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The AGRICULTURAL ECONOMY of Bolivia

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Farmland on the highlands of Bolivia. The scene is typical of much of the area on the Altiplano, where most of the population is centered.

Contents

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THE AGRICULTURAL ECONOMY OF BOLIVIA

By John V. Lynch and Paul J. Ferree
Latin American Analysis Branch
Regional Analysis Division

The Republic of Bolivia is a deficit agricultural producer, importing one-third of its food. Even with this, the estimated per capita daily intake of 1,880 calories is the lowest in South America. Almost two-thirds of the people obtain their livelihood from agriculture, yet Bolivia's wealth is derived largely from minerals. The agricultural sector contributes 33 percent of the gross national product. Agricultural development has been slow, mainly because of the higher priority given to the development of mineral resources. The important agricultural potential in the country contrasts sharply with the present subsistence existence of many of the people.

This seemingly paradoxical situation of poverty amidst plenty is partly the result of inadequate transportation and communication within the country. The rugged topography and climate of the Altiplano, where the population is centered, are not well suited for agricultural production; food output is inadequate for the needs of the people located there. Moreover, the lower elevations which are centers of present and potential production are great distances from the population centers, and these remain largely underdeveloped.

Additional factors contributing to this situation include the shortage of qualified technical personnel, a high illiteracy rate among the people, adherence to the tradition of producing only for themselves, government policies that have not favored agriculture and, until recent years, the land ownership pattern and social system. A somewhat less tangible, but nonetheless significant, influence has been the seeming reluctance or indifference of the Altiplano population toward movement from the eroded lands to more promising agricultural areas in the lowlands.

Bolivia's main agricultural imports are grains, sugar, and vegetable oils. The United States and Argentina are the principal sources of wheat; sugar is imported mainly from Peru. Small amounts of farm and forest products are exported, but mineral products provide over 90 percent of the total foreign exchange earnings.

Significant socio-economic changes have occurred in Bolivia within the last decade. The Agrarian Reform Law of 1953 has been an important development in the field of agriculture. Through the enactment and administration of this legislation the Bolivian Government envisions greater opportunities for those engaged in agriculture to use the resources available to better themselves.

Physical Environment

Bolivia is located in the heart of South America. An inland country, it has common borders with five other republics. Its geography presents dramatic contrasts which have had a profound influence on the agricultural development of the country. About one-third of the total area of 424,000 square miles is mountainous and two-thirds lowlands. Although it is located entirely in the Tropical Zone, wide variations in elevation within the country cause corresponding differences in climate. Approximately 75 percent of the population is centered on the northern Altiplano near Lake Titicaca, in and around the city of La Paz, and in the valley region around Cochabamba.

In addition to the Altiplano, Bolivia has the Montaña and the Llanos — three different geographic regions, each of which differs in its agriculture.

The Altiplano, or mountain plateau, is enclosed by the eastern and western Cordilleras of the Andes and represents 16 percent of the total area of the country. It extends from the region of Lake Titicaca at 15° S to the rough barren lands of southern Potosi Department at 22° S. Its elevation ranges from 11,000 feet to 14,000 feet. La Paz, the capital, political center and chief commercial city of Bolivia, is located on the Altiplano at an elevation of 12,000 feet.

Agriculture on the Altiplano is severly limited by low temperature, deficient rainfall, and soils which are low in fertility and often badly eroded. Food production here is insufficient to take care of the large population, and additional supplies must be obtained from other areas. Sudden changes in temperature and raw winds add to the difficulty of those engaged in agriculture. During the summer growing season, crops are sometimes exposed to frosts.

The bulk of the agricultural production is centered in the northern Altiplano, especially around Lake Titicaca. This deep body of water which maintains a year-round temperature of about 52° F. has a modifying effect on the otherwise bleak climate of the surrounding area. Wheat, barley, alfalfa, quinoa, vegetables, and beans are grown on a subsistence basis near the lake and the traditional hardy cereals and potatoes are grown on the nearby hillsides. Sheep, llamas, and alpacas graze on the northern Altiplano. A number of cattle, hogs, and donkeys are found in and near the villages, but these are not well suited to the sparse pastures, cold climate, and high elevation.

Drainage on the Altiplano is southward. Lake Titicaca receives the flow from the intermittent streams and overflows into the Rio Desaguadero which flows southward about 155 miles into Lake Poopo. The overflow from Lake Poopo moves into the salt flats to the south.

On these flats and through the southern Altiplano the dry nature of much of the area permits little agricultural production. Some cereal and potato production is found around Lake Poopo, and sheep, llamas, and alpacas graze near scattered settlements.

Between the Altiplano and the Montaña is the rugged mountainous area of the Cordillera Real. The Montaña, accounting for roughly 14 percent of total area, includes the valley and mountain lands that descend from the eastern cordillera and slope eastward and northeastward to the extensive plains. A wide variety of agriculture is found throughout the valley region and its subregions. The subregions are denoted by different elevations, soils, and climate. Soils are more fertile than on the Altiplano, but erosion is a serious problem on the steep slopes. Although some supplemental irrigation is used, rainfall is generally adequate.

The northern section of the Montaña, northeast of the city of La Paz, is called the Yungas, a heavily forested, rainy and humid subtropical area ranging in elevation from 1,600 feet to 6,000 feet above sea level. The area is cut by deep valleys of rivers which flow northeastward into the Rio Beni and thence to the Amazon River basin. The Yungas is mainly an area of subsistence agriculture, although some cash crops are grown. Cacao, coca leaves, and coffee are of commercial importance; tropical fruit, manioc, rice, and sugarcane are important food crops.

In the central Montaña near the city of Cochabamba (elevation 8,500 feet) a fairly extensive area of valley basins drains into the Rio Grande and Rio Pilcomayo. This region receives somewhat less rainfall than the valleys to the north and east. It is, however, a region of diversified agriculture and the principal area of wheat, barley, and corn production. A large proportion of the country's vegetables and temperate and tropical fruit is also produced in the area. In addition, some dairy and poultry enterprises are located there. Both the Yungas and the Cochabamba Valley areas are important agricultural zones, owing to their relative accessibility to markets of the larger cities in the northern Altiplano and central valley region.

The southern valleys are less developed, mainly because of the greater distance from consuming centers. Some dairy and livestock operations are located near the larger towns; cereals and fruit are also produced in some areas.

The Llanos, or eastern lowlands, the largest and least developed region in Bolivia, contains 70 percent of the total area. This generally tropical region extends from the foothills of the eastern cordillera adjacent to the Montaña at about 1,500 feet elevation and slopes eastward to as low as 300 feet to the tropical and subtropical scrub forest and intermittent grassland area of Matto Grosso on the Brazilian frontier. In the north, the region extends from the tropical rain forests that border on Brazil east and south to the arid and scrub lands of the Gran Chaco area bordering on Argentina and Paraguay. The eastern lowlands are an important source of agricultural potential for Bolivia. However, much of the humid north is poorly drained, covered by dense forests and rank but unproductive grasslands and is almost inaccessible to markets. Population is widely scattered, centering mainly along the rivers where subsistence agriculture is supplemented with production of forest products, rubber, and brazil nuts. An extensive cattle grazing region is found in the San Borja-Santa Ana-Trinidad area. Meat is marketed through the use of high-cost air transport. Further south, the fertile subtropical plains of Santa Cruz have been an area of recent agricultural development.

The Santa Cruz Plains have soils and climatic conditions which are generally favorable to agriculture, and considerable current development is centered there. Commercial rice and sugarcane operations highlight the agriculture of the area. Significant quantities of corn, bananas, citrus, manioc, fibers, and oilseeds are grown together with small-scale dairy, beef, and pork enterprises.

The eastern Llanos becomes more arid toward the south. Some cereals and fruit are grown on a subsistence basis; small herds of cattle are also located there.

The Gran Chaco, or southern plains, is also too dry for good agriculture. Grazing predominates, but some corn, sugar, rice, manioc, and citrus are grown for local consumption.

Population

The Republic's estimated population of 3.5 million is increasing at the rate of approximately 2 percent per year. The population is young; 40 percent are under 15 years of age. Approximately 60 percent of the population is made up of Aymará- and Quechua-speaking Indians, 30 percent is mixed Indian and white (mestizo), and 10 percent is white.

Two-thirds of the population is engaged in agricultural production, with the racial make-up of the farm labor force varying from one region to another. On the Altiplano, particularly around Lake Titicaca, the farm population is almost entirely Indian, whereas mestizos account for three-fourths of the population in the Montaña and an even greater percentage in the lowlands.

Agricultural Patterns and Policies

According to the last official census in 1950, approximately 33 million hectares (82 million acres), or 30 percent of the total land area, were classified as farmland. However, only 2 percent of the farmland was actually cultivated. Of the remaining land, pasture and meadows accounted for 34.6 percent, forest and brush 33.5 percent, idle land 7.4 percent, and other classes 22.5 percent.

In 1950 the per capita landholding averaged 36 hectares, with farmland averaging 11 hectares and cultivated land only 0.22 hectare, characteristic of the predominant subsistence agriculture within the country. While land in farms was about equally distributed between the three regions, 50 percent of the cultivated land was in the Altiplano, 40 percent in the Montaña, and only 10 percent in the Llanos.

For several centuries, up until 1953, there existed a great disparity in land ownership in Bolivia. Land tenure consisted of two basic forms: A private property system, which had

Bolivian women sell grain in an open-air market. About 90 percent of the people are Indians and mestizo (Indian and white), and most of them are engaged in agricultural production.

Table 1.—Number of farms and areas of farmland, by farm size, Bolivia, 1950

Size group (In hectares)	Farms		Farmland	
	Number	Percent	1,000 hectares	Percent
0 - 0.9	24,747	28.6	10.9	0.03
1 - 4.9	26,451	30.6	63.0	.20
5 - 19.9	14,671	17.0	136.1	.42
20 - 49.9	4,832	5.6	142.4	.43
50 - 99.9	2,776	3.2	183.1	.56
100 - 499.9	4,732	5.5	1,051.2	3.21
500 - 999.9	1,539	1.8	1,049.3	3.20
1,000 - 2,449.9	2,138	2.5	3,290.0	10.05
2,500 - 4,999.9	1,861	2.2	5,433.9	16.59
5,000 - 9,999.9	797	.9	5,146.3	15.71
Over 10,000	615	.7	16,234.0	49.57
Not reported	1,217	1.4	8.7	.03
Total	86,377	100.0	32,749.8	100.00

Bolivian Agricultural Census, 1950.

1 hectare = 2.471 acres.

developed from original tracts established following the Spanish conquest, and a communal system of land rights, stemming from the collective society of the Incas.

At the time of the 1950 census, 6 percent of the landholders possessed 92 percent of the farmland in units of 1,000 hectares or more, while at the other extreme approximately 60 percent of the farmers held only 0.2 percent of the total farmland in units of less than 5 hectares. Three-fourths of the country's farm population had no property rights; they occupied the poorer, steeper land and existed in virtual serfdom. The land tenure system was one of the major obstacles to the development of a progressive agriculture.

Agrarian Reform Law

The Agrarian Reform Law, enacted in 1953, is the keystone to subsequent developments in Bolivia's agriculture. The Agrarian Reform was undertaken for the purpose of redistributing to landless farmers, idle or underexploited farmland tied up in the latifundio, or large feudal landholdings. Under its terms, the latifundio was abolished as an institution. Five forms of tenure were recognized:

1. Small holding - capable of furnishing the needs of the owner-operator and his family.

2. Medium-sized holding - larger than a small holding, producing primarily for market and worked with the aid of salaried help.

3. Commercial farm enterprise - large-scale farm operation worked with salaried employees using modern methods and equipment and requiring considerable capital investment.

4. Community holdings - legally recognized Indian communities worked for the benefit of indigenous groups.

5. Cooperative property - land worked cooperatively by farmers.

The maximum size of farms differed from one region to another, with the area of lowland properties being larger than those in the highlands. Also, certain agricultural enterprises, such as those suitable to the production of livestock were granted larger areas.

So strong was the desire for land and so great the expectations, that an agrarian revolution took place wherein takeover of property by peasants quickly followed the enactment of the legislation. In the scramble to obtain food and property, livestock were slaughtered, seed supplies were consumed, and property was taken without legal action.

Delays in the transfer of land titles, caused by a lack of planning and trained personnel, resulted in the quick seizure of most of the productive land. Much of this land remained largely idle for some time as the peasants were unwilling or unable to do much before having title to the land. Due to the scarcity of land in heavily populated areas, many land grants were so small as to permit only subsistence farming. As a consequence, in place of production increases, output decreased sharply following enactment of the law. In recent years, however, production of some crops has turned upward mainly as a result of the opening up of new areas of production in the lowlands.

Accurate data on the amount of land expropriated and redistributed is not available, but the results of the Agrarian Reform are expected to reveal a much greater number of small- and medium-sized owner-operated units, particularly in the highlands and valleys. Through 1960, titles to an estimated 2 million hectares have been distributed to 80,000 families.

The recognition by the government of the Indian community and cooperative landholdings accounts for some of the large holdings now in existence on the Altiplano. In the Cochabamba Valley area the topography of the land is better adapted to supplemental irrigation and to possible future use of mechanized farm equipment. Future increases in production in this area hinge tightly to the development of additional units of this type.

The agrarian revolution has resulted in a greater distribution of land ownership and has aided, to some extent, in assimilating more of the population into the economic, political, and social life of the Republic. In spite of the initial desire for land, many have returned to the cities because of the rigors of farming the Altiplano and the extremely small size of the plots that were distributed. Plans are now underway to settle colonists in the Alto Beni area where sizable tracts of bottom lands are available for distribution.

Production Practices

Soil Conservation

Soil erosion control practices are not general in Bolivia. The absence of crop rotation and plantings of legumes and cover crops induces soil depletion and erosion. Fallowing of land on the Altiplano is practiced because of the low fertility of the soil and insufficient moisture for successive cropping. In much of the valley and tropical lowland regions, land is prepared by clearing and burning and, after one or two crops, is allowed to return to brush. Even in the more settled areas around Santa Cruz where some improvements in agriculture are to be found, the relative abundance of land does not provide incentives for conservation and soil improvement practices.

Fertilizers

The soils of the Altiplano are generally deficient in organic matter, phosphorous, and nitrogen. Use of commercial fertilizers and manure is very limited. Crop residues and manure are often used for fuel on the Altiplano. Although there are deposits of phosphates within the country, the only commercial fertilizer produced is small amounts of bonemeal. The low per capita income of the Bolivian farmer as well as a lack of knowledge of the benefits of fertilizer use together with its high unit cost and difficulty of transportation have contributed to low consumption levels.

Farm Equipment

The steep and rocky character of much of the land and the small size of farm plots preclude the general use of mechanized equipment. There are less than a thousand tractors in the country, and only a small quantity of harvesting machinery is available for use.

Farming on the Altiplano is generally a small-scale operation. A few Indian cooperatives have medium-sized tractors, but the major part of the land is tilled by wooden ox-drawn plows tipped with iron. Large clods of earth are broken up with wooden mallets; small sickles are used for harvesting grains and iron-pointed sticks are used to cultivate and dig potatoes.

In other sections of the country, use of mechanized equipment varies. On the rough sections of the Montaña, conditions are largely unsuitable to mechanization. The more level areas of the Montaña around the Cochabamba Valley encourage some use of tractors, but dependence

on hand labor is still great. The greatest use of tractors and related equipment is made in the lowlands where labor is scarce, farms are larger, and topography more favorable to mechanization. However, the classic tools of the lowlands, the axe, machete, sickle, and hoe, are much in evidence.

Irrigation

Slightly more than 10 percent of the cultivated land in Bolivia is irrigated. Most of this is located in the Departments of Potosi, Cochabamba, and Chuquisaca and consists of small-scale gravity operations. There is also some irrigation around the margins of Lake Titicaca and Lake Poopo. On the Altiplano and some of the Montaña regions, rainfall deficiency makes irrigation almost a necessity.

Three major irrigation projects are being developed at present. With the completion of the Angostura Dam near the City of Cochabamba, the Tacagua project near the City of Ororo, and the Villa Montes project on the Rio Pilcomayo in the Department of Tarija, irrigation capacity will increase by one-third.

Diseases and Pests

Crops in Bolivia are plagued by a number of serious diseases and insects. Control is made difficult by the lack of communication and knowledge among the farmers, inefficient organization, and a shortage of supplies.

Seed Improvement

Little attention is given by the farmer to seed selection or improvement. Considerable effort has been made to introduce improved varieties of seed that are adaptable to Bolivian conditions. Corn, grains, seed potatoes, and pasture grasses have already been introduced and found to thrive in various areas.

Production Policies

Farm Credit

Availability of farm credit in Bolivia has generally been extremely low. Before 1954, existing latifundios fulfilled their needs for credit from regular banking sources, and the technical level of the Indian communities and other small farmers was such that little credit was used. Up to that time, loans to farmers represented less than 1 percent of the value of agricultural production.

The Agricultural Bank has been, and continues to be, the principal source of agricultural credit. However, its assets represent only a small percentage of the assets of the Central Bank compared with much higher percentages for the Mining Bank's funds and those of commercial banks. Loans are generally of the supervised credit type and are made for 1 year or less at an interest rate of about 10 percent. About 40 percent of the loans provide financing for farm operating expenses and 25 percent are for the purchase of agricultural equipment and machinery.

The greater availability and use of farm credit have been important factors in increasing agricultural production, especially in the lowlands. Demand for farm credit still exceeds the amount available, however, and the need for technical assistance to supervise the loans has increased at a faster rate than the program can be expanded.

In March 1961, the Inter-American Development Bank extended a $10-million line of credit to the Bolivian Development Corporation. Approximately $1.7 million of this amount

will be used for improvement of livestock, cotton, rice, and sugar-cane production, as part of the Agricultural Credit Program.

Taxation

There are several types of taxes that affect agriculture and trade in agricultural products. However, land taxes are low, tending to encourage speculative holding of land and discourage production.

Agricultural Organizations

Government Organizations.—The Ministry of Agriculture is the main government agency concerned with agricultural matters. The Agrarian Reform Service has been important in recent years.

This agency has been vested with the authority to implement the agrarian reform program of Bolivia. It establishes regulations for land redistribution, hears suits concerning land claims, provides technical services for land surveys, and assists in land settlement arrangements. Other government agencies with responsibilities in the field of agriculture are the Servicio Agricola Interamericano (SAI) and the Bolivian Development Corporation, which provide financial assistance in agricultural research and extension. SAI, also known as the Inter-American Agricultural Service, is a joint United States-Bolivian organization for technical assistance which works closely with the Ministry of Agriculture but is not directly a part of it.

Also involved in agricultural matters are the Ministries for Peasant Affairs, Treasury and Statistics, and National Economy. In June 1959, a Superior Council of Agriculture was established with responsibility for planning and directing agricultural development.

Farm Organizations.—Two professional agricultural organizations, the Society of Agronomists and the Rural Society, concern themselves with agricultural affairs. The Peasants Union, associated with the national labor organization, is a younger organization which represents the small-farm segment of the agricultural population.

Cooperative farms and community-type organizations have been a traditional aspect of Bolivian agriculture, especially among the Indians. Small landowners, however, are showing increased interest in forming cooperatives for purchasing supplies, selling produce, and obtaining credit. SAI has assisted in the development of cooperatives, and a new Cooperative Law became effective in early 1959. Additional new cooperatives are expected to be formed as a result of this law.

Transportation

Transportation in Bolivia is generally difficult. The extremes in topography have been a major deterrent to the development of an adequate national transportation system. Road construction costs are consequently extremely high.

About half of the area of Bolivia does not have adequate surface transportation facilities. Many of the highways and railroads link the mining communities to the large cities, but there are insufficient roads leading from the distant agricultural areas to the population centers. Road maintenance is formidable, since many roads are subject to rock slides and washout.

Recent road construction has emphasized the development of existing trails into all-weather highways. Since 1954 the Cochabamba-Santa Cruz highway has provided a link between the cities and the area of agricultural potential in the lowlands. Additional areas in the lowlands are scheduled to be linked to this newly paved road.

Abave, raad from Altiplana northeast ta the lawlands shaws how difficult transportatian is in Balivia's mauntains. Left, New Cochabamba to Santa Cruz highway.

Rail facilities and equipment generally service the mining industry. They are not well situated to be of significant service to agriculture. Also, rail costs for bulky agricultural products are extremely high. The government has subsidized the air shipment of meat from the El Beni area, but the transportation cost is expensive. There is limited amount of water transport in the lowlands.

Marketing

Marketing costs are high, due mainly to heavy transportation costs, losses from poor handling and storage, and large price markup at every stage of the marketing process, beginning with the trader on the farm and ending with the retailer in the city. In most areas, little recognition is given to sanitary or weight standards or price differential based on quality. Open-air street fairs constitute the markets in most villages and municipalities.

Several other factors complicate the marketing of products in Bolivia. Among the more important are:

(1) The low income of most of the people of the country. This results in their dependence upon a barter exchange of goods for items which they need; only 25 percent of the people are part of the commercial or money economy.

(2) Favorable government policy with respect to imports of foodstuffs, which has made consumers in the cities and mining camps more dependent on imported food products.

(3) Commodities produced in remote areas of Bolivia have found markets in adjacent countries more accessible than domestic markets.

(4) Government policy, prior to the Stabilization Program of 1956, unwittingly assisted the development of clandestine trade to the detriment of growth of effective markets.

Food Storage

Food storage facilities in the producing areas are scarce and losses from insects and spoilage are serious. On the Altiplano, the food supply for the winter is often stored in the house or in poor shelters. Some sugar and rice warehouses have been constructed in Santa Cruz, but as agricultural production in the lowlands advances, the lack of storage space for cereal and sugar production becomes an increasing problem.

Agricultural Development

Bolivia's agricultural research, extension, and education were largely concentrated in Cochabamba. Recently the agricultural institute has received significant assistance from outside groups, particularly those groups working under the auspices of the United States. However, some technical assistance, particularly in the form of economic and agricultural planning, has been made available through the United Nations and its specialized agencies. International financial organizations have aided development through loans.

Agricultural assistance has been an important part of overall U.S. aid. In 1958, about 39 percent of total U.S. contribution to cooperative technical assistance programs and 56 percent of U.S. personnel went into agricultural activities. Bolivia's agriculture has also benefitted from technical assistance in areas of health, education, and road construction.

SAI, Interamerican Agricultural Service, has responsibility for the bulk of the technical assistance work in agriculture. The agency's Division of Agricultural Research and Technical Services administers the work of seven experiment stations and conducts research in all phases of agriculture. Experiment stations are located in each of the three topographical regions, and these centers conduct investigations in agricultural problems typical of the area where located. Other specialized stations are concerned with livestock improvement and research in coffee, cacao, and rubber.

Agricultural extension work is also performed by SAI. Since 1953, this activity has been carried on as a joint United States-Bolivian activity, with some support from departmental and municipal governments. The work has expanded rapidly, especially in the areas of home economics, youth clubs, and programs in rural community development. Over 600 local leaders now direct youth club activities in such projects as gardening, livestock, and small animal and poultry raising. Also, the general work of communication between the research and experiment stations and the farmer has been strengthened and expanded.

Educational levels in Bolivia are not well advanced. Illiteracy is high among the farm population. The shortage of professional people engaged in agriculture creates difficulties in carrying out research and extension activities. However, through the use of foreign training grants, specialists in various fields of agriculture have received training in the United States. While the number of specialists is relatively small, they have had a significant impact on the overall agricultural program. Emphasis has also been directed toward development of additional vocational schools to train students for positions with SAI.

In 1954, an emergency economic aid program with Bolivia was undertaken by the United States on such special projects as supervised farm credit. Funds for part of the program were made available to Bolivia from the sale of U.S. surplus agricultural commodities within

the country under the Mutual Security Assistance Program. Commodities included wheat and flour, cotton, rice, sugar, and dried milk.

Financial assistance in the form of loans was given by various international agencies for road construction, sugar mill expansion and stabilization purposes. The Food and Agriculture Organization of the United Nations has advised on implementation of the programs of the Agrarian Reform. This organization also carried out special studies on livestock and animal disease control and recommended institutional changes in forestry and agriculture.

Government Agricultural and Trade Policy

One of the greatest concerns of the Bolivian Government has been the control of inflation. This has been a problem for a quarter century, but since 1952 it had become more serious. The tools of regulation used by the government have included domestic price controls and food distribution together with a complex system of multiple exchange rates on imports and exports.

Price controls had an important effect on domestic agriculture. Prior to December 1956 all imported food products were regulated by price ceilings. Most domestic grain crops, sugarcane, coffee, cacao, and peanuts were subject to guaranteed prices. However, price relationships among some of the commodities became unbalanced and, as a result, many producers shifted over to crops which were not controlled or attempted to market their products in neighboring countries. As a consequence, dependence upon imported foodstuffs increased.

Since the end of 1956, however, price controls have been taken off many commodities, and prices of most food items reflect free market supply and demand. Dependence on imported foodstuffs still remains high though. In another effort to keep food prices from increasing, the government has subsidized the sale of foodstuffs in the mining camp commissaries.

The stabilization plan of December 1956 brought about the adoption of a single exchange rate closely allied to the free market rate. Tariff policy presently includes moderate specific and ad valorem duties largely for revenue purposes.

Food and Fiber Production

Potatoes

Grown in great quantity on the Altiplano, the potato is Bolivia's most important food crop. It forms the basic food, both in fresh and naturally frozen dehydrated form, for the entire population of the plateau and mountain campesinos. The Altiplano is the principal area of production; about one-fourth of its total cultivated area is planted to potatoes, mostly on small plots of land. They are generally planted from August to December and harvested from March to August. Production of an estimated 200,000 metric tons, in 1960 reflects an encouraging increase in recent years; yields, however, are low. Improved cultural practices, insect and disease control, and introduction of improved varieties are expected to boost output. A small amount of potatoes is imported annually.

Cereals

Corn is the most important cereal produced in Bolivia. It is a staple in the diet of the lowland and valley people, who make it into flour and meal. It is also used in the brewing of chicha, a traditional fermented beverage of the highland population. Small amounts of corn are fed to hogs and poultry.

All regions of Bolivia, except the Altiplano, grow corn. The most important areas are the Cochabamba Valley, Santa Cruz, and parts of the Department of Chuquisaca. Corn is planted from August to December, depending on the area, and harvested mainly in April and May. The greater part of the crop is produced on small plots and is consumed on the farm. The lowlands area has recently increased production through the use of the flint-type Cuban yellow corn. However, high transportation rates to consuming centers have deterred expansion of production.

Production of an estimated 140,000 metric tons of corn in 1960 reflects an increase over earlier years. Bolivia is nearly self-sufficient in corn, and only very small amounts are imported.

Second only to corn as a cereal crop, wheat is Bolivia's largest food import. Domestic production accounts for less than 20 percent of total consumption. Consumption is highest in urban households, although government policy with respect to imports of wheat and maximum control of retail prices has resulted in increased use of the grain in rural areas. Wheat is used in making bread or is crushed and boiled and eaten as meal; it is sometimes an ingredient in making the fermented beverage, chicha.

Wheat production in 1960 is estimated at 16,000 metric tons; Cochabamba is the most important wheat-producing Department, followed by Potosi, Tarija and La Paz. Wheat farms are generally small; much of the crop is produced without the aid of machinery, as most fields are not large enough for mechanization. Spring wheat is planted on the Altiplano in November and December and harvested from May through July. In the valley region where winter wheat predominates, the crop is planted from April through June, depending on the rains; harvesting is done from October to November. Wheat rust damage has been a problem in some areas. Introduction of resistant varieties has, however, given promise of greater yields in the future.

The United States and Argentina are presently Bolivia's principal suppliers of wheat and flour. Imports of these two commodities account for about one-fourth of the value of agricultural imports.

Barley is an important staple on the Altiplano, especially among the Indians. Most of the crop is grown for grain, but at high altitudes some is grown for livestock forage. Planted from October to January and generally harvested 6 months later, barley is a hardy crop which grows well and vigorously. When eaten, barley is ground into meal or roasted whole. A part of the domestic production is used for brewing; significant quantities are also imported for this purpose. Production in 1960 is estimated at 45,000 metric tons.

Rye is a relatively new crop in Bolivia. Production is small but is increasing. It is a hardy crop that thrives and yields well on the Altiplano. Rye is also grown for livestock forage.

Oats production is also small. Principal areas of production are the valleys of Potosi and Cochabamba. Some oats products are imported.

Quinoa is a cereal which is native to the highland regions of Bolivia and Peru. It is a hardy plant which will grow and mature best at high altitudes of 11,800 to 13,000 feet under conditions where other cereals fail. Planting is done in August, and harvesting goes on from February to April. Quinoa is an important source of protein for the masses, being consumed as a porridge or as bread or cakes. Over two-thirds of the production is in the Departments of La Paz and Oruro.

Rice is an important item in the diet of the people in the lowlands and valley regions. Production is centered in the Santa Cruz area, which accounts for more than 70 percent of the country's output. Rice is planted in October and November and harvested from March through May. The lowlands area, particularly around Santa Cruz, is well adapted to rice production.

Much of the crop is produced by three cooperatives. Rice is second only to sugar in value of production in the lowlands. Upland rice is grown near Santa Cruz and irrigated or paddy rice in El Beni and other areas. Output is increasing, and in 1960 an estimated 41,000 metric tons of rough rice were produced. About a fourth of the total rice supply is imported; Argentina is the principal supplier.

Vegetables

Many kinds of vegetables are grown in Bolivia, mainly in home gardens. Some commercial production is located in the Cochabamba Valley areas, and some vegetables are shipped into the larger cities and mining camps. Foreign trade in these commodities is relatively small.

Among the root crops grown in Bolivia are manioc, or yucca, sweet potatoes, and oca. Manioc is used principally in the lowlands, where it forms an important part of the laborer's diet. The root may be cooked or eaten fresh or it may be ground into flour and mixed with wheat flour. Production operations are simple, and the crop is adapted to a wide range of physical conditions. Sweetpotato production is also concentrated mainly in the lowlands. Another tuber, oca, is a food of the Indians of the Altiplano. Production of these latter vegetables is relatively small.

Other vegetables consist mainly of such pulses as dried peas, broadbeans, and chickpeas. Beans are consumed mainly on the Altiplano. Fresh vegetables are not an important part of the diet of most of the people.

Oilseeds

Oilseed production has developed slowly. Vegetable oil is derived mainly from peanuts and cottonseed. In addition, some peanuts are consumed as food. Bolivia has extensive natural stands of palm which are largely undeveloped. A large part of the domestic vegetable oil supply is imported, mainly from the United States and Argentina. The total supply of edible fats and oils in 1958, based on imports and estimated domestic production, was equivalent to about 6 pounds per capita.

Sugar

The lowland areas of Bolivia have land and climatic characteristics necessary for sugar production. Output has increased steadily from 2,000 metric tons in 1950 to an estimated 25,000 in 1960. However, this represents less than half of total domestic requirements. The Department of Santa Cruz accounts for over 80 percent of production. Only about half of the sugarcane is processed into centrifugal sugar. The remainder goes into the production of noncentrifugal sugar and alcohol.

Sugarcane is generally planted in May and June, and the main grinding season extends from June through November. Little use is made of fertilizers or irrigation; a shortage of labor makes harvesting difficult. At present, sugar mills are operating at near capacity. Anticipated increases in domestic sugarcane production will necessitate construction and expansion of mills to grind the cane; the Inter-American Development Bank and the Development Loan Fund have recently approved loans for this purpose. The government has assisted expansion of sugar production through the building and improvement of roads, financial assistance in the operation and expansion of sugar mills, and guaranteed prices for sugarcane. On the other hand, government trade policy has enabled large quantities of sugar to be imported.

Fruits

The Valley and lowland areas produce a variety of fruit. Among the temperate and tropical fruits grown are apples, pears, grapes, peaches, citrus, and bananas. Most of the fruit is

consumed near the point of production; perishability of the product, great distance from market, and inadequate storage result in a high rate of spoilage. Seasonal supplies are available to medium- and high-income groups in the larger cities. Some fresh and dried fruit is imported from neighboring countries and the United States.

Cotton

Cotton production accounts for about one-eighth of the present domestic requirements. Production is centered in the Department of Santa Cruz, but increased output is expected from the Villa Montes area in southeastern Bolivia, where irrigated land has been developed.

The crop, which is of the short staple type, is planted from September to November and picked in April and May. With heavy rainfall and high temperatures during the wet season, the production of quality cotton is difficult, and losses from insects and diseases are heavy. While yields are presently considered low, increased use of insecticides and better production practices are expected to improve this situation. Cotton imports are supplied mainly by the United States.

Livestock

The livestock industry of Bolivia provides food and fiber for the people and, in addition, draft power and export products for the country. An important part of the agricultural exports is comprised of livestock products. However, the industry is generally not well developed.

Cattle are the most important type of livestock; numbers are estimated at 2 million head. They are grazed largely in the Llanos, in the Departments of El Beni and Santa Cruz, where they are raised for meat. Production in El Beni is centered in the central and southern sections, especially around the towns of Santa Ana, Trinidad, and San Borja. Operations are hampered by periodic floods, disease, and poor pastures. Markets are generally located great distances away. In the Altiplano region, poor grazing land makes general livestock production difficult.

The Santa Cruz area is more accessible to markets and livestock; production has expanded in this area in recent years. Cattle ranching in the Gran Chaco area farther south is also being developed. On the Altiplano, most of the cattle raised are used for draft purposes. Some dairy cattle are also raised, mostly near the population centers.

The Santa Cruz and lower valley areas are the main locations of hog production. Despite problems of disease and low returns to producers, output appears to be developing favorably.

The largest concentration of sheep is on the Altiplano, where they are raised mainly for wool. Mutton production, however, is gaining in importance. The sheep are generally small size and are pastured year round without much supplemental feeding; pastures are generally poor. The sheep are exposed to many diseases and parasites.

Goats, llamas, alpacas, and vicunas are a source of meat for local consumption, and their hides are bartered for other necessities. In addition, the llamas and alpacas are used as pack animals on the higher elevations.

Livestock Products

Meat constitutes only a small portion of the daily diet; beef and mutton are the main meats consumed. Relatively little beef is consumed on the Altiplano, and much of this must be trucked or flown in from the lowland areas. Some meat is imported, largely as live cattle; small amounts of dried beef and live cattle are also exported.

While there are several milk plants in the country, much of the milk is processed into butter and cheese on the farm, due to the difficulties of transport. A considerable part of the lard requirements are imported. Hides and skins and wool are important livestock exports.

Export Crops

Rubber

Rubber, the most important agricultural export crop, is grown in scattered areas through the lowland rain forest of northern Bolivia, largely in the Departments of El Beni and Pando. The wild Pará rubber trees, generally found near the rivers, yield the largest quantity and highest quality of rubber.

The trees are under exploitation for 15 years; they are generally tapped for 3 years and then left to rest for an equal period. The sap is processed into balls of 45 to 55 pounds, which are then transported in small boats to shipping points. Production in 1959 was estimated at more than 2,300 metric tons, most of which was exported.

Brazil Nuts

Brazil nuts, the second most important agricultural export, grow wild on tall trees scattered throughout the lowland rain forest of northern Bolivia. The nuts are gathered during the rainy season when workers cannot tap rubber trees. The average annual output of approximately 2,000 metric tons varies according to market demand and weather conditions during the harvest season. The United States is the principal market for Brazil nuts.

Coffee

Output of coffee in the principal growing areas of the Yungas and the Department of Santa Cruz is increasing and offers potential as an export product. Production is centered largely on small holdings, where it is grown as a sideline to other occupations. Even though difficulty of transport, high harvesting costs, and restrictions on export have discouraged greater production, output in recent years has increased significantly.

Cacao

Cacao is grown in the Yungas area of La Paz and El Beni Departments. It is another product which has future potential as an export commodity. Poor-quality beans and low yields are presently the result of poor care for the plants.

Coca

Coca leaves, used for centuries as a stimulant by the Indians of the Andes, are grown extensively in the Yungas. Coca bushes mature in about 4 years, after which the leaves may be picked three or four times a year. When chewed with vegetable ash, the dried leaves yield a cocaine alkaloid which acts as a stimulant.

Most of the annual production of slightly over 3,000 metric tons is consumed domestically. Attempts have been made to reduce coca production and increase coffee production on the same land. However, the higher monetary returns from coca growing on the steep slopes of the Yungas encourage its continued production. Some reduction in output can be expected in the future. Taxes on the sale of coca leaves are a source of revenue for the government.

Trade in Agricultural Products

Exports

Agricultural products account for less than 10 percent of exports. Small quantities of rubber, Brazil nuts, coffee, cattle hides, and vicuna wool supplement the more important mineral exports of tin, lead, and silver.

Table 2.—Principal agricultural exports by quantity and value, Bolivia, average 1950-54 and annual 1956-59

Product	Average 1950-54		1956		1957		1958		1959	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars
Rubber	1,162	843	1,249	886	1,057	535	1,073	569	2,234	1,294
Cowhides	1,209	713	380	137	1,125	375	1,023	338	1,269	422
Other hides	299	250	438	821	402	727	177	272	219	377
Brazil nuts	593	214	2,545	1,094	1,075	527	971	414	3,207	1,272
Coffee	142	85	80	71	655	523	577	485	601	560
Coca leaves	189	433	46	62	159	359	133	166	21	22
Vicuna wool	11	89	20	555	21	306	41	473	40	732
Cattle	718	149	10	4	133	77	31	7	308	61
Cacao beans	0	0	13	6	66	36	92	43	32	17
Dried meats	883	37	121	102	5	5	0	0	12	8
Vegetables and potatoes	35	14	26	21	13	2	14	2	10	1
Other agricultural	77	406	188	78	504	64	285	99	670	87
Total agricultural	5,318	3,233	5,116	3,837	5,215	3,536	4,417	2,868	8,623	4,853
Nonagricultural	218,910	121,295	268,242	103,600	346,219	94,131	303,061	61,869	264,645	72,814
Total exports	224,228	124,528	273,358	107,437	351,434	97,667	307,478	64,737	273,268	77,667

Boletin Estadistico, Ministry of Finance and Statistics, National Directorate of Statistics and Census. Annual issues, 1950-59. La Paz.

Table 3.—Principal agricultural imports by quantity and value, Bolivia, average 1950-54 and annual 1956-59

Product	Average 1950-54		1956		1957		1958		1959	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars	Metric tons	1,000 dollars
Wheat	54,091	4,497	13,192	1,518	54,722	5,104	3,351	360	14,336	1,108
Wheat flour	19,461	2,427	14,781	2,826	63,047	5,240	64,913	5,166	71,902	5,134
Sugar, white	43,011	5,558	41,190	4,148	66,733	6,557	33,519	3,362	46,082	4,278
Lard	3,163	1,607	1,717	682	5,273	1,746	6,744	1,890	4,854	1,241
Rice	10,068	1,859	5,559	1,129	11,495	1,797	11,216	1,391	8,565	915
Dried milk	1,179	772	1,654	667	2,069	1,086	480	349	923	602
Condensed milk	1,908	540	2,158	534	3,027	722	580	123	1,982	516
Barley malt	1,752	288	3,273	627	3,382	578	1,835	298	920	148
Cotton	1,608	1,434	816	649	208	141	342	264	526	348
Wool	416	1,248	681	2,049	110	242	108	197	194	350
Cattle, Live	3,472	2,173	10,893	5,028	5,547	900	1,489	149	155	10
Vegetable oils[1]	1,466	1,023	554	452	3,361	1,206	2,111	664	3,071	818
Tallow	1,474	675	288	104	396	54	380	44	301	47
Butter	130	147	398	320	51	24	26	12	46	28
Potatoes	52	6	7,530	701	317	9	0	0	0	0
Other agricultural	12,961	4,164	9,323	3,815	14,783	3,351	10,469	2,242	7,644	778
Total agricultural	156,212	28,418	114,007	25,249	234,521	28,757	137,563	16,511	161,501	16,321
Nonagricultural	155,156	45,150	99,536	58,809	119,634	63,489	105,312	63,081	91,986	48,665
Total imports	311,368	73,568	213,543	84,058	354,155	92,246	242,875	79,592	253,487	64,986

[1] Includes edible oils.

Boletin Estadistico, Ministry of Finance and Statistics, National Directorate of Statistics and Census. Annual issues, 1950-59, La Paz.

Total exports of agricultural commodities have increased slightly in recent years. Increased shipments of Brazil nuts, coffee, and vicuna wool more than offset declines in cow hides, cattle, and coca leaves.

The United States takes most of the Brazil nuts and vicuna wool and is an important market for coffee and hides. Peru is also a chief market for coffee exports; Brazil is the principal outlet for Bolivia's rubber.

Imports

Agricultural commodities account for one-quarter of the value of imports; as a percentage of total imports, they have decreased from the higher levels of earlier years. The main imports are wheat and wheat flour, sugar, lard, vegetable oils, and milk.

Wheat and wheat flour account for over one-third of the value of agricultural imports; the United States and Argentina are the principal suppliers. Sugar is imported mainly from Peru, while the United States and Argentina are the main suppliers of lard.

Outlook

The future of Bolivia's agriculture rests mainly in the untapped agricultural resources in the lowlands and remote valley areas. The difficulty of linking these potentially productive areas with the consuming centers across the mountains leads to uncertainties. The problem is further complicated by the low purchasing power of the Altiplano population.

Development of the agricultural potential is one of apportioning capital and labor into sectors of the economy where the optimum development of the country's resources can be realized. In the agricultural sector the objective is to increase Bolivia's food production and expand the agricultural export potential.

Settlement of the remote valleys and the eastern lowlands appears to offer one of the greatest possibilities for expansion of crops for domestic consumption and export. Opening and improving roads should act as an incentive to boost production and should help relieve the population pressure on the Altiplano. The settler's diets may be improved and in time living standards would be raised. Some long-range programs are being initiated to meet these goals.

Since these largely undeveloped areas are far from the population centers, consideration should be given to producing new crops and expanding already-existing ones for export to markets in neighboring countries. Some agricultural areas in the lowlands are more accessible by railroad to the markets of Brazil, Paraguay, and Argentina than to the Bolivian Altiplano, where the greatest population is located. The expansion of plantation rubber might readily find a market in both Brazil and Argentina, for example.

On the Altiplano itself, the use of fertilizers and cover crops, together with more widespread use of improved varieties of crops adapted to the environment and better cultural practices, could result in increased yields to better meet the needs of the people located there.

In a country where some 70 percent of the population are engaged in agriculture, nature has provided the people with both hardship and resource potential to survive. An understanding of the agriculture of Bolivia involves an appreciation of both.

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