AGRICULTURAL SERVICES PROGRAM

(BO-0176)

EXECUTIVE SUMMARY

Borrower and guarantor:	Republic of Bolivia	
Executing agency:	Ministry of Agriculture and Rural Development (MAGDR)	
Amount and source:	IDB (FSO):	US$34 million
	Local contribution:	US$10 million
	Total:	US$44 million
Financial terms and conditions:	Amortization period:	40 years
	Grace period:	10 years
	Disbursement period:	5 years
	Interest rate:	1 % during the grace period and 2% for the next 30 years
	Inspection and supervision:	1%
	Credit fee:	0.5% a year on the undisbursed balance

Objectives: The objective of the agricultural services program is to raise the income of Bolivian farmers through investments which, by strengthening technical services to generate and transfer technology and improving agricultural health practices, will boost the productive efficiency and the quality of the country's agrifood products.

Description: The program will support two subprograms: (i) technology generation and transfer; and (ii) agricultural health.

1. **Technology generation and transfer subprogram (US$18.5 million).** Includes funding for three components:

   a. **Institutional development.** Will help to establish the new Bolivian agricultural technology system (SIBTA) by supporting: (i) the organization of its steering committee; (ii) the strengthening of MAGDR's Directorate General of Technology Development, which will act as the permanent secretariat of SIBTA; and (iii) the establishment and consolidation of four agricultural technology development

foundations in the agroecological regions of the high plateau, the valleys, the humid tropics and El Chaco.

b. **Genetic resource conservation**. Will help to conserve Bolivia's genetic heritage of priority native species that are highly valuable nutritionally, ecologically and economically, by maintaining active germplasm banks.

c. **Technology innovation projects in agriculture**. Will cofinance strategic and applied projects that respond to: (i) national technology development priorities; (ii) producers' demands; and (iii) shortcomings in the main agrifood chains.

2. **Agricultural health subprogram (US$21.5 million).** Includes financing for four components:

a. **Institutional development**. Will support the establishment of the **National** Agricultural Health and Food Safety Service (SENASAG) at the national and departmental levels, as Bolivia's agricultural health authority.

b. **Animal health**. Will improve the country's animal health by: (i) strengthening the animal quarantine system; (ii) stepping up epidemiological surveillance; (iii) improving diagnostic laboratories; (iv) supporting campaigns to combat foot-and-mouth disease and avian salmonellosis; and (v) responding to animal health emergencies.

c. **Plant health**. Will improve the country's plant health by: (i) strengthening the plant quarantine system; (ii) establishing an epiphytotic surveillance system; (iii) installing a diagnostic laboratory; and (iv) supporting health campaigns for the control of potato wilt and cotton boll weevils; and (v) responding to plant health emergencies.

d. **Food safety**. Will support establishment of a system to ensure food safety, guaranteeing its quality for human consumption and facilitating exports.

The Bank's country and sector strategy: The proposed program is consistent with the Bank's country and sector strategy. It supports rural development and poverty alleviation through better technological and sanitary practices which will improve producers' incomes, create jobs, and make for more efficient and sustainable management of agricultural resources. The program will also support efforts to modernize the public agricultural sector by addressing shortcomings in technology development and agricultural health services that stand in the way of further development.

Environmental and social review:

The program will have positive social and environmental impacts: (i) the technology innovation projects will promote technologies that improve natural resources; (ii) the genetic resources component will help to maintain germplasm banks of native species; (iii) the agricultural health subprogram will help improve public health through programs to monitor animal and plant health; and (iv) the program as a whole will raise producers' incomes, thus helping to reduce rural poverty and bringing about a positive social impact.

The ESIR included a management and mitigation plan which has been included in the program's Operating Regulations.

Benefits:

The program is expected to produce the following benefits by 2007: (i) an increase of from 20% to 40% in net income at the farm level for beneficiary producers; (ii) increases in average productivity of from 25% to 50% for their main production lines; (iii) a reduction in annual production losses caused by pests and diseases of US$15 million; and (iv) an increase in the sector's gross production value of US$30 million.

Risks:

The foundations for agricultural technology development may encounter difficulties in attracting funds from outside sources to cover their operating costs and obtain income from an overhead charge to assure their financial sustainability. The commitments already obtained by the Bolivian government from bilateral agencies and the interest expressed by other donors and some departmental governments in supporting technology development in the sector through the foundations will reduce that risk.

Special contractual clauses:

1. Conditions precedent to the first disbursement: (i) evidence that the coordination unit has been legally established, its core staff has been appointed, and its financial and accounting control systems are operating (paragraph 3.3); (ii) presentation of the first annual plan of operations (paragraph 3.4); (iii) evidence that the decree implementing the SENASAG has entered into force (paragraph 3.1); and (iv) evidence that SENASAG has appointed its core staff and implemented its financial and accounting control systems (paragraph 3.1).

2. Conditions during program execution: (i) evidence that the foundations that will participate in the agricultural technology generation and transfer subprogram have been legally established, have access to supplementary sources of financing, and have signed an execution agreement with MAGDR (paragraph 3.1); (ii) presentation of annual reports on the use of each foundation's competitive funds (paragraph 3.34); (iii) presentation of annual plans of operations

(paragraph 3.33); and (iv) presentation of a mid-term progress report 24 months after program start-up or once 50% of the financing has been disbursed (paragraph 3.35).

Conditions already fulfilled

The executing agency has presented evidence to the Bank's satisfaction that it has fulfilled the following conditions: (i) creation of SIBTA under a Supreme Decree (paragraph 4.6); (ii) establishment of the first two foundations that will participate in the technology generation and transfer subprogram (paragraph 4.10); and (iii) adoption by Congress of the law establishing SENASAG (paragraph 3.1).

Poverty-targeting and social sector classification:

This operation qualifies as a social equity enhancing project, as described in the indicative targets set forth in the report on the Bank's Eighth Replenishment (document AB-1704). Furthermore, this operation qualifies as a poverty-targeted investment (PTI). The borrower will not be using the 10 percentage points in additional financing (see paragraph 5.37).

Exceptions to Bank policy:

None

Procurement:

The Bank's policy on the procurement of goods, the awarding of contracts for works, and the hiring of consulting services to be financed with loan proceeds will be applied. When Bank funds are used, international competitive bidding will be compulsory for procurements worth US$2 million and up for works, US$250,000 and up for goods, and US$200,000 and up for consulting services. Initially, the Bank will also perform ex ante reviews of all procurement procedures below those thresholds and may change this form of supervision for ex post reviews based on sampling, once the executing agency gains the necessary experience in procurement. The Bank will establish the minimum requisites and set the amounts below which an express nonobjection will not be necessary for the procurement of goods, works and services.

I. FRAME OF REFERENCE

A. The agricultural sector

1. General characteristics

1.1 The agricultural sector plays a strategic role in the Bolivian economy. From 1993-1998, its primary and processed products generated about 21% of GDP and 32% of total exports (US$345 million a year) on average. It produced 80% of raw materials used in the agrifood industry, provided employment for close to 42% of the workforce and contributed most of the basic foodstuffs consumed domestically.

1.2 Bolivian farming takes place in four large agroecological macroregions (high plateau, the valleys, the humid tropics and El Chaco) which exhibit marked differences in altitude, climate, soil types, vegetation and water resources, and in the abundance and management of natural resources. These differences determine the types of production and levels of technology that prevail in the regions. In the high plateau and the valleys, small farms and traditional organizations (*ayllus*) prevail. Technology and investment levels are low, accompanied by labor-intensive practices, low income for producers and production earmarked chiefly for the domestic market and on-farm consumption. In El Chaco, low-productivity extensive cattle raising prevails. In contrast with the other regions, commercial farming prevails in the humid tropics, with higher levels of technology, better integration with agribusinesses, and production largely earmarked for foreign markets.

1.3 Since small farm production remained virtually stagnant in the 1990s, with low returns, real annual growth in the sector of 4% came almost exclusively from export crops grown in the tropical lowlands. The marked differences among the four regions means that the problems and priorities of sustainable development are different in each of them, a fact that must be kept in mind when designing targeted interventions to promote their technological and commercial development.

1.4 Approximately 42% of the 7.8 million inhabitants of Bolivia live in rural areas. Of these, close to 94% are poor, according to the most recent version of the poverty map produced by the government (1992) and the rural poverty line of Bs179 per person per month, estimated by the Bank for Bolivia in 1999. These three million people, who are unable to earn enough to meet their basic needs, are experiencing one of the highest levels of rural poverty on the continent.

1.5 Rural poverty in Bolivia is linked to the low productivity of labor, limited human capital development, a shortage of support services for producers – particularly in technology, agricultural health, marketing channels and productive infrastructure (irrigation and rural roads) – and limited access to production factors such as land and capital goods. Improving the living conditions of the poorest groups,

particularly those in rural areas, is one of the largest challenges facing the country in the long term.

2. Natural resources and agro-ecological regions

1.6 Although Bolivia covers more than 109.8 million hectares, good farmland is scarce. Out of some 5 million hectares that are potentially arable, less than 40% (about 2 million hectares) is under cultivation, with the rest used for pasture or simply not used at all.

a. The high plateau and the valleys

1.7 Despite the fact that the high plateau and valleys in western and central Bolivia suffer from major restrictions involving climate, soil, topography and water availability and occupy just 31% of the country, they are home to 64% of Bolivians. Small farming predominates there, with 450,000 farms of under five hectares, which make up more than 64% of all the country's farms (700,000). They are operated by farmers who come from a wide variety of indigenous cultures, with Aymará predominating in the high plateau and Quechua in the valleys. Despite the small farm size, these producers generate close to 40% of agricultural GDP and produce most of the country's food.

1.8 Small farming (0.1 to 12 hectares) in the high plateau (tubers, cereals, Camelidae and sheep) is carried out using rudimentary technologies on land with moderate to low fertility, under severe climate conditions and with high risks of losses owing to drought, hail and frost. The heavy pressure on the land from population concentration and over-grazing has led to significant deterioration of natural resources, with loss of plant cover, accelerated erosion and depleted soil fertility. Production losses caused by pests and diseases, such as potato wilt, are significant. All these factors have led to stagnation in the yield of the main crops (potatoes, quinoa, barley and tarwi) over the last two decades. Prices have also fallen and the result is high poverty indexes among the rural population.

1.9 In the valleys, technological limitations range from over-parceling of the land and marked erosion to low levels of mechanization for various crops. Sanitary problems are reflected in the presence of different pests and diseases that affect garden vegetables and the heavy use of pesticides contributes significantly to production costs. Poultry die from avian salmonellosis and hogs from classical swine fever. All these factors affect farm profitability and reduce producers' net incomes.

b. The humid tropics and El Chaco

1.10 These macro-ecoregions are located in the Bolivian northeast and southeast. They cover 69% of the country but have just 36% of its population. Although most producers in these regions are also classified as small farmers (under 20 hectares) and rural poverty levels are also high, there are more medium-sized (between 50

and 300 hectares) and large farms (from 300 to several thousand hectares) than in the other two regions.

1.11 The dynamism seen in production in these regions, particularly in Santa Cruz department, is linked to capital-intensive, export-oriented farming (soybeans, cotton and sugar cane) and extensive livestock farming. However, rapid expansion of the agricultural frontier for crop and livestock farming in these regions has led to deterioration in the productive capacity of the land as a result of irrational clearing and inadequate farming practices. This threatens the sustainability of production systems and the potential for future expansion. In crop farming, the main health problem is the recent introduction of the cotton boll weevil which, if not controlled in time, may cause large losses. In livestock farming, the prevalence of foot-and-mouth disease in cattle affects production and quality levels, in addition to limiting Bolivia's access to foreign markets for exports of live animals and beef.

3. Productive structure and technology

1.12 Of the 700,000 farms that take up close to 25 million hectares (including cultivated land, pastures and forested areas) about 68% are under 5 hectares (87% are under 20 hectares) and occupy just 1.5% of the land that is being farmed in some way. At the other extreme, 1.5% of farms occupy over 80% of the land (farms from 1,000 to 17,000 hectares). This land distribution reflects a production structure with marked differences in technology and income levels for farmers. It is also closely correlated with the prevailing levels of poverty in the Bolivian countryside.

1.13 This productive structure and the predominance of traditional farming with low productivity and deficient agricultural health practices mean that, on average, agricultural productivity levels are significantly lower than in the other members of the Andean Community and MERCOSUR, ranking the sector in Bolivia among the least productive on the continent, as can be seen from the following table.

Table I-1
Bolivia. Comparative agricultural productivity (metric tons/hectare)

Product	Bolivia	Andean community [1]	MERCOSUR [2]
Rice	2.02	4.17	4.35
Maize	2.19	1.93	3.07
Wheat	0.90	1.26	2.11
Potatoes	6.07	11.46	14.25
Yucca	9.70	8.59	12.36
Soybeans	1.96	1.78	2.27
Meat [3]	171.00	185.00	202.00

[1] Andean Community: Bolivia, Colombia, Ecuador, Peru and Venezuela.
[2] MERCOSUR: Argentina, Brazil, Paraguay and Uruguay.
[3] In kg/animal.
Source: FAO, Annual Production Report 1997.

B. Restrictions on sector development

1.14 A preliminary analysis of the four macro-ecoregions and their main agrifood chains suggests that the main restrictions on the sector are linked to shortcomings in the following four areas: (i) generation and transfer of technology; (ii) agricultural health; (iii) credit; and (iv) infrastructure, particularly storage facilities, irrigation and local roads.

1.15 The restrictions associated with credit and investments in infrastructure are being partly addressed under several programs financed by the Bank, other multilateral agencies and a considerable number of bilateral cooperation agencies (Germany, Belgium, Denmark, the United States, the Netherlands, Japan, Switzerland, etc.). These programs include the investment program for rural development and the national irrigation program financed by the IDB; rural community development and land management projects financed by the World Bank; and various projects financed by bilateral agencies, which often use nongovernmental organizations to gain more immediate access to the beneficiaries. Nonetheless, the largest gap in financing is in the first two areas (technology and agricultural health) whose impact on productive efficiency, quality, and profitability is more direct.

1. Shortcomings in technology generation and transfers

1.16 Until 1998, the public system for the generation and transfer of agricultural technology in Bolivia was led on the national level by the now defunct Instituto Boliviano de Tecnología Agropecuaria (IBTA) [Bolivian Agricultural Technology Institute] and on the departmental level by the Centro de Investigaciones de Agricultura Tropical (CIAT) [Tropical Agricultural Research Center] in the department of Santa Cruz. Since it was based on a centralized and bureaucratic institutional model that viewed technology development as a mechanism for inducting technologies from research centers into farms, the system did not have a significant impact on improving the sector's productive efficiency or profitability.

1.17 That approach failed to take account of: (i) the large agroecological differences in the country which require differentiated treatment from the technological standpoint; (ii) producers' demands to surmount the restrictions (technological, health-related, commercial and entrepreneurial) encountered in their main productive chains; (iii) the changing market situation; (iv) the sociocultural characteristics of producers (including ethnic and linguistic differences); and (v) the importance of obtaining alternative sources of financing for the technological and entrepreneurial development of the sector that lessen its dependency on the public purse.

1.18 This last factor is particularly important in Bolivia since fiscal restrictions have led to declining public investments in agricultural research (0.1% of the agricultural GDP), which is the lowest in all of Latin America. The IBTA model depended

almost exclusively on public-sector financing, which made it vulnerable to problems of institutional and financial instability in that sector.

1.19 Although Bolivia made good progress in 1991-1997 in training human resources in the generation and transfer of technology, with support from the World Bank (agricultural technology development project, 2216/BO-IBRD), it was clear even then that the centralized system of support would have to be drastically changed if better productivity and quality indicators were to be obtained in the sector and farmers' incomes were to improve. As a result, the IBTA's technical assistance activities were suspended in 1991 and the institution was officially disbanded in 1998.

1.20 Today, Bolivia does not have an adequate institutional framework to provide an efficient structure for its national agricultural research system. Bridging that gap is critical on account of the country's need to: (i) overcome the technological lag affecting most farms; and (ii) increase the productivity and improve the quality of farm products with a view to raising producers' incomes.

1.21 Despite the gap on the national level, the country still has several institutions which, with their own funds, contributions from departmental governments or donations from bilateral agencies, continue carrying out some technology development activities (research, training or technical assistance). However, apart from operating without the benefits of an institutional framework to more closely coordinate their activities to reflect strategic national priorities in agrifood technology, they suffer from limited financing which prevents them from responding better to the demands for technologies made by producers in the different regions. The development of a technology market that would tap the installed technical capacity of those institutions, enabling them to provide better service for producers, is one of the objectives of the program proposed here.

1.22 The entities include: (i) CIAT in Santa Cruz which, with support from the British government and the departmental government, maintains two experimental stations and 12 regional research centers; (ii) the Pairumani Plant Ecogenetics Research Center, which operates with support from the Patiño Foundation; (iii) the Foundation for Andean Products Promotion and Research (PROINPA), which receives support from the Swiss government and operates in the high plateau; (iv) the experimental stations belonging to Gabriel René Moreno University in Santa Cruz and the University of San Simón in Cochabamba; (v) at least seven of the experimental stations that formerly belonged to the IBTA; and (vi) about 160 entities with the capacity to provide technical assistance and training services, including NGOs, producers' cooperatives and associations and agribusinesses.

2. Shortcomings in agricultural health services

1.23 In the last 15 years, agricultural health services in Bolivia have been operating with difficulty owing to frequent organizational changes, budgetary restrictions and staff shortages. They do not have enough technical capacity to effectively cope with health problems in the sector. The administrative decentralization efforts undertaken in this area over the last few years did not have the desired results, since the departmental governments did not attach priority to these problems or assign the resources needed to address them. Poor information systems on diseases and pests, incomplete and out-of-date technical standards and regulations, and application of obsolete sanitary requirements have left national agricultural health management lagging behind regional and international standards and have complicated Bolivia's effective integration into regional trading blocks.

1.24 These drawbacks mean that the Ministry of Agriculture and Rural Development (MAGDR) does not have a national organizational or technical structure that permits Bolivia to effectively comply with its obligations to: (i) prevent and control over 20 pests and diseases that are causing significant losses in its main agricultural products, reducing their quality and limiting the possibilities of access to foreign markets; (ii) protect the quality of food consumed by the public; and (iii) comply with international sanitary commitments incurred by the country under agreements with the Andean Community, MERCOSUR and the World Trade Organization.

1.25 The economic implications of agricultural pests and diseases (together, foot-and-mouth disease, avian salmonellosis, potato wilt and the cotton boll weevil cause annual production losses estimated at over US$15 million) and the government's interest in harmonizing its standards with its neighbors and regional integration blocks (Andean Community and MERCOSUR) mean that Bolivia must take steps to improve its services and levels of agricultural health and protection of food quality and safety.

1.26 Agricultural health services in Bolivia must be rebuilt by readapting the country's few existing facilities. The country has two veterinary research and test laboratories – LIDIVET in Santa Cruz and LIDIVECO in Cochabamba. Both diagnose animal diseases, perform quality control of inputs and animal feed, and certify foods for domestic consumption and export. A pesticide and fertilizer residue test laboratory exists in La Paz, but it has obsolete instruments and operates in a precarious fashion.

1.27 The Unidad de Vigilancia Epidemiológica (UNIVEP) [Epidemiological Surveillance Unit] operates in Santa Cruz de la Sierra, has jurisdiction in nine of the country's departments, and receives support under British cooperation.

C. Bolivia's strategy to surmount sector shortcomings

1. Agricultural policy

1.28 Bolivia's agrifood policy has been increasingly consistent with macroeconomic policy, whose liberalization in the last 10 years has permitted the country to achieve price stability and sustainable economic growth.

1.29 The stress in sector policy is to support services in the public interest, i.e. services that cannot be appropriated or financed by the private sector. This category includes: (i) surveillance and protection of the health of agricultural products; (ii) protection of the quality and safety of agrifood products for the domestic and foreign markets; (iii) protection of renewable natural resources and the environment; and (iv) creation of strategic technologies (maintenance of germplasm banks, sustainable production technologies, and research to meet the specific needs of small producers). This policy also seeks to optimize the use of public funds, by creating opportunities for increased private-sector participation in the financing of development in the sector.

1.30 To tackle the challenge of extreme rural poverty, the government's rural development policy aims at creating more productive job opportunities in the countryside and raising rural incomes. Special stress is laid on measures to boost sector productivity through the development of better technologies, appropriate use of modern inputs and health practices, rational use of natural resources, larger investments in productive infrastructure, and development based on the sociocultural characteristics of rural communities.

2. Generation and transfer of agricultural technology

1.31 To overcome the technological limitations and replace the former IBTA, the government has proposed to introduce a new institutional model for the generation and transfer of technology for the sector – the Bolivian system of agricultural technology (SIBTA). This model has been designed to support technology development based on: (i) producers' demands; (ii) the strategic importance for the country of addressing the technological limitations identified in its main agroecological regions; (iii) increased private participation in funding technology; and (iv) development of a technology market that allocates financing on a competitive basis. This last feature is also one of the conditions agreed upon by Bolivia under the Highly Indebted Poor Countries (HIPC) initiative.

1.32 Under the innovative concept of SIBTA, support will be given on the central level to strategic areas of technology development in the national interest, which are larger than technological problems in a specific macro-ecoregion. Demands for technological innovation by producers on the regional level will be met through the competitive technology funds operated by foundations for agricultural technology

development to be established in the country's four main agroecological zones (the Andes, the valleys, the humid tropics and El Chaco).

1.33 Establishment of these four foundations is a strategic government objective, as part of its administrative decentralization policy. Apart from reflecting production differences in the macroregions, this institutional scheme will: (i) allow for direct contact with producers and entrepreneurs in those zones to involve them more closely in setting priorities and allocating funds to applied technology projects; and (ii) serve as a pilot mechanism that will act as a catalyst for attracting financing from other sources (private sector, departmental governments and bilateral agencies) for technology development in their respective areas of influence.

3. Agricultural health

1.34 To address problems in this area, the country has proposed to introduce a new institutional model known as the National Agricultural Health and Food Safety Service (SENASAG). The model is based on the lessons learned from the shortcomings of the old system and seeks to: (i) establish a vertically-integrated system for agricultural health and food safety on the national and departmental levels; (ii) improve health surveillance and control to lessen the adverse impact on production of the high prevalence of diseases and pests and comply with its international sanitary commitments; and (iii) spur greater private sector participation in the financing thereof; and (iv) establish mechanisms for charging fees to partially and incrementally recover the cost of the services provided.

D. Bank strategy

1.35 The Bank's strategy for Bolivia includes three lines of action: (i) economic growth and the creation of opportunities, including a favorable political climate for private investment, better producer potential for participating more actively in the domestic and foreign markets, support for microenterprises and the development of rural zones; (ii) development of human capital and access to basic social services to raise the standard of living; and (iii) governance and consolidation of State reforms, including programs to modernize the public sector, particularly with respect to administrative decentralization and deconcentration.

1.36 The proposed program is consistent with the lines of action mentioned in (i) and (iii) above. It supports rural development and the alleviation of rural poverty through better technological and sanitary practices intended to boost producers' incomes and through job creation and more sustainable management of sector resources. The program will also support modernization of the public agricultural sector by addressing shortcomings in technology and agricultural health services that hamper further progress.

1.37 The program is also consistent with the Bank's strategy for the agricultural sector, which supports more equitable distribution of the benefits of growth among the

rural population and better use of the opportunities and challenges offered by regional integration systems. The strategy lays specific stress on actions to alleviate rural poverty, increase sector productivity and improve natural resource management, taking account of the nature and limitations of the country's main agroecological regions.

1.38 The program also dovetails with the four pillars of the government and HIPC Initiative program in Bolivia, since it aspires to: (i) improve farmers' incomes (opportunity); (ii) help alleviate rural poverty (equity); (iii) improve the institutional framework for services to support the sector (institutionality); and (iv) support technology innovation projects that improve returns from alternative products in coca-growing areas (dignity).

E. Action in the sector by the Bank and other lending agencies

1. Bank action

1.39 The Bank has contributed over US$300 million to the agricultural sector, which has been used to cofinance investment projects, small projects, technical-cooperation programs and MIF operations. Of the 17 investment projects financed in the sector, only two were approved in the 1990s and they are still under way: the rural development investment program (901/SF-BO) and the irrigation and drainage development program (964/SF-BO).

1.40 The rural development investment program, approved in 1993, has Bank financing of US$12.5 million and has received approximately US$30 million in cofinancing from several bilateral agencies (Germany, Belgium, Japan, etc.). The program is executed by the Fondo de Desarrollo Campesino (FDC) [Rural Development Fund]. It seeks to alleviate rural poverty by building infrastructure (local roads, micro-irrigation, schools, health posts, etc.) and strengthening community self-management capacity. To date, almost 90% of the loan has been disbursed and some 142 projects have been carried out to the benefit of low-income producers. In 1999, the bulk of the efforts were channeled into strengthening the FDC's accounting and financial capacity, through the services of an auditing firm, to enable the Fund to make more effective use of the different sources of financing for its activities. The disbursement period ends in 2000.

1.41 The Programa Nacional de Riego [National Irrigation Program] (PRONAR) was approved by the Bank in December 1995, with financing of US$25.6 million and was declared eligible for disbursement in September 1998. PRONAR's basic objectives are to alleviate rural poverty through the construction and upgrading of micro-irrigation systems and the institutional development of the country's irrigation and drainage subsector. The program is executed by the Ministry of Agriculture and Rural Development (MAGDR). The ministry receives support from the FDC in executing the investment component.

1.42 After a delay of over two years in the start of execution owing to problems related to compliance with the conditions precedent to the first disbursement of the investment component, the program is being executed as anticipated. By the end of 1999, PRONAR had financed construction of 39 irrigation projects that bring 2,000 hectares into irrigated production and has had a favorable impact on the productivity and income levels of some 1,500 rural families.

2. Action of other agencies

1.43 The sector has also received significant support from other multilateral (World Bank, CAF, FAO, IFAD, IICA, UNDP) and bilateral agencies (Germany, Belgium, Canada, Denmark, United States, Great Britain, the Netherlands, Italy, Japan, Switzerland, the European Union, etc.). About 80 projects are currently under way, financed with credits and donations from bilateral agencies for close to US$400 million.

1.44 Since 1987, the World Bank has been financing projects in the sector worth about US$135 million. Two of these projects are still in execution: the rural communities development project and the land management project. The first is intended to alleviate rural poverty through productive investments identified and formulated by the beneficiary communities themselves, which also participate in their execution. The second seeks to introduce a more efficient and transparent land management system, in which the beneficiaries apply criteria of self-sufficiency to make their holdings sustainable.

1.45 The recent actions in the sector by the IDB, the World Bank and bilateral agencies have sought greater participation by communities and beneficiaries in defining priorities and in designing and executing new rural and agricultural development projects. Efforts of this type, coupled with institutional strengthening activities, have become more relevant and have had a larger impact on raising the standard of living of the rural population than actions from the top down or the centralized schemes supported by these institutions in the past.

F. Program design

1.46 Despite active participation by the Bank and other multilateral and bilateral agencies in supporting rural development in Bolivia, rural poverty in the country continues to be widespread. Studies conducted during program preparation pointed to the high correlation between rural poverty indexes and the rudimentary technologies and poor agricultural health practices applied by most Bolivian producers. The prevalence of a rural economy based on traditional low-productivity farming that does not generate sufficient income to enable producers to cover their basic needs or improve their standard of living calls for a new approach be taken to support for technology development. The old models, based on the induction of

technologies from research centers to farms, must be replaced by a model that responds to real demands by producers and market signals.

1.47 It has also been shown that the large production losses in the sector owing to the many pests and diseases are linked to an institutional vacuum in agricultural health. These deficiencies, apart from reducing returns from the main crops, mean that Bolivia fails to meet international standards in this area, which seriously limits its possibilities of successfully joining regional integration blocks such as the Andean Community and MERCOSUR.

1.48 In this context, the country and the Bank agree that sector development must be supported by innovative institutional frameworks in which the beneficiaries themselves play an active role in setting technology development priorities, and implementing and cofinancing them. The lessons learned from recent Bank projects in this sector in Bolivia (PRONAR and rural development) show that rural poverty can be alleviated if actions are properly designed to address limitations and if they encourage participation by beneficiaries in their design and implementation. These lessons also indicate that the closer the Bank monitors the programs through more effective control of management and disbursements, the greater the likelihood that they will achieve their development objectives and goals. The proposed program has taken all these aspects into account and has been designed as a pilot operating instrument which, if appropriately implemented, will have a favorable impact on improving the standard of living of Bolivian farmers and the rural economy and will facilitate access for the country's agrifood products to foreign markets.

II. THE PROGRAM

A. Objectives

2.1 The **general objective** of the agricultural services program is to raise the income of Bolivian farmers through investments which, by strengthening technical services to generate and transfer technology and improving agricultural health practices, will boost the productive efficiency and the quality of the country's agrifood products. The **specific objectives** are to: (i) establish new institutional models for technology generation and transfer and agricultural health services; (ii) boost the productivity and production volumes of the main crops; and (iii) improve the health of agricultural products and food safety to enable the country to comply with regional (Andean Community and MERCOSUR) and international health and quality requirements and gain more access to foreign markets.

B. Goals

2.2 The program proposes the following goals to attain the above objectives: (i) establishment and consolidation of the Bolivian agricultural technology system (SIBTA) and the National Agricultural Health and Food Safety Service (SENASAG); (ii) obtain increases in average productivity by 2007 of from 25% to 50% for the main lines as compared with production in 1997-1999; (iii) by 2006: (a) reduce the incidence of cow foot-and-mouth disease from the current 13% to close to 0%; (b) reduce the incidence of avian salmonellosis in poultry farms from the current 75% to 0%; (c) reduce the incidence of potato wilt in potato seed production fields from the current 20% to 0%; and (d) prevent the introduction of cotton boll weevil in cotton fields; and (iv) include, on a pilot basis, 120 farms and 10% of food processing plants in official food safety programs by 2005.

C. Program description

2.3 The program will support two subprograms: (i) technology generation and transfer; and (ii) agricultural health.

1. Technology transfer and generation subprogram (US$18.5 million)

2.4 To bring about technological changes adapted to conditions in the country's main agroecological regions that respond to national strategic priorities and producers' demands, this subprogram will finance three components: institutional development, conservation of genetic resources, and agricultural technology innovation projects.

a. Institutional development (US$5.4 million)

2.5 This component will support establishment of the new Bolivian agricultural technology system (SIBTA) by: (i) organizing a steering committee as a broad forum to discuss problems, priorities, strategies and national agrifood technology development policies; (ii) strengthening MAGDR's Directorate General of Technology Development to enable it to act as the permanent secretariat of the system, prioritize, evaluate and monitor strategic technology innovation projects, hire staff and administer the use of funds to cofinance applied technology projects; and (iii) establishing four foundations for agricultural technology development, under private law with minority public-sector participation, in the country's four main agroecological regions (high plateau, the valleys, the humid tropics and El Chaco) which will cofinance applied innovative technology projects.

b. Conservation of genetic resources (US$800,000)

2.6 This component will help to strengthen Bolivia's native genetic heritage (Andean roots and tubers, high-altitude grains, legumes, passionflowers, squashes, fruit and forest trees and Camelidae), which are priorities on account of their nutritional, ecological and economic value, through *in situ* conservation; taxonomic, morphological and molecular categorization; agronomic evaluation; health inspection and protection; and documentation and dissemination.

c. Agricultural technology innovation projects (US$12.3 million)

2.7 Will support cofinancing, on a competitive basis, of agricultural technology innovation projects carried out by public and private institutions on the national level or by institutions linked to international centers of excellence through strategic alliances.

2.8 Two types of projects will be financed: (i) strategic, and (ii) applied. The strategic projects are in the public interest and cut across regions and sectors. Focus areas are selected on the basis of national priorities and restrictions that are identified in the national agrifood technology innovation plan. The applied projects focus on solving technological problems faced by producers in a macroregion, with priorities based on a study of their demands for better technology or on restrictions identified in their agrifood chains.

2. Agricultural health subprogram (US$21.5 million)

2.9 A National Agricultural Health and Food Safety Service (SENASAG) will be established to address the country's main needs in the area of animal and plant health and food safety. The subprogram will have four components: institutional development, animal health, plant health and food safety.

a. Institutional development (US$9.1 million)

2.10 This component will support the establishment of SENASAG on the national and departmental levels, as Bolivia's agricultural health authority, to ensure that the hygienic and sanitary conditions of plant and animal products and Bolivian food safety are maintained in accordance with regional and international standards.

b. Animal health (US$7.1 million)

2.11 This component will carry out the following actions to improve the country's animal health status: (i) strengthening of the animal quarantine system to prevent the entry into the country of pests and diseases, improving the registration and control of inputs for animals and the inspection and certification of products of animal origin; (ii) stepping up epidemiological surveillance to better evaluate the risks that animal health problems might be introduced and facilitate emergency responses; (iii) improving diagnostic and analytical practices to identify the causal agents of pests and diseases affecting animals; (iv) supporting health campaigns to eradicate foot-and-mouth disease through immunization and to control avian salmonellosis; and (v) responding to animal health emergencies.

c. Plant health (US$4.7 million)

2.12 This component seeks to improve plant health status by: (i) strengthening the plant quarantine system to prevent the entry of exotic pests and diseases, improving the control and registration of inputs for crop farming and the inspection and certification of plant products; (ii) establishing an epidemiological surveillance system to assess the status of plant pests and diseases and to monitor the risk that exotic pests and diseases might be introduced; and supporting the establishment of a national emergency-response system; (iii) improving diagnostic and analytical practices to identify the causal agents of plant pests and diseases, support risk analyses, control the quality of agricultural chemicals, and identify pesticide residues in plant products; (iv) supporting health campaigns for the control and eventual eradication of potato wilt and the cotton boll weevil; and responding to plant health emergencies.

d. Food safety (US$500,000)

2.13 This component will support the establishment of a system to control food safety, which guarantees quality for human consumption and facilitates exports through: (i) the application of good management practices on farms under official control; (ii) quality assurance in processing plants; and (iii) monitoring and control of chemical residues and biological contamination.

D. Program cost

2.14 The program will cost an estimated US$44 million, distributed by source of financing and investment category as shown in the following table.

Table II-1
Program cost (US$ thousands)

	IDB	Local	Total	%
I. Administration and supervision	**1,270**	**211**	**1,481**	**3.4**
II. Direct costs	**30,560**	**9,410**	**39,970**	**90.9**
1. Technology generation and transfer	**16,005**	**2,505**	**18,510**	**42.1**
1.1 Institutional development	2,905	2,505	5,410	
1.2 Conservation of genetic resources	760	-	760	
1.3 Technology innovation projects	12,340	-	12,340	
2. Agricultural health	**14,555**	**6,905**	**21,460**	**48.8**
2.1 Institutional development	4,700	4,370	9,070	
2.2 Animal health	6,100	1,145	7,245	
2.3 Plant health	3,330	1,355	4,685	
2.4 Food safety	425	35	460	
III. Concurrent costs	**900**	**-**	**900**	**2.0**
3.1 Project Preparation Facility	400	-	400	
3.2 Program auditing	500	-	500	
IV. Financial costs	**1,270**	**379**	**1,649**	**3.7**
4.1 Interest	930	-	930	
4.2 Credit fee	-	379	379	
4.3 Inspection and supervision	340	-	340	
Total program cost	34,000	10,000	44,000	100.0
Percentage	77.3	22.7	100.0	

2.15 The main investment categories are described below.

1. Administration and supervision (US$1.5 million)

2.16 This item represents 3.4% of the total cost of the program and includes financing for: (i) office equipment and furniture for the program coordination unit (US$110,000); (ii) the unit's staff (US$870,000); (iii) the unit's operating costs (US$279,000); and (iv) consulting services to establish a uniform system for financial administration, perform the mid-term program evaluation, install the planning and follow-up system and train staff in its use (US$222,000).

2. Direct costs (US$40 million)

2.17 This category represents 90.9% of the total cost and includes financing for the activities to be carried out under the two subprograms.

a. Technology generation and transfer subprogram (US$18.5 million)

2.18 The costs of this subprogram represent 42.1% of the total and include financing for: (i) projects for strategic technology innovation (US$2.9 million) and cofinancing for applied technology innovation (US$9.4 million); (ii) equipment and vehicles for the Dirección General de Desarrollo Tecnológico (DGDT) [Directorate General of Technology Development] and for the regional foundations (US$422,000); (iii) training for technical personnel and local and international consulting services to prepare the national agrifood technology development strategy, prioritize and evaluate strategic technology innovation projects and define the national system for the management and evaluation of Bolivian genetic resources in the medium and long terms (US$1.1 million); (iv) contracting of services to develop SIBTA's planning and monitoring system (US$280,000) and for the maintenance of germplasm banks (US$727 million); (v) incremental staff for the DGDT (US$594,000 million) and the foundations (US$1.6 million); and (vi) inputs for operating the DGDT (US$1.1 million) and the foundations (US$1.1 million).

b. Agricultural health subprogram (US$21.5 million)

2.19 These costs represent 48.8% of the total and include financing for: (i) construction of a fumigation chamber, the plant health diagnostic laboratory in Santa Cruz department, 16 posts to monitor plant and animal health at the border and 16 posts for internal monitoring (US$540,000); (ii) rehabilitation of two animal health diagnostic laboratories and installation for the plant pests and diseases surveillance unit and refurbishing of the offices of SENASAG's central and departmental directorates (US$150,000); (iii) computer, dissemination, communications, field and laboratory equipment (US$2 million); (iv) vehicles (US$2.5 million); (v) software and bibliographical materials (US$283,000); (vi) national and international training for SENASAG staff and accredited technicians (US$1.2 million); (vii) local and international consulting services for institutional strengthening (US$2.3 million); (viii) incremental staff for SENASAG on the national and departmental levels (US$5.9 million); (ix) travel and per diems (US$750,000); supplies for offices, field units and laboratories (US$4.2 million); (x) contracts for printing and publicity services (US$800,000); and (xi) agricultural health emergencies (US$1 million).

3. Concurrent costs (US$900,000)

2.20 This investment category represents 2% of the total cost and includes financing for the following two activities:

Project Preparation Facility (US$400,000). Funds will be provided to repay loan 1012/SF-BO for US$300,000 which was used to prepare the program and loan (1054/SF-BO) for US$100,000 which will help the executing agency to comply

with the conditions precedent to the first disbursement. Both operations have been financed from the revolving line of conditional credit established under agreement PPF/007-BO.

External auditing (US$500,000). Covers the contracting of external auditors to perform the annual audits of the program, of SENASAG, and of the procurement, disbursement and management processes carried out by the program executing agencies.

4. Financial costs (US$1.6 million)

2.21 This category represents 3.7% of the total cost and includes: (i) interest falling due during project execution (US$930,000); (ii) the credit fee (US$379,000); (iii) Bank inspection and supervision (US$340,000).

E. Program financing

2.22 The Bank will provide US$34 million equivalent (77.3% of the total) from the Fund for Special Operations, to be disbursed in foreign exchange. The local contribution of US$10 million equivalent (22.7% of the total) will come from the national budget. The feasibility of the local contribution is analyzed in the section on financial feasibility in chapter V.

2.23 The prospective loan will have the following conditions: (i) interest rate of 1% during the first 10 years and 2% during the next 30 years; (ii) credit fee of 0.5%; (iii) inspection and supervision fee of 1%; (iv) five-year disbursement period; (v) 10-year grace period; and (vi) 40-year amortization period.

III. PROGRAM EXECUTION

A. Execution plan

3.1 The program will be executed by the Ministry of Agriculture and Rural Development (MAGDR) through the program coordination unit. The ministry's Directorate General of Technology Development (DGDT) and the foundations for agricultural technology development will participate in executing the agricultural technology generation and transfer subprogram. To enable them to participate, **evidence will be required that the foundations have been legally established, have access to supplementary sources of financing and have signed participation agreements with MAGDR**. The National Agricultural Health and Food Safety Service (SENASAG), which was recently established by law, will participate in executing the agricultural health subprogram. **Evidence that implementing regulations under the law establishing SENASAG have entered into force and that SENASAG has contracted core staff (national director, technical directors and financial unit personnel), has installed its financial and accounting control system, and has signed an agreement with MAGDR establishing its responsibilities for executing the subprogram, will be a condition precedent to the first disbursement of the loan**.

3.2 The structure of the Bolivian agricultural technology system (SIBTA) has been created under a supreme decree and implementing regulations have been promulgated in agreement with the Bank. SENASAG has been established under a law and proposed regulations are also acceptable to the Bank. The Bolivian government has also signed agreements with bilateral agencies in the United States (USAID) and Switzerland (SDC) to support the activities of the foundations in the valleys and high plateau, respectively, which indicates the high priority attached by Bolivia to prompt initiation of the proposed program.

B. Program coordination unit

3.3 The coordination unit will be attached to the Office of the Deputy Minister of Agriculture and Fisheries of MAGDR. **Presentation of evidence that the unit has been legally established under a ministerial resolution and that it its operating with its core staff and financial and accounting systems in place, under Operating Regulations agreed upon with the Bank, will be a condition precedent to the first disbursement of the loan.**

3.4 The coordination unit will be responsible for managing, planning, coordinating and supervising program activities and for performing administrative and financial activities following the rules and procedures established in the loan contract. It will also prepare the progress reports (technical and financial) required by the Bank. To carry out these functions, the unit will establish and operate an integrated planning,

evaluation and monitoring system. **Presentation to the Bank of the annual plan of operations for the first year of the program, which will include an update of the indicators in the logical framework, will be a condition precedent to the first disbursement of the loan.**

3.5 The coordination unit will have a team of up to nine people: an executive coordinator, a specialist in program planning, follow-up and evaluation, an environmental specialist, a technical coordinator for each subprogram and four administrative and support staff.

C. Technology generation and transfer subprogram

1. Institutional development

3.6 With technical support from the DGDT, the coordination unit will procure all the consulting services and equipment needed to organize and establish the steering committee and the permanent secretariat of SIBTA, strengthen the DGDT and establish the information system for the subprogram and publicize it on the national and departmental levels. The coordination unit will also procure the services and equipment included in the initial investment costs to start up the operations of the foundations that have signed agreements with MAGDR to participate in this subprogram. It will also reimburse the foundations for the portion of their operating costs financed by the program, which include: (i) consulting services to evaluate proposals and monitor applied innovation projects; and (ii) inputs such as travel costs and publicity materials. The other operating costs of the foundations (including incremental staff, basic services, leases, fuel and office supplies) will be financed from the contributions of bilateral agencies or out of their own budgets.

2. Conservation of genetic resources

3.7 The activities in this component will be contracted through competitive bidding and will be supervised by the DGDT. The coordination unit will process disbursements to the entities contracted to perform the activities. The materials conserved will be considered public goods.

3. Technology innovation projects

3.8 The agricultural technology innovation projects will be contracted and executed on a competitive basis, applying criteria to guarantee transparency in their identification, prioritization, selection, contracting and execution. The competitions to present projects and the results of the selection process – including the list of projects approved for financing under the program – will be widely publicized in the national media. The results and evaluation of the impact of the projects carried out will also be made public. Intellectual property rights over the new technologies generated will be registered in MAGDR's name.

a. Strategic projects

3.9 The DGDT will have technical responsibility over holding the competitions, prioritization, evaluation, selection, supervision of execution and evaluation of the impact of strategic technology innovation projects. The project cycle begins with public invitations to submit proposals for projects in the priority areas established in the national strategic agrifood technology plans. When the present program was prepared, the following subject areas were identified for the strategic projects: (i) traditional farming and/or alleviation of rural poverty; (ii) sustainable management of natural resources; (iii) environmental protection; and (iv) diversification of agrifood production.

3.10 The proposals submitted for strategic projects will be evaluated on their technical and scientific merits by DGDT staff and independent experts (peer groups) engaged by the subprogram for that purpose. Based on the evaluation, the DGDT will ask the coordination unit to process contracts with the executing agencies that presented the selected proposals. The DGDT will supervise technical execution of the projects and will submit requests to the coordination unit to disburse funds to the executing agencies, based on achievement of the performance indicators established in the contracts signed with them. When the projects are completed, the DGDT will evaluate their impact based on program objectives and will publicize the results. Since the strategic projects are in the public interest, 100% of their costs will be financed by the program.

b. Applied projects

3.11 The project processing cycle is similar to that for the strategic projects, since these projects will be based on public competition, ranked in order of priority and their technical/scientific, economic/financial and social/environmental merits will be evaluated by independent reviewers engaged for that purpose. However, the applied projects will have the following specific characteristics: (i) the technical activities entailed in announcing the competitions, evaluation and selection of proposals and project supervision will be performed by the foundations in their regions; (ii) the subject matter will be based on studies conducted by the foundations to explore demand by producers, which will take account of the number of beneficiaries, the production area affected, the economic significance of the items considered and whether they address problems identified in the main agrifood chains; (iii) the projects may include all or some of the following activities: research, validation, transfer or dissemination of technology, taking a systemic approach; (iv) the program will only cofinance projects, under a matching funds arrangement, in amounts that decline from 70% in the first year, to 60% in the second, 50% in the third, 40% in the fourth, and 30% in the fifth year of the program, based on the availability of supplementary contributions; (v) the matching funds of the foundations will come from the competitive funds to be operated by them, which will be financed with contributions from bilateral agencies, departmental and

municipal governments and private sources (the beneficiaries' contribution will range between 10% and 30%, depending on producers' incomes, farm size and production lines); (vi) they will be executed under tripartite agreements between the coordination unit, the foundations and the selected executing agencies; and (vii) the coordination unit will make disbursements directly to the executing agencies.

3.12 The cycle for processing the applied projects begins with the invitations to submit proposals issued by the foundations in areas whose priority has been determined based on producers' demands or shortcomings identified in studies of production chains. The proposals submitted will be evaluated for their technical/scientific, economic/financial and social/environmental merits by independent specialists (peer groups), who will apply the criteria established in the program. They include the types of beneficiaries to be served, the scientific and technological validity of the proposals, and the potential for transferring, disseminating and adopting the results.

3.13 Subsequently, an analysis committee in each foundation will evaluate all the proposals and recommendations of the peer groups and prepare a list of recommended projects and a list of projects that are not recommended. The lists and all the documentation on the projects will then be presented to the board of directors of the foundation for review and approval.

3.14 After receiving approval from the board of directors, the selected projects will be presented to the DGDT for cofinancing under the program. The foundations, with support from independent specialists hired for the purpose, will be responsible for supervising the approved projects and evaluating their impact. The foundations will also be responsible for receiving and evaluating supporting documentation on the costs of the projects cofinanced under the program, which must be remitted to the coordination unit before the unit makes the corresponding payments to the executing agencies.

3.15 Since only two foundations (high plateau and the valleys) will be in existence when the program begins, it will establish a facility that producers in the other two regions (humid tropics and El Chaco) can use to present their project proposals directly to the DGDT. The DGDT will evaluate the proposals in terms of the number of beneficiaries, production area affected and the economic significance of the items proposed. The proposals selected by the DGDT will be eligible for cofinancing under the program, provided that their proponents contribute the matching funds that would be provided, in other cases, by the foundations and the beneficiaries. In that event, the contract for project execution will be between the coordination unit and the respective executing agency. This plan for direct cofinancing with the executing entities will have the nature of a pilot project and its performance will be evaluated in comparison with that of the foundations in the mid-term program evaluation to determine the merits of these two alternatives for financing technology development in Bolivia.

3.16 The program also includes an appeal mechanism whereby entities whose proposals are not selected by the foundations for cofinancing under the program can apply for a review by the DGDT. The DGDT will conduct the review in consultation with the foundations involved. If it is thereby determined that the proposal has sufficient merit, the DGDT will request that the foundations provide cofinancing, on condition that the proponent contributes the necessary counterpart funds.

D. Agricultural health subprogram

3.17 Successful execution of this subprogram requires that steps be taken to ensure that SENASAG functions effectively on the national and department levels as Bolivia's agricultural health and food safety authority. The law establishing SENASAG and its enabling regulations define the structure and functions proposed for the service and the program will support their implementation. The subprogram will begin by contracting and providing basic training for SENASAG's staff for the central office and the district offices that will operate in the country's nine departments.

3.18 Once its structure is in place and operating, SENASAG will carry out the institutional strengthening, animal health, plant health and food safety activities proposed for the subprogram, using annual plans of operations. The plans will be integrated with those prepared each year by the coordination unit for the entire program. SENASAG's plan of operations will be prepared by the national directorate, but will take account of the studies of the health situation in the different departments prepared by the district directorates and periodic consultations held with different producers' and business organizations in the sector in the departments. The plan of operations will be carried out by the district directorates, following the guidelines established by the national directorate. To increase the impact and coverage of its activities, SENASAG will introduce a system for the accreditation of private technical experts (who may be individuals or firms) to provide support for producers in epidemiological surveillance and health control.

3.19 The staff of the district directorates will manage the internal sanitary control activities, inspect farms and agrifood processing plants, and coordinate campaigns to control pests and diseases in their areas of influence. The technical directorates of animal health, plant health and food safety will monitor activities in their areas of expertise on the national level, including operation of sanitary control stations at the borders, and will apply and enforce the health and food standards agreed to by Bolivia pursuant to its participation in regional and international trading blocks. The service's laboratories will perform tests to support campaigns and sanitary surveillance systems and to ensure the health quality of agricultural products and food safety.

3.20 The law establishing SENASAG authorizes it to charge for its services and to levy fines for infractions of agricultural health and food safety legislation. This

mechanism will permits it to generate its own resources to cover a substantial and incremental part of its operating costs and will be an important factor for its financial sustainability after the program ends. The program includes hiring a consultant to support SENASAG in establishing its fee system to optimize this income. The mid-term evaluation will pay special attention to the system and the preliminary results obtained.

3.21 As an autonomous entity, SENASAG will have its own administrative and financial department and will keep accounting records to track its resources and justify the disbursement requests it presents to the Bank through the coordination unit. The unit will advance funds to SENASAG under the same conditions as those agreed upon with the Bank for the program's revolving fund.

E. Cost recognition and retroactive financing

3.22 The executing agency has incurred a series of costs to launch the program. They include start-up and initial operating costs for the foundations in the high plateau and the valleys and the start-up costs of some health regulatory activities in the case of the agricultural health subprogram. Costs incurred after October 8, 1999, estimated to be in the order of US$550,000 may be financed from the loan and up to US$150,000 may be recognized from the local counterpart. The executing agency will present evidence to the Bank that these costs were incurred under conditions that are substantially similar to those stipulated in the loan contract for this program.

F. Disbursement schedule

3.23 The disbursement schedule for the five years of the program is presented in the following table.

Table III-1
Disbursement schedule
(US$ thousands)

Year	IDB/FSO	Local	Total	%
1	9,100	1,600	10,700	24%
2	7,700	2,400	10,100	23%
3	6,200	1,900	8,100	18%
4	5,400	2,000	7,400	17%
5	5,600	2,100	7,700	18%
Total	34,000	10,000	44,000	100.0%
%	77	23	100.0	

G. Revolving fund

3.24 The loan proceeds will be disbursed to the executing agency in the form of a revolving fund of up to 5% of the loan.

H. Contracting of works, goods and services

3.25 **Works and goods**. Under Bank policies, international competitive bidding will be required for works worth US$2 million and up and goods worth US$250,000 and up when loan proceeds are used. Works and goods below those amounts will only be financed with counterpart funds, in accordance with domestic legislation.

3.26 **Consulting services**. Under Bank policy, international competitive bidding will only be required for contracts over US$200,000.

3.27 The Bank will initially perform ex ante reviews of the procurement processes for goods, works and services involving amounts below the thresholds for international competitive bidding. As the executing agency gains experience and demonstrates its ability to perform these tasks, the Bank may opt to conduct ex post reviews based on sampling, to which end it will establish the pertinent requisites and the amounts above which explicit nonobjections will be required. The Bank reserves the right not to use loan proceeds to finance procurements that have not been made following acceptable procedures.

I. Environmental considerations

3.28 The ESIB for the program was approved by CESI on October 19, 1998. As required under Law 1333 (Bolivia's Environment Act), the environmental fiche for the program was submitted to the Ministry of Sustainable Development and Planning for review. On April 15, 1999, the ministry ruled that the legal requirements had been complied with and exempted the project from the need for an environmental impact evaluation (category IV under Bolivian environment legislation). The fiche and its technical annexes include all the information and analysis necessary for it to be considered a Bank environment and social impact evaluation. It was made available to the public on March 28, 1999, and presented to the Public Information Center on September 10, 1999. The ESIR was approved by CESI on December 13, 1999, with the following recommendations, which have been incorporated into the program's Operating Regulations: (i) to consider the participation of indigenous organizations on the boards of directors of the foundations; (ii) to protect the intellectual property rights of indigenous communities in managing native genetic resources; and (iii) to monitor participation by women in program activities.

3.29 The program's Operating Regulations contain environmental and social criteria for the preparation, evaluation and monitoring of projects to generate, validate and transfer technology, and all necessary mitigation and monitoring measures for agricultural health activities. The coordination unit will have an environmental specialist on staff to ensure that the criteria and mitigation measures are applied.

J. External auditing

3.30 The financial statements for the program and SENASAG will be audited and certified by an independent firm of auditors acceptable to the Bank. During the program, the statements will be presented within 120 days after the close of the government's fiscal year.

3.31 The same auditing firm will be hired to review program management and the procurement and payment processes. These activities will assist the coordination unit in project execution by guaranteeing transparency in those processes and effective compliance with Bank operating requirements and controls.

K. Program monitoring

3.32 The program will be monitored through a series of actions that include the preparation of annual plans of operations, periodic reports, a mid-term evaluation, and maintenance of a database on the main performance indicators linked to program goals. The coordination unit will bear chief responsibility for these activities, but will receive support from the DGDT, the foundations and SENASAG. The coordination unit will use its financial and accounting system and its system for program planning, follow-up and evaluation to perform these tasks. The Bank will monitor the program through its Country Office in Bolivia.

3.33 The main monitoring tool will be the annual plans of operations, which will define the principal goals for the year and evaluate progress in the previous year. **Prior to October 31 of each year, the coordination unit will present the plan of operations for the following year of the program and the two subprograms to the Bank**. In addition, the coordination unit will keep the Bank abreast of the program's technical and financial performance, presenting consolidated semiannual reports starting the first year of the program. The plans of operations and the semiannual reports will help the Bank to decide what actions may be required to improve program execution.

3.34 The Bank will pay special attention to the foundations, since they are a pilot project. **Within two months after the end of each year, the coordination unit will present a report to the Bank on the use made by each foundation of the competitive funds**. The report should include detailed information on the number and cost of the applied technology innovation projects approved by each foundation, the amounts cofinanced by the program, the technical features of the projects, the classification of the executing agencies, the number and socioeconomic characteristics of the beneficiaries, and the results of each project compared to the proposed goals.

3.35 **Twenty-four months after the loan becomes eligible for disbursement or when 50% of the loan proceeds have been disbursed, whichever comes first, the**

Bank and the government will perform a mid-term evaluation of the program, including mechanisms to make it sustainable. For the subprogram on the generation and transfer of agricultural technology, they will evaluate how the new institutional models function, the number and quality of the strategic and applied projects approved, their execution status, and the interest expressed by complementary sources of funds (bilateral agencies, departmental governments and the private sector) in helping to finance the foundations. Special attention will be paid to evaluating the operating performance of the foundations as compared with that of the DGDT, with a view to determining which method is the best alternative for financing technology development projects and, if necessary, to use the results as the basis for a possible redistribution of funds among different types of projects and financing mechanisms under the program.

3.36 The mid-term evaluation will also include an analysis of program impact, in terms of participation by women and indigenous communities in its activities and benefits, and will examine compliance with the environmental recommendations made when it was being prepared. If significant shortcomings are found in program execution, the Bank will not authorize new commitments of funds until the executing agency has made the necessary adjustments.

3.37 The executing agency will maintain a database on performance indicators and goals for two years after the program ends. This will make it possible to evaluate its impact, if that is considered necessary. The database will be very useful to the Bank and the country, given the innovative nature of this operation.

IV. THE EXECUTING AGENCY

A. The borrower and the executing agency

4.1 The borrower will be the Republic of Bolivia and the executing agency will be the Ministry of Agriculture and Rural Development (MAGDR), through the program coordination unit which will be attached to the Office of the Deputy Minister of Agriculture and Fisheries. The four foundations for agricultural technology development will help to execute the subprogram for the generation and transfer of agricultural technology on the regional level. The National Agricultural Health and Food Safety Service (SENASAG) will support the coordination unit in executing the agricultural health subprogram.

1. The Ministry of Agriculture and Rural Development

4.2 MAGDR was established on September 16, 1997, under Law 1788 which was regulated by Supreme Decree 24855 of September 22 of the same year. The ministry's main functions are to formulate policies and rules and encourage their application in order to: (i) promote agricultural production and natural resource management; (ii) develop research and transfers of agricultural technology; (iii) support rural development in cooperation with the departmental and municipal governments; and (iv) promote projects for alternative development.

4.3 MAGDR has a staff of 203, 66 of whom are professionals, 33 administrative staff and 104 field personnel. Its budget in 1999 was US$16.5 million, with US$10.2 million of that figure coming from foreign credits and donations for its investment program and US$6.3 million coming from internal sources. In 1999, MAGDR used US$4 million of its internal resources as the counterpart for programs financed with external funds and just US$2.3 million for its current expenses.

2. The Directorate General of Technology Development

4.4 MAGDR's Directorate General of Technology Development (DGDT) will participate in the program as the permanent secretariat of SIBTA's steering committee. Its functions in that role will be compatible with its current functions, which are to promote and monitor the implementation of policies, plans and programs for agricultural technology innovation and development. The directorate has 21 employees – nine professionals, five technicians and seven support staff. The DGDT will be strengthened so that it can effectively carry out the activities related to the program.

B. The subprogram institutions

1. The Bolivian agricultural technology system

4.5 The agricultural technology system (SIBTA) is a permanent program operated by MAGDR to organize and promote financing initiatives and manage resources intended for agricultural and agribusiness technology innovation projects.

4.6 The system's structure is composed of: (i) a steering committee; (ii) a permanent secretariat; (iii) an oversight committee; and (iv) the foundations. **The structure has been defined in a Supreme Decree for which implementing regulations have been duly issued.**

a. The steering committee and the permanent secretariat

4.7 The system's steering committee is the main body that formulates policies and national standards for the country's agrifood technology development. Its main function is to act as a broad forum for dialogue on problems, priorities and strategies in this field. Its members will be drawn from the public and private sectors and will include the Minister of Agriculture and Rural Development who will chair the committee, the Deputy Minister of Agriculture and Fisheries, the presidents of each of the four foundations, the president of the Bolivian National Academy of Science, the president of the National College of Agricultural Engineers or of the National College of Veterinarians (who will alternate each year), and a representative of the country's public or private universities (who will also alternate each year).

4.8 As permanent secretariat of SIBTA, the DGDT will coordinate, supervise and monitor the system's activities, including the activities of the four foundations. It will also be responsible for supervision and coordination of the national strategic investigation projects and the genetic resource conservation component.

b. SIBTA oversight committee

4.9 The committee's functions are to advise and issue recommendations for the good operation of the system and the foundations. It will be composed of representatives of bilateral and multilateral cooperation agencies and private organizations that participate directly in financing the system's activities in general and those of the foundations in particular.

c. Agricultural technology development foundations

4.10 The foundations will be the regional operators of SIBTA. They will be established under law as private not-for-profit entities, as joint ventures in which only legally-established entities may participate. **The foundations in the high plateau and the valleys have been legally established.** The other two (humid tropics and El

Chaco), which have not yet been established, are expected to join the program in year two.

4.11 The foundations will not conduct research themselves, but will promote initiatives to obtain funding to finance innovative applied technology projects, selected competitively. In this way, they will promote the development of a market for agricultural technology services in which private and public agents involved in the agrifood chain will participate.

4.12 The operating model of each foundation includes an organizational structure composed of an assembly, a board of directors and core staff. The structure will be based on the following principles: (i) 60% of the assembly will be representatives of sectors that demand innovative technology services and 40% will be representatives of its suppliers; (ii) two thirds of the board of directors will be drawn from civil society organizations and one third from the public sector; and (iii) the core staff will number between five and seven, depending on activities. In the assembly, the sector demanding technology will be represented by various civil society organizations, including associations of producers and entrepreneurs, grass-roots territorial organizations and groups of indigenous communities.

4.13 The staff of the foundations will be small in order to keep operating costs to a minimum. It will include an executive director responsible for administration, a specialist in technology generation and transfer, a specialist in planning and raising funds, and financial and administrative personnel.

4.14 The initial investments in the foundations have been estimated at between US$119,000 and US$135,000 and include the procurement of equipment, furniture and consulting services to set up the financial and monitoring systems. The operating/recurrent costs will finance incremental staff, inputs and annual consulting services (peer groups to evaluate project proposals and monitor their execution). These costs range from US$167,000 to US$220,000 a year.

4.15 For the foundations to receive support under the program, they must sign agreements in advance with MAGDR. The support will consist of reimbursing their initial investment costs and the portion of their operating costs (consulting services and inputs such as travel costs and publicity) financed by the program. The program will also cofinance competitive applied technology innovation projects with the foundations, under the matching funds approach. The portion of project costs not financed by the program will come from complementary sources, including bilateral agencies, the project executing agencies and the private sector.

4.16 The foundations will be established without an initial capital investment. However, during the five years of the program, they may establish minimum capital funds financed from an overhead charge applied to the financing they attract from sources outside the program for their competitive funds. The resources may come from

bilateral agencies, new government contributions, departmental and municipal governments and the private sector.

4.17 The foundation for the high plateau has already been established with support from the Swiss Agency for Cooperation and Development (SDC) which has made a minimum capital contribution and will finance part of its operating costs and innovative technology projects. This foundation grew out of the transformation of the Andean Products Promotion and Research Foundation (PROINPA). Unlike the other foundations proposed, this foundation has its own installed capacity to perform research, since it operates the Toralapa experimental station under a contractual arrangement. The performance of this operating modality will be examined during the mid-term program evaluation, with a view to determining its advantages and drawbacks as compared with the other foundations, whose activities will be limited to management functions.

4.18 The Bolivian government has also signed an agreement with the United States Agency for International Development (USAID) to support the foundation for the valleys. USAID will contribute to its operating costs and its competitive fund.

4.19 The Deutsche Geselleschaft für Technische Zuzammenarbeit (GTZ) of Germany is also negotiating a donation for the Chaco foundation with the Bolivian government. The negotiations are expected to conclude during the first year of the program and the GTZ could begin its activities starting in year two. The foundation for the humid tropics has not been established and no complementary source of financing has been identified as yet. This means that it will not be able to participate in the program until these requirements are met.

4.20 Except for the Toralapa experimental station (under the high plateau foundation), the public experimental stations will not be part of the foundations. It is the government's intention to legally transfer the existing experimental stations to the departmental governments. The program will finance a study to evaluate the alternatives for making the best use of them. One potential alternative would be to convert some of them into executing agencies of technology projects.

2. The National Agricultural Health and Food Safety Service

4.21 SENASAG is a decentralized public agency reporting to MAGDR, with autonomy in its technical and administrative management. It will sign an agreement with the ministry to receive program financing in order to carry out the investments and actions envisaged in the agricultural health subprogram. **Implementing regulations for the law establishing SENASAG will be a condition precedent to the first disbursement of the loan**.

4.22 SENASAG, as a new agency, will have responsibilities and functions that are not carried out at present in the country or which are only performed partially on the central level or by certain departmental governments. Those functions and

responsibilities are: (i) protection of the agricultural and forestry heritage and improvement of plant and animal health; (ii) certification of the agricultural health and food safety of exported and imported products; (iii) control, prevention and eradication of pests and diseases in animals and plants; (iv) control and guarantee of food safety; (v) control of inputs used in agricultural production; and (vi) improvement in agricultural health and agrifood quality.

4.23 The structure proposed for SENASAG includes a national directorate, a district directorate in each of the country's nine departments and program administration committees.

4.24 The national directorate will be the senior executive body responsible for directing, coordinating and supervising compliance with SENASAG's mandate. The national director will be appointed in accordance with regulations in force in Bolivia for public officials at that rank. The national directorate will have three technical directorates: animal health, plant health and food safety.

4.25 The district directorates will be deconcentrated units with jurisdiction and operating authority in each department and their operations will be governed by guidelines and standards issued by the national directorate. The district directors will be appointed by the national director following a merit-based competitive process.

4.26 The national and departmental program administration committees will be deconcentrated entities composed of representatives of the public and private sectors. They will constitute a forum to permit private sector participation in specific programs, such as pest eradication.

4.27 Since SENASAG will be established under the proposed program, all its staff of up to 156 at the national and district levels will be incremental. It will include professionals, technicians, and administrative and support staff.

V. FEASIBILITY AND RISKS

A. Technical feasibility

5.1 The main factors necessary to assure technical feasibility have been considered in the conception and design of the two subprograms. The technology generation and transfer subprogram has been formulated to support a new system, which draws broad representation from the public and private sectors and will have effective participation by producers in planning, monitoring and financing activities involving technology generation, validation and transfer.

5.2 The technology innovation projects will be designed based on priorities identified in strategic agrifood technology plans and in technical studies to explore producers' demands. The DGDT and the foundations will have technical staff trained in the process of prioritizing and selecting technology innovation projects. The process will include a review of the technical and scientific merit of each project to be performed by consultants specializing in each line of action (peer review) and projects will be selected by an analysis committee. Both stages will assure that the projects chosen include actions to solve the problems identified, that appropriate development methods are used and that the executing institutions have expert personnel and sufficient infrastructure to generate, validate and/or transfer the required technologies.

5.3 Use of a strategy that integrates all the stages from generation to transfer of technology in each project, including training and communications activities, will facilitate the adoption of technology by producers and exchanges among researchers, technicians and producers.

5.4 The agricultural health subprogram has been based on a broad study of Bolivia's problems in the field of health and food safety. Creation of the Agricultural Health and Food Safety Service (SENASAG) is intended to provide an effective response to those problems, through an integrated system to control the main pests and diseases, which will help resolve them. It will also be provided with the capacity to respond to future challenges that may arise in this field.

5.5 SENASAG will also have a system for accrediting private technicians, that will expand and guarantee operating capacity. Significant participation by the private sector will be sought in decision making and in performing activities.

B. Environmental feasibility

5.6 An analysis of the environment impact of the program concluded that it will have several positive environmental effects. The integration of environmental considerations and technologies, such as the protection and improvement of natural

resources and the search for mechanisms to control pests, will reduce or obviate the need to use agricultural chemicals. The program's negative environmental impact will not be significant and can be controlled with mitigation measures.

5.7 The program will have positive social impacts for low-income producers by increasing productivity and income through the use of new technologies and the control of pests and diseases that cause significant financial losses on their farms. The transfer activities included in technology innovation projects will permit closer involvement of women and their families in boosting production, given their importance in Bolivia's rural economy.

5.8 The program's environmental management and mitigation plan will ensure that the impact of research projects is evaluated, that mitigation measures are complied with, and that the environmental aspects of research and technology transfers included in the projects and in all agricultural health activities are monitored.

C. Institutional feasibility

5.9 The organizational structure of the program coordination unit, the profiles of the proposed technical staff and the fact that the unit will report to the Deputy Minister of Agriculture and Fisheries means that it will have sufficient capacity and ability to satisfactorily perform program coordination and supervision.

1. Technology generation and transfer subprogram

5.10 The program will support the DGDT through institutional strengthening activities to ensure that it will have the installed capacity needed to effectively coordinate the activities of SIBTA and supervise national strategic innovation projects.

5.11 The foundations have been designed institutionally to keep their organizational structure and overhead to a minimum, which will enable them to operate effectively. Each foundation will have a small core staff to coordinate the evaluation of proposals for innovative projects, administer the competitive funds and monitor projects under way. The staff will be supplemented by short-term consultants to assist in evaluating proposals and monitoring project execution. The consultants will bring an independent outlook and ensure that the process is transparent. The profiles of the foundations' staff and consultants indicate that they will have the necessary skills for good operations. This confirms the institutional feasibility of the proposed operating plan for the foundations.

2. Agricultural health subprogram

5.12 Under the proposed legislation, SENASAG will be established as a central public agency with national authority and independent technical and administrative management, but with links to MAGDR. The institutional plans to be introduced

during the program confirm that SENASAG will have the necessary structure and resources to act as the agency responsible for controlling agricultural health.

5.13 SENASAG will use its own staff to perform functions that the government cannot delegate and will certify private-sector professionals to perform other functions. This will enable it to achieve higher coverage, without having to maintain an overly large staff. The size and profiles of SENASAG staff been based on the type and volume of work to be performed in each unit at headquarters and in the district offices. Since no national government agency is currently performing these functions, all the employees are incremental. The design of SENASAG's structure and the proposed personnel profiles indicate that it will be institutionally viable.

D. Financial feasibility

5.14 One of the program's main objectives is to ensure that the institutions to be established and consolidated under it (the foundations and SENASAG) take steps to make themselves financially sustainable after the program ends. Attainment of this objective will produce two significant benefits. The first is intended to reduce to the extent possible the counterpart funding requirements during the five years that the project will last. The second seeks to minimize the impact that the recurrent costs of the new institutions will have on the national budget after the program ends. Potential sources that the institutions could tap to generate funds to bring about these benefits were identified during program preparation.

5.15 On the one hand, around US$2.2 million could be obtained to finance their operating costs through a revision of the agreements that the Bolivian government is negotiating with different bilateral agencies to support introduction of SIBTA and the institutions could potentially generate income by charging overhead on the resources they capture for their competitive funds from sources outside the program. If those resources can be obtained, demands on the national budget would be reduced by an equivalent amount.

5.16 On the other hand, the income that SENASAG could earn from the services it will provide in exercise of its legal mandate as Bolivia's agricultural health and food safety authority was estimated. Those services include health certification of agrifood exports and imports, inspections of processing plants, and accreditation of private technicians to assist producers in health surveillance and control. SENASAG will also be able to levy fines for infractions of regulations in its sphere of competence. It was estimated that the amount that could be generated from these sources would increase from US$800,000 in the second year of the program to US$1.9 million by year five, for a total of about US$4.6 million over the program implementation period. This sum could also replace an equivalent amount currently allocated in the national budget as the counterpart contribution to the program, to cover SENASAG's operating costs.

5.17 Notwithstanding the potential for generating resources from the above-mentioned sources, the Bolivian government has made a commitment to provide an average of US$2 million a year to finance the entire US$10 million counterpart required over the five years of this program. The contribution for the first year has already been included in the budget submission for 2000.

5.18 The average annual counterpart for this program of US$2 million represents a significant increase (53%) in MAGDR's operating budget, which averaged US$3.8 million over the last four years. Despite the counterpart's size, the government is determined to allocate these funds owing to the priority it attaches to the areas to be supported by the program. In the long run, the expected impact of the program on the ministry's operating budget will come from the recurrent costs of the new activities that the DGDT will continue to perform in support of SIBTA. These costs have been estimated as US$163,000 a year, or 7% of MAGDR's operating budget in 1999. The ministry has indicated its intention to include these incremental costs in its future annual budgets.

1. Technology generation and transfer subprogram

5.19 The foundations will have to find resources for their competitive funds from sources outside the program (bilateral agencies, departmental governments, private sector, etc.). They will be put to two uses. On the one hand, they will provide the matching funds needed by the foundations to cofinance the applied technology projects that will be partly financed by the program. On the other, by charging overhead on the resources they obtain for their competitive funds, the foundations can also obtain income to cover the operating costs not financed under the program. Simulations were used to determine that the maximum rate that could be charged as overhead would be 10%, since anything higher would reduce the likelihood of attracting the interest of potential contributors to the foundations' competitive funds.

5.20 The program will provide cofinancing for the applied technology projects ranging from US$520,000 to US$540,000 a year for each foundation. Under the matching funds approach, the percentage cofinanced by the program will be gradually reduced from about 70% in year one to 30% in year five, which means that if the foundations are to use all the program's resources, each will have to obtain funding ranging from US$743,000 in their first year of operation to close to US$1.8 million by the last year of the program. At an average expected cost of US$75,000 per project, 10 projects per foundation will be financed in the first year and 24 in the last year of the program. Accordingly, to achieve this level of financing and generate overhead to cover a portion of its operating costs, the foundation for the high plateau would have to find supplementary financing about US$3.4 million over the five years of the program. The requirement for the foundation for the valleys would be US$3.6 million. The foundations for the humid tropics and El

Chaco, which are expected to begin operating in the second year of the program, would have to find US$2.1 million each.

5.21 The probability of attracting these funds is high, since the government has signed an agreement with USAID for a poverty alleviation program which includes US$5 million for the foundation for the valleys. The same holds true for the foundation for the high plateau, since the Swiss bilateral agency, SDC, has already agreed to provide US$2 million for its competitive fund and is also willing to help cover part of its operating costs. Germany's GTZ is considering a contribution of about US$1.6 million for the El Chaco foundation. Last, other bilateral donors (the Netherlands and Denmark), some departmental governments (Santa Cruz and Tarija) and some private companies and producers' organizations have expressed interest in providing funding for the foundations, once they have been established and demonstrate that they can effectively administer their competitive funds.

5.22 The financial sustainability of the foundations after the program ends will depend on their operating efficiency. If efficiency remains at the same levels as the foundations are expected to achieve during the program, they will be able to continue attracting contributions for their competitive funds at levels that will permit them to generate sufficient overhead to finance their operating costs. If each foundation can obtain between US$1.7 million and US$2.2 million a year from bilateral cooperation or businesses, it will be able to cover its operating costs by charging the 10% overhead envisaged in the program. The interest in supporting SIBTA expressed by different bilateral agencies, departmental governments and entrepreneurs in the sector suggests that they can probably obtain those funds.

2. Agricultural health subprogram

5.23 SENASAG's operating costs will be financed during the program, with 52% charged to the local counterpart. After the program ends, the costs will be partly financed by the US$1 million contribution that the Bolivian Treasury has committed to pay in order to ensure SENASAG's sustainability, and partly by fees for services and fines for infractions of agricultural health legislation, as mentioned earlier. The program includes financing for consulting services to assist SENASAG in designing a fee schedule to optimize the income it can obtain on its own.

5.24 SENASAG's financial sustainability depends on its capacity to control its operating costs and obtain direct income by charging for its services. Financial projections were made for SENASAG for the four years after the program ends, using its operating costs in the fifth year of the program as the basis. Its potential income from certifications of imports and exports and the administration of agricultural health registers was estimated over the period. Import and export volumes have tended to grow historically and the fees applied were those currently charged by Santa Cruz department. The estimates are conservative, since Bolivia's exports can be expected to grow as a result of the program.

5.25 It was estimated that SENASAG's operating costs would be US$2.2 million and its income US$1.9 million by the fifth year of the program. This would leave US$300,000 to be financed from the national budget, which can easily be covered by the amount already committed. Extending the analysis and assuming annual growth of 5% in SENASAG's operating costs, growth of 7% in imports and 9% in exports by the ninth year the service is in operation (or four years after the program ends), its operating costs would be US$2.7 million and its income approximately US$2.4 million, which would leave the same balance of US$300,000 observed in the fifth year, which is included in the government's annual budget. These results are reasonable, since there are few countries in which national agencies in charge of agricultural health are fully self-sustainable.

E. Socioeconomic feasibility

5.26 A socioeconomic evaluation was performed of each of the two subprograms (technology generation and transfer and agricultural health subprograms) and their expected overall impact, in terms of increases in production value and sector exports.

5.27 For the technology generation and transfer subprogram, the analysis focused on an ex ante estimate of the anticipated economic impact of the sample of potential strategic and applied technology innovation projects that could be financed on a competitive basis by the DGDT and the four foundations.

5.28 For the agricultural health subprogram, the evaluation was based on an estimate of the benefits accruing from the reduction in production losses caused at present by the pests and diseases to be combated under its health campaigns.

5.29 For both subprograms, the analysis centered on the production lines that are most important economically for the sector and the country and the level of the activities to which the investments proposed under the program will be targeted. The cost-benefit analysis was based on a comparison of the economic benefits and/or costs of the situations 'with' and 'without' the project. The costs included were the incremental costs of program investments and operations (production) for the projects evaluated, valued at efficiency prices in foreign exchange.

1. Technology generation and transfer subprogram

5.30 The investments to be made under this subprogram seek to surmount technological restrictions that affect national strategy or farmers' production systems or their agrifood chains. The subprogram stresses technology options to improve returns from the main sector products and raise producers' incomes.

5.31 The economic evaluation was based on estimating the most probable economic impact of the subprogram stemming from 27 strategic and applied research projects

and validations and transfers of technology. The projects were ranked in order of priority by MAGDR experts, after consultations with technology development institutions and potential users of the technology to be generated and/or transferred. These projects were also reviewed by peer groups to ensure that their technical designs were valid. The projects are directly linked to potential demand for technology in 12 areas to be served, on a competitive basis, by the DGDT or the four foundations in their respective areas. The criteria used to prioritize the projects and in the ex ante evaluation of their impact have been included in the regulations governing the competitive system and will be applied during the subprogram.

5.32 Probability distributions were calculated for the projects studied, associated with the event of achieving adequate economic impact, i.e. a positive net present value for flows of incremental benefits. In addition to indicating the probability of success (or failure) in the generation or adoption of new technologies, the distributions took account of the impact of factors that could affect their adoption such as: (i) lower-than-expected impact on productivity and quality; (ii) financial and management requirements; and (iii) market conditions for the production lines studied. In addition to the probability distribution estimate, indicators of aggregate economic merit were also obtained (net present value and internal rate of economic return).

Table V-1
Results of the benefit-cost and sensitivity analysis for Technology development projects

Foundation/project	NPV (US$ millions)	EIRR %	EIRR sensitivity [1]
High plateau			
Potatoes	9,083.1	37	23
Camelidae	1,167.4	29	15
Quinoa	565.3	19	14
Broad beans	952.4	28	12
Valleys			
Lesser cereals	1,699.9	34	23
Fruit and vegetables	2,659.8	43	24
Humid tropics			
Farm-forestry	2,241.9	48	28
Soybeans	6,260.8	55	37
Cotton	1,450.0	35	14
Fodder crops	4,678.3	47	32
Tropical crops	8,606.8	52	41
El Chaco			
Oilseeds	5,460.0	47	31
Native cattle	1,077.0	35	17

NPV = net present value discounted at 12% per annum. EIRR = economic internal rate of return.

[1] Sensitivity estimated using the most pessimistic probable scenario for technology adoption patterns.

5.33 The results of the evaluation of 12 priority products are presented above. All the probability distributions converged around positive net present values. In other words, projects of this kind have a high probability of generating positive impact with respect to net economic returns for the producers or entrepreneurs who adopt them. This means that Bolivia is justified in allocating funds to finance them from the economic standpoint. The sensitivity analysis applied to the indicators demonstrated that they are stable in the face of possible variations in the main factors that influence technology-adoption patterns.

2. Agricultural health subprogram

5.34 The economic evaluation of this subprogram examined the impact of some specific agricultural health projects (foot-and-mouth diseases, avian salmonellosis and potato wilt) that will be supported by the proposed investments. Not enough information was available to evaluate the impact of losses caused by the cotton boll weevil, since the pest is new to the country. The following table presents the main indicators of economic merit and an analysis of their sensitivity. The table shows that all the projects evaluated will have a positive economic impact, which justifies their financing under the subprogram. The results are also stable in the face of possible variations in the main factors that influence their potential and benefits.

Table V-2
Results of the benefit-cost and sensitivity analysis for selected agricultural health projects[1]

Project	NPV (US$ millions)	EIRR %	EIRR sensitivity
Control and eradication of foot-and-mouth disease	2,656.6	22	14
Control of avian salmonellosis	3,299.4	36	23
Control of potato wilt	5,192.7	27	17

NPV = net present value discounted at 12% per annum. EIRR = economic internal rate of return.

[1] Sensitivity estimated assuming that reductions in production losses will only be 75% of the anticipated figure.

3. Aggregate economic analysis of the program

5.35 On the aggregate level, as a result of the investments in technology generation and agricultural health, it has been estimated that the gross value of sector production will increase by about US$30 million by 2007. The increases in production, coupled with more access to foreign markets as a result of better agricultural health, will bring about an increase in sector exports of approximately US$25 million a year. The increase is very probable, since in the early 1990s Bolivia exported about US$35 million worth of meat products but lost that source of foreign exchange due to health problems. The impact of this subprogram on better public health for Bolivians will, of course, far outstrip the proposed investments.

F. Program beneficiaries

5.36 The main beneficiaries of the program will be producers, entrepreneurs and salaried workers engaged directly in agricultural activities. The technology development projects are expected to directly benefit an estimated 10,000 producers. Furthermore, dissemination of information on the results of the projects, the campaigns to control pests and diseases and use of better health practices will benefit another 100,000 producers. The new systems for food safety inspection and control will directly benefit all Bolivian consumers.

5.37 This operation qualifies as a social equity enhancing project, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Furthermore, it qualifies as a poverty-targeted investment (PTI). Its classification as a PTI is justified since 70% of the direct beneficiaries have incomes below the poverty line for Bolivia established by the Bank. A similar percentage has been estimated for the indirect beneficiaries. The project does not specify explicit performance indicators to measure poverty reduction or improve social equity. The borrower will not use the 10 percentage points in additional financing.

G. Risks

5.38 The main risk faced by the program has to do with the agricultural technology transfer and generation subprogram. Specifically, the foundations for agricultural technology development may encounter difficulties in attracting funds from outside sources to cover their operating costs and obtain income from an overhead charge to assure their financial sustainability. The commitments already obtained by the Bolivian government from bilateral agencies and the interest expressed by other donors and some departmental governments in supporting technology development in the sector through the foundations will reduce that risk.

BOLIVIA
AGRICULTURAL SERVICES PROGRAM (BO-0176)
LOGICAL FRAMEWORK

ojectives	Indicators	Means of verification	Assumptions
producers'	By 2007: • Net income on the farm level from the main agricultural products of beneficiary producers rises by 20%-40% over the levels in 1997-1999.	• Statistics from the National Statistic Institute (INE). • Agricultural statistics from INE and MAGDR. • Statistics from the departmental agricultural boards of trade. • Statistics for program monitoring prepared by the coordination unit on the income of families of beneficiary producers.	• The government maintains its macroec stability policy. • The government's rural development a poverty alleviation strategy continues. • The relative price structure of products does not change or improves, and there productive structure does not change ei • The production technologies and agricu health measures promoted by the progr adopted.
rove the ive efficiency and of sector products.	By 2007: • Gross production volume (in MT) increases by 10% over the average for 1995-1999. • Bolivian agricultural products meet the standards required by regional markets.	• INE statistics. • Agricultural production statistics from INE and MAGDR. • Statistics from the departmental agricultural boards of trade. • Statistics on the program prepared by the coordination unit.	• Program investments are made in acco the proposed timetable. • The production technologies and agricu health measures promoted by the progr adopted.

TECHNOLOGY GENERATION AND TRANSFER SUBPROGRAM

ectives	Indicators	Means of verification	Assumptions
se the ity of the main e sector he adoption of hnologies.	By 2007: • Average productivity of the main lines of beneficiary producers rises by 25%-50% over the levels in 1997-1999.	• Agricultural production statistics from INE and MAGDR. • Statistics from the departmental agricultural boards of trade. • Statistics on the program prepared by the coordination unit.	• The relative price structure of produ inputs does not change or improves therefore the productive structure d change either. • The production technologies promo program are adopted.
ish and te the Bolivian ral Technology SIBTA).	By 2006: • SIBTA continues operating effectively after the end of the program.	• MAGDR reports on the performance of SIBTA and the foundations.	• The government continues to attach SIBTA. • The government provides the count for the subprogram. • The foundations are able to attract f from other sources for their compet and operating costs to ensure their sustainability.

TECHNOLOGY GENERATION AND TRANSFER SUBPROGRAM			
ectives	**Indicators**	**Means of verification**	**Assumptions**
ıal **ıent** ment of steering e and t secretariat. ment of the ns.	By 2005: • Two meetings a year of the steering committee. • DGDT able to carry out its functions as permanent secretariat of SIBTA. • At lease two agricultural technology foundations established with their competitive systems operating.	• Minutes of the regular annual meetings. • Annual SIBTA reports. • Semiannual program progress and evaluation reports. • Legal status of the foundations.	• The supreme decree establishing SI promulgated. • Bilateral agencies help to finance th foundations. • Private sector organizations are inte participating in SIBTA and the four
ation of genetic **s** nce of five rmplasm banks tubers and h-altitude tive fruit and es and e).	By 2005: • 1,400 accessions to preserved Andean roots and tubers. • 2,700 accessions to preserved quinoa. • 3,000 accessions to nine preserved collections (amaranth, beans, tarwi, peppers, squashes, passionflowers, wheat, peas and broad beans). • Six live collections of forest species and five fruit species preserved. • A national registry of Camelidae established and an elite stock of 90 llamas (kcaras and tampulli) and 20 alpacas (suri and huacaya) classified.	• SIBTA annual reports. • Semiannual program progress and evaluation reports. • Operating agreements for the germplasm banks.	• The institutions that administer the banks reach agreements with the go on conservation of the genetic resou priority Bolivian native crops.
gy **ıent** ment a ve system for strategic and rojects.	By 2005: • Ten strategic projects selected on a competitive basis. • 160 agricultural technology innovation projects selected on a competitive basis. • 10,000 farmers participate directly in technology transfers and 100,000 producers benefit indirectly.	• SIBTA and foundation annual reports. • Annual plans of operations of the foundations. • Semiannual program progress and evaluation reports. • Final project reports.	• The foundations have been organiz macroregion. • Entities that provide technology-ge services are interested in presenting proposals. • Farmers are interested in the compe system. • A sufficient number of proposals th requisites are presented.

AGRICULTURAL HEALTH SUBPROGRAM

jectives	Indicators	Means of verification	Assumptions
ve the sanitary agricultural and food safety by better sanitary	By 2007: • Bolivian products meet regional standards for health and food safety. • Production losses due to pests and diseases are reduced by US$15 million a year.	• INE and MAGDR agricultural production statistics. • Statistics from departmental agricultural boards of trade. • Program monitoring statistics prepared by the coordination unit.	• The investments proposed for th subprogram are made. • Producers apply the health meas recommended by SENASAG.
ish and te the National ral Health Service AG).	By 2006: • SENASAG is operating effectively on the national and departmental levels, performing the functions envisaged in the subprogram.	• Semiannual progress and evaluation reports on the subprogram. • Protocols on the health situation with regard to food-and-mouth disease and avian salmonellosis submitted by SENASAG to international organizations.	• The primary sector is aware of t status of the country's livestock need to improve it. • Exporters of food and agricultur are aware that they must comply health requirements to maintain competitiveness.
s **onal development** G is established its are al; its staff has racted and	By 2005: • SENASAG structure created and up to 166 staff hired and trained. • Agricultural health standards in effect. • Producers and the general public are aware of agricultural health problems. • Accreditation system operating. • Planning, monitoring and evaluation system operating. • Fee system in effect. SENASAG earns US$800,000 in 2001, rising to US$1.9 million by 2005 from fees for its services.	• Semiannual progress and evaluation reports on the subprogram. • SENASAG annual reports. • Publication of SENASAG laws • SENASAG economic and financial reports, including the income received from its services.	• Law creating SENASAG and re decree in force. • The government contributes the as scheduled. • The private sector demands effi agricultural health services and to their consolidation. • Growth in exports and imports o agricultural products, byproduct is maintained.
ealth uarantine system ned.	By 2005: • All live animals and animal products imported into the country are inspected. • 70% of stockyards are inspected. • 70% of establishments that sell veterinary products are registered and inspected. • 100% of exported animal products are inspected and certified.	• Semiannual progress and evaluation reports on the subprogram. • SENASAG annual reports. • Reports by the animal inspection and quarantine unit compared with import statistics kept by the customs administration. • Monthly reports and documents from the Epidemiological Surveillance Unit.	• Recognition and use of the servi society. • SENASAG staff and accredited perform their work efficiently. • Materials are delivered in suitab for processing. • Producers participate actively in campaigns. • Agreements on carrying out hea campaigns are signed with prod associations.

AGRICULTURAL HEALTH SUBPROGRAM			
jectives	**Indicators**	**Means of verification**	**Assumptions**
ological ıce Unit fully ted into the	• Five differentiated strategies developed to identify and analyze animal diseases, using valid methodologies and tools	• Monthly technical reports from the LIDIVET and LIDIVECO laboratories.	• There is consensus among all th participating in the program.
ealth diagnostic ies fully ted into the nd a network of ies established.	• 165,000 samples and materials submitted to laboratories are analyzed. • Five laboratories join the network.		
declared free -and-mouth ith immunization.	• By 2006, the incidence of foot-and-mouth disease falls from 13% to close to zero. Production losses from the disease fall from US$2.5 million a year to zero. • By 2007, restrictions are lifted on exports of Bolivian beef.		
monellosis is d.	• By 2006, 100% of imported chicks and fertilized eggs are inspected and enter the country disease free. • By 2006, the incidence of the disease in incubators and poultry farms has fallen from its level of 75% at the start of the program to zero and economic losses in poultry production are reduced by US$2 million annually.		
lth h quarantine engthened.	By 2005: • All plant products imported into the country are inspected. • 70% of nurseries and plant deposits are inspected. • 70% of establishments that sell farm inputs are registered and inspected. • All exported plant products are inspected and certified.	• Semiannual progress and evaluation reports on the program. • SENASAG annual reports. • Reports by the Plant Inspection and Quarantine Unit compared with the import statistics of the customs administration. • Monthly reports and documents of the Plant Health Surveillance Unit.	• SENASAG staff and accredited perform their work efficiently. • Materials are delivered in suitab for processing. • Producers participate actively in campaigns. • An agreement is signed with PR • Agreements are signed with pro associations to carry out health c
lth Surveillance blished and .	• Five differentiated strategies developed to identify and analyze plant diseases, using valid methodologies and tools.	• Monthly technical reports from the plant health diagnostic laboratory.	

AGRICULTURAL HEALTH SUBPROGRAM			
jectives	**Indicators**	**Means of verification**	**Assumptions**
lth diagnostic ies built and and laboratory established.	• 5,000 samples and materials submitted to laboratories analyzed. • Three laboratories join the network.		
mpaigns: cotton il controlled and m the cotton- g region.	From 2001 to 2005: • Prevent the entry of the boll weevil into production fields, which will avert an estimated increase in the incidence of the pest of 10% a year. • Avoid annual production losses of about 3,000 tons that represent economic losses of US$18-22 million over the five years.		
lt controlled.	By 2006: • Pest reduced from 20% to zero in seed-production fields. • Incidence of the pest reduced from 40% to 10% on average in Chuquisaca, Cochabamba, La Paz, Santa Cruz and Tarija. • Production losses caused by this disease reduced by 15,000-20,000 tons a year.		
ty	By 2005: • 120 farms under official inspection. • 10% of food processing plants under official inspection. • System to monitor and control residues and microbiological contamination established.	• Semiannual program progress and evaluation reports. • SENASAG annual reports.	• Recognition and use of the servi society. • The private sector participates a working together with the publi

General Procurement Table

Item	Number of lots	Total cost (US$)	Financing		Method	Publication
			IDB	Local		
I. Civil works		**688,860**				
1.1 Construction fumigation chamber	1	143,920	100		LCB	I 2001
1.2 Construction LARDIF laboratory	1	200,000	100		LCB	I 2001
1.3 Construction 16 external control posts	1	97,600	100		PS	I 2001
1.4 Construction 16 domestic control posts	1	97,600	100		PS	I 2001
1.5 Repairs SENASAG offices	1	99,740	100		PS	I 2001
1.6 Repairs UNIVEF offices	1	10,000	100		PS	I 2001
1.7 Rehabilitation LIDIVET and LIDIVECO laboratories	1	40,000	100		PS	I 2002
2. Goods		**5,307,666**				
2.1 Computer equipment	2	735,690	83	17	ICB	I 2001 a I 2002
2.2 Dissemination equipment	2	121,848	90	10	PS/LCB	I 2001 a II 2002
2.3 Communications equipment	2	284,853	83	17	LCB	I 2001 a II 2002
2.4 Office equipment	2	170,800	86	14	PS/LCB	I 2001 a II 2002
2.5 Furniture	2	302,382	76	24	PS/LCB	I 2001 a I 2002
2.6 Field equipment	1	80,280	100		PS	I 2001
2.7 Laboratory equipment	2	572,279	79	21	ICB	I 2001 a I 2002
2.8 Light trucks	2	2,448,200	79	21	ICB	I 2001 a II 2002
2.9 Boats	1	36,684	78	22	PS	I 2001
2.10 Motorcycles	1	185,772	82	18	LCB	I 2001
2.11 Software	2	212,734	96	4	PS/LCB	I 2001 a I 2002
2.12 Bibliography	Various	103,500	100		PS	I 2001 a I 2005
3. **Services**		**6,708,700**				
3.1 National training [1]	Various	562,000	100		PS	I 2001 a II 2005
3.2 International training [2]	Various	653,430	100		PS/ICB	I 2001 a II 2005
3.3 Local consulting [3]	Various	2,744,200	80	20	PS/LCB	I 2001 a II 2005
3.4 International consulting [4]	Various	1,316,400	100		PS/ICB	I 2001 a II 2005
3.5 Publicity and communications	2	207,600	100		PS/LCB	I 2001 a II 2002
3.6 Maintenance of germplasm banks	5	727,070	100		PS/LCB	I 2001
3.7 Development and computerization of SIPSYE	1	498,000	100		PS/LCB/ICB	I 2001
Total		**12,652,582**				

PS = price shopping
LCB = local competitive bidding
ICB = international competitive bidding

[1] Training in the monitoring system, workshops to coordinate the germplasm banks, training in the competitive system for executing agencies, and training for accredited SENASAG technicians.

[2] Forty-one short courses and one master's degree for SENASAG staff.

[3] Consulting services to design a uniform financial and accounting system, mid-term evaluation, SIBTA strategic plan, evaluation of experimental stations, project evaluation, and health campaigns against foot-and-mouth disease, avian salmonellosis and potato wilt.

[4] Consulting services to define rules for project cofinancing, establishment of capital funds, project evaluation, and 46 short-term consulting services for SENASAG (management, planning, accreditation, organization, fee setting, register of inputs, animal and plant quarantine, health risk analysis, plant pathology, entomology, food safety (HACCP).

PROPOSED RESOLUTION

BOLIVIA. LOAN /SF-BO TO THE REPUBLICA DE BOLIVIA AGRICULTURAL SERVICES PROGRAM

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the República de Bolivia, as Borrower, for the purpose of granting a financing to cooperate in the execution of an Agricultural Services Program. Such financing will be for the amount of up to US$34.000.000, or its equivalent in other currencies, except that of Bolivia, which are part of the Fund for Special Operations resources of the Bank, and will be subject to the "Special Contractual Conditions" and the "Financial Terms and Conditions" of the Executive Summary of the Loan Proposal.