volume, institutions, simple application procedures, and the opportune disbursement when available.

(c) Fertilizer and Agrochemicals. It is a fact that Bolivia lacks a fertilizer and agrochemical manufacturing capacity. It is also known that the country contains many of the natural deposits necessary to produce these agricultural production components. As a result, Bolivia imports all fertilizer and agrochemicals used in agriculture. The disadvantages of this situation and impact on agricultural production have been highlighted in a previous section of this report.

(2) Wheat Production. Like the input link, wheat production is a function of many variables. If optimized, the result is efficient production of agricultural commodities. In the short run, however, certain production elements may be weak or lacking which lead to deficient production conditions. As a consequence, yields are reduced below their potential and production is inefficient and/or uncompetitive.

The existence of the traditional altiplano wheat production areas in juxtaposition with the wheat production in the semi-tropical lowlands creates both opportunities and problems. The opportunities exist because of the unique situation in which seed wheat is ideally suited for upland production while the lowlands contain higher yield and mechanization potentials. Additionally, the ideal growing seasons are such that upland seed wheat can be planted in the lowlands soon after harvest, eliminating the need for long-term storage. The major problems are related to organization and institutional factors.

The identified components within this link which would lead to increased production efficiency and yields, improved product quality, and a stronger

bargaining position for farmers include farming practices, postproduction technologies, and producer organizations.

(a) Farming Practices. Farming practices in Bolivia are either ancient (traditional areas of production) or new and as widely varied as there are farmers (nontraditional areas). Research and development in farming practices (in this case focused on wheat but taking the whole farm as a production unit) will return high dividends if maintained over long enough periods of time. This type of research leads to the development and introduction of improved farming practices such as land preparation, planting, cultivation, crop rotation, and soil conservation which result in higher production yields and efficiency, reduced soil erosion, increased diversification potential, etc.

(b) Postproduction R&D. This type of research leads to the development and introduction of appropriate postproduction technologies for harvesting, threshing, cleaning, drying and storing grain. Implementation of these improved technologies results in improved product quality and combined higher yields of all farming activities. Examples of these technological packages, and estimated needs are contained in Appendix D.

(c) Producer Organizations. The current market structure for inputs and marketable wheat surpluses in Bolivia poses a serious disadvantage to producers. The deficiencies of the present system have been reviewed in earlier sections. These two situations are further aggravated by the lack of economies of scale, inadequate infrastructure, lack of auxiliary marketing functions, and lack of information, knowledge, and credit.

(3) Wheat Marketing. Wheat marketing is the third link in the food chain connecting producers and consumers through intermediaries and processors. However, the recommended actions, if taken alone, cannot eliminate all of the current constraints. Much will depend upon the success of the government's revitalization program, and the provision of an infrastructure that will benefit the total agricultural sector.

Wheat marketing is currently the weakest link of the wheat food system in Bolivia. The components, which if strengthened will make this link more efficient and effective in bringing wheat in the form, place, and time desired by users and consumers, include (1) market research and information, (2) merchandising organization, (3) market infrastructure (reactivation of the wheat purchasing centers), and (4) marketing credit.

(a) Market Research and Information. Efficient and effective marketing is based on decisions which in turn are derived from market research analysis and information. This is one of the weakest components in the whole system, and what little information is available is only known to some privileged groups.

(b) Merchandising Organization. A well-managed merchandising organization attempts to obtain the best possible pricing and marketing conditions for the products offered. Incipient initiatives in this area of marketing are being undertaken by such producer organizations as CESAT and ANAPO. Improving them will result in higher returns to the wheat farmers.

(c) Market Infrastructure. The market infrastructure referred to in this study is concerned with the reactivation of the wheat purchase centers built in the late 1970s and closed down shortly thereafter for reasons referred to earlier. Reactivating them within the private sector and in conjunction with producer organizations holds the promise for a successful utilization of these facilities.

(d) Marketing Credit. Marketing credit is a necessary input which allows adjustments for the cash flow lags that occur between harvest and disposal of the commodities in the marketplace. This type of credit is hardly available in a formal way for wheat marketing in Bolivia. The potential of rolling production credits into marketing credits and/or establishing new credit volumes and lines needs to be explored, in order minimize the actual constraints of this link.

(4) Flour Milling. Prior to 1985, flour mills were the focal point for implementing government policies. Since Supreme Decree 21060, the industry has made some radical adjustments. Actions taken have been reviewed in the previous section. The milling industry is handicapped by the lack of definitive national policies. At the present time, the industry needs some assurances that the government will establish policies conducive to the development of sound marketing and investment strategies.

Because of the pre-1985 policies, the milling industry did not need the technical skills, capital equipment, and marketing management required for production and distribution of differentiated products. The lack of these essential now handicaps the industry's ability to compete with imported products. The three most critical components which must be addressed in this link are as follows.

(a) Flour Milling and Product Quality. Since level of quality and product differentiation have a direct bearing upon price and product acceptance, the flour milling industry in Bolivia will have to improve its production capabilities in order to stay competitive with imports.

(b) Structural Adjustments. Excess capacity increases costs and creates operating inefficiency. Adjustments will have to occur for the industry to be competitive. The forms of these adjustments and methods of transition need to be studied in the very near future.

(c) Working Capital. Under the previous policies, the working capital needs were substantially less than required under competitive conditions. The industry needs assistance in determining the level of needs and developing sources for acquiring working capital.

(5) Flour Utilization. The fastest changing link in the wheat system is the baking industry. This is indicated by the competition from imported wheat products which are making the industry more quality conscious. The technologically-advanced bakeries encountered during the course of this study were having flours made to specification. Some flour millers spoke of present and future plans for providing customer assistance, and strategies employed to capture specialty markets. The Minister of Industry, Trade, and Tourism issued a press release promising assistance in improving bread quality (78).

The identified components in this link are closely related to those in the milling sector, and thus concerned with product quality, differentiation, pricing, and product development. The following components are undergoing changes and further assessments are needed to develop strategies.

(a) Changes in Consumption Patterns and Habits. Consumers are reacting to the changed market conditions created by the new government policies. The direction and rate of change of these new trends and patterns must be analyzed in depth in order to understand their significance for the baking and pasta manufacturing industry, and in turn the milling industry as well.

(b) Product Quality and Differentiation. Entrepreneurs will now be able to take advantage of the new marketing possibilities created. This will require new products, product differentiation, pricing strategies, consumer packaging, product promotion, and other market-oriented activities. The baking industry can be assisted in this change by a combination of national policies, training, and technical assistance.

(6) Wheat Imports. The problems of wheat import procedures have been discussed in Sections I and II. The following recommendations set forth actions to correct some immediate problems and prepare for a transition to increased national production. Two broadly-identified components need immediate attention in order to minimize the problems that exist in this external link of the wheat system in Bolivia. These include the knowledge and skills required in the international grain trade, and physical improvements at the ports.

(a) Knowledge and Skills in International Grain Trade. Many of the current problems in wheat imports under the PL 480 program can be attributed to a lack of skills, knowledge, and information by those in charge of wheat imports. International grain trading is governed by very strict and precise conventions. A failure to comprehend the rules and terms employed can lead to costly mistakes, frustrations, and delays in the import program.

(b) Port Facilities. The existing facilities and equipment as well as handling practices at the ports of Antofagasta and Arica can be upgraded at minimal cost in order to minimize the contamination of the grain at this point and increase the efficiency and speed of grain handling operations.

b. Specific Action Recommendations

(1) Production Inputs

(a) National Wheat Research Strategy. It is essential that a National Wheat Research Strategy be developed and implemented as soon as possible. Such a strategy would help consolidate the results achieved so far, avoid costly duplication, plan long-term wheat research, and allow for specialization by area. Furthermore, a National Wheat Research Strategy must seriously consider expanding research into the area of genetic improvement and incorporate end-use analysis as a primary factor for the selection of new varieties. The National Seed Council and the regional counterparts must participate in the design and implementation of such a strategy.

(b) Cooperative Research Agreements. The National Wheat Research Strategy would result in formal agreements among participating institutions, and indicate the research support needed by each to carry out its commitments under a long-term wheat national research program.

The formal cooperative agreements would establish a framework under which each party would plan and carry out its research activities in cooperation with the other institutions involved, but under the general guidance of the National Wheat Research Strategy. The national and regional seed councils would coordinate and supervise the implementation of the cooperative agreements established among the institutions.

The individual research development support needed by each institution would be derived from its long-term research plan, priorities established by the National Wheat Research Strategy, and available funds. In general, such support will include infrastructure development, technical guidance, personnel training, financial assistance, supplies and materials and other inputs needed to achieve a higher scientific and technological plateau for wheat research in Bolivia.

(c) Seed Market Research. At the moment an infinite demand exists for certified seed. This is both a gratifying and challenging situation, which as seed production and marketing volume expand should change to one of sufficient and balanced supply of seed. While we cannot now predict when this will happen, when it does, it will transform all the "easy" marketing conditions existing up to that point. Since seed is a specialty and perishable product, it is important that supply be in rough balance with demand. Large stocks of unsold seed will result in setbacks and discouragement to seed producers. Also such stocks must then be maintained while costs are incurred and viability suffers.

Therefore, the question of market research becomes increasingly important as seed supplies begin to approximate demand. Market research will be needed to estimate demand by variety and region, improve logistics and distribution, calculate competitive marketing costs, margins and prices, project capacity utilization and expansion needs, etc.

(d) Seed Market Organization. The results of seed marketing analysis will also assist in determining the need and form for seed market organizations. As the seed production and marketing sector matures into an industry, a more formal organization will be needed to coordinate all aspects of seed production and marketing, including keeping track of seed supplies, organizing distribution by areas, controlling quality, and promoting brand development.

(e) Credit Requirements and Disbursement. It is necessary to assess accurately the potential credit volume that commercial wheat production could absorb in both production areas. Since this type of production is a function of its market potential, assessing the right credit volume needs might be very difficult, especially in the traditional areas.

Production credit can be offered in two different ways, depending on the state of development of the credit market and the need to control repayment. Credit can be given in kind, that is seed, fertilizer, etc., based on an accurate assessment of the farmer's need, followed by field surveys to assure a proper and timely application. This credit system is only possible through a well-organized and managed local farmer organization. Such an organization would obtain the funds from regular commercial sources or FENACRE, buy the required inputs, and make them available in kind to members of the organization. Repayment could be either in cash or in kind depending on the organization and market availability.

The other form of credit is simple commercial credit. This type of credit would be more appropriate for the Santa Cruz area, where commercially-oriented farmers are producing wheat and the volume of credit per farmer would be higher. Credit sources can be private banks and the BAB.

Since production credit should eventually be self-financing, the issue of subsidized credit must be carefully investigated. Unless absolutely necessary, subsidies should be avoided and realistic market rate of interest charged. A well-managed credit and repayment program should put the financial institution in a completely independent position within a given time period.

(f) National Fertilizer and Agrochemical Industry. Serious thought should be given to analyzing the feasibility and sizing of a national fertilizer and agrochemical base in Bolivia. This assessment and planning will take time and should be carried out as an independent activity, aside from those action recommendations contained in this report. This issue is further addressed later in this section.

## (2) Wheat Production

(a) National Wheat Production Research Strategy. Several institutions are engaged in seed wheat improvement R&D, including MACA, IBTA, CIAT, IBSTN, PAIRUMANI, Abapo-Izozog, etc. However, none are engaged in wheat production research (farming systems) or postharvest research. Since these institutions are involved in seed wheat research, the cooperative agreement suggested for that research component should be extended to cover wheat production and postharvest research activities.

Research should be oriented to the different farming systems being employed in the traditional and nontraditional areas of wheat production. For example, farming practices in Santa Cruz are highly varied. This situation leaves ample room to achieve higher yields through improved farming practices, such as appropriate crop rotations, adequate planting dates, improved cultivation technologies and practices, appropriate and timely use of fertilizers and agrochemicals, sound soil conservation techniques, etc.

In the traditional wheat growing areas, improved yields and soil conservation are well possible by improving the same type of farming practices. While basically the same, the application of improved farming practices in the traditional areas will be very different.

(b) National Postharvest Research Strategy. Harvest and postharvest handling technologies offer another area with great potential for improvement. More

advanced yet appropriate postharvest technologies and practices will lead to improved quality and uniformity of marketable wheat (and other grains) surpluses, as well as to reduction of postharvest losses. A series of technological packages are available which should be tested for adaptation and implementation in the traditional areas of wheat production. Trials could be started in areas where there are functioning producer organizations such as CESAT in Cochabamba. Again, the incorporation of these technologies will differ according to the areas, infrastructure, social and cultural patterns, etc. In Santa Cruz, a different postharvest infrastructure technology and management will be needed as volumes to be marketed increase. The climatic conditions require a different approach to postharvest handling and storage of wheat as well as other grains.

(c) Producer Organizations. Existing producer organizations should be strengthened and new ones established in order to transfer sufficient bargaining power to producers and enable them to take advantage of economies of scale. ANAPO in Santa Cruz and CESAT in Cochabamba are producer organizations which can serve as models for others to be established in other areas. Each one is unique to the characteristics of the area. The cooperative model could also serve the same purpose. The Cooperativa Integrada de Servicios Cochabamba, Lmt. is another model which could be emulated in other parts of the Altiplano.

### (3) Wheat Marketing

(a) Market Research Strategies and Information. Because the market for wheat is unique to each region, the market research and information action will establish a research program to determine (1) the market potentials for wheat, flour, and subproducts, (2) the varieties of wheat required to meet flour mill specifications, (3) costs of value-added activities such as drying, cleaning, classification, and storage by alternative methods, (4) the processed value of the wheat being produced, and (5) prices and volumes of national and imported wheat and wheat products offered in local markets.

(b) Strengthening and/or Developing Merchandising. In conjunction with local producer organizations this action recommendation would assist in determining the cost/benefit ratios that could enhance the value of the wheat being produced for the local millers, such as cleaning, drying, classifying, assembly into truckload quantities, storage, and financing. If the opportunity exists in the area, this action would assist and advise in the operation of the "centros de acopio."

Producer organizations would be advised in their negotiating strategies with the flour millers. All activities related to merchandising would have to be initiated jointly with counterpart personnel from the producer organizations, so as to permit the required specialists to withdraw from active involvement and serve only as advisors by the end of a reasonable time period.

In the Santa Cruz region where producer organizations exist, ANAPO and PROMECO, assistance may be needed in only "fine-tuning" and strengthening elements of their existing merchandising programs. In Cochabamba, CESAT and some cooperatives might form the basis for the merchandising organization. No strong organizations could be identified in the departments of Chuquisaca and Tarija, and it may be necessary to delay work in those regions until the producer organizations have been formed.

(c) Reactivation of the Wheat Purchasing Centers. Seven "centros de acopios" were constructed by the now defunct National Wheat Institute in the late 1970s (33, KSU Report). These centers are unused today, and could be used as an operating base for wheat producer organizations if they can be leased or acquired from the government on favorable terms.

Assistance will be needed to determine the feasibility, management structure, and training needed by the individual producer organizations to operate the centers. The centers in Cliza and Yamparuez should be considered or reactivation first due to their proximity to the milling centers in Cochabamba and Sucre, respectively, and for the wheat production potential where they are located. The operation of these centers should be considered as pilot projects until their operations are firmly established.

The centers themselves are in relatively good condition, but lacking in some essential equipment for successful marketing operations. The primary needs are a grain precleaner and elevator leg. Some centers might also benefit from grain classifying equipment, depending upon level of technology employed in harvesting, the varieties produced in the area, and benefits to the flour millers who will buy the wheat.

(d) Establishing Marketing Credit Program. It will be necessary to evaluate the need for marketing credit at the producer and organization level. Several credit programs exist on a regional basis and through PL 480 Title III programs. These may be sufficient to provide for the credit needs of the producers until the volume of production increases substantially.

Collaboration will be needed from available credit sources to determine their applicability, and the cost and benefits to individual producers and producer organizations. Marketing credit might be most beneficial if the reactivated centers can negotiate compensation from the flour millers for storing and delivering wheat on a definite timetable.

#### (4) Flour Milling

(a) Improvement of Flour Milling. Some of the required adjustments should be identified and treated on an industrywide basis. Information, technical, and managerial training could be provided on subjects such as (1) milling properties of national wheat varieties and imported wheat grades, (2) flour quality and characteristics of final products, (3) product development and testing, (4) consumer packaging, bulk flour handling, and flour storage, (5) characteristics and utilization of subproducts, and (6) inventory financing and cashflow management.

Short-term technical expertise could assist in identifying issues and training needs that could be addressed industrywide, and subjects that could be investigated jointly with the flour-consuming industries. Technical assistance can be provided through short courses, seminars, publications, and individual consultation. Many US and international organizations provide such training and materials to participants at minimal cost if local groups can identify the needs and recruit trainees.

(b) Assessment of Structural Adjustments. The above activities can provide some short-term relief to current problems, but the milling industry will face some difficult structural adjustments in the years ahead. A thorough analysis of the long-term demand for flour and subproducts, national wheat production potentials by regions, and government policies towards continued imports are needed to assist the industry in making long-term investment and product line decisions.

Much of the information needed will be developed by the WPAU. The milling industry should formulate its own study agenda to assure that its views are fully considered in the development of government policies. Technical assistance can be provided in the formulation and conduct of this research, and in assisting individual firms to interpret the results in light of their particular situation.

(c) Working Capital Assistance. Technical assistance may be provided to determine, in conjunction with the industry and financial sources, the volume of working capital required and to develop credit and investment programs. This issue is further elaborated later in this section.

#### (5) Flour Utilization

(a) Flour Utilization and Consumption Studies. Lack of basic data is a major handicap in projecting future needs and trends in the bread and pasta industries. This action, in cooperation with the milling industry and the WPAU, would produce studies of the bread and pasta industries. The structure of the industry, the levels of technology employed, costs, and marketing strategies would be studied to determine trends and appropriate interventions for improving efficiency and product quality. Consumer purchasing habits and preferences would be investigated to provide guidance for product planning, and investment in new facilities and equipment.

It is highly probable that future increases in wheat consumption will be closely linked to population growth. As wheat product prices reach equilibrium levels with substitute commodities, the demand for other foods may increase. Knowledge of food consumption trends is essential in long-term planning for the agricultural and food processing sectors.

(b) Improvement of Baking and Pasta-Making. As in the milling industry, a number of issues can be addressed through information and training. Assistance can be provided to the baking and pasta-making industries to identify the needs and organize training programs in cooperation with the milling industry. Some of the following subjects could be discussed: (1) factors affecting product quality and yield by types of flours, (2) technical and economic considerations in utilizing composite flours, (3) product development and marketing strategies, (4) bread and pasta-making technology, and (5) financing capital improvements.

The training and technical assistance required is readily available through the same and/or affiliated organizations of flour milling. Some training and information activities can be conducted jointly with the milling industry to increase communications between these sectors and to minimize the costs of training.

(6) Wheat Imports

(a) Official Training on Imports. It is extremely important that those charged with import responsibilities have ready access to accurate technical and economic information. Because of the press of other responsibilities, the highest officials cannot be expected to become technicians in all aspects of grain importing. However, these officials can be made aware of the complexities involved and be prepared to ask the right questions and insist on the proper assurances to achieve their objectives.

Two levels of training are proposed, familiarization training and demonstrations for officials at the decision-making level, and intensive technical training and import training for officials at the staff or supporting level.

(b) Familiarization Training. The International Grains Program (IGP) of Kansas State University (KSU), in cooperation with the US Wheat Council and the US Department of Agriculture, offers a 2-week program in grain trading covering grading and inspection, buying specifications and procedures, shipping, insurance, financing, and other topics.

The California Wheat Commission has developed a comprehensive set of guidelines useful for importers of American wheats. The materials provide useful methods of comparing the utilization value of imported wheats, and comparing tenders. Examples of this and other materials will be provided in a separate cover. If the number of persons involved warrants, localized versions of these courses and materials can be offered in-country.

Officials from Bolivia have received training in the past, but some of the effectiveness has been lost due to the high rate of turnover. The importance of wheat imports and stability of the present government now warrants the selection of officials to receive this type of training as quickly as possible.

(c) Intensive Technical Staff Training. MACA, MICT, ADIM, MPC, USAID/La Paz, producer associations, and private firms have need for the detailed technical and procedural information on wheat grading, inspection, and importing. The number of persons and diversity of interests involved warrants the contracting for expertise to conduct group training on technical and procedural subject matter, and design and implement information systems for each specific organization or entity involved. Depending upon the needs, more than one specialist may be utilized in training and consultations that could be scheduled periodically over a 2-year time span. In some instances, specialized training needs might be identified which would warrant some trainees being sent abroad for short courses or study tours.

(d) Import Conferences. Many persons are involved in wheat importing who do not have final responsibility for the import program. Their often conflicting desires and advice to those in authority can cause inadvertent delays and confusion in making final decisions.

It is therefore proposed that a 1-or 2-day wheat import conference or seminar be organized twice per year for the following reasons: (1) present results of past importations, and proposed adjustments for future imports, (2) present the range of alternative qualities, sources, and terms for wheat that can be imported during the next contract period, (3) solicit opinions on the quantities

on the quantities and quality of wheat to be imported, (4) solicit opinions on timing of imports to coordinate transportation and storage with national harvests of grain crops and seasonal sales patterns, and (5) revised US export grain standards will go into effect in May 1987. The major changes concern the calculation of dockage and foreign material. These have been the source of most complaints and problems with past imports.

(e) Import Assessment. At present, there is no unified process for monitoring the quality, disposition, and financial results of the import program. Such a program should be developed to include (1) a technically-qualified representative of Bolivian interests to inspect shipments before and during unloading at the Chilean ports, (2) daily monitoring of deliveries by Chilean and Bolivian railroads, (3) regular reports by flour mills on the quality and milling properties of wheat from each shipment, (4) calculations of costs and returns from each shipment in terms of milling yields, shipping losses, transportation costs, port charges, and finance costs, and (5) evaluation of suppliers in terms of compliance with quality specifications and other contract terms, meeting delivery schedules, services provided, and net cost of wheat.

ADIM, AADAA, MICT, USAID, and the PL 480 Secretariat collect various parts of this information. The WPAU could provide the center for coordination, analysis, and dissemination of these data. AADAA and/or higher authorities in the GOB may have to negotiate the terms for Bolivian personnel to inspect grains in transit at the Chilean ports. Presently, grain inspection is under the jurisdiction of SAG, the Chilean Ministry of Agriculture. AADAA personnel permanently stationed in Chile could be trained as inspectors.

(f) Improving Shipping Schedules. The largest improvement that could be made at the ports is virtually costless. Schedule arrivals so that each shipload is evacuated from the port before the next shipment arrives. For the past 2 years, several shiploads have arrived almost simultaneously as delays in negotiating agreements forced shipments to be made quickly so as to get all entitlements shipped before the end of the US fiscal year. This has caused wheat to be left on the Chilean docks for up to 6 months before being transhipped to Bolivia.

It must be recognized, however, that much of the delay in PL 480 contract negotiations and shipping is beyond the control of the GOB and the USAID/La Paz mission. PL 480 agreements must be approved by the US State Department, US Department of Agriculture, and the Office of Management and Budget. Each of these agencies has its own agendas which are not constant or necessarily in harmony with the objectives of the GOB and USAID mission.

Inevitably, delays are encountered for reasons having no direct relationship to Bolivian needs or requests. Additionally, each of the above-listed entities often requests either the Bolivian government or USAID mission to supply additional information that may not be readily available. Complying with these requests takes much time. Misunderstanding or misinterpretation of the data supplied or requested is not uncommon, leading to further requests for clarification, additional data, etc.

(g) Physical Improvements. Bolivian governments have been understandably reluctant to invest substantial sums in grain handling systems at the Chilean ports. The memorandum of a meeting between EMPORCHI (the Chilean Port Authority) and AADAA, on September 5, 1986, agrees to improve the grain handling system in Antofagasta by installing silos. However, AADAA insists that silos are a port service and the silos should be installed by EMPORCHI. EMPORCHI's position is that silos should be provided by private enterprise, and that EMPORCHI will only rent space for the silos.

Several improvements could be made without fixed capital outlays that would minimize the problems raised in the preceding paragraph. This can be accomplished by (1) using portable cement barriers to define the edges of the wheat piles to prevent spilling and the need for cleaning up and repiling from the streets, (2) analyzing the feasibility of a belt transport system from ship-side to the temporary storage areas in Antofagasta and Arica, since the belts could provide rapid transport of grains with less possibility of damage and concentration of impurities, (3) loading the railcars at both ports from hopper bins (tolvas), and (4) installing simple precleaners in the portable elevator systems used to fill the hoppers.

Examples of portable cleaning equipment currently available are included in the supplemental materials package.

A hopper system will become more feasible or required in the near future. The Ministry of Transport and Communications has recently ordered 100 standard railcars that will be modified for wheat transport. As these railcars come into service, hoppers will permit faster loading. The feasibility and costs of converting older railcars for hopper loading should be investigated when the new railcars are placed in service. Approximately 300 to 400 railcars should be available for carrying wheat and other grains.

### C. Management of Action Programs

While the recommendations for locating, managing, and running the WPAU in the PL 480 Secretariat are clear, the implementation of the specific action recommendations is less definitive. There are basically two options for their implementation. These are listed below. Appendix E contains the proposed program components and a tentative budget.

1. Combined Action Programs. The first implementation alternative would be to create a Wheat Action Program Office, with management and staffing similar to that of the recently terminated seed project. A single project management unit, with qualified management skills and technical expertise, would supervise and support the action recommendations for inputs, production, marketing, flour milling, flour consumption, and wheat imports.

From an administrative standpoint, this is probably the most desirable alternative, albeit the most costly system. The project management would work through existing regional and national organizations, and provide the technical support and assistance necessary, while training local personnel to assume all responsibilities within a 3- to 5-year time frame. The project management would have the flexibility to contract specialists who could work in multiple project areas such as seed production and wheat production, market analysis for seed, and flour products. Engineering capabilities might be employed in seed processing, harvest and postharvest systems, and in grain handling at the ports and/or milling facilities.

2. Separate Action Programs. A second managerial possibility would be to group the action programs by activity and clientele, and create separate projects for each. Three logical groupings would be (1) inputs, production, and marketing, (2) milling and flour consumption, and (3) wheat imports.

a. Inputs, Production, and Marketing. This group would consist primarily of rural activities dealing with wheat research, production, and marketing to flour millers. The program would deal with essentially the same government institutions engaged in basic and applied research in wheat breeding and production, public and private financial institutions financing seed and wheat production and marketing, and the producer organizations engaged in providing inputs, technical assistance, and marketing services for seed and commercial wheat producers.

b. Milling and Flour Consumption. This group is more urban based, and would involve a high degree of cooperation and information exchange among flour millers and commercial flour consumers. The research and training needs are similar for both groups, and many of the training activities can be conducted jointly. The duration of action programs for Group 2 is anticipated to be less than 3 years. Afterwards, their respective organizations should be able to organize and sponsor activities on their own, with minimal outside support.

c. Wheat Imports. Wheat imports could stand alone and be managed through the PL 480 Secretariat and/or USAID/La Paz. The main thrusts will be the adoption of the philosophy of importing wheat to support national production efforts, training of both USAID and GOB officials in some of the technical aspects of wheat and wheat importing, and low-cost alternatives to improving the import facilities.

The training can consist of two levels: intensive 2- to 6-week short courses held in the US, and abbreviated in-country short courses and 1- to 3-day seminars. The former training is for career employees whose primary responsibility is for the determination of import needs and the direct negotiation and supervision of imports. The latter courses are for a broad range of public- and private-sector personnel, including donor agencies, who must make policy decisions and judgments concerning wheat imports.

Improvement of the Chilean port facilities could be accomplished by better administrative procedures that hopefully will be one outcome of the training listed above. A second phase would be to conduct some engineering studies of non-fixed capital equipment alternatives that are available. Heretofore, all engineering studies of the port problems have centered on constructing permanent facilities at costs ranging up to US \$8 million. Several less expensive solutions may be available, including installation of portable cleaners and bins for loading the freight cars.

Provision of these portable facilities is a matter for negotiation between AADAA and the Chilean port authority. Bolivia may not necessarily need to invest in capital equipment if an appropriate schedule of port charges can be negotiated.

#### D. Other Action Recommendations

The following are recommendations that do not easily fit within the actions listed above or are responses to specific questions raised during the course of this study.

1. Auxiliary Functions. Throughout this report, reference has been made to a number of auxiliary or facilitating functions that support or expedite the marketing processes. In a subsistence society where most marketing transactions occur on a face-to-face basis, facilitating functions are not important. As the society progresses and the exchange process becomes more impersonal, these functions become extremely important for maintaining confidence, fairness, and equity in the marketing system.

The auxiliary functions apply to all agricultural commodities, therefore the development of auxiliary services for marketing lies largely outside the scope of this report. Some of the action recommendations regarding the WPAU bear directly on improving such auxiliary functions as marketing information, grades, and standards.

The development of auxiliary functions should be a high priority of government in its economic revitalization program. The development of these functions lies primarily within the jurisdiction of MACA and MICT. Many of the auxiliary functions are in place, but the performance and effectiveness have fallen victim to economic dislocations in recent years. Other functions such as market standards need review and updating in light of new technology and varietal changes.

The auxiliary functions that need strengthening with regard to Bolivian wheat development are (1) market information, (2) market standards and grades, (3) marketing credit, (4) weights and measures, (5) storage, and (6) risk management.

2. Marketing Credit. Marketing credit has been previously discussed, but as an auxiliary function, it deserves individual attention due the present controversy over availability of credit for imported wheat purchases.

It is recommended that consideration be given to a partial restoration of the credit for wheat imported under the PL 480 program and creation of a credit program for the purchase of national wheat. This is recommended because of the impact that the changes in import terms and market conditions have had upon the milling industry since decree 21060. In general terms, a credit program might be structured as presented in Table 14.

The credit program assumes that the PL 480 funds will be the source, and ties the credit rates to the GOB's costs and opportunity costs in on-lending. The credit program favors purchase of national wheat. The credit program would assist the government in recovering the interest costs of PL 480 imports up to the time the commodities are converted to cash for transfer into PL 480 supported projects. Credit extended between 30 and 90 days for import purchases would carry a rate equal to that which PL 480 funds are deposited with commercial banks for on-lending. After 90 days, imported wheat credit would carry rates equal to commercial development loans funded from PL 480 sources.

TABLE 14

## Proposed Credit Program for Wheat Purchases

Time Period	PL 480 Imports Interest Rates	National Wheat Interest Rates
30 days	Equal to rate paid by GOB for PL 480 imports	Equal to rate paid by GOB for PL 480 imports
31 - 90 days	Equal to rate PL 480 funds are placed with commercial banks for on-lending	Equal to PL 480 import rate plus 1/2 of difference between PL 480 import rate and rates paid by banks for PL 480 funds.
Over 90 days	Commercial bank loan rates for PL 480 sourced funds	Same as above up to 180 days, commercial bank loan rates for thereafter.

For domestic wheat purchases, the rates are subsidized for up to 180 days. The subsidy is in the form of interest rate reductions between the GOB's cost of the funds, and interest that could be earned by placing the funds with commercial banks for on-lending. The bias towards national wheat purchases may encourage mills near wheat-producing areas to expand their purchases.

Since credit availability and interest rates fluctuate over time, the credit program above is suggested as a basis for study and negotiation between the flour millers, the government, and USAID. The length of credit, interest rate spreads, and interest rates from other sources are factors to be considered.

3. Level of PL 480 Wheat Imports. The current PL 480 agreement is for US\$20 million in wheat imports. At US Gulf prices for US No. 2 Hard Red Winter wheat, the available funds would purchase about 182,000 MT. Imported wheat totaled slightly over 200,000 MT for 1986, plus 30,000 MT of flour. Wheat imports from Argentina totaled 10,390 MT through September 1986.

With world wheat market prices trending lower, reduced volume of flour sales in Bolivia, and large inventories of wheat and flour products carried over from the 1986-87 fiscal year, it is highly unlikely that Bolivia will be able to utilize the total PL 480 allocation for wheat purchases during fiscal 1987-88.

In the past, the government has stressed the need for acquiring the maximum quantity of wheat possible with the available funds. This has resulted in purchasing wheats of lower quality than the milling industry has desired. With lower prices, it is now possible to buy higher quality and different types of wheat for the improvement of Bolivian flours. It is therefore recommended that: (1) current rates of milling be closely monitored and adjustments in PL 480 wheat purchases be programmed accordingly, (2) the quality of wheat imports be improved by purchasing according to specifications detailing the protein and moisture content, and allowable foreign materials (US export regulations will be amended in May 1987 and purchase specifications should be planned accordingly), and (3) the specifications and wheat shipments received be evaluated using the "Millable Wheat Value Index" being provided under separate cover or suitable locally-developed index.

4. Fertilizers. Fertilizer cost and availability will become the key constraint to increasing yields as new wheat varieties are introduced, and as cultivation becomes more established. The commercial wheat production in the Santa Cruz area is largely on recently cleared lands. The natural levels of soil fertility decline over time, and need replenishing. Crop rotations can restore or deplete the natural fertility, and research has been proposed to develop optimum farming systems.

It is recommended that past feasibility studies for the construction of fertilizer plants in Bolivia be reviewed in the light of present fertilizer production technology and advances in agronomics. Previous studies were rejected because the scale of production in relation to demand was not deemed practical in relation to potential demand and the export prices of petroleum and other raw materials. Technological advances have reduced the scales of production necessary for competitive prices, and the relative prices of raw materials to fertilizer prices have changed. Fertilizer is a universal requirement in all commercial crop production, and should be granted high priority in the economic revitalization efforts.

5. Role of ADIM. ADIM has been the key link in representing the interest of flour millers to the government, and in negotiating with the government over import terms, milling margins, flour quality specifications, wheat transportation, and other policy matters. ADIM also performs many services for government, the milling industry, and the bakers and food processors. ADIM's role in the flour milling and baking industries needs to be reevaluated in the light of today's more competitive conditions.

The following items are commentaries and matters that need further discussion and deliberation, and are offered in this spirit, rather than as recommendations for an action program.

a. Service Center. ADIM could become a service center and focal point for milling and baking industry by:

-- Monitoring the quality of flour and wheat products produced, and assisting the industries in upgrading product quality.

-- Leading in developing packaging and grading standards for consumer and commercial products.

-- Developing and coordinating industry wide promotions and information campaigns.

-- Cooperating with wheat producer associations and government in developing model wheat purchase contracts including testing and grading methods, discount and premiums for quality differentials, delivery schedules, payment procedures, and similar items.

b. Long-range Planning Center. ADIM could become a center for long-range planning for the milling industry by:

-- Assembling, analyzing, and disseminating of data and information on industry performance, consumption trends, technological innovations, etc.

-- Conducting or sponsoring of research in flour and by-product utilization, product development, impact of government policies, and meeting foreign competition.

-- Studying the skills and knowledge required in the milling and processing industries, and working with government and educational institutions to develop training programs for the industry.

6. Transportation Issues. Transportation continues to be the number one problem in marketing for all agricultural commodities, including wheat. However, the ultimate solutions are generations away at the present rate of development in rural and urban infrastructure. Transportation must be included as a priority item in the national revitalization programs as a means of stimulating the total Bolivian economy.

Fortunately, some positive steps are being taken to correct the most urgent problems. The EENE is rehabilitating its locomotive fleet. One hundred new convertible rail cars are on order, with options taken on an additional 100. These railcars will make it possible to use grain precleaners in conjunction with a hopper-type grain loader, and should reduce the estimated 3 percent loss of grain that occurs between the Chilean ports and Bolivian flour mills. Other steps are being taken to better coordinate wheat movement from the Chilean docks and Bolivian flour mills.

Truck transportation will remain the most costly and difficult problem in both the traditional and nontraditional areas. Producer associations may find it necessary to provide transportation service for its membership. Truck transport is tightly controlled by "sindicatos" or unions of drivers and driver/owners who standardize rates on various transport routes.

As the producer and marketing associations are developed, transportation should become one of their major priorities. In addition to bargaining over price, the associations may well bargain for multiple delivery points, and/or ceiling transport costs, on both inputs and sales of wheat.

APPENDIX A  
ECONOMIC THEORY FOR FOOD PRICE  
POLICY ANALYSIS

This appendix contains the economic theory on which the analysis of government price policy in Section II is based. This material was obtained from "Food Policy Analysis" by Timmer, Pearson, and Falcon.

Figure 1 illustrates the socioeconomic effects of the subsidy policy. Before the subsidy policy was initiated, the position of the country was where domestic prices were roughly equivalent to world market prices. At that time, the national supply would have been represented by Q1 on the horizontal axis of Figure 1, while consumer demand would have been at Q3. The difference between supply and demand (Q3-Q1) was made up by imports.

When the subsidy was introduced, dropping domestic prices below world prices, from Pw to Pd on the vertical scale, consumer demand increased from Q3 to Q4 while the national supply was reduced from Q1 to Q2. Both the supply and demand effects were due to lower prices. Imports increased to the quantity represented by Q4-Q2.

The amount of government subsidies rose to the amount of imports times the subsidy per import unit, or  $(Q4-Q2) \times (Pw-PD)$  in Figure 1. The amount is represented by the rectangle BEHG. The remainder of the subsidy was paid implicitly by wheat producers to consumers because of the lower prices received. The producers' subsidy to consumers is shown in Figure 1 as the rectangle ABGF, plus profits lost from lower production volumes as represented in the triangle BCG. Thus the total economic outlay for the subsidy policy was greater than the actual budget outlay for the subsidy itself.

While consumers benefitted by wheat subsidies, their gain was less than the amount of the budget transfers and the implicit transfers by wheat producers. The losses were caused by the distortions created by the differences between domestic and world market prices. The losses occurred in both the producing and consuming sectors.

Production efficiency losses occurred because domestic resources that could have been used to produce wheat at less than import wheat costs were not used. Some domestic production could have taken place as long as the supply curve is below the world price. The triangle between the domestic price, the world market price, and the domestic supply curve is the area of wasted resources. This is shown in Figure 1 as BCG. The cost of the wasted resources is paid by the subsidy budget, but no gains accrued to consumers from this expenditure.

The demand curve represents the price consumers were willing to pay for varying quantities of wheat products. As long as the subsidy was in effect, consumers did not have to pay those prices, and in effect, consumers received a "consumer surplus".

The consumer surplus is the area ADHF in Figure 1. Since the government paid the amount to lower the world market price (Pw) to the domestic price level (Pd), the total government subsidies were greater than the consumer surplus. The consumption efficiency loss is shown in triangle DEH.

Figure 1 shows one other result of subsidy policies. Using subsidies to provide consumers with imported wheat at prices lower than international market prices reduces the country's degree of self-sufficiency to lower than what it would have been under the conditions of free trade. A different result would have occurred if the country had restricted imports to push domestic prices to self-sufficiency; ( $P_s$ ) in Figure 1.

Whether or not self-sufficiency is a desirable policy goal can be determined only after a thorough examination of the technical and economic factors that would be required to achieve self-sufficiency, and the sacrifice producers and consumers would have to make in the production and consumption of other items.

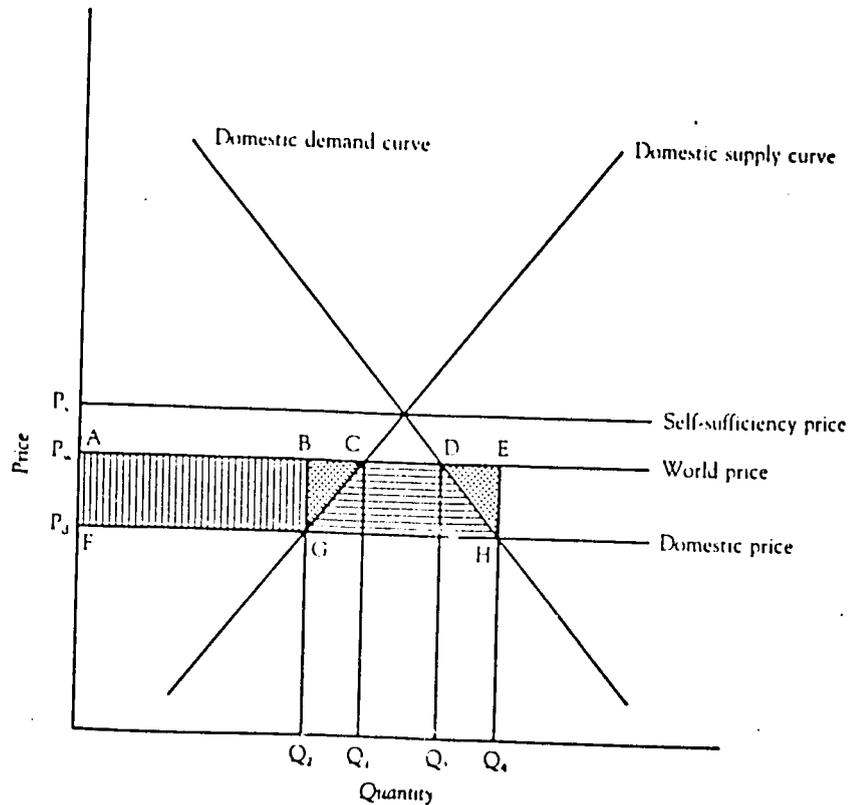


FIGURE 1. Effects of a Subsidy Policy

APPENDIX B  
ANAPO/MILLS WHEAT PURCHASE CONTRACT



A V I S O

ANAPO (Asociación de Productores de Oleaginosas y Trigo), tiene a bien comunicar a sus asociados que luego de concluidas las negociaciones con las Empresas Molineras, se ha convenido que para la presente Campaña de Invierno el precio del Trigo será:

- . POR TONELADA US\$. 170.- (\$b. 325.720.000.-)\*
- . POR QUINTAL US\$. 7,82 (\$b. 14.982,52.-)\*

\* Precios en pesos bolivianos calculados a 1.916.000.- US\$/\$.

Las condiciones de pago son:

- . El pago será hecho en pesos bolivianos, a la tasa oficial de cambio del dólar americano en el Bolsín del Banco Central de Bolivia, vigente a la fecha de pago.
- . Se cancelará al productor el 50% (cincuenta por ciento) del precio establecido en el momento de la entrega de trigo y a partir del desembolso del crédito que otorgará USAID, estimándose que ocurra a fines de Septiembre próximo.
- . El 25% (veinticinco por ciento) a los 45 días del desembolso del crédito USAID.
- . El 25% (veinticinco por ciento) restante a los 90 días del desembolso del crédito de USAID.
- . En caso que las Molineras no pagaran la última cuota del 25% (veinticinco por ciento) en el plazo de 90 días establecidos y hasta un plazo máximo de 150 días, se le reconocerá al productor una tasa de interés anual del 13% (trece por ciento) para dicho período.
- . Si las Molineras se excedieran de 150 días para el pago de esta última cuota, el interés a cancelar será el comercial.





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NORMAS DE RECEPCION

Peso Hectolítrico	78 Kg/Hl.
Humedad Máxima Tolerable	13 %
Impureza Máxima Tolerable	2 %

Para cada Unidad superior al peso hectolítrico base 78, se reconoce un premio correspondiente al 1 % (uno por ciento) del precio fijado y por cada Unidad inferior un castigo similar.

Los productores que tengan interés en conocer mayores detalles de este convenio, pueden solicitarlos en nuestras oficinas de la calle Libertad # 763, 1er. Piso.

Santa Cruz, 29 de Septiembre 1.986

LA GERENCIA



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APPENDIX C  
COMPOSITE FLOUR LAW

In late September, the "Camara de Diputados" passed the "Anteproyecto de Ley de Harinas Compuestas". This new policy initiative seeks a complete change in the ways wheat flour is being consumed in Bolivia. Composite flours made out of wheat, corn, soybean, and quinua will be substituted in lieu of wheat flour which will be left with only 5 percent of the market (essentially pastries).

The objectives of the proposed law are to (1) improve the nutritional quality of basic foods based on wheat flour by improving the protein content, using appropriate mixes of wheat with soybean, corn, and quinua flours, (2) save foreign exchange by reducing the amount of wheat imports, and (3) stimulate agriculture, agroindustry and commercialization of national raw materials (wheat, soybeans, corn and quinua) to satisfy the demand that the introduction of composite flour will generate.

The proposed law must be applauded from a socioeconomic-welfare point of view. The nutritional studies on which this proposed law is based leave no doubt about the need to improve the nutritional intake of a large as well as specific segments of the Bolivian population.

Where this policy initiative must be faulted is in the way of its proposed implementation. First, this law seeks to "obligate" a free market to carry out social/welfare activities, and carry the full cost for doing it. The policymakers will find their initiatives frustrated by the very same free market forces they helped create under the Supreme Decree 21060. A profit-oriented private sector will not carry out social welfare activities unless they are fully compensated.

Second, people will not consume composite flours simply because the government mandates it. Under the present free market conditions people will determine their own consumption pattern according to their economic means and personal preferences, and may opt for imported wheat flour as long as that option is left open.

Third, a free market for basic grains is going to change according to local supply and demand conditions as well as uncontrollable externalities. The proposed ratios for the composite flours cannot, under these conditions, remain static, otherwise the changed price relationships among the grains in question will distort any initial competitive position composite flours may have over wheat flours. In other words, while a given combination of wheat, soybean, and corn flour might be competitive with wheat flour today, the same mixture might not be once the price relationship among the three ingredients changes.

Finally, the government lacks any means of checking on the composition of flours. The temptation to substitute additional quantities of the cheaper flours for the more expensive ingredients could destroy confidence in the composite flour program.

For the above as well as other reasons, the introduction of composite flours in other countries on a large scale has not been very successful. Many initiatives have been abandoned after great efforts and costs. Programs of this kind have been most successful when aimed at a target group within the population. This has allowed for specific project planning, implementation, and control.

The fundamental policy issue raised by this "Anteproyecto" is whether composite flours should be mandated by law for the whole nation. The composite flour law as written seems to be in conflict with Supreme Decree 21060 which removed most government controls and provides for private initiative in determining the quantities and qualities of products to be produced. Targeting "at risk" segments of the population for programs using composite flours could provide an alternative means of introducing the products to Bolivian consumers and reducing the risk of market disruptions under a mandatory program. The feasibility of this policy alternative should be explored. Conditions in Bolivia have changed considerably since the project was first proposed in 1977. The need for nutritional improvement is greater than ever, but this laudable policy initiative should be restudied in light of the changed flour marketing situation.

APPENDIX D  
POST-PRODUCTION TECHNOLOGIES

## Methods of Production and Post-production

There are generally two methods of cultivating wheat in Bolivia, namely traditional and commercial. Traditional wheat production is characterized by the cultivation of small parcels of land using draft animals to prepare the land, planting by hand and manually harvesting, threshing, and cleaning the crop. On the other hand, commercial wheat production involves the use of modern farm machinery from land preparation to harvesting. Large tracts of land are used and high capital investment is needed in commercial wheat production.

At present, about 90 percent of the area devoted to wheat production in Bolivia is under the traditional method of cultivation. Most of the traditional method of wheat production could be found in the departments of Cochabamba, Chuquisaca, Potosí, Tarija, and La Paz while the commercial production method is mainly found in the department of Santa Cruz. Wheat is traditionally grown in rotation to potato, broad beans, barley, and corn. Growing any crop by traditional ways involves the intensive use of family as well as hired labor.

Traditional wheat harvesting involves cutting the stalks with a sickle, transporting the bundles by hand, threshing the grain in a variety of ways, and cleaning by tossing the grain into the air to remove light materials such as chaff and empty grains. When there is a large volume of material to be threshed, it is usually spread on a hardened surface or patio and a team of animals is used to tread on it until the kernels are completely separated from the panicles. Smaller lots of harvested wheat are usually threshed by beating a bundle at a time against log or rock. The threshing of wheat on the ground causes dirt and sand to be mixed with the grain. Dirt and sand which are of the same size as the grain can not be separated by winnowing and screening. Because of this predominant condition, wheat grain brought to the market usually gets excessive discounts due to a high percentage of foreign material even if the kernels are of good quality.

To promote increased production of wheat in Bolivia, it is but proper that the producer get a fair share of the value of his crop. For this reason, the present grain postharvest method of threshing and cleaning must be modified to help the wheat farmer increase his productivity. To help achieve this goal, a few simple technologies can be introduced in the country. Experience in technology transfer in other developing countries has shown that desirable results were achieved by the introduction of technologies that altered existing systems the least. An example of this is the introduction of small hand tractors in Asia, more specifically the Philippines, in the 1970s. The hand tractor augmented the dwindling population of water buffaloes used for land preparation for rice production. Today, hand tractors are a common sight in Asia in addition to the different farm equipment that has been developed since then, such as the threshing machine and small two wheel trailers. These machines have practically revolutionized rice production in Asia and have made the region self-sufficient in rice.

A parallel mechanical revolution can take place in Bolivia by carefully selecting the points of intervention in the entire wheat production system, both in the traditional and commercial production methods. This section of the report will address the issue of postharvest handling of wheat at the farm and cooperative levels under the traditional method of wheat production.

The various components of a grains postharvest system are shown schematically in Figure 1 below, together with the possible points of intervention and levels of technology that can be introduced.

### Levels of Technology and Points of Introduction

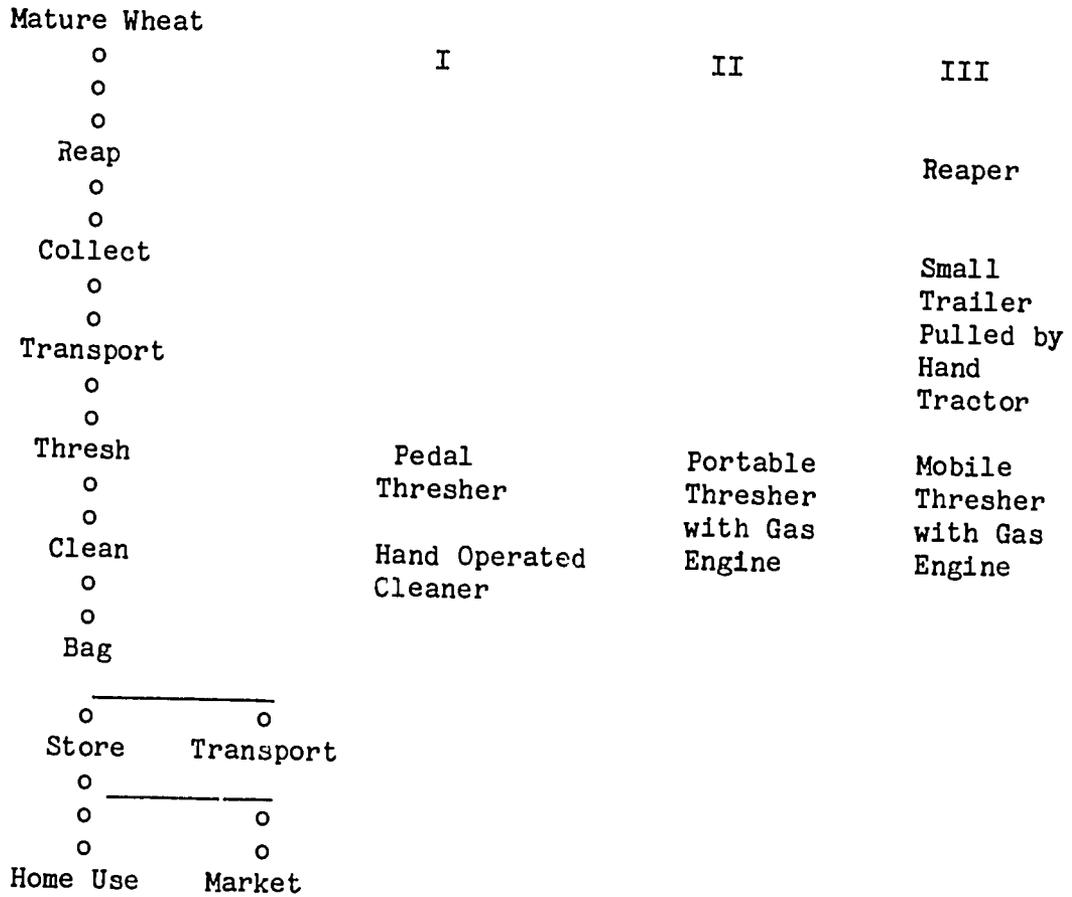


Figure 1. Traditional wheat postharvest system with three levels of technologies and their points of introduction.

## Technological Package I

The simplest technologies which can be introduced in the wheat postharvest system are the pedal thresher and hand operated grain cleaner.

The Pedal Thresher. It consists mainly of a rotating drum with spikes or wire loops, a box enclosing the drum, and the treadle which converts reciprocating action to rotary motion. The operator provides the power while threshing the grain. This machine was used in Japan and Taiwan for many years before both countries achieved a high level of industrialization. The pedal thresher can easily be carried by two persons or transported into the field by pulling it on a sled. Its capacity ranges from 200-400 kg/hr depending on the individual operator and yield of the crop.

Because of its simple construction, the machine can be fabricated by small machine shops in Bolivia, thus creating employment in the country. Assuming an average wheat yield of 1,000 kg/ha, one machine can thresh the equivalent of 1-2 ha per day.

One important feature of the pedal thresher is that the straw remains intact after threshing. The straw can therefore be used for building purposes or for feed. Also, it still permits the participation of family members, thus preserving traditional and social values usually observed at harvest time.

The Grain Cleaning Machine. This machine is hand-operated and consists mainly of a blower made of wooden paddles enclosed by a box, a feed hopper, and a slide gate that controls the flow of grain entering the separation chamber. A stream of air is generated by hand-cranking the blower which separates light foreign material from the falling grain. The cleaned grain is collected below the machine.

The entire machine can be fabricated in Bolivia out of wood or sheet metal with angle iron as frame. It is simple to use and can be operated by women and children while the men operate the pedal threshing machine.

### Estimated Number of Machines Needed Nationwide

Considering the traditional wheat-producing departments of Cochabamba, Chuquisaca, Potosí, Tarija, and La Paz with a combined wheat area of about 92,000 ha, the required pedal threshers and grain cleaners would be:

$$T_n = \frac{H_w}{T_c \times D_s}$$

Where:

$T_n$  = number of threshers required

$H_w$  = total wheat hectarage

$T_c$  = threshing capacity, ha/day

$D_s$  = number of days per harvest season

Assuming 60 percent of the wheat hectarage as the targeted area, then:

$$T_n = \frac{.60 \times 92,000}{2 \times 90} = 306.6 \text{ or } 307 \text{ units}$$

The same number of grain cleaning machines will be required to complement the threshing machines. A 4-year program can be drawn where the first year will be devoted to research and development with an introduction rate of 100 units each year. It is estimated that the pedal thresher will cost around US\$600 to fabricate in Bolivia and around US\$500 for the grain cleaner. If the project achieves its goal, then the targeted wheat area can be increased as demand requires.

### Technological Package II

A higher-capacity threshing machine of simple construction can also be fabricated in Bolivia. The machine is portable and can be dismantled into three components for ease of transport. The machine is powered by a 6 hp gasoline engine and can be transported from the roadside to the field by four persons. It consists mainly of a rotating cylindrical cage with spikes, a paddle blower, set of screens, a closing body, and the engine. The machine has a threshing capacity of 600-800 kg of clean grain per hour or about 6 ha per day. The estimated cost to fabricate each machine in Bolivia would be around US\$1,200, excluding the engine.

The machine can be used for custom threshing by farmers' cooperatives and by seed producers. Assuming a targeted area of 40 percent of the traditional wheat regions, the number of units required would be:

$$T_n = \frac{.40 \times 92,000}{6 \times 90} = 68 \text{ units}$$

Because it is simple in construction, the machine can be maintained at the village level. This machine can be introduced in the country within a period of 2-to 3-years, with the first year devoted to research and development.

### Technological Package III

If wheat production in Bolivia takes an accelerated pace due to higher yields and better marketing structure, then a more efficient wheat postharvest handling system will be needed. To meet this situation, higher capacity and more mobile threshing machines will have to be introduced in the traditional wheat areas in combination with hand-operated grain reapers and small farm trailers to transport grains and other agricultural products.

The Reaping Machine. This machine is composed of a 1-m cutter bar mounted in front of a two-wheel hand tractor. It resembles a lawn mower except that it has a picking device which lays the cut crop in windrows. The reaper can also be used to cut barley, beans, and rice. This technology was originally developed in the People's Republic of China and modified in the Philippines to

simplify its construction and ease of fabrication. It would cost around US\$800 to fabricate it in Bolivia. Its cutting rate is around 2 ha per day on relatively flat terrain.

The Two-Wheel Hand Tractor. The hand tractor has pneumatic tires and is powered by a 6-hp gasoline engine. Its main drive mechanism is composed of chains and sprockets and a belt drive between the engine and its flywheel. The hand tractor has a hitch whereby a single bottom plow can be attached for land cultivation as well as for disc harrowing and for pulling a trailer. This machine can also be fabricated by machine shops in Bolivia and should cost around US\$2,000-2,500, excluding the engine. Assuming 30 percent of the wheat hectareage as the targeted area, the number of reaper-hand tractor combinations will be:

$$T_n = \frac{.30 \times 92,000}{2 \times 90} = 153 \text{ units}$$

Mobile Axial Flow Thresher. The mobile axial flow thresher is similar in design to the power driven portable thresher except that it has a larger threshing capacity of 1,000 kg/hr of clean grain. Furthermore, it has two pneumatic tires and a hitch for transport on the road and into the field. It is powered by a 10-hp gasoline engine. It would cost around US\$3,500 to fabricate it in Bolivia, excluding the engine.

Because of its high capacity and relatively high cost, this machine can be owned by a farmers' cooperative for custom threshing. About 40 units of this will be able to complement the 153 units of reaper-hand tractor units. With one year of research and development, it should take 3 years to introduce the machine in the assumed targeted area of 27,600 ha of wheat-producing areas.

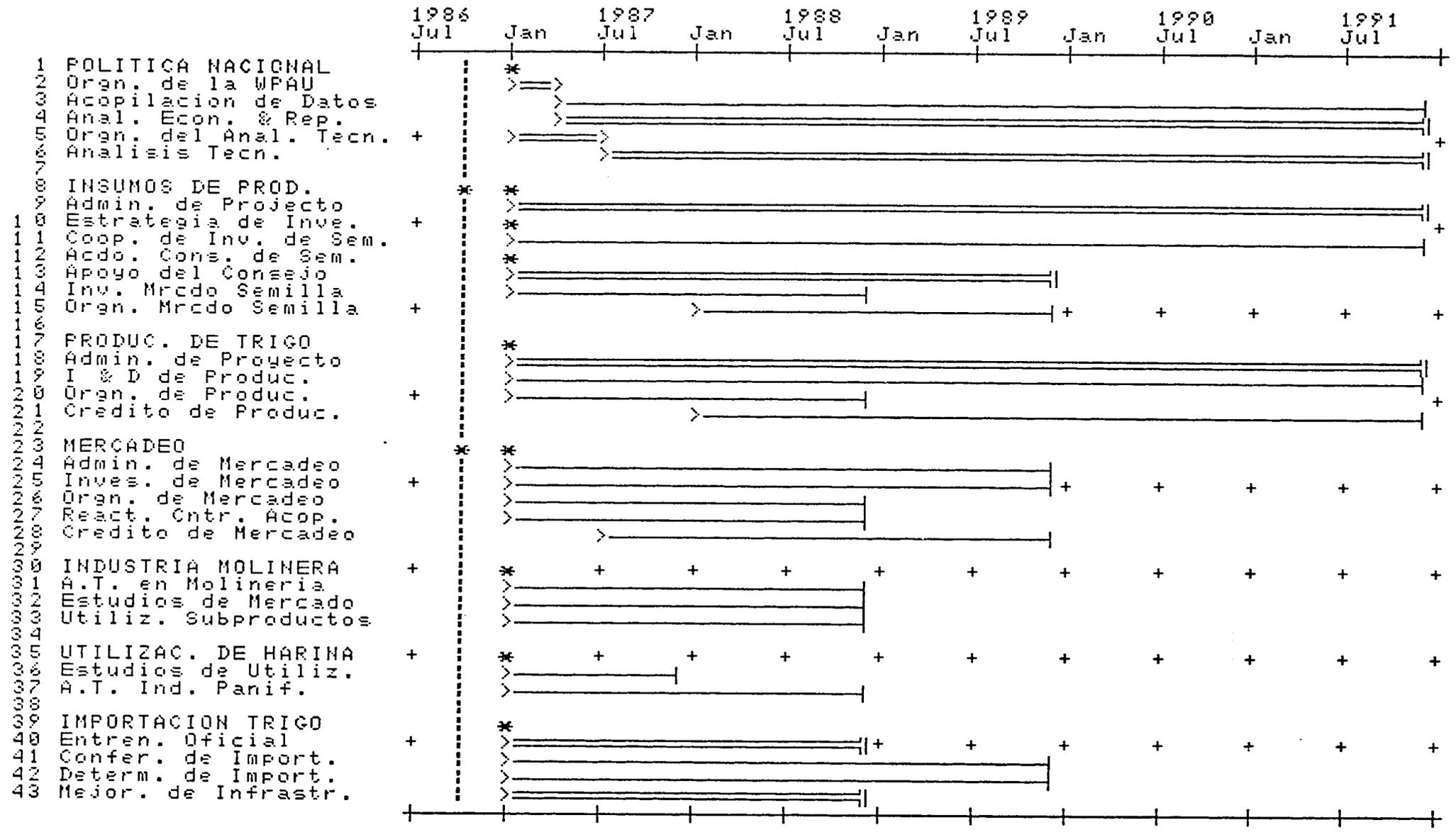
Small Farm Trailer. This is a simple flat bed trailer with two pneumatic tires. It is designed to be pulled by the hand tractor for transporting farm equipment to and from the fields and can also be used to transport farm produce to nearby markets. It should cost around US\$500 to build a unit in Bolivia.

It is recommended that the above equipment be introduced as a package either to relatively large wheat growers or farmer's cooperatives. A possible research and development center can be located in Cochabamba such as the Instituto Boliviano de Tecnología Agropecuario (IBTA) in cooperation with College of Agriculture in the same city. All the working drawings for the machines mentioned above are available free from the International Rice Research Institute in the Philippines.

APPENDIX E

SUGGESTED PROGRAM AND TENTATIVE BUDGET FOR  
ACTION RECOMMENDATIONS

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PROJECTED BUDGET  
NATIONAL WHEAT POLICY AND WHEAT SYSTEM IMPROVEMENTS

Subproject/Resource	Unit Cost		Year	Year	Year	Year	Year	Total
	US\$	Per	1	2	3	4	5	
	US\$		US\$	US\$	US\$	US\$	US\$	US\$
<b>NATIONAL WHEAT POLICY</b>								
Economic Analysis Staff	6,000	Month	72,000	79,000	87,000	96,000	106,000	480,000
Operating Funds	2,500	Month	30,000	33,000	36,000	40,000	44,000	183,000
Econ. Staff Equipment		Year	40,000	15,000	5,000			60,000
Technical Analysis Staff	2,000	Month	24,000	26,000	29,000	32,000	35,000	146,000
Technical Analysis Funds	1,500	Month	18,000	20,000	22,000	24,000	26,000	110,000
Technical Equipment		Year	50,000	15,000	10,000	5,000	3,000	83,000
Consultants	12,000	Month	144,000	127,000	112,000	99,000	87,000	569,000
Sub-total National Policy			378,000	315,000	301,000	296,000	301,000	1,591,000
<b>PRODUCTION INPUTS</b>								
Input Project Staff	3000	Month	36,000	40,000	44,000	35,000	28,000	183,000
Input Operating Funds	1,500	Month	18,000	20,000	22,000	18,000	14,000	92,000
Input Equipment		Fixed	60,000	30,000	15,000			105,000
Seed Research Funds	25,000	Month	300,000	375,000	469,000	586,000	646,000	2,376,000
Seed Council Support	2,500	Month	30,000	33,000	36,000			99,000
Seed Marketing Credit		Fixed		200,000	300,000			500,000
Consultants	12,000		144,000	158,000	174,000	139,000	111,000	726,000
Sub-Total Production Inputs			588,000	856,000	1,060,000	778,000	799,000	4,081,000
<b>WHEAT PRODUCTION</b>								
Prod. Management Staff	1,500		18,000	38,000	77,000			133,000
Prod. Operating Funds	1,000		12,000	25,000	52,000			89,000
Production Equipment	30,000		20,000	30,000	30,000			80,000
Prod. R&D Fund	15,000	Month	180,000	225,000	281,000	351,000	387,000	1,424,000
Prod. Orgn. Support	1,500	Month	18,000	38,000	77,000			133,000
Appropriate Technology			25,000	40,000	60,000			
Production Credit		Fixed		200,000	400,000			600,000
Consultants	15,000		180,000	198,000	218,000	174,000	139,000	909,000
Sub-total Wheat Production			453,000	794,000	1,195,000	525,000	526,000	3,368,000

WHEAT MARKETING

Mkt. Management Staff	1,000	Month	12,000	25,000	52,000		89,000
Mkt. Operating Funds	800	Month	9,600	20,000	41,000		70,600
React. Centros de Acopio		Fixed		50,000	150,000		
Marketing Credit		Fixed		300,000	600,000	800,000	900,000
							2,600,000
Consultants	12,000		144,000	158,000	174,000	139,000	111,000
							726,000
Sub-total Wheat Marketing			165,600	553,000	1,017,000	939,000	1,011,000
							3,485,600

MILLING INDUSTRY

Industry Tech. Asst.		Fixed	50000	75000			125,000
Special Studies		Fixed	25000	30000			55,000
Consultants	5,000	Month	30,000	30,000			60,000
Sub-total Milling Industry			105,000	135,000			240,000

FLOUR UTILIZATION

Baking/Pasta Tech. Asst.		Fixed	50000	75000			125,000
Consumption Studies		Fixed	40000				40,000
Consultants	5,000	Month	30,000	30,000			60,000
Sub-total Flour Utilization			120,000	105,000			225,000

WHEAT IMPORTS

Official Training		Fixed	50,000	60,000			110,000
Import Conferences		Fixed	15,000	15,000	15,000		45,000
Port Equipment Improvements		Fixed	300,000	500,000			800,000
Consultants	6,000	Month	36,000	36,000			72,000
Sub-total Wheat Imports							1,027,000

PROJECT TOTALS

			1,810,000	2,760,000	3,570,000	2,540,000	2,640,000	14,020,000
Total Consultants			710,000	740,000	680,000	550,000	450,000	3,120,000
Total Loan Funds			0	700,000	1,300,000	800,000	900,000	3,700,000
Total Capital Equipment			470,000	640,000	210,000	10,000	0	1,130,000

APPENDIX F  
LIST OF PERSONS AND ORGANIZATIONS CONTACTED

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<u>Person(s) Contacted</u>	<u>Organization</u>
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APPENDIX G  
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