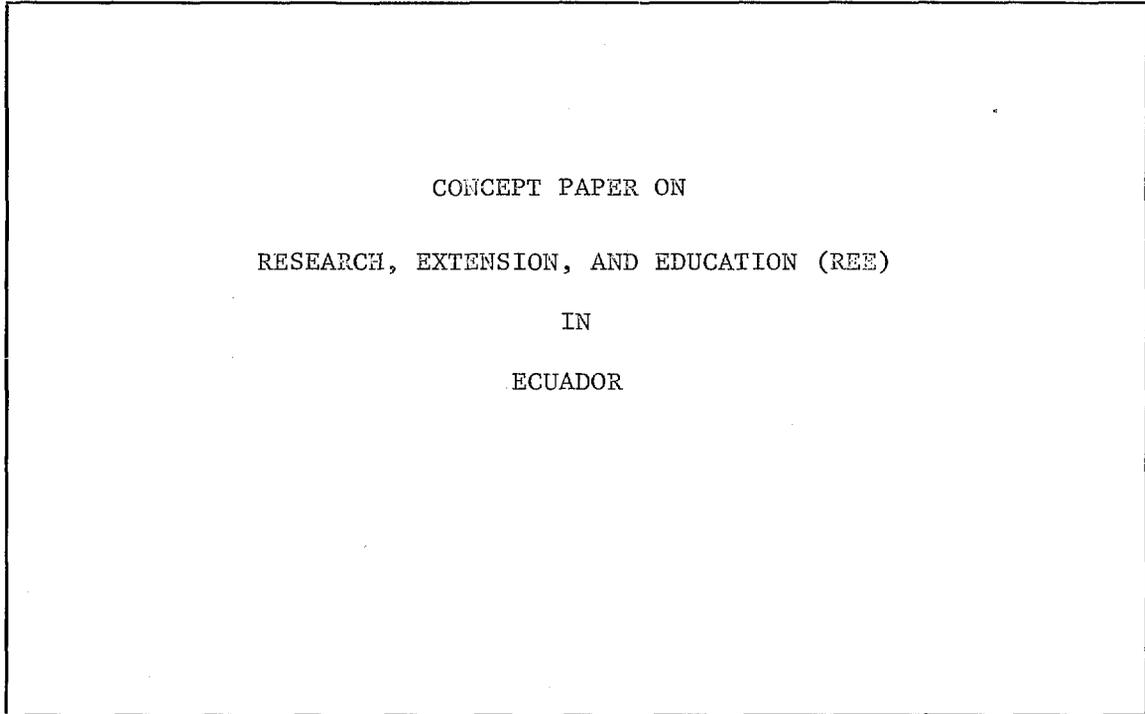


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Oficina de Agricultura y Desarrollo Rural - USAID/E.



Agencia para el Desarrollo
Internacional (A. I. D.)

CONCEPT PAPER ON REE/ECUADOR

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I. SUMMARY PROJECT DESCRIPTION

Ecuador has been faced with a stagnating agricultural sector since 1975. For the eleven-year period 1975 to 1985, there were nine years that average less than 2% growth in agricultural production; for two years there were average negative rates of 8.5. percent. Excluding 1983 (because of severe climatic problems), the average rate of change in the agricultural sector between 1975 and 1985 was less than 2% per year versus an estimated increase in demand in excess of 3%.

Basic reasons for the failure of growth in agricultural production to match demand include a costly and inefficient emphasis on rural-development and land-reform programs and disincentive policies for producers. There was an exaggerated dependency on a growth strategy that emphasized opening new lands, restructuring land ownership, heavy investment in new irrigation projects and strong governmental intervention in agricultural input and product markets.

Slow growth rates in agriculture in the last decade resulted in increased food imports, declining nutritional levels and inflationary pressures. Concomitantly there was a rapid deterioration of Ecuador's critical agricultural research, extension and educational institutions. The product of these institutions is critical to the transition from a resource-based to a science-based agriculture, where production increases are based on productivity change.

Many developing countries have demonstrated that a science-base is the more efficient growth strategy. The science-focused strategy concentrates on developing relevant research knowledge, transferring this knowledge to farmers and educating the essential human talent required to staff a research, extension and education (REE) system. Many emerging countries are successfully moving toward a science-based agriculture, and have achieved sustained rates of agricultural growth exceeding 3% per year.

The report of the U.S. Presidential Agricultural Task Force to Ecuador in 1984 contains a set of deep concerns and strong recommendations relating to the national agricultural research, education and extension system ^{1/}. The task force noted that, without improvement of this system, changes recommended,

^{1/} See Report of the U.S. Presidential Agricultural Mission to Ecuador, U.S. Agency for International Development, January 1985.

in other key areas including macro-policy, agricultural pricing policy, credit, and private investment would not lead to the desired overall improvement in the agricultural sector.

Among the recommendations of the Presidential Agricultural Mission was the formation of a Science and Technology Commission to advise the Minister of Agriculture on development of a national strategy for improving and defining functional relationships between agricultural education, research and extension. The Science and Technology Commission (STC) was established by the Minister of Agriculture in July, 1985.

Over the course of time since the Presidential Agricultural Mission first made its recommendations on the REE, the STC has met several times, and numerous expert individuals and groups have been commissioned to investigate and explore options to be considered by the GOE and the STC for strengthening the REE systems.

The basic message from all of these efforts was that a strategy based on sound economic and biological science is an absolute requirement to overcome the deteriorating condition of the sector. The Minister of Agriculture requested USAID to give priority focus on these two dominate areas, including assistance on macro-and micro economic policies; and further assistance on the development of a science-based agricultural development strategy.

The joint Ecuadorean/U.S. working group, which was charged with developing a strategy for improving the Agricultural REE system, recommended that a publically and privately supported foundation be created to serve as the catalytic point for activities to improve the REE system. The Foundation, (Fundación Ecuatoriana de Investigación Agropecuaria FEDIA) was established by Presidential decree in July, 1986 and the board of Directors and Executive Director have been named. USAID/E. has the opportunity to make a substantial and important contribution to this high priority GOE and private sector initiative, through the proposed project described herein.

The overall goal of this project, and FEDIA's primary objective, is to expedite the transition from primary dependency on a natural-resource based agriculture to a science-based agriculture by: (a) strengthening and integrating the agricultural research, extension and education system (REE); (b) enhancing public and private institutional

capabilities within the REE system; (c) linking the national REE system into the international network of agricultural science; and (d) investing in human-capital improvements for staffing and managing the national REE system.

The more specific project purpose focuses on a very innovative involvement of the recently established private agricultural foundation (FEDIA) to serve as a "mentor" for the REE system. Specifically, the project purpose is to further develop and strengthen the credibility and capacity of FEDIA. The project will develop capacity in FEDIA to set priorities and to implement specific complementary and catalytic investments which link and increase the effectiveness of public and private research, extension and education activities. FEDIA will serve as the pivotal entity to provide program continuity, concentration of scarce resources, retention of essential human resources, linkage among the three REE elements, and to overtly promote a greatly increased role for the private sector in technology development and transfer. The project also will serve as an important element in the reduction of rural poverty. Increases in rural incomes through productivity changes have had positive effects on employment levels in rural services.

Furthermore, a productivity focus can turn the rates of return on many small irrigation investments from negative to positive. Coordinated and focussed REE investments, as planned in this project, towards the small farmers can slow down rural to urban migration.

The proposed project would involve three main components. The first component would focus on developing and strengthening the capacity of FEDIA to carry out its mandates. It would assist FEDIA to: (1) build its endowment and funding base through an active program to obtain national and international funding support; (2) analyze the range of problems constraining the REE system from contributing to more rapid progress toward a science-based agriculture in Ecuador; (3) design and channel appropriate investments in the system in a more systematic and comprehensive manner in order to address the problems identified; and (4) set priorities for expenditures of Foundation funds.

The second component would focus on addressing some of the more obvious constraints in the REE system. It would undertake catalytic investments in four or five provinces on an equal number of priority commodities (PCs). Each PCP would comprise an integrated program to resolve research,

extension and education bottlenecks constraining increased production and productivity in the priority commodity. In addition to addressing these bottlenecks, a principal objective of this second component and its PCPs and provinces is to enhance and build FEDIA's reputation in a relatively short time, so that additional funding can be obtained to finance interventions to address other priority constraints identified by FEDIA.

At this conceptual stage the investment options for FEDIA in the PCPs are likely to include:

1. Investments in research is priority commodity program along with INIAP and PROTECA; special programs involving socio-economics, soil/plant/center, agro-forestry and possibly others.
2. Further complementary investments to link research to extension by supporting research-extension liaison units for each PC;
3. Other complementary investments to fortify the public extension efforts via MAG provincial directors in priority provinces along with the use of innovative means to link with private associations, establish new private extension firms, to link with PVO's and with public and private credit institutions; and
4. Linkage of research and extension efforts associated with the selected PCs to requisite educational activities at the provincial level.

The third component would focus on augmenting FEDIA's endowment fund. GOE counterpart funds would be dedicated to FEDIA's endowment to increase the income stream from endowment earnings, and thereby provide increased viability to FEDIA. It is expected that additional donations from other donors also will be forthcoming. For example Germany has held preliminary discussions with FEDIA about a possible grant. It is expected that by the end of the project FEDIA will have sufficient endowment income and program grants to be self-sustaining in pursuing its objectives (and the broad program goal of this project).

II. PRE-PID

A. Background

Ecuador is fortunate to have some of the most potentially productive soil types in Latin America which, combined with irrigation, has served to keep food supplies from being more out of balance with increasing food demand than they are. This dependency on a fortuitous natural-resource endowment has been and will continue to be inadequate for future growth without a commitment to a science-based strategy.

The general softening of the Ecuadorean economy and the agricultural sector during the 1975 to 1983 period triggered a series of events. These included high level of external borrowing, a three-fold increase in public spending and employment, devaluation of the sucre, emergence of fiscal deficits, distortions and disincentive in the terms of trade facing agriculture, and increased public investments to attempt to directly address rural poverty with decreasing attention to investments for increasing agricultural production and economic efficiency.

The poor performance of the sector over the last 10 years has resulted in increased food imports, declining nutritional levels for low-income urban and rural households, and increased food prices which have been a major contributor to 20-25% inflation rates.

Presently, there are about 900,000 farms with about 7% over 50 ha., another 40% from 1 to 5 ha., and 53% with less than 1 ha. Almost these fourths of these rural households are land owners with average incomes about 30% less than urban incomes of about US\$900 per capita per year.

Small farms of 2 to 10 ha., produce about 50% of the basic food items for the growing urban sector. However, the rural sector suffers substantial un- and under-employment; a recent estimate suggests that present agricultural output could be maintained using existing technologies and employing only 50% of the active rural population.

1. Sector-wide Problems

The problems associated with an increasing imbalance of change in food demand (3-3.5%/year) and food

supplies (2-2.5% per year) are common to most developing countries. The lag of food production, and agricultural stagnation, are associated with political, economic, and institutional problems. These include counter-productive political policies; an over dependency on integrated rural-development programs rather than production/productivity programs to help resolve the serious rural-poverty issue; a deterioration of already weak agricultural research, extension and educational institutions (which reflects a failure to recognize and commit resources to a science-based technology generation and transfer system that will be the major source of future agricultural growth); and an overdependence on governmental interventions as contrasted with private-sector solutions to the stagnating agriculture.

The set of fiscal and monetary policies prior to 1982 forced a devaluation, import restrictions, and fiscal austerity, beginning in 1983. Extensive public-sector intervention in the agricultural sector through 1982 also caused disincentive terms of trade in the sector. Beginning in 1984, a more market-oriented set of policies was initiated. Included were alignment of exchange rates, increased reserve requirements, more flexible interest rates, reduction in government subsidies, and a reorientation of administered agricultural prices towards market rates. Continuing policy efforts on further alignment of exchange rates, reductions in disincentive agricultural prices and governmental intervention, increased efforts to improve efficiency of the public sector, an enhanced information system serving the agricultural sector, and a gradual movement towards a free-market agricultural price policy demonstrate forceful GOE commitment to overcoming a serious set of problems.

Throughout the period 1970-1984, public investments in the agricultural sector emphasized land reform, integrated rural development, small-scale irrigation and greatly expanded public marketing activities with a focus on the resolution of rural poverty. Unfortunately, these actions did not improve the efficiency of land use, land reform or the efficient allocation of irrigation investments. Further, the continuation of cheap-food policies for urban people exaggerated the declining rates of growth in agricultural production. This set of actions, rather

than a production-focused (research, extension and education) strategy, accelerated the process of agricultural stagnation and did little to resolve the rural-poverty issue.

During the 1970-1984 period, critical sector institutions were allowed to deteriorate. The research, extension and educational institutions struggled to survive, which resulted in dispersion and overlapping of functions, loss of essential human resources, maintenance of a corps of technical people without operational support, and no training on technological options. With declining budgets, the research institution (INIAP) accepted almost any project offered which, over time, eliminated any sense of concentration.

Many research, extension and educational institutions replaced scarce technical personnel with political appointees. Furthermore, severe budget constraints limited any serious linkages among institutions.

With a three fold increase in public employment, the prevailing attitude was that all problems were to be resolved by government action. Government intervention into factor and product markets further restricted the opportunity for or interest of the private sector to participating in overcoming stagnation in the agricultural sector.

2. Constraints in the Research, Education and Extension (REE) System

Overcoming slow growth rates in agriculture requires a continuous commitment to resolve the major problems. This commitment must express itself by supporting: (1) continuity of program; (2) concentrating on priority production opportunities; (3) resolution of the scarcity of essential professional talent; (4) increasing reliance on the private sector (to permit a smaller but more efficient set of public institutions to become sustainable under continuing austere economic conditions); and, (5) development of viable linkages between critical research, extension and educational institutions.

The solution to these five constraints has been sought in many countries using an array of alternatives. Many of the alternatives, discussed below, were studied for the REE system in Ecuador.

Continuity: This issue really depends on an understanding and commitment by political leaders to the idea that science in agriculture as in health, construction, transportation, computerization, energy, etc. is an absolute requirement. The options have included the establishment of national science academies including agriculture; development of a single highly specialized educational institution; development of quasi-public institutions where professionals are classified as civil servants less subject to political influence; the establishment of special boards of scientists with long term tenure to screen and select priority science projects; and the development of private research organizations.

Another solution has been a coordinated interest of donors in a common science strategy and commitment to develop non-governmental means for continuity. The case in Peru is illustrative of partial success in spite of five leadership changes in six years.

Concentration: The concept of priorities on what, how, and where is relatively easy when a set of market (pricing) forces are functioning reasonable well. However, in public decisions on these questions market forces are not operative. The decisions are based on political not economic choice criteria. Consensus on priorities with multiple objectives and short time-frames usually results in equality type choices rather than profitability type choices.

The constraint is also confounded by a false belief that some form of external support will continue to be available. This issue of sustainability or living within ones domestic means is a last resort type action.

In Ecuador, the concentration options were made more difficult under conditions of an oil bonanza with a capacity to address all conditions and then a drastic shift to fiscal austerity. The latter condition encouraged REE institutions to react favorable to all sources of revenue in order to survive. This response was often more sensitive to the donors interest than to a prioritization interest of Ecuador.

Even though economic conditions have reached a stagnation state in agriculture, political and

scientific leadership have not accepted concentration/prioritization as a viable solution. Until this year, there has been no effort in the Ministry to use a systematic, reproducible approach to establish any kind of priority. It is anticipated that leadership operating in a more competitive economic environment can bring such discipline to the agricultural science community.

Scarcity of human resources: Many governments confronting large external debts, increasing competitiveness in external markets and pressures for fiscal austerity are unable to act on salary schedule reorganizations. Further, the political pressure is severe and prioritizing salary changes justified by the concept of scarcity is generally unacceptable.

In the case of agricultural research, the issue is confounded by the fact that a private sector initiative cannot be assured of capturing the products of such efforts. The result is a reluctance of private investors to gamble when the risks are very high. Therefore, there is no incentive for the private sector to underwrite the retention of quality productive professionals.

In Ecuador, as in other countries, consideration was given to special legislation, distinctive publicly supported academics, to quasi-legal salary supplement mechanisms to using housing and representation allowances as bonuses, to overtly endowing moon-lightlings and to an option of longer mandatory public service if advanced education was supported by public resources. The more realistic option was a mechanism that could reward scarce human resources at market rates within the country.

Private sector dependency: This issue is closely associated with two ideas. One focuses on decisions being guided by economic or market forces and the other on a willingness to make hard choices on public institution sustainability.

As indicated earlier, the complete privatization of agricultural research, extension and education is uneconomic. The options considered focused on an examination of what elements of the REE strategy might be transferred and mechanisms where by the private sector could participate in the allocation of scarce resources.

There is evidence in Ecuador as in other countries that some research spin-offs can be captured by the private sector. These developments firm research include multiplying seeds and planting strok, animal breeding, production of selected farm machinery and chemicals. In the area of extension, the private sector participates in expectation of a higher quality of the information transfer process and therefore a better quality product as raw mateiral, i.e. barley for malting. The motive in each case is that of economic gain to private individuals or groups of private individual and firms.

Viable REE linkages: After many attempts at developing REE institutional linkages in developing countries, the record is dismal. There are the issues of coordination among agricultural and educational ministries, a history of carefully developed inter-institutional contacts with a record of low productivity, a failure to recognize the product of scientific specialization and the in adequacy of agricultural generalists, a mistaken view that presence in a location is a substitute for rapidly flowing knowledge that could favorably impact a region's opportunities, belief in the fallacy that all university professors are and should be engaged in serious research activities, and finally, that all linkage proposals are viewed as "what's in it for me" rather than "what can I contribute to a broader purpose".

These conditions and attitudes were assessed in Ecuador. The confrontational situation between both public and private agricultural sector employers and education was obvious and the basic solution was to try a new mechanism.

Beyond these five serious constraints is the need to satisfy the necessary components or requirements of a science-based, technology-focused strategy. The basic components are an agricultural research capacity to develop biologically and economically viable technologies; a transfer system; links into priority elements of the educational system; an operational set of factor and product markets; and a rational set of incentive agricultural policies.

The basic requirements for these components are program elements that concentrate on priority crops/animals, private researchable-problem areas, priority geographic locations in Ecuador, and focus

on priority sector goals. Another requirement is program continuity that can be realized with less political intervention and more private-sector participation. Sustainability in the agricultural-growth strategy can be sought by attempting to reduce the large public research and extension staff (over 2800 people), recruiting and/or retaining high-quality public-sector professionals, and incorporating a significant private-sector research and transfer involvement. The private sector should be able to integrate some REE functions directly into its investment portfolio and fund them. At the same time a stronger private-sector can provide a broader and cheaper tax base for funding high priority public REE programs.

A final requirement is to link the technology-development process with the transfer and educational processes that produce the science-trained human talent that is the basic ingredient. Weak research, extension and educational institutions must be strengthened, linked and complemented by the private sector. This institutional problem-set can be reinforced by defining and prioritizing functions, attracting and retaining a smaller cadre of high quality professionals and developing, as well as implementing, an expanded role for private-sector institutions.

B. GOE Agricultural Sector Policies

The published policy of the MAG identifies elements of the current agricultural development policy. They include: the improvement of product marketing to guarantee an adequate return to producers; rational use of soil, water and forest resources; encouragement of the effective and permanent participation of the private sector; the establishment of strategic reserves; and establishing strategies designed to satisfy internal food demand. The latter will involve increased national supplies and import substitution possibilities, diversified exports, increased farm employment to reduce rural to urban migration, and increased rural incomes leading to improved rural nutrition.^{1/}

A recent report by the MAG described a new structure designed to increase productivity as well as to

^{1/} 1984-1985, MAG Report: Progress Report, Chapter 11, Agricultural Development Policy

rationalize input and product markets (domestic and external) associated with agro-industry in order to promote a greater private sector participation in Ecuador's productive process.^{1/}

These recent policies build on existing and newly designed programs. These are briefly described below in categories of land and irrigation; prices, taxes and exchange rates; research; extension; and education.

1. Land and Irrigation

Special emphasis has been given to a reorientation of Agrarian Reform. The Government guarantees the right to land to those who are owner-operators and who make investments in designated land within a specified period of time. The minimum size is 8 ha. and there is a plan to establish a "land bank" to finance developing these newlands.

A land titling project is underway for agrarian reform beneficiaries who have lived on the land for several years as owner-operators. This activity will provide such owners with access to credit from the National Development Bank (BNF) and other rural public services.

Several agrarian reform and colonization projects are at different stages of development or implementation. In the Amazon region, the goal is integration with the rest of the country through a technically sound and rational exploitation of natural resources.

The GOE is interested in a regional approach as a fundamental element for planning agricultural development. A zoning approach for crops, cattle and forestry can result in more efficient use of natural resources. The evaluations of the renewable natural resources by regions, including the studies of the current and potential use of the land for agricultural purposes, are almost complete, but there has been little dissemination of this useful information. It is expected to be the basis for selectively allocating credit funds of the BNF to each one of its agencies throughout the country.

^{1/} Prologue, 1985 Report of MAG: Organizations and Objectives

The GOE is concerned with the progressive and permanent loss of soil, especially in the highlands. The MAG is carrying out several soil conservation projects with the participation of national and international institutions. For example, the "Project to Control Erosion and Environmental Pollution in the Pastaza River High Basin" is being carried out in collaboration with OEA, INECEL, INERHI. An agreement has been signed between MAG and ORSTROM to establish a national conservation system for natural resources. With the assistance of UNESCO, conservation practices have been implemented in demonstration plots. Also, through a MAG-CARE agreement, profiles for soil management and conservation, using plant and animal residues, are being prepared.

In irrigation, the goal is to improve the country's capacity to utilize and conserve its hydrologic resources, which currently are underutilized. Institutional and operational improvements are being implemented by the National Institute of Hydrology and Irrigation (INERHI), the institution charged with planning and executing policies, programs and projects on irrigation and drainage. There were about 90,000 ha. in irrigation projects developed by INERHI during its first 19 years; the goal is to add 40,000 ha. during the period 1984-1988.

Besides INERHI, some regional development institutions have the responsibility to establish and manage irrigation programs. Some examples are CEDEGE (Rio Guayas basin and the Santa Elena Peninsula), CRM (Manabi Province) and PREDESUR (El Oro, Loja and Zamora Provinces).

2. Prices, Taxes, Exchange Rates

The pricing policy for agricultural commodities has been focused on guaranteeing the producer an adequate profit. This policy is expected to improve relationships between the agricultural sector and other sectors of the economy, and to encourage a more rational allocation of resources. Actual government involvement, however, has been limited primarily to corn, rice, and soybeans. Government policy is currently one of transition from setting official prices, to a more market-oriented approach. A new agricultural marketing system centered around a commodities trade exchange has been

established with offices in five cities to benefit both producers and consumers and correct market distortions. The limited grain storage capacity and the lack of liquidity have been major constraints to the successful implementation of the new system. There are plans to expand and improve the network of silos, warehouses and storage centers and an information system for prices and markets has been established.

Various mechanisms have been developed and implemented to improve the price structure for agricultural inputs,. Credit has been established to finance the importation of seeds, fertilizers, pesticides. Taxes on the importation of inputs have been reduced or eliminated, and importation has been opened to individuals or associations.

The economic measures of August 11, 1986, included floating exchange rates which was a significant change in GOE trade policy. There no longer is a subsidy for imports which was levied on exporters. Consequently, agricultural commodity exports are expected to diversify and increase.

3. Education

The GOE policy on agricultural education is to strengthen technical level schools. Relationships with the public universities are sensitive, since they are generally highly politicized, maintain an open and "free" admission policy, and require substantial financial support.

Out of about 200 technical agricultural vocational schools, seven have benefited from PROMEET, a Ministry of Education project financed by IDB (US\$28 million, including 8 industrial schools) which provides for infrastructure and equipment. Four of these schools will receive MAG financing, through FEDIA, to use their farms to teach practical agriculture. A second phase of PROMEET is being negotiated for US\$56 million to cover forty-one additional agricultural, industrial and other schools.

There are two projects to improve and expand elementary education in rural areas. "AMER", (US\$33 million) will construct 550 new schools, hire 7,000 teachers, publish textbooks and train teachers and

administrators. "Educación a Distancia", (US\$25 million) will reach the rural population through mass media, mainly radio.

4. Agricultural Research

Research is considered a key element for agricultural development by the GOE, but there has been a series of constraints to effectiveness. These are financial, political, legal, administrative and technical in nature. (See appendix I for more detail). To overcome some of these limitations, and to strengthen the national research institute (INIAP), the Ecuadorian Foundation for Agricultural Research (FEDIA) was created by Presidential decree on June 11, 1986, with initial financial support from the GOE and USAID. FEDIA also is charged with a catalytic role in education and extension and with establishing and strengthening linkages in the REE system.

INIAP has a good network of experiment stations (7), but their laboratories, and other equipment are obsolete. Therefore, the GOE decided to include about US\$13 million (out of the IDB US\$46 million loan) in PROTECA, to provide INIAP with new infrastructure and equipment. This will be an excellent complement to FEDIA's operational assistance.

5. Extension

The strong GOE commitment to assist farmers is implicit in a variety of costly services and institutions that now exist. There is, however, no national extension network so extension efforts are generally weak and isolated.

PROTECA, with a total of US\$46 million BID loan, and US\$15 million counterpart will provide for US\$12 million for extension beginning in 1987. There are plans to revitalize extension in selected areas throughout the country, by providing training to extensionists, purchasing vehicles, constructing offices, and providing operational support. This is a modest effort, since PROTECA will include only 500 extensionists at the end of its fifth year, and the primary focus is for equipment and materials.

C. Other Donor Programs

An accounting of external assistance to the agricultural sector, excluding A.I.D., programmed over the next 3

to 5 years totaled US\$870 million as of January 1986. This included US\$780 million from three major donors (BID, IBRD and CAF -- Corporación Andina de Fomento along with US\$90 million from 10 countries, FAO and 15 other donor organizations (such as IARC's, etc.).

The main donors allocated their major shares to capital transfer, infrastructure formation, and rural development in cooperation with the National Agricultural Bank and the Ministry of Agriculture and Livestock (MAG). A little over 3% was allocated to irrigation investments as of early 1986. Except for small allocations to training, the major donors did not focus on institutional development in research, extension or education, although a major BID-financed project now is under consideration.

The 26 smaller donors referenced above have allocated over 50% to forestry, another 38% to rural development, and small amounts to research and irrigation. Of this group, the 10 donor nations account for more than 60% of the US\$90 million with major allocations to forestry, specific crop or livestock programs, and agricultural production and marketing.

A World Bank sector loan of US\$100 million that is being implemented has a very small policy orientation; the major investments in policy analysis are from AID. Another IBRD market-development loan of US\$40 million is being considered and would focus on private-sector market infrastructure.

Existing external support for technology transfer is part of many rural-development projects. These activities focus on income-transfer mechanisms, not productivity change. Furthermore all the rural development loans are with the public sector, whereas A.I.D. has technology-transfer projects that are primarily implemented through the private sector.

Except for one large project with BID (discussed below) it is estimated that less than 5% of all non-A.I.D. external assistance is dedicated to human-resource or institutional development. It is quite evident from this funding review that the science and technology development/transfer mode has not been considered a major source of agricultural growth.

The proposed US\$62 million BID loan focuses on research, with INIAP, extension with MAG's Provincial

Directors, seed production with EMSEMILLA, and associated training which reflects a sharp change in the GOE agricultural development strategy. This new project, PROTECA, (Programa de Desarrollo Tecnológico Agropecuario) includes US\$46 million in loan and US\$16 million in GOE counterpart funds.

Over 80% of this BID project will be allocated to physical infrastructure, laboratory equipment, vehicles and non-durable supplies. There is a small (4%) allocation focused on degree (\$1,135,000) and non-degree (\$650,000) training. Also, there are resources, (US\$2.2 million) to fortify the quasi-public seed industry.

This very commendable project suggests a greater dependency on a productivity increasing strategy is managed as a special project within the MAG. There is, however, no private sector component but rather a focus on public-extension. The project will concentrate on 187 extension locations of about 1,000 ha. each which will be organized and implemented under the authority of provincial directors of MAG. There is also an attempt at concentration with agreement to prioritize extension activities on about 14 commodities.

This new research and extension project is scheduled for 5 years and will provide a much needed recapitalization of the national research stations and extension offices. Furthermore, the project eventually will involve about 500 of Ecuador's 2,200 extensionists.

As will be shown in a subsequent section, the PROTECA project with its large recapitalization component, will be a major complement to the proposed A.I.D. project.

D. USAID Agricultural Development Strategy

There are three key elements that characterize USAID/Ecuador agricultural sector strategy. Included are: (1) policy dialogue, analysis and reform; (2) productivity-improvement focusing on technology development, transfer and human resources development; and (3) sustainable use of natural resources. As indicated in Section V, MAG vigorously supports the first two of these elements and the third as a secondary objective.

AID's sector goal is to assist the GOE to realize a sustainable 3% increase in food output per year. Furthermore, sub-goals are to lower per unit costs of

production, decrease real food prices, and to increase both producer incomes and foreign-exchange earnings. The context for achieving these sub-goals involves developing imaginative ways to get private-sector involvement as a substitute for large, unsustainable public actions.

1. Policy dialogue, analysis and reform

An essential prerequisite for successful science-based agricultural development is a set of rational policies. Since coming to office in 1984, the Cordero Administration has instituted a set of incentive macro-economic policies on taxes, imports, exports, exchange rates, interest rates and public expenditures as well as more market-oriented policies that impact factor and product prices.

The USAID Agricultural Sector Reorientation Project (ASRP), which has focused on agricultural policy analysis and reform has contributed to the steady movement towards a more market-oriented set of factor and product price policies.

In addition to a continuing set of jointly programmed and executed studies, the reorientation project elements include: training; building analytical capability in the private sector; and improving an information system essential to greater individual-and private-sector participation.

2. Productivity Improvement

A major source of future growth in the agricultural sector is a constant flow of biologically, economically and socially sound technologies. Increased production via the productivity route will increase efficiency that can reduce food costs and thereby lower family and national food budgets. This same path will enhance Ecuador's competitive position and improve the foreign exchange balance. Unfortunately, productivity improvement has not been a major source of growth in Ecuadorian agriculture over the last twenty years; more critically, there has been a deterioration in the capacity of the system to generate productivity increases.

Three of the five components for a science-based system, research, extension and education, have been substantially weakened. As indicated above, the

policy component has achieved some success. The fifth component, a viable factor and product marketing system, has been negatively impacted by excessive and inappropriate government interventions; although the current government has made progress in overcoming the excesses of the past.

The Mission strategy on productivity improvement has included training, private-sector extension and crop-specific renovation projects. The Rural Technology Transfer System Project (RTTS) focuses on private-sector producer associations. The basic concept is to have these private groups develop an efficient extension cadre, sustained by association membership. The proposed coffee-renovation project focuses on the private sector with adaptive research, technology-transfer, credit and training elements.

3. Sustainable use of natural resources

Ecuador has a highly heterogeneous set of climatic and physical resources that range from arid to humid, alpine to coastal to jungle, and temperate to tropical. The basic objective is to assist in sustaining the natural-resource base while promoting increased productivity which will help to alleviate the pressure to expand or produce in the more fragile areas.

The Mission has a Forestry Development project that involves institutional strengthening, agro-forestry research and extension as well as reforestation.

The Land Titling (100,000 units in 5 years) is expected to have an impact on both sustained use and productivity of natural resources.

4. Equity Concerns

Within the productivity and natural-resource strategy elements there is a continuing commitment to equity considerations. Technology-transfer activities through private associations involve all farm sizes, and selected rural development activities with PVO's focusing more directly on equity issues.

Further, there is an integrated rural development project ending in 1986, that has specifically

addressed the severe rural poverty problem. Throughout all the projects, the mission efforts on equity have emphasized production and private sector actions.

E. Project Description

1. Project Rationale

Evidence continues to accumulate that it is possible for developing countries to achieve 3+% growth rates in the agricultural sector.

Productivity increases have driven agricultural growth in many LDCs, especially in Asia, but also in selected countries in Latin America, the Caribbean, The Near East and Middle East, and even a few African countries. These countries, which all have relied on a combination of a science-based agricultural development strategy, and associated economic policy reform, have achieved growth rates in agricultural production in excess of increases in demand. A significant share of increases in agricultural production in these countries has been empirically determined to come from productivity increases made possible by a viable REE system.

The driving mechanism is a science-based strategy that involves public and private research, extension and selected educational components. A successful science-based strategy is equally dependent on rational sets of agricultural policies and a private sector that can produce, import if necessary, and distribute essential inputs as well as assemble, store, process and distribute agricultural products.

The incumbent GOE has made substantial progress in re-aligning agricultural policies and has a commitment to a production/productivity strategy for the agricultural sector. These two necessary conditions, science and rational policies, provide for the realization of the expectation of sustained growth rates in excess of 3 percent in the sector. There are other conditions that fortify this expectation: (1) evidence on the "productivity growth frontier" (yield per hectare gaps between existing and potential levels); (2) recognition that well-trained people must be attracted to and retained by the essential research, extension and educational institutions; (3) recognition that concentration and prioritization are indispensable;

and, (4) realization that the private sector readily accepts the challenge to substitute private research and extension activities that complement smaller but sustainable public sector research and extension functions.

Ecuadorian agriculture must reduce the risks and lower unit costs of production for three fundamental reasons. The dominant one is to lower the family and national food budgets (production efficiency and lower unit costs will reduce real food prices). Second, Ecuador can only be competitive in world food-markets if it can sharply improve efficiency of agricultural resource use. Finally, one of the effective means to reduce rural poverty will be to increase small-farm productivity which will release pressure on scarce land in the Sierra, and stimulate non-farm rural employment and incomes.

The timing for this project is both critical and complementary. It is critical because the commitment by the present government must be exploited within the next 18 months. The science-based strategy must demonstrate solid progress before the next elections. Further, it is highly complementary to the large PROTECA recapitalization project by the GOE/BID. This primarily capital-oriented project will strengthen the infrastructure and equipment both INIAP and the public extension service. The proposed project will also directly complement existing AID agricultural development projects.

The Agricultural Sector Reorientation Project will continue to assist in the formulation of rational policies. The private-sector oriented RTTS project and the proposed coffee renovation project, all focus on technology transfer for priority commodities that will enhance the rate by which growth can be increased.

Another reason for the timely implementation of the proposed project centers on the resolution of the five continuing constraints which were discussed in Section I. A major one is attracting and retaining critical professional talent in research, extension and selected educational institutions. There are several attractive and legal mechanisms available to resolve the problem of low salaries problem for that relatively small cadre of top professionals (see Appendix II).

Another critical constraint that can be overcome by the project is the sustainability of essential public research and extension institutions. The resolution of this issue involves a mechanism that encourages private-sector participation in research and extension. The rationale is that private-sector investment of human, as well as financial capital can enhance the efficiency of use of both public and private resources within the REE system.

A final but very important constraint concerns continuity of efforts to guide and nurture the linkage of the essential components of a science-based strategy. There needs to be a "mentor" for the nation's research, extension and educational elements. Each of these elements feeds the others - human talent to research and extension, new technologies to the class-room and extension, and problem identification from extension to research. Each element is also in competition with the others to attract and retain top human talent.

The support of FEDIA as the catalytic and complementing entity will assure the success of the science-based agricultural development strategy of Ecuador. FEDIA is prepared to act as this "mentor" for the research, extension and educational system (REE). (See Appendices III and IV).

2. Why Priority AID option

There are two basic reasons for AID/Ecuador to give priority to this project. The primary reason focuses on the novel nature of the proposed project. The innovative elements include:

- (a) A determined effort to pull the essential components of a REE system into a common science-based strategy,
- (b) The establishment of FEDIA as the "mentor" of the integral REE strategy,
- (c) The expectation that the private sector will play a dominant role as part of the "mentorship" and in privatizing the extension component,
- (d) The opportunity to demonstrate the consequences of continuity and concentration as necessary conditions for sustainability;

- (e) The potential to build an unrestricted and restricted endowment for the foundation that could resolve the continuity and sustainability problems. The endowment could be built by contributions from the GOE, the private sector in Ecuador (check-offs, donations, etc.), donor nations (11 nations now contribute to the agricultural sector of Ecuador), multi-lateral development agencies (BID, IBRD, FAO, etc.), and private external foundations. It is quite possible that this mode of development would eliminate the need to refurbish the REE system every 5 years with additional loans or grants;
- (f) The existence of selected current AID projects which are now beginning to produce visible results that can assure early credibility and viability of FEDIA, if they are subsumed into the proposed project; and
- (g) The potential of FEDIA as the "mentor" to coordinate donor activities.

These seven innovative elements are addressed at one time. Many previous efforts have singularly attempted to: support independent research projects and the training of essential professionals; obtain changes in the rewards and promotional systems; implement pilot projects that link research, extension and educational elements; privatize extension activities and link to research; educate Ecuadorean leaders and scientists on the essential components of a science-based system; and continue to fortify elements of the system. However, piece-meal efforts are likely to continue to be unsuccessful.

The second reason for priority concerns decisions by the GOE to recapitalize selected elements within REE institutions through a BID loan for research, extension and the seed industry. About US\$61 million is being programmed, 80% for recapitalization of research and extension elements by the PROTECA project. Many of the critical issues of continuity, sustainability, human talent and of the private sector for an REE system are not addressed in the BID project; AID support for FEDIA would provide the critically needed complementary resources.

3. Sector and Program Goals

a. Sector Goal

The broad sector goal to which this project contributes is to increase resource productivity and production in the agricultural sector, and hence to: (a) exploit Ecuador's potential for increasing exports, and for substituting domestic production for imports; (b) increase the incomes and well-being of rural people; and (c) provide a lower-cost, more abundant, and more stable supply of food for rural and urban consumers.

The project will contribute to this broad sector goal by improving access of farmers to a sustained flow of new and improved technologies and cultural practices from a rejuvenated and functional REE system (including public and private entities). The enhanced technology development and transfer process will be achieved by:

- (a) improving focus and concentration of limited resources;
- (b) increased stability for agricultural, research and extension programs through longer term commitments of financial resources and mechanisms for attracting and retaining professional talent; and
- (c) strengthening mechanisms that link and integrate research, extension and educational functions and expand private sector participation in the agricultural generation and transfer process.

b. Program Goal

To expedite the transition from primary dependency on a natural resource-based agriculture, to a science-based agriculture by: (a) strengthening and integrating the agricultural, research, extension and education system; (b) building public and private institutional capabilities within the national REE system; c) incorporating the national REE system into the international network of agricultural science;

and (d) investing in human capital improvement for staffing and managing the national REE system. This is basically the principal goal of FEDIA, to which achievement of the project purpose will contribute.

4. Project Purpose:

To develop and strengthen the credibility and capacity of the Ecuadorian Foundation for Agricultural Research (FEDIA) as a catalyst and complement for linking and strengthening an integrated research, extension and educational system (REE) in Ecuador. This project will develop capacity in FEDIA to set priorities and to implement specific complementary and catalytic investments which link and increase the effectiveness of public and private research, extension and educational activities, that will have the highest possible pay-off, and national and international visibility in the shortest possible term.

5. Project Components

The proposed project has three components: 1) institutional development and strengthening; 2) integrated REE high-impact, priority commodity programs (PCPs) and related support services; and 3) an endowment fund. It is estimated that by the time this project is implemented approximately US\$2.9 million will be invested in initial efforts by FEDIA in Components 1 and 2, and US\$4.0 million in Component 3. FEDIA's resources are insufficient to assure its viability without additional support. Project resources will augment and sustain this initial effort of FEDIA.

The three project components are highly inter-related and collectively contribute to achieving of the project purpose. The high-impact PCPs and endowment fund contribute to the institutional strengthening of FEDIA, while AID support to FEDIA's institutional development reinforces the effectiveness of PCPs and development of the endowment fund. Thus, the following three components are all necessary elements comprising a highly interrelated whole.

a. Institutional Development and Strengthening:

Project resources will be provided to FEDIA to develop capability and viability to: (a) build

its endowment and funding base; (b) analyze the REE system and the range of problems constraining it; (c) identify opportunities for FEDIA investments; (d) set priorities for expenditures of foundation funds; and (e) design and implement appropriate interventions. The project will provide technical assistance in foundation management and in designing and implementing grant programs, inter-institutional programs, and a fund-raising program. It also will provide consultants for inter-institutional program development, project management and implementation.

b. Integrated Priority Commodity Programs (PCPs):

Project resources will be provided to permit FEDIA to augment investments in selected provinces, and in the high-impact priority commodity programs appropriate to each province. Each program integrates the research, education and extension functions of several public and private entities and focuses their collective resources on resolution of production constraints in high-priority crops and livestock in selected provinces. This component will address the need to integrate, concentrate and focus REE efforts. The set of PCPs will be selected primarily on the basis of high probability of rapid and highly visible pay-offs in order to enhance FEDIA's credibility and build its reputation as quickly as possible. Achieving success in the PCPs is important in and of itself, but in this case, contributes to the more fundamental project purpose of developing the credibility, viability, and funding base of FEDIA.

It should be pointed out that the high-impact programs will contribute substantially to achieving the broader program goal. Developing linkages between research, education, and extension entities; technology transfer; private sector involvement; highly visible results in key provinces; and, ultimately, increased incomes among a broadly based set of farmers all are likely results of initial investments in the set of high-impact PCPs discussed below. Moreover, the PCPs will provide FEDIA's Board of Directors a base of experience as it

considers investment decisions outside the purview of the project. In short, project investments in the PCPs are catalytic, pilot activities which help to assure that FEDIA will realize its broader program goal, as well as AID achieving the more narrow purpose of the project.

FEDIA resources will be directed toward one or more of the following functional activities and their linkage, integration and focus, in an effort to formulate, catalyze, provide leadership for, and complement a science-based agricultural development strategy. These highly inter-related functional activities will be financed for each high-impact PCP.

(1) Functional Activities

i) Research: FEDIA will provide complementary resources to INIAP to continue setting research priorities to develop a reward system for outstanding productivity in priority research programs; and to support technical assistance, operational support, bibliographic, communications and other complementary resource requirements for each PCP. These programs will be designed in cooperation with INIAP, and FEDIA resources will complement those from INIAP, PROTECA and other donors.

In addition, FEDIA will provide external scholarship support to build the professional staff in priority program areas of INIAP; develop an inventory of research outside of INIAP; and consider research grants to dedicated researchers at selected universities (agricultural and veterinarian) and in the private sector. Furthermore, FEDIA will develop research support capacity in soil/plant/water relationships, extension communications, and socio-economic factors, with special concern for the needs of small farmers.

An important part of the FEDIA research strategy will be to link the national research effort into the international network of agricultural science, to

assimilate the relatively large body of existing knowledge. National systems, even if relatively well financed and staffed, are relatively unproductive unless they have broad-based and enduring linkages into the international science network.

FEDIA will access this international knowledge base by establishing institutional ties between INIAP (and other national research programs) and international agricultural research centers, such as CIAT, CIP, and CIMMYT; universities, USDA; IICA and regional programs like CATIE. This will be accomplished through institutional contracts for long-term and short-term technical assistance; specialized short-term and degree training for Ecuadorian scientists at such centers; travel grants to visit such entities; and for participation in professional meetings, etcetera. Furthermore, INIAP will be re-designing other PCPs outside the purview of this project and it is recommended that FEDIA establish linkages through senior scientists with CIAT, IRRI, CIP, universities, and other international centers of excellence.

ii) Research-Extension Liaison and Linkages: FEDIA will provide resources to help assure that research efforts are interpreted and appropriate recommendations are taught to extension agents. In the PCPs described below, this will be addressed explicitly by forming a Research-Extension Liaison Unit (RELU) in each of the PCPs. Each RELU will include 4 to 6 extension specialists jointly assigned to INIAP and the relevant public or private extension agency(ies). This specialist team should include economist(s) with responsibility for farm management, marketing and production problems. These specialists would be involved in both applied research and extension and would be responsible formally for assuring a two way flow of information among researchers, extension agents and farmers. RELU specialists would be charged

with liaison among a broad group of extension entities, including producer associations, private consulting firms, PVOs, MAG provincial ASAs, and similar agencies, which serve specific socio-economic strata of farmers to assure that the entire spectrum of farmers is linked to research efforts.

iii) Extension: FEDIA resources will be focused on improving the quality and scope of extension efforts in priority locations, and in high-impact PCPs. Investments will be made in several pilot extension modalities in both the public and private sector to capitalize on existing national extension programs and experiences.

FEDIA will assist the growing number of agri-business firms and producer associations which are committed to technological change and which have demonstrated willingness to accept greater responsibility for financing at least a part of this extension effort. Increased financial support from the private sector will address the issue of sustainability and make the likelihood of an efficient, and manageable public extension effort much greater.

Several private extension approaches are being considered for FEDIA investments as integral elements of the PCPs: (1) alternative mechanisms for producer associations to establish and finance their own extension agents and to reach smaller producers who have potential for greater commercial production and association membership; (2) consulting firms comprised of agricultural scientists and technicians to serve the needs of commercial farmers; (3) extension agents and technical assistance tied to and financed by credit; and (4) agri-business firms making production contracts which include technical assistance and credit under pilot programs developed jointly with FEDIA. The RELU (discussed above) would provide direct support to the private sector extension efforts.

This project will include several public sector extension efforts consistent with high priority locations and programs to assure that those farmers who are unable to afford private extension services are able to benefit from improved technologies. The primary approach will be for FEDIA to assist provincial MAG directors to develop programs that combine and focus the diverse efforts of various interest groups including: MAG agents, PVOs; cooperatives; community organizations; students serving their Año Rural; and U.S. Peace Corps Volunteers (see below).

iv) Education: The RFE project will assist in establishing linkages among key education, research and extension components. Help will be given to students in selected faculties to complete their theses as part of INIAP research efforts in the high-impact PCPs. Also being considered are more formal relationships between students of selected professors or faculties and FEDIA for placement in PCPs for their Año Rural. Consideration is being given to strengthening the basic science program of one or two university faculties and technical schools, and linking them more directly into the REE system. Finally, consideration is being given to implementing a second degree program linking provincial university professors to both private and public extension efforts. Furthermore, the project will provide FEDIA support to M.S. and Ph.D. research, extension and university candidates.

v) Private Sector Firms and Associations: Private sector participation and involvement is central to the proposed project. Farmers associations and agri-business firms are participants in executing various activities especially in extension but also in research and education. These entities will be fully operational partners with INIAP, MAG, PVOs, and FEDIA to assure the success of the project. The PCPs that are being considered for funding under this project have been identified in large part

because of demonstrated success of current donor efforts with major private sector associations especially in the RTTS sub-projects , with dairy, sheep, beef and short-cycle crops.

(2) Complementary Resources: There are three complementary sets of resources, human and financial, which can support the primary REE components discussed above:

i) The Peace Corps: More formally linking of U.S. Peace Corp Volunteers (PCVs) into the project is being considered, and preliminary discussions have been held with the Peace Corps. The approach is to have FEDIA serve as the coordinating mechanism for placing PCVs with appropriate entities. In this way additional human resources can be provided in the selected provinces, in the high-impact PCPs or in other priority areas. The PCVs could be assigned to public or private institutions, perhaps as counterparts to extension agents, or to students serving their Año Rural. Again, there already is a base of experience, with Peace Corps Volunteers working with the producers associations in sheep and milk production, which is proposed to be expanded into a pilot program in a PCP. The Peace Corps in Quito has reacted favorably to the idea of a more formal relationship in the current RTTS dairy and sheep subprojects, and to a more formal relationship with FEDIA in this project.

ii) PROTECA: The REE project is being developed in coordination with MAG and its BID-financed PROTECA project. The PROTECA project is over 80% financing for buildings, commodities and equipment to renovate the research and extension facilities of INIAP and MAG, with a small amount for seed production. There is only modest funding for training and technical assistance, with no attempt to develop a private sector focus, or a broad based integrated REE system.

Discussions are being held with MAG to assure a complementarity of programs between FEDIA/MAG/AID and MAG/PROTECA/BID in the two projects. It is clear that FEDIA/AID is focusing on developing a viable science based agricultural development strategy, and an integrated functional REE system, with a strong focus on the private sector. The BID project complements this with "bricks and mortar" for public sector elements of the system.

iii) Regenerative Agriculture: FEDIA has a mandate to link the REE strategy with all client groups (as the discussions of the Research-Extension Liaison Unit, and of extension have shown). A specific thrust through the PVO's and public extension will be on small farms served by the project. A likely orientation will be on low purchased-input systems, organic agricultural practices, and conservation including crop rotations as well as agro-forestry. This thrust will assist in directing many rural development resources to a productivity orientation.

(3) Commodity Programs and Provincial Focus:

The REE components along with the three complementary sources of support will likely focus on five high-impact priority commodity programs (PCPs). The preliminary set of PCPs, and locations were identified on the basis of several criteria including: potential for earning or saving foreign exchange; INIAP research priorities; market potentials; existing projects with evidence of progress and success; current private sector involvement; current linkages to the international science network; and potential for rapid and highly viable impact under FEDIA auspices.

The tentative set of PCPs and locations are: (a) milk in Cotopaxi and Pichincha; (b) hard corn in Manabi, Los Ríos and Napo; (c) Soybeans in Manabí and Los Ríos; (d) potatoes in Cotopaxi, Carchi and Pichincha; and (e) coffee in Los Rios, Manabi, and El

Oro. Each of these PCPs integrates research, extension and education functional activities with public and private resources into a systematic process and program. FEDIA resources will complement those of INIAP for research, MAG (including PROTECA), producer associations and private firms for extension, and selected technical schools and university faculties for education (see Appendix V for details).

(4) Profile of a Priority Commodity Program:

Dairy: The following example of a PCP for dairy illustrates how FEDIA, with AID support, will integrate and focus various public and private resources, and build on an existing effort to achieve rapid and highly visible results.

i) Research: INIAP will obtain relevant technologies from domestic and international sources and carry out applied research in three main areas: (1) reproduction and fertility; (2) nutrition, pastures and forages; and (3) technical management practices. Research efforts will be centered at the Santa Catalina Research Station.

ii) Research/Extension Linkages: A Research-Extension Linkage Unit (RELU) will be established. Extension specialists will be housed with the research team and closely associated with the Cattlemen Association. These specialists will assist INIAP in applied research in technical management practices. Their primary function will be to help interpret applied research findings, inform and train extension agents on recommended practices, and assist in designing and implementing extension methods. This aspect of the PCP will build on and continue the efforts currently underway in the RTTS/Dairy Subproject. The RELU specialists will be supported by communication program, soil/plant center and socio-economics programs.

iii) Extension: The association will employ their own extension agents. FEDIA

will propose alternative check-off systems to the association and will likely agree to a declining subsidy to encourage association membership to move towards self-financing of their agents. Also the RELU specialists will work directly with MAG provincial director and provincial extension agents; major PVOs; and other entities with important extension capabilities. The principal objective is to provide wide dissemination of research results across all sizes of dairy farm. Major program foci will be nutrition, reproduction and disease control and reduction.

iv) Provincial Focus: The Dairy PCP of the proposed REE project will focus efforts primarily in Cotopaxi and Pichincha working through the Provincial directors. The RELU, in conjunction with members of the Cattlemen's Association, will support appropriate dairy-production improvement projects with all active extension entities such as PIP, DRI, ASA, Centros Agrícolas, comunas, PVO's, etc. This support will take the form of short-courses, audio-visual presentations, field days, publications, etc.; that is, any device that will strengthen the extension component of the PCP. Peace Corps Volunteers will be assigned to work with various extension entities with technical supervision from the RELU.

v) Education: Selected students from INIAP and the Agricultural Faculties of the Universidad Central will complete their theses in collaboration with INIAP scientists in the research areas discussed above. Selected students also will complete their Años Rurales working with RELU extension specialists, extension agents, and Peace Corps Volunteers. This will help augment and concentrate the extension effort and simultaneously help develop and train a cadre of technicians and junior scientists. Laboratories at the University will be up-graded, and RELU and INIAP scientists will present seminars and generally help develop and strengthen linkages between INIAP, RELU, the Cattlemens Association and the University.

vi) Peace Corps: Selected Peace Corps Volunteers will be assigned to work with RELU and key extension agents, and with students serving their Año Rural. This pilot program will test the viability of having FEDIA eventually coordinate the placement of all Peace Corps Volunteers in food and agriculture, in support of FEDIA's REE Program.

vii) Project Inputs: AID project funds will be used to provide long and short term technical assistance, training, equipment, research grants, merit awards, travel grants, and research awards for key Ecuadorians. Requisite technical assistance will be institutionally tied to assure linkages with the international network of agricultural science.

c. Foundation Endowment

Project resources will be provided to FEDIA to increase its endowment to enhance its income stream, and attract donations and grants from national and international sources. Project contributions to FEDIA's endowment will permit FEDIA to generate other income and donations that will eventually lead to a financially independent status that will transcend changes in the political environment. It is critical to FEDIA's longer term viability that it develop quickly an adequate endowment base and a reputation for excellence (which components No. 1 and 2 address). However, to assure FEDIA with long term financial viability, greater independence from political manipulation, and to provide an example to other bilateral, and international donors, significant counterpart funds will be granted to FEDIA's endowment fund as a basic component of the AID FEDIA project. Technical assistance also will be provided FEDIA to assist in increasing the endowment.

III. ILLUSTRATIVE BUDGET

3 years
(\$000)

Components	USAID Grant	PL 416	GOE Counter part	PROIECA	Private Sector	Other Donors	Total
<u>A. Institutional Development</u>							
a. TA							
a) Project Manager	450						450
Project Assist.	75						75
b. Training	400						400
c. Local Costs	0				600		600
d. Resident Advisors	1,800						1,800
SUBTOTAL	2,797	0	0	0	600	0	3,397
<u>B. Priority Commodity Programs</u>							
1. Research							
TA (18 p.m.)	216						216
Training	700					100	800
Commodities	150			3,000		200	3,350
Local Costs	484	0	800		300	100	1,684
SUBTOTAL	1,550	0	800	3,000	300	400	6,050
2. RELU & Ext.							
TA (18 p.m.)	216	0					216
Training	650	0					650
Commodities	250	0		1,100			1,350
Local Costs	515	0	750		400	200	1,865
SUBTOTAL	1,631	0	750	1,100	400	200	4,081
SUBTOTAL PC	3,181	0	1,550	4,100	700	600	10,131

Components	USAID Grant	PL 416	OE Counter part	PROTECA	Private Sector	Other Donors	Total
<u>3. Education</u>							
Training	130	0		0		100	230
Res. Grants	220	0		0			220
Local Cost	150	0	100			50	300
SUBTOTAL	500	0	100	0	0	150	750
<u>C. Endowment</u>							
TA (6 p.m.)	72	0	0	0	0	0	72
Local Costs	0	8,000			1,000	750	9,750
SUBTOTAL	72	8,000	0	0	1,000	750	9,822
<u>D. Contingencies</u>							
	450	0	0	0	0	0	450
T O T A L	7,000	8,000	1,650	4,100	2,300	1,500	24,550

IV. ISSUES/CONCERNS

- A. FEDIA's Institutional Continuity: Ecuador has an increasingly polarized political environment. The FEDIA is a creature of the current government, which has been severely criticized by the opposition for its economic, and agricultural development policies. In fact, the FEDIA is so closely associated with the Febres Cordero administration that it was listed as one of the major accomplishments of Ministry of Agriculture Marcel Laniado after his resignation. Moreover, the decree establishing FEDIA gives its Board of Directors authority to appoint successors to the Board, which may appear to some to be an attempt to exempt the Board from accountability and make it self-perpetuating. The next government is likely to try and reverse and modify policies of the Febres Cordero administration. How can the proposed project deal with this political reality, and assure institutional continuity for FEDIA?

The project can help to assure the growth and development of a robust and viable FEDIA in several important ways. First, FEDIA's initial investments should be directed toward addressing REE constraints through the instrumentality of private sector entities, especially producer's associations. These entities, in turn, can contract with, or grant funds to GOE agencies (such as INIAP, and MAG) for requisite services, to the extent the political environment is supportive. If the new government is hostile (a worst-case scenario) some support could be obtained from the international science network, (e.g. CIAT, CIP and U.S. Universities and firms). In either case, farmers' associations will be the primary purchasers of needed support, with FEDIA in the background as a private, non-profit entity. With this approach, FEDIA is not a competitor with GOE agencies, nor a threat to them. Rather FEDIA, working with and through producers associations can provide additional sources of funding to support and help farmers to resolve production constraints.

Second, obtaining positive results from initial investments will be vital to the credibility and capability of FEDIA. To the extent FEDIA can develop joint projects which link INIAP and other public entities, and private sector entities and quickly and successfully address critical REE constraints, it will gain support from a broad base of people in the public and private sector. The large cadre of civil servants in MAG and associated agencies (such as INIAP) are, in fact, extremely important in this regard and may be described

as the "fourth branch" of government. The current administration attempted initially to belittle and ignore the civil servants in MAG only to see them thwart and stall many initiatives. FEDIA can win the support and cooperation of these people if it acts quickly and effectively, and demonstrates its independence and fairness in complementing and acting as a catalyst for addressing REE constraints. At the same time private sector groups and individuals will also increasingly support FEDIA as it helps them to address production constraints, and the broad private sector has substantial political and economic influence under any scenario.

Third, initial investments in quick, high pay-off efforts will help FEDIA to increase its endowment and operational funding base. FEDIA is, after all, a private non-profit foundation and is relatively immune from government intervention. The extent of its influence and insularity from political manipulation will be related, obviously, to the level of its funding base. Hence, it will be important to focus initial efforts on enhancing its funding base as quickly as possible.

Fourth, the Board of Directors is able to exercise broad power in appointing Board members. Also, the current Board is very sympathetic to serving the needs of smaller farmers, with a general sense that the majority of smaller farmers would be a priority (but not exclusive) concern for FEDIA. It is probable that FEDIA's current Board of Directors could be persuaded to expand the Board to include one or two representatives from the smaller farmers. If so, this would broaden this base of political support, and, if accompanied by a purpose of goal statement that included concern for helping smaller farmers, would reduce, perhaps significantly, criticism from the political opposition.

Fifth, the FEDIA can develop more broad-based political support by developing an associate members program. Such a program (as part of FEDIA's campaign to obtain funding support for its endowment) would seek associate members from a broad set of farmers, agribusiness firms, producers associations, and friends of agriculture generally.

Finally, FEDIA can explore ways to further clarify and define its status as a legal entity, not subject to

government control. One possible avenue is to change its status from a Foundation, created by Presidential Decree, to one that has legal identity under existing law (apparently administered by the Ministry of Industry and Commerce - per discussion with Diego Gandara). In short, there appear to be legal means for FEDIA to insulate itself from attacks by an opposition government, if broad-based political support is not forthcoming. The basic for such action would need to be investigated and completed well before the assumed change in government.

B. Salary Supplements

Salary supplements have been proposed as a primary mechanism to attract and retain highly qualified agricultural scientists and technicians for Ecuador's agricultural science (REE) system (attraction and retention of such human capital is one of the major constraints in the system). There are two principal concerns related to payment of salary supplements: (1) can such payments be made legally; and (2) can the process be institutionalized so that the additional recurring costs for such supplements are sustained by Ecuadorian institutions after the AID REE project is completed?

There are at least three legal ways in which various forms of salary supplements can be paid (see Appendix II for the laws and decrees which describe these). First, bonuses can be paid by FEDIA (a private entity) to GOE employees. Second, GOE employees can be granted up to two years of leave with pay to work in special projects, and receive additional payments from other entities. Third, GOE employees also can take up to two years of leave without pay, and work for someone else. GOE employees can also receive travel grants, research awards, and research grants.

Assuring that the payment of salary supplements under the project is institutionalized in the REE system, and that Ecuadorian institutions accept responsibility for continued funding support after the AID REE project ends, is the more difficult issue. A.I.D. experience with government agencies bearing operations costs after a project terminates has been poor throughout LAC countries, and salary supplements are perhaps the most difficult to sustain because of priority attached to other demands on budgets. Budget support always has been the most limiting constraint.

FEDIA, however, does offer an unique and novel approach for addressing this problem. First, it is a private not-for profit institution, and does not have to depend on the GOE budget process for its support. Second, it will have a stream of income from its endowment which can provide a reliable source of funding, year after year. If FEDIA is willing to put a priority on salary supplements in various forms for key Ecuadorian scientists and technicians throughout the REE system, the sustainability constraint can be addressed.

This underscores the critical need to assure that FEDIA's endowment is large enough initially to generate an income streams that can accomodate the implementation of other initiatives besides salary supplements, and that it has grown to the point that by the end of the AID REE project FEDIA can sustain the program of salary supplements, and other initiatives at reasonable levels.

In short, the endowment addresses the funding constraint and assures the sustainability of salary supplements.

C. Endowment Strategy

One of the three components of the project is development of an endowment fund for FEDIA. There is general agreement about the need for the fund, and for supporting GOE counterpart contributions from PL-480 and Section 416. There is, however, an issue of timing of such counterpart contributions.

One position is to allocate only the US\$2.0 million of PL-480 funds to FEDIA (of which \$1.0 million is destined for operations, and \$1.0 for the endowment) prior to the assumed change in government. This approach would then await the transition of governments and determine if FEDIA was viable enough to merit additional Section 416 allocations to the endowment. It would, however, proceed with the implementation of the REE project with grant funds in the third or fourth quarter of 1987.

The alternative approach is to allocate the US\$2.0 million of PL-480 on schedule as described above, and an additional US\$8.0 million of Section 416 counterpart funds (US\$7.0 to the endowment, and US\$1.0 to operations) shortly after implementation of the project during calendar year 1987. This would provide FEDIA with

an initial endowment of US\$8.0 million plus US\$2.0 million of operations support at the beginning of the REE project.

The project simultaneously would emphasize strongly during its first year the building of the endowment fund, by seeking additional contributions from other donors and the private sector. The approach would seek to assure the viability of FEDIA by building its endowment fund to a level that would permit it to be self-supporting in the event of a hostile government. The goal would be to have an endowment of US\$8-10 million by the change in government, and US\$18-20 million by the end of project. Incomes from US\$8 million endowment would yield US\$1.2 million/year at 15 percent interest, which, when couple with the AID grant funds would permit FEDIA to maintain a significant level of effort. (The current C.D. rate is 30-34 percent, and the passbook savings rate is 20-22 percent, so 15 percent approximates a real rate of interest over several years). Earning on the US\$1.0 million endowment proposed in the conservative approach would yield only US\$150 million which would significantly reduce FEDIAS capacity. Over the life of the project, a minimum of US\$3.15 million would be foregone by adapting the "wait-and-are approach" and putting only US\$1.0 million in the endowment instead of US\$8.0 million. This is equal to nearly one-half the additional US\$7.0 million during 1987 for the endowment proposed in the alternative approach.

D. Financial Support Capability of the Private Sector

One premise of the project is that the private sector, including farmers, agribusiness firms, and producers associations will provide some direct financial support for FEDIA's endowment, employment of their own extension agents and contract research. One concern is whether or not the demands of the AID REE project on the private sector exceeds the capacity of entities or individuals in the sector to provide such financial support, or hire their own agents etc.

The following analysis illustrates the magnitude of impact of a check-off system on producers gross income, and the amount generated.

A check-off of 1/100 of one sucre (one centavo) on the 675 million liters of domestically produced milk would manually produce US\$47,500. This check-off level would

be .0004% of the value at S/.25 per liter. A check-off of one-half a sucre or .02% of the value per liter would annually produce about US\$2.4 million.

Another option is to have associate memberships in FEDIA. There may be many producers among the 800,000 rural households that would choose to be an associate member for a modest fee per year (e.g. \$5). Assuming 5 percent would join, this would generate US\$200,000 per year. The foundation could sponsor annual regional demonstrations for the associate members. Also the agri-business firms might become corporate associates of FEDIA. Assuming a US\$100 annual corporate membership fee and about 50% response, would add over US\$1.0 million to the FEDIA endowment.

Another possibility would be in relation to CEDULA where a member must receive a card to qualify for a loan. There is a small fee associated with receiving the credit card; possibly an additional small fee could be designated for FEDIA, or for technical assistance or extension services.

FEDIA also should consider a requirement that for each restricted grant accepted. There would be an overhead charge of perhaps 20 percent with 5 percent of this charge designated for the endowment.

E. Equity

The REE project is focused on improving the effectiveness of research, extension and education institutions serving agriculture and rural people. The approach is to strengthen FEDIA's capacity, and to invest in a set of high-impact priority commodities (in which research, extension linkages, extension, and education are integrated with significant private sector participation in extension efforts.

The concern is the degree to which such a system-wide approach will address equity concerns, and assure that the project improves the incomes and productivity of smaller farmers.

This issue of equity can be addressed in several ways in the project, and more broadly in FEDIA. One way for the project to assure that the equity issue is addressed is in the design of the vertically integrated priority commodities, in the extension-research linkages (RELU) activity, and in extension. The RELU's are

to assure linkages with a variety of public and private extension entities to assure a flow of research information to variety of extension entities (PVO's, communities, and producers associations serving a broad range of socio-economic classes. At the same time, both private and public extension efforts will be mounted and focused at the provincial level. These efforts will be purposefully designed to assure a broad range of extension coverage within the priority commodities. The focus on commodities and provinces, coupled with the RELU, and extension design should assure that a wide range of farmers are benefited by the projects.

A second important way to address equity concerns is in the selection of priority commodities. Other things equal, commodities which are produced by small producers should receive FEDIA support. These are several crops and livestock which have potential for quick, high-pay off impacts that meet most of the other criteria for identifying the preliminary set of commodities for consideration in the REE project, and which also are produced mainly by small-medium producers. Included are sheep, vegetables, fruits and spices, coffee, and Cacao.

Another way to address this equity issue has already been discussed in Section IV above. FEDIA's current Board is sympathetic to equity concerns and has explicitly addressed this topic in Board meetings. If FEDIA were to exercise its prerogative and appoint one or two farmer-leaders from the campesino sector to the Board, this would help improve the likelihood for FEDIA to impact smaller farmers in its investment decisions. FEDIA's current Board, comprised primarily of successful businessmen and high-level public sector officials, would then have someone to talk to about the problems and constraints in the small farm sector.

Appendix I

STATUS OF AGRICULTURAL RESEARCH IN ECUADOR

Background

Agricultural research in Ecuador officially began in 1942, finalized by a GOE/US memorandum of understanding. The current institution, the National Agricultural Research Institute (INIAP) was created in mid 1959 and has been the official GOE agricultural research entity since then. Across time, INIAP has absorbed or established research stations or substations until, now, it has seven stations and six experimental farms across the country. INIAP uses as its project selection criteria five main considerations:

- The family market basket
- Traditional exports
- Import substitution commodities
- Non-traditional exports, and
- Agroindustrial crops.

Currently INIAP has research projects covering some 70 crop and livestock commodities. It conducts research at the experiment station, field verification, and on-farm production levels. INIAP also seeks to provide seed, breeding stock, or seedlings as basic material to the Empresa Mixta de Semillas, to the National Seed Program, the National Extension programs, and directly to the farm population. Also, INIAP provides some analytical and diagnostic services (soils, pathology, entomology etc.) via experiment-station laboratories. Some stations have facilities for conducting short courses. Linkages between INIAP and the IARC's have waxed and waned.

INIAP's assigned budget in 1985 was about US\$5.3 million (0.4% of national budget, 9% of Ag. sector budget and 24% of MAG budget); it gains approximately another US\$0.5 million through sales. Of this total, almost 90% is spend on wages and salaries, leaving some US\$350,000 to cover capital and operational costs.

INIAP has a staff of some 660 employees, of which 320 are professionals. This latter includes four Ph.D. and 64 M.S.; training projections estimate two more Ph.D. and 30 M.Sc. by 1990 (PROTECA).

Over the years INIAP has enjoyed several significant research successes and has significantly impacted some components of the agricultural sector.

Some private-sector adaptive research is in place, particularly for those commodities (poultry, african palm, etc.) for which the producers can capture directly the output of investigation or information-transfer.

Factors constraining better research:

Constraints to better public-sector agricultural research in Ecuador, apart from problems of counterproductive GOE policy, may be lumped under five general headings, as follows:

a) Concentration:

- (1) As mentioned above, INIAP is attempting to research a broad array of commodity problems with markedly restricted resources. The prioritization of commodities or research areas, and of researchable problems within those two categories has not been attempted by INIAP or MAG. In the same vein, INIAP has no mechanism by means of which to track expenditures by project or to evaluate the return to its investment (by project).
- (2) There is no way that INIAP can either anticipate or evaluate the effects of GOE policy decisions on its priorities and/or projects.
- (3) INIAP has no system by means of which it can decide whether or not a problem is, in fact, researchable.
- (4) No real attempt has been made to identify target populations and to identify (or prioritize) problems by clientele groups.
- (5) Much of INIAP's energy and resources is spent on what are the development (fomento) aspects of the R&D system of MAG. This is, in most cases, inappropriate.

b) Continuity:

- (1) Given the fact that INIAP has no established system of prioritization it is, therefore, susceptible to pressure from other GOE agencies that have specific agendas. This results in transitory swings in programming that are primarily influenced by the political crisis of the moment.
- (2) INIAP's already-limited resources tend to be expended on brush-fires rather than fundamental program objectives. In this, as well as the human-resource sense, the research organization must be properly insulated

and isolated from the transitory political process, which is not to say that it should be insensitive to national agricultural priorities.

- (3) In the absence of strong, well-prepared leadership, INIAP has lacked the spokesman and arbiter who could protect it from sporadic interventions and provide an institutional philosophy that is essential to continuity.
- (4) With few exceptions, INIAP has failed to establish the strong links with agribusiness and user clientele that foment and maintain grass-roots support. This lack further weakens the capacity of the Institute to maintain programmatic continuity.

c) Sustainability:

- (1) Within INIAP there is little relationship between institutional priorities and budget.
- (2) When external funding is provided it is often invested in activities chosen by the donor rather than being guided by INIAP's priorities.
- (3) The private sector plays little part in establishing institutional priorities. Therefore, as a group it has no stake in the outcome or longevity of INIAP activities.
- (4) The lack of a strong, institutionalized extension link tends to separate INIAP from the concerns of its clientele groups. This results in the formulation of inappropriate project objectives, the lack of transfer of technology when appropriate, or both of these.
- (5) The net result of these factors, plus extremely restrictive operational budgets, renders sustainability of INIAP programs enormously difficult.

d) Human-resource factor: As mentioned earlier, INIAP has invested considerable funds and time in training its professionals. However, it is incapable of retaining these people upon their return or of attracting new, trained, capable talent. This is primarily a result of the unrealistic salary schedule that it must respect. Other problems that impact the personnel question are:

- (1) The politization of its leadership and some recruiting practices;

- (2) An up-and-out philosophy that ties salary to administrative posts and, traditionally, precludes return to research responsibilities.
 - (3) An implicit policy that precludes recruitment of other than new graduates, as compared to hiring of experienced professionals;
 - (4) Lack of any institutionalized personnel evaluation programs.
 - (5) Lack of incentives, such as subsidized travel to professional meetings, etc., in recognition of professional productivity
 - (6) Lack of economic recognition of professional improvement including formal post-graduate study, despite the fact that the law provides for such remuneration; and
 - (7) The fact that INIAP professionals suffer significant scientific isolation. Relations with counterparts in the international community are, at best, limited.
- e) Private-sector linkages: As mentioned previously, INIAP has very few direct links with the private sector as represented by either agribusiness interests or by the various producer and clientele groups.
- (1) Because of the lack of a private-sector relationship, INIAP has missed an opportunity to gain support and credibility.
 - (2) This gap in communications precludes any feed-back from the users to the researcher.
 - (3) There is little incentive for INIAP to routinely incorporate economic analyses with its recommendations. Thus, the user-groups are presented with only one option or recommendation as compared to an array of alternatives and costs.
 - (4) Through INIAP has a couple of private-sector contract research projects underway this source of funding and institutional support has never been completely developed.
 - (5) The private sector is not involved in establishing program or project research priorities with INIAP. The lack of such consultation conveys an impression of indifference.

Conclusion

If the mandate of INIAP is to assure a continuous flow of clientele-oriented technology, appropriate to resolution of the prioritized problems of the Ecuadorean agricultural economy, these constraints must be released. Unfortunately, many of them have been institutionalized. Therefore, a new approach is required.

This PID outlines a program designed to integrate the research, extension and educational components of the sector. Each of the three suffers institutional problems similar to those outlined for INIAP. In order to overcome these barriers, and those associated with inter-institutional relations, a different mechanism must be sought. It is for this reason that, in July, 1986, the Minister of Agriculture created FEDIA.

FEDIA has as its broad goal the rational integration of all components, including the private sector, in support of increased Ecuadorean agricultural productivity. This PID proposes support of FEDIA as a catalyst for and coordinator of this absolutely fundamental integration.

Appendix II

THE LEGAL OPTIONS TO REWARD
OUTSTANDING PROFESSIONAL CONTRIBUTIONS

TITULO II

Derechos y Obligaciones de los Servidores Públicos

CAPITULO I

De los Sueldos

Art. 27 Salvo las excepciones previstas en la Constitución Política y Leyes especiales, ningún ciudadano podrá percibir, a ningún título, dos remuneraciones provenientes del desempeño simultáneo de cargos o empleos e instituciones del sector público.

Se excluyen de la disposición anterior los honorarios que a propuesta de la Dirección Nacional de Personal apruebe el Ministerio de Finanzas y Crédito Público para el pago de los servidores públicos que laboren en calidad de organizadores, profesores o instructores en programas de capacitación organizados o auspiciados por la Dirección Nacional de personal que llevará un registro de los servidores públicos calificados como tales.

Art. 28 Cuando la Ley así lo permita, percibirán también honorarios los servidores públicos que integren directorios, juntas, comités, etc., en representación de sus instituciones o de funcionarios del Estado de acuerdo con la Ley.

Art. 29 Los honorarios por este concepto, se denominan dietas y el valor máximo de su pago mensual no podrá ser superior al 25% del sueldo que percibe el servidor determinado en su nombramiento.

CAPITULO VI

De las Vacaciones, Licencias y Permisos

Art. 44 Los servidores públicos tendrán derecho a licencia con sueldo en los siguientes casos:

- a) Por enfermedad hasta por 60 días cada año de servicio, debiéndose justificar mediante certificación conferida por un facultativo del servicio médico del IESS y, en los lugares que no disponen de este servicio, mediante certificación extendida por el facultativo que atendió el caso.
- b) Por calamidad doméstica, debidamente comprobada, hasta por 8 días. Entiéndese por calamidad doméstica del servidor público el fallecimiento, accidente o enfermedad grave de su cónyuge o de sus parientes hasta el segundo grado de consaguinidad o afinidad, e igualmente los siniestros que afectan la propiedad o los bienes del servidor, gravemente.
- c) Por maternidad durante 2 semanas anteriores y 6 posteriores al parto, las mismas que podrán ser acumulables.
- d) Para estudios, seminarios, reuniones, conferencias pasantías y visitas de observación en el exterior en el País, que interese a la Administración Pública, mediante comisión de servicios hasta por 2 años, previo dictamen favorable de la Dirección Nacional de Personal sobre la conveniencia e interés de lo Administración Pública y siempre que el servidor hubiere cumplido por lo menos un año de servicio en el Sector Público.

Si los eventos señalados en el párrafo anterior se realizará en el País y su duración es de sesenta días a menos, se requerirá únicamente la aprobación de la Autoridad Nominadora respectiva.

Art. 45 Las licencias con sueldo, para los servidores públicos previstas en la Ley de Servicio Público Obligatorio, sólo podrán concederse previo dictamen favorable de la Dirección Nacional de Personal.

Art. 46 Se podrá conceder licencia sin sueldo a los servidores públicos en los siguientes casos:

a) Por asuntos particulares hasta por 60 días no acumulables, durante cada año de servicio.

b) Para la prestación de servicios en otras Instituciones de Educación Superior en el exterior o en el País como complemento a la licencia con sueldo por estudios, prevista en el literal d) del Artículo 44 de este Reglamento, hasta por el período de dos años, la misma que podrá ser autorizada simultáneamente con la licencia con sueldo, con informe favorable de la Dirección Nacional de Personal.

CAPITULO IV

De la capacitación

Art. 97 Los servidores públicos que por sus conocimientos y experiencia, sean requeridos para colaborar en calidad de organizadores, profesores o la Dirección Nacional de Personal, tienen derecho a percibir honorarios por su trabajo de acuerdo a la respectiva escala que fije el Ministerio de Finanzas y Crédito Público a propuesta de la Dirección Nacional de Personal

Nº. 1947.....

LEON FEBRES-CORDERO RIBADENEYRA
Presidente Constitucional de la República

CONSIDERANDO:

QUE la investigación agropecuaria constituye una actividad primaria para conseguir el desarrollo armónico y sostenido del sector agropecuario nacional;

QUE esta actividad, necesita de recursos económicos permanentes que le permitan desenvolverse en forma ininterrumpida y tener, por tanto, una base financiera sólida;

QUE la investigación agropecuaria del país requiere desenvolverse al margen de ingerencias externas que menoscaban su labor científica;

QUE es deber del Gobierno Nacional establecer el mecanismo apropiado para asegurar que las inversiones que se realizan en investigación agropecuaria, reviertan en pleno beneficio del país;

QUE es obligación del Gobierno Nacional propender al desarrollo de la educación en el campo agropecuario;

QUE el artículo 584 del Código Civil, prescribe que es atribución del Presidente de la República, aprobar la constitución de las Fundaciones que se establezcan en el país;

EN uso de la facultad que le confiere el artículo 78, literal a) de la Constitución Política,

D E C R E T A :

ARTICULO 1o.- Créase la Fundación Ecuatoriana de Investigación Agropecuaria como persona jurídica de derecho privado, sin fines de lucro, con domicilio en la ciudad de Quito, dedicada a planificar, realizar y financiar la investigación agropecuaria nacional y apruébense sus Estatutos que han sido sometidos a consideración del señor Presidente de la República, por parte del señor Ministro de Agricultura y Ganadería.

ARTICULO 2o.- Con el propósito de que la Fundación Ecuatoriana de Investigación Agropecuaria cumpla con sus fines específicos, el Ministerio de Finanzas y Crédito Público, proporcionará los fondos a la misma para su presupuesto anual, como aporte fundamental del Estado, que constituirá parte del patrimonio de la Fundación. También el Estado podrá hacer donaciones u otros aportes, dependiendo de la economía general del país; con sujeción a la Ley.



Nº. 1947

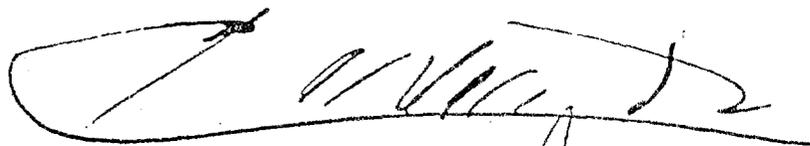
LEON FEBRES-CORDERO RIBADENEYRA - JUNIO 11 1900
Presidente Constitucional de la República

CONSIDERANDO:

ARTICULO 3o.- Encárguense de la aplicación del presente Decreto, los señores Ministros de Agricultura y Ganadería, de Finanzas y Crédito Público y de Defensa Nacional.

ARTICULO 4o.- El presente Decreto entrará en vigencia a partir de su publicación en el Registro Oficial.

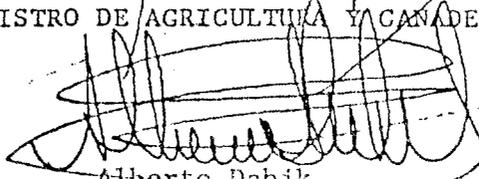
DAO en Quito, en el Palacio Nacional, a 11 de Junio de mil novecientos ochenta y seis.



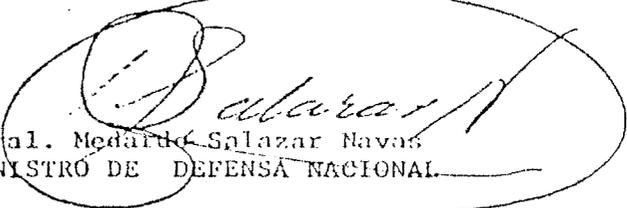
León Febres-Cordero Ribadeneira
PRESIDENTE CONSTITUCIONAL DE LA REPUBLICA



Marcel J. Laniado
MINISTRO DE AGRICULTURA Y GANADERIA



Alberto Dahik
MINISTRO DE FINANZAS Y CREDITO PUBLICO



Gral. Medardo Salazar Navas
MINISTRO DE DEFENSA NACIONAL

TITULO I

NATURALEZA, DOMICILIO, DURACION Y OBJETIVOS

ARTICULO 1º El Estado Ecuatoriano crea la Fundación Ecuatoriana de Investigación Agropecuaria (FEDIA), como persona jurídica de derecho privado sin fines de lucro, con patrimonio propio y administración autónoma de acuerdo a lo dispuesto en el Título XXIX del Libro I del Código Civil.

ARTICULO 2º El Domicilio legal de la Fundación es la ciudad de Quito, pero su acción será de ámbito Nacional.

ARTICULO 3º La Fundación tendrá una duración de cincuenta años prorrogables.

ARTICULO 4º El objetivo fundamental de la Fundación es mejorar la implementación de las ciencias agrícolas, fortaleciendo la investigación, extensión y educación, para impulsar el desarrollo sostenido del sector agropecuario ecuatoriano. Para lograr este objetivo, la Fundación tiene las siguientes responsabilidades:

- a) Identificar y definir las prioridades de Investigación para propender el desarrollo agropecuario del País;
- b) Estructurar los Programas de investigación que correspondan a estos lineamientos;
- c) Generar alternativas tecnológicas apropiadas a las condiciones ecológicas del País, orientadas a incrementar la producción, productividad, ampliación de la frontera agrícola y conservación de los recursos naturales;
- d) Validar y difundir las tecnologías generadas;
- e) Estructurar y mantener el inventario tecnológico;
- f) Realizar intercambios científicos con Instituciones Nacionales e Internacionales, públicas o privadas; y, cuando crea conveniente, financiar programas específicos de estas instituciones, dentro de los objetivos de la propia Fundación;
- g) Estructurar un sistema de servicios agropecuarios en las siguientes áreas compatibles con su actividad específica:

- Capacitación para técnicos, productores, estudiantes y profesores a través de centros que establecerá para el efecto, o a través de instituciones ya establecidas, a nivel pre-universitario, universitario o de post-grado;
 - Establecimiento de laboratorios para atender los requerimientos del sector agropecuario;
 - Producción y entrega de materiales genéticos mejorantes;
 - Producción y difusión de publicaciones científicas, técnicas y divulgativas.
- h) Asegurar el financiamiento de los Programas de Investigación que realice o auspicie.

TITULO II

ORGANIZACION Y FUNCIONAMIENTO

ARTICULO 5º La Fundación contará para su organización y funcionamiento con una Junta Directiva; una Comisión Ejecutiva; cuatro Comités Permanentes; de Programación, de Finanzas y Auditoría, de Nominaciones y de Desarrollo; un Panel Consejero Externo; un Director Ejecutivo y las Unidades Operativas cuyo número, características y atribuciones estarán determinadas en el correspondiente Reglamento General.

DE LA JUNTA DIRECTIVA

ARTICULO 6º La Junta Directiva es el máximo organismo de la Fundación y estará integrada por los siguientes miembros:

- a) El Ministro de Agricultura y Ganadería o su Delegado, quien será el Presidente de la Junta y de la Fundación;
- b) El Ministro de Defensa Nacional o su Delegado;
- c) El Secretario General de Planificación del CONADE o su Delegado;
- d) Dos miembros provenientes de los Centros de Educación Superior del País, por un período inicial de dos años, pudiendo ser reelegidos;
- e) Dos Representantes de los Organismos Internacionales que colaboren con la Fundación, por un período inicial de tres años, pudiendo ser reelegidos;



- f) Dos miembros provenientes del Sector Productivo Agropecuario de la Costa y Región Insular, por un período inicial de cuatro años, pudiendo ser reelegidos;
- g) Dos miembros provenientes del Sector Productivo Agropecuario de la Sierra y Región Amazónica, por un período inicial de cinco años, pudiendo ser reelegidos; y,
- h) El Director Ejecutivo de la Fundación quién actuará únicamente con voz informativa.

Concluído el período inicial, los miembros de la Junta Directiva constantes en los literales (d), (e), (f) y (g) de este Artículo, serán elegidos o reelegidos por períodos de cuatro años. Estos miembros serán elegidos por la Junta Directiva, a título personal, y no podrán delegar sus funciones.

ARTICULO 7º La Junta Directiva sesionará trimestralmente de manera ordinaria, y, en forma extraordinaria, cuando fuere convocado por el Presidente o lo pidieren cinco de sus miembros o el Director Ejecutivo de la Fundación.

Habrá quorum con la asistencia de seis de sus miembros.

El Presidente de la Junta Directiva tendrá voto dirimente.

Actuará como Secretario de la Junta Directiva el Secretario de la Fundación.

ARTICULO 8º La Junta Directiva tendrá los siguientes deberes y atribuciones:

- a) Vigilar por el normal funcionamiento de la Fundación y en especial su carácter privado, autónomo y apolítico;
- b) Dictar las normas que orienten la organización y la política general de la Fundación;
- c) Aprobar el Reglamento General de la Fundación, y los Reglamentos Especiales que sean necesarios;
- d) Aprobar los planes, programas, presupuesto e informes de labores que anualmente deberá someter a su consideración el Director Ejecutivo;
- e) Dictar las normas de control que fueren necesarias para el cumplimiento de los fines específicos de la Fundación;
- f) Nombrar de su seno a los Miembros de la Comisión Ejecutiva y a los Miembros de los Comités Permanentes;

g) Nombrar a los Asesores de los Comités Permanentes y a los Miembros del Panel Consejero Externo;

- h) Nombrar al Director Ejecutivo de la Fundación y removerlo por causa justificada;
- i) Nombrar al Secretario de la Fundación que al mismo tiempo será Secretario de la Junta, y removerlo por causa justificada;
- j) Seleccionar el personal técnico para posiciones de jefatura, propuesto por el Comité de Nominaciones, y otras posiciones importantes que la Junta considere conveniente;
- k) Crear e integrar las Unidades Operativas que considere necesarias para el cumplimiento de los objetivos y buena marcha de la Institución así como suprimirlas cuando creyere conveniente.

DE LA COMISION EJECUTIVA

ARTICULO 9º La Comisión Ejecutiva estará integrada por el Presidente de la Junta Directiva, el Director Ejecutivo (con voz, pero sin voto), y los Presidentes de los cuatro Comités Permanentes, y tendrá como funciones las siguientes:

- a) Autorizar al Director Ejecutivo para que efectúe egresos según lo establezca el Reglamento General;
- b) Servir en ausencia de la Junta en asuntos que demanden soporte oficial de la Dirección Ejecutiva y/o asuntos que deben ser resueltos antes de que la Junta pueda ser convocada;
- c) Actuar en todos los asuntos presupuestarios, administrativos y programáticos que, de otra manera, sean asumidos por la Junta;
- d) Las demás que le fueren asignadas por la Junta Directiva y el Reglamento General.

DE LOS COMITES PERMANENTES

ARTICULO 10º La Fundación contará con cuatro Comités Permanentes: de Programación, de Finanzas y Auditoría, de Desarrollo y de Nominaciones; y sus funciones básicas son las de actuar como consejeros de la Junta Directiva, de la Comisión Ejecutiva y del Director Ejecutivo.

En caso necesario la Junta Directiva podrá crear Comités Ad-hoc.

Los Comités Permanentes estarán íntegrados por lo menos de tres miembros, incluyendo un miembro de la Junta Directiva quien los presidirá, un Jefe de Programa o Departamento y un ASESOR designado por la Junta Directiva.

Los Comités Permanentes deberán reunirse tantas veces cuantas sean necesarias, debiendo al efecto ser convocados por el Presidente.

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ARTICULO 11º El Comité de Programación tendrá como funciones básicas asesorar a la Junta Directiva, a la Comisión Ejecutiva y al Director Ejecutivo en el planeamiento, implementación y evaluación de los Programas y Departamentos de Investigación, y las demás que se establezcan en el Reglamento General.

ARTICULO 12º El Comité de Finanzas y Auditoría ejercerá la función de asesor de la Junta Directiva, de la Comisión Ejecutiva y del Director Ejecutivo en todo lo relacionado a alternativas de inversión, asignaciones presupuestarias, control de operaciones, presentación de estados financieros, y las demás que se establezcan en el Reglamento General.

ARTICULO 13º El Comité de Desarrollo asesorará a la Junta Directiva, a la Comisión Ejecutiva y al Director Ejecutivo en la búsqueda de financiamiento, en todas las fuentes posibles públicas y privadas, nacionales e internacionales. Los medios para la consecución de estos fines estarán determinados en el Reglamento General.

ARTICULO 14º El Comité de Nominaciones propondrá nuevos candidatos para la Junta Directiva. También asistirá a la Junta Directiva, a la Comisión Ejecutiva y al Director Ejecutivo en la selección del personal científico especializado para las más altas posiciones técnicas de la Fundación. El Reglamento General establecerá las normas para el fiel cumplimiento de estas funciones.

DEL PANEL CONSEJERO EXTERNO

ARTICULO 15º El Panel Consejero Externo estará constituido por científicos de renombre para cada área de Programas prioritarios de la Fundación, además de profesionales con muy altas credenciales en administración y manejo de la investigación, extensión o educación agropecuaria. El número y el nombre de los Miembros será definido por la Junta Directiva.

El Panel Consejero Externo hará evaluaciones de los Programas y Departamentos de la Fundación cada tres a cinco años, basados en el informe que al efecto presentará el Director Ejecutivo. Sus funciones y atribuciones estarán determinadas en el Reglamento General.

DEL DIRECTOR EJECUTIVO

ARTICULO 16º El Director Ejecutivo es el Representante Legal de la Fundación, es el responsable de su desenvolvimiento técnico, administrativo y financiero, y desempeñará sus funciones por un período de cinco años, pudiendo ser reelegido.

ARTICULO 17º Son atribuciones y deberes del Director Ejecutivo:

- a) Ejercer la Representación Legal, Judicial y Extrajudicial de la Fundación;
- b) Organizar, orientar y dirigir todas las actividades institucionales en orden a conseguir las finalidades y objetivos señalados por el Estatuto y el Reglamento General;
- c) Nombrar, contratar, promover y remover al personal técnico y administrativo de la Fundación, cuando según los estatutos y regulaciones no se necesite aprobaciones de la Junta Directiva;
- d) Someter a consideración de la Junta Directiva a más tardar hasta el mes de noviembre los planes, programas y presupuesto para el año siguiente, asistido por el Comité de Programas; y, hasta el mes de enero los informes económicos y de actividades del año inmediato anterior;
- e) Suscribir contratos, convenios y autorizar inversiones o gastos en las cuantías y según el procedimiento que señale el Reglamento General de la Fundación;
- f) Establecer vínculos institucionales con personas naturales o jurídicas, nacionales o extranjeras, públicas o privadas, relacionadas o interesadas en programas o proyectos de la Fundación;
- g) Cumplir y hacer cumplir las Resoluciones de la Junta Directiva y de la Comisión Ejecutiva; y,
- h) Los demás que le confieren estos Estatutos y el Reglamento General.

TITULO III

DEL REGIMEN PATRIMONIAL Y FINANCIERO

ARTICULO 18º El Patrimonio de la Fundación estará constituido por:

- a) Los aportes entregados por el Estado Ecuatoriano;
- b) Las contribuciones y valores que en calidad de asignaciones, donaciones, legados o préstamos otorguen las personas naturales o jurídicas, nacionales o extranjeras, públicas o privadas;
- c) Las reservas que formule en su presupuesto y los excedentes de revalorización de Activos Fijos;
- d) Los ingresos provenientes de los servicios, contratos o convenios que preste o celebre en relación de sus objetivos; y,
- e) Los bienes muebles e inmuebles que adquiriera a cualquier título.

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ARTICULO 19º El patrimonio de la Fundación es variable. Su monto será establecido al término de cada ejercicio económico en los estados financieros, dictaminados éstos por Auditores Externos independientes y debidamente aprobados por la Junta Directiva.

El ejercicio económico anual será de enero a diciembre.

ARTICULO 20º La Fundación tiene amplias facultades para la administración e inversión de sus recursos; sin embargo, los bienes de cualquier tipo que componen el Patrimonio de la misma podrán utilizarse únicamente para los objetivos y fines previstos en los presentes Estatutos.

ARTICULO 21º Los bienes de la Fundación no pertenecen ni en todo ni en parte a ninguna de las personas que la integren.

ARTICULO 22º Las donaciones, legados, subvenciones u otras aportaciones de patrimonios similares realizados a la Fundación por cualquier persona natural o jurídica, no darán a quien los otorgue ningún derecho sobre el patrimonio de la misma, ni modificarán el objetivo ni responsabilidades principales de la Fundación.

ARTICULO 23º Los Miembros de la Junta Directiva recibirán las dietas que se fijen en el Presupuesto anual de la Institución.

TITULO IV

DE LA EXTINCION O DISOLUCION

ARTICULO 24º La Fundación podrá extinguirse o disolverse por causas legales o por decisión unánime de todos los Miembros de la Junta Directiva. De producirse la extinción o disolución, sus bienes y valores pasarán a la persona o personas jurídicas que siendo afines con los objetivos de la Fundación, fueren designadas por la Junta Directiva para tal efecto.

De no haber tal designación pasarán a poder del Ministerio de Agricultura y Ganadería para proyectos de Investigación Agropecuaria.

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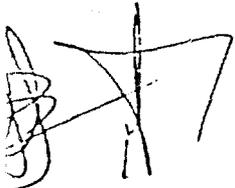
DISPOSICION GENERAL INSTITUTO DE LA UNION PURISIMA

La Fundación podrá solicitar la reforma de sus estatutos a la Autoridad competente, con el voto de las dos terceras partes de los Miembros de la Junta Directiva.

DISPOSICIONES TRANSITORIAS

PRIMERA: Por esta vez el Presidente de la Fundación designará a los vocales de la Junta Directiva constantes en los literales (d), (e), (f) y (g) del Artículo 6º, así como al Director Ejecutivo de la Fundación.

SEGUNDA: El Presidente y el Director Ejecutivo de la Fundación en el plazo de hasta ciento ochenta días, contados a partir de la fecha de aprobación de los presentes Estatutos, convocarán a la Junta Directiva y someterán para su conocimiento y aprobación el proyecto de Reglamento General que regirá los destinos de la Institución.



Appendix IV

Statutes for FEDIA

dica de derecho privado, sin fines de lucro, con domicilio en la ciudad de Quito, dedicada a planificar, realizar y financiar la investigación agropecuaria nacional y apruébense sus Estatutos que han sido sometidos a consideración del señor Presidente de la República, por parte del señor Ministro de Agricultura y Ganadería.

ARTICULO 2º— Con el propósito de que la Fundación Ecuatoriana de Investigación Agropecuaria cumpla con sus fines específicos, el Ministerio de Finanzas y Crédito Público, proporcionará los fondos a la misma para su presupuesto anual, como parte fundamental del Estado, que constituirá parte del patrimonio de la Fundación. También el Estado podrá hacer donaciones u otros aportes, dependiendo de la economía general del país, con sujeción a la Ley.

ARTICULO 3º— Encárguese de la aplicación del presente Decreto, los señores Ministros de Agricultura y Ganadería, de Finanzas y Crédito Público y de Defensa Nacional.

ARTICULO 4º— El presente Decreto entrará en vigencia a partir de su publicación en el Registro Oficial.

Dado en Quito, en el Palacio Nacional, a 11 de octubre de mil novecientos ochenta y seis.

I.) León Febres-Cordero Ribadeneyra, Presidente Constitucional de la República.— I.) Marcel J. Lamiado, Ministro de Agricultura y Ganadería.— I.) Alberto Dohik, Ministro de Finanzas y Crédito Público.— I.) Gral. Medardo Salazar Navas, Ministro de Defensa Nacional.

Es fiel copia.— Lo certifico:

I.) Lcdo. Patricio Quevedo Terán, Secretario General de la Administración.

LEON FEBRES-CORDERO RIBADENEYRA,
Presidente Constitucional de la República,

Considerando:

Que la investigación agropecuaria constituye una actividad primaria para conseguir el desarrollo armónico y sostenido del sector agropecuario nacional;

Que esta actividad, necesita de recursos económicos permanentes que le permitan desenvolverse en forma ininterrumpida y tener, por tanto, una base financiera sólida;

Que la investigación agropecuaria del país requiere desenvolverse al margen de ingerencias externas que menoscaban su labor científica;

Que es deber del Gobierno Nacional establecer el mecanismo apropiado para asegurar que las inversiones que se realizan en investigación agropecuaria, reviertan en pleno beneficio del país;

Que es obligación del Gobierno Nacional propender al desarrollo de la educación en el campo agropecuario;

Que el artículo 584 del Código Civil, prescribe que es atribución del Presidente de la República, aprobar la constitución de las Fundaciones que se establezcan en el país;

En uso de la facultad que le confiere el artículo 78, literal a) de la Constitución Política,

Decreta:

ARTICULO 1º— Créase la Fundación Ecuatoriana de Investigación Agropecuaria como persona jurídica

ESTATUTOS DE LA FUNDACION ECUATORIANA
DE LA INVESTIGACION AGROPECUARIA

TITULO I

Naturaleza, domicilio, duración y objetivos

ARTICULO 1º El Estado Ecuatoriano crea la Fundación Ecuatoriana de Investigación Agropecuaria (FEDIA), como persona jurídica de derecho privado sin fines de lucro, con patrimonio propio y ~~administración autónoma~~ de acuerdo a lo dispuesto en el Título XXIX del Libro I del Código Civil.

ARTICULO 2º El domicilio legal de la Fundación es la ciudad de Quito, pero su acción será el ámbito nacional.

ARTICULO 3º La Fundación tendrá una duración de cincuenta años prorrogables.

ARTICULO 4º El objetivo fundamental de la Fundación es mejorar la implementación de las ciencias agrícolas, ~~promoviendo la investigación~~ ~~extensión~~ ~~investigación~~ para impulsar el desarrollo sostenido del sector agropecuario ecuatoriano. Para lograr este objetivo, la Fundación tiene las siguientes responsabilidades:

a) Identificar y definir las prioridades de Investigación para propender el desarrollo agropecuario del País;

b) Estructurar los Programas de investigación que correspondan a estos lineamientos;

c) Generar alternativas tecnológicas apropiadas a las condiciones ecológicas del País, orientadas a incrementar la producción, productividad, ampliación de la frontera agrícola y conservación de los recursos naturales;

d) Validar y difundir las tecnologías generadas;

e) Estructurar y mantener el inventario tecnológico;

f) Realizar intercambios científicos con Instituciones Nacionales e Internacionales, públicas o privadas; y, cuando crea conveniente, financiar programas específicos de estas instituciones, dentro de los objetivos de la propia Fundación;

g) Estructurar un sistema de servicios agropecuarios en las siguientes áreas compatibles con su actividad específica:

— Capacitación para técnicos, productores, estudiantes y profesores a través de centros que establecerá para el efecto, o a través de instituciones ya establecidas, a nivel pre-universitario, universitario o de post-gradado;

— Establecimiento de laboratorios para atender los requerimientos del sector agropecuario;

— Producción y entrega de materiales genéticos mejorantes;

— Producción y difusión de publicaciones científicas, técnicas y divulgativas.

h) Asegurar el financiamiento de los Programas de Investigación que realice o auspicie.

TITULO II

Organización y funcionamiento

ARTICULO 5º La Fundación contará para su organización y funcionamiento con una Junta Directiva, una Comisión Ejecutiva, Cuatro Comités Permanentes, de Programación, de Finanzas y Auditoría, de Nominaciones y de Desarrollo, un Panel Consejero Externo, un Director Ejecutivo y las Unidades Operativas cuyo número, características y atribuciones estarán determinadas en el correspondiente Reglamento General.

DE LA JUNTA DIRECTIVA

ARTICULO 6º La Junta Directiva es el máximo organismo de la Fundación y estará integrada por los siguientes miembros:

a) El Ministro de Agricultura y Ganadería o su Delegado, quien será el Presidente de la Junta y de la Fundación;

b) El Ministro de Defensa Nacional o su Delegado;

c) El Secretario General de Planificación del CONADE o su Delegado;

d) Dos miembros provenientes de los Centros de Educación Superior del País, por un periodo inicial de dos años, pudiendo ser reelegidos;

e) Dos Representantes de los Organismos Internacionales que colaboren con la Fundación, por un periodo inicial de tres años, pudiendo ser reelegidos;

f) Dos miembros provenientes del Sector Productivo Agropecuario de la Costa y Región Insular, por un periodo inicial de cuatro años, pudiendo ser reelegidos;

g) Dos miembros provenientes del Sector Productivo Agropecuario de la Sierra y Región Amazónica, por un periodo inicial de cinco años, pudiendo ser reelegidos; y,

h) El Director Ejecutivo de la Fundación quien actuará únicamente con voz informativa.

Concluido el periodo inicial, los miembros de la Junta Directiva constantes en los literales (d), (e), (f) y (g) de este Artículo, serán elegidos o reelegidos por periodos de cuatro años. Estos miembros serán elegidos por la Junta Directiva, a título personal, y no podrán delegar sus funciones.

ARTICULO 7º La Junta Directiva se reunirá ordinariamente de manera ordinaria, en forma extraordinaria, cuando fuere convocado por el Presidente o lo pidieren cinco de sus miembros o el Director Ejecutivo de la Fundación.

Habrà quórum con la asistencia de seis de sus miembros.

El Presidente de la Junta Directiva tendrá voto ordinario.

Actuará como Secretario de la Junta Directiva el Secretario de la Fundación.

ARTICULO 8º La Junta Directiva tendrá los siguientes deberes y atribuciones:

a) Vigilar por el normal funcionamiento de la Fundación y en especial su carácter privado, autónomo y apolítico;

b) Dictar las normas que orienten la organización y la política general de la Fundación;

c) Aprobar el Reglamento General de la Fundación, y los Reglamentos Especiales que sean necesarios;

d) Aprobar los planes, programas, presupuesto e informes de labores que anualmente deberá someter a su consideración el Director Ejecutivo;

e) Dictar las normas de control que fueren necesarias para el cumplimiento de los fines específicos de la Fundación;

f) Nombrar de su seno a los Miembros de la Comisión Ejecutiva y a los Miembros de los Comités Permanentes;

g) Nombrar a los Asesores de los Comités Permanentes y a los Miembros del Panel Consejero Externo;

h) Nombrar al Director Ejecutivo de la Fundación y removerlo por causa justificada;

i) Nombrar al Secretario de la Fundación que al mismo tiempo será Secretario de la Junta, y removerlo por causa justificada;

j) Seleccionar el personal técnico para posiciones de jefatura, propuesto por el Comité de Nominaciones, y otras posiciones importantes que la Junta considere conveniente;

k) Crear e integrar las Unidades Operativas que considere necesarias para el cumplimiento de los objetivos y buena marcha de la Institución así como suprimirlas cuando creyere conveniente.

DE LA COMISION EJECUTIVA

ARTICULO 9º La Comisión Ejecutiva estará integrada por el Presidente de la Junta Directiva, el Director Ejecutivo (con voz, pero sin voto), y los Presidentes de los cuatro Comités Permanentes, y tendrá como funciones las siguientes:

- a) Autorizar al Director Ejecutivo para que efectúe egresos según lo establezca el Reglamento General;
- b) Servir en ausencia de la Junta en asuntos que demanden soporte oficial de la Dirección Ejecutiva y/o asuntos que deben ser resueltos antes de que la Junta pueda ser convocada;
- c) Actuar en todos los asuntos presupuestarios, administrativos y programáticos que, de otra manera, sean asuntos por la Junta;
- d) Las demás que le fueren asignadas por la Junta Directiva y el Reglamento General.

DE LOS COMITES PERMANENTES

ARTICULO 10º La Fundación contará con cuatro Comités Permanentes: de Programación, de Finanzas y Auditoría, de Desarrollo y de Nominaciones; y sus funciones básicas son las de actuar como consejeros de la Junta Directiva, de la Comisión Ejecutiva y del Director Ejecutivo.

En caso necesario la Junta Directiva podrá crear Comités Ad-hoc.

Los Comités Permanentes estarán integrados por lo menos de tres miembros, incluyendo un miembro de la Junta Directiva quien los presidirá, un Jefe de Programa o Departamento, y un Asesor designado por la Junta Directiva.

Los Comités Permanentes deberán reunirse tantas veces cuantas sean necesarias, debiendo al efecto ser convocados por el Presidente.

ARTICULO 11º El Comité de Programación tendrá como funciones básicas asesorar a la Junta Directiva, a la Comisión Ejecutiva y al Director Ejecutivo en el planeamiento, implementación y evaluación de los Programas y Departamentos de Investigación, y las demás que se establezcan en el Reglamento General.

ARTICULO 12º El Comité de Finanzas y Auditoría ejercerá la función de asesor de la Junta Directiva, de la Comisión Ejecutiva y del Director Ejecutivo en todo lo relacionado a alternativas de inversión, asignaciones presupuestarias, control de operaciones; presentación de estados financieros y las demás que se establezcan en el Reglamento General.

ARTICULO 13º El Comité de Desarrollo asesorará a la Junta Directiva, a la Comisión Ejecutiva y al Director Ejecutivo en la búsqueda de financiamiento en todas las fuentes posibles públicas y privadas, nacionales e internacionales. Los medios para la consecución de estos fines estarán determinados en el Reglamento General.

ARTICULO 14º El Comité de Nominaciones propondrá nuevos candidatos para la Junta Directiva. También asistirá a la Junta Directiva a la Comisión Ejecutiva y al Director Ejecutivo en la selección del personal científico especializado para las más altas posiciones técnicas de la Fundación. El Reglamento

General establecerá las normas para el fiel cumplimiento de estas funciones.

DEL PANEL CONSEJERO EXTERNO

ARTICULO 15º El Panel Consejero Externo estará constituido por científicos de renombre para el área de Programas prioritarios de la Fundación, además de profesionales con muy altas calificaciones en administración y manejo de la investigación, extensión o educación agropecuaria. El número y el nombre de los Miembros será definido por la Junta Directiva.

El Panel Consejero Externo hará evaluaciones de los Programas y Departamentos de la Fundación cada tres a cinco años, basados en el informe que al efecto presentará el Director Ejecutivo. Sus funciones y atribuciones estarán determinadas en el Reglamento General.

DEL DIRECTOR EJECUTIVO

ARTICULO 16º El Director Ejecutivo es el Representante Legal de la Fundación, es el responsable de su desenvolvimiento técnico, administrativo y financiero, y desempeñará sus funciones por un período de cinco años, pudiendo ser reelegido.

ARTICULO 17º Son atribuciones y deberes del Director Ejecutivo:

- a) Ejercer la Representación Legal, Judicial y Extrajudicial de la Fundación;
- b) Organizar, orientar y dirigir todas las actividades institucionales en orden a conseguir las finalidades y objetivos señalados por el Estatuto y el Reglamento General;
- c) Nombrar, contratar, promover y remover al personal técnico y administrativo de la Fundación, cuando según los estatutos y regulaciones no se necesite aprobaciones de la Junta Directiva;
- d) Someter a consideración de la Junta Directiva ~~o someter hasta el mes de noviembre~~ los planes, programas y presupuesto para el año siguiente, asistido por el Comité de Programas; y, hasta el mes de enero los informes económicos y de actividades del año inmediato anterior;
- e) Suscribir contratos, convenios y autorizar inversiones o gastos en las cuantías y según el procedimiento que señale el Reglamento General de la Fundación;
- f) Establecer vínculos institucionales con personas naturales o jurídicas, nacionales o extranjeras, públicas o privadas, relacionadas o interesadas en programas o proyectos de la Fundación;
- g) Cumplir y hacer cumplir las Resoluciones de la Junta Directiva y de la Comisión Ejecutiva; y,
- h) Las demás que le confieren estos Estatutos y el Reglamento General.

TITULO III

Del Régimen Patrimonial y Financiero

ARTICULO 18º El Patrimonio de la Fundación estará constituido por:

- e) Los aportes entregados por el Estado Ecuatoriano;
- b) Las contribuciones y valores que en calidad de asignaciones, donaciones, legados o préstamos otorgan las personas naturales o jurídicas, nacionales o extranjeras, públicas o privadas;
- c) Las reservas que formule en su presupuesto y los excedentes de revalorización de Activos Fijos;
- d) Los ingresos provenientes de los servicios, contratos o convenios que preste o celebre en relación de sus objetivos; y,
- e) Los bienes muebles e inmuebles que adquiera a cualquier título.

ARTICULO 19º El patrimonio de la Fundación es variable. Su monto será establecido al término de cada ejercicio económico en los estados financieros, dictaminados éstos por Auditores Externos independientes y debidamente aprobados por la Junta Directiva.

El ejercicio económico anual será de enero a diciembre.

ARTICULO 20º La Fundación tiene amplias facultades para la administración e inversión de sus recursos; sin embargo, los bienes de cualquier tipo que componen el Patrimonio de la misma podrán utilizarse únicamente para los objetivos y fines previstos en los presentes Estatutos.

ARTICULO 21º Los bienes de la Fundación no pertenecen ni en todo ni en parte a ninguna de las personas que la integren.

ARTICULO 22º Las donaciones, legados, subvenciones u otras aportaciones de patrimonios similares realizadas a la Fundación por cualquier persona natural o jurídica, no darán a quien los otorgue ningún derecho sobre el patrimonio de la misma, ni modificarán el objetivo ni responsabilidades principales de la Fundación.

ARTICULO 23º Los Miembros de la Junta Directiva recibirán las dietas que se fijen en el Presupuesto anual de la Institución.

TITULO IV

De la extinción y disolución

ARTICULO 24º La Fundación podrá extinguirse o disolverse por causas legales o por decisión unánime de todos los Miembros de la Junta Directiva. De producirse la extinción o disolución, sus bienes y valores pasarán a la persona o personas jurídicas que siéndole afines con los objetivos de la Fundación, fueren designadas por la Junta Directiva para tal efecto.

De no haber tal designación pasarán a poder del Ministerio de Agricultura y Ganadería para proyectos de Investigación Agropecuaria.

DISPOSICION GENERAL

La Fundación podrá solicitar la reforma de sus estatutos a la Autoridad competente, con el voto de la mayoría de las partes de los Miembros de la Junta Directiva.

DISPOSICIONES TRANSITORIAS

PRIMERA: En esta vez el Presidente de la Fundación designará a los vocales de la Junta Directiva constantes en los literales (d), (e), (f) y (g) del Artículo 6º, así como al Director Ejecutivo de la Fundación.

SEGUNDA: El Presidente y el Director Ejecutivo de la Fundación en el plazo de ~~treinta~~ ^{noventa} ~~días~~ ^{meses} contados a partir de la fecha de aprobación de los presentes Estatutos, convocarán a la Junta Directiva y someterán para su conocimiento y aprobación el proyecto de Reglamento General que regirá los destinos de la Institución.

Es fiel copia.— Lo certifico:

f.) Ldo. Patricio Quevedo Terán, Secretario General de la Administración.

I. PROGRAMA NACIONAL DE PAPAS

A. ANTECEDENTES

Por las condiciones ecologicas, sistemas de cultivo y preferencias varietales de mercado, el area productora de papa se subdivide en tres regiones principales:

- Region Norte: provincias de Carchi e Imbabura
- Region Central: Pichincha, Cotacachi, Tungurahua, Chimborazo y Bolivar.
- Region Sur: Azuay, Cañar y Loja

La superficie de cultivo constituye el 5.5 % del area total de cultivos agricolas en la Sierra, con una superficie promedio de siembra de 38.317 hectareas y una produccion de 421.471 toneladas, lo que representa un promedio nacional de rendimiento de 11.0 toneladas metricas por hectarea, hasta 1985. La produccion total se destina al consumo nacional.

Se estima que el 48% de la produccion total de papa, proviene de unidades agricolas de menos de 10 hectareas en extension total, que utilizan el 54% de su superficie para este cultivo, y que en conjunto representan el 93% de las unidades productoras de papa.

B. FACTORES LIMITANTES

1. Region Norte

- **Sermoplasma:** aproximadamente el 80% de la superficie de esta region es cultivada con variedades colombianas, de buen rendimiento pero ajenas a nuestro medio. El 20% restante se reparte entre variedades nativas, de buena calidad culinaria, pero susceptible a los principales patogenos del cultivo y de largos ciclos vegetativos; y variedades, mejoradas por el INIAP, aun de poca difusion en esta region.

- **Manejo del cultivo:** se aplican elevadas dosis de fertilizacion, equivalentes en su costo a 1.5 veces lo aplicado en la Region Central, y 2.2. veces la Region Sur; sus rendimientos son similares a la Region Central. Igualmente, los pesticidas en mezclas y frecuencias, son aplicados en altos niveles (12-16 fumigaciones por ciclo de cultivo).

- **Carencia de semillas mejoradas:** toda el area es sembrada con tuberculos seleccionados de lotes de consumo.

- **Transferencia:** el sistema de extension es practicamente nulo, por falta de un adecuado nexo con el grupo de investigacion.

2. Region Central

Es la region de mejor uso tecnologico y adecuados niveles de rentabilidad. Para esta region, el principal factor limitante constituye la Transferencia de Tecnologia, la cual se considera ineficiente y deficitaria, con una polarizacion

marcada hacia cierta clientela mientras que un amplio sector se encuentra desatendido. Sin embargo se estima prudente continuar con el desarrollo de nuevas variedades y tecnología innovativa de cultivo, contribuyendo de esta forma al incremento de la producción y productividad del cultivo.

2. Region Sur

Esta Region es la de condiciones ecologicas mas dificiles; bajos niveles tecnológicos y bajos rendimientos.

- Germoplasma: Mayoritariamente, el area de cultivo utiliza variedades raras de bajos rendimientos, susceptibles a plagas y enfermedades, y de largos ciclos vegetativos.

- Tecnologia: El manejo del cultivo es deficiente, por cuanto se utiliza semilla de baja calidad, bajo niveles de fertilizacion y escaso numero de controles fitosanitarios, entre los principales limitantes.

- Transferencia: En esta region el servicio de extension es completamente nulo.

II. PROBLEMAS SOLUCIONABLES A TRAVES DE LA INVESTIGACION Y TRANSFERENCIA

INVESTIGACION

Mejoramiento genetico

En todas las zonas es necesario continuar con la generacion de nuevas variedades de alto rendimiento, precoces y resistentes al ataque de larva, roya y nematodos. Mayor énfasis debe darse a la Region Sur en la generacion de materiales de amplia adaptacion y de alta calidad culinaria.

Tecnología de cultivo

En la Region Norte es necesario investigar en la optimizacion del uso de fertilizantes y pesticidas.

En la Region Sur es necesario desarrollar tecnologias apropiadas en todo cuanto se refiere al manejo del cultivo, principalmente a densidades de siembra, tamaño de semilla, fertilizacion, control de plagas y enfermedades, cosecha y almacenamiento.

TRANSFERENCIA DE TECNOLOGIA

En ninguna de las tres regiones se advierte una relacion de trabajo entre los sectores de investigacion y extension. Al contrario, sin embargo de haberse generado una completa tecnologia de manejo del cultivo, esta casi no ha llegado a los interesados, por falta de un agil y adecuado sistema de transferencia: capacitacion a los extensionistas y a traves de estos, la retroalimentacion hacia y desde la estacion experimental y los agricultores.

Es necesario establecer una metodología mas dinamica y precisa de transferencia y capacitacion tecnologicas, y con ello generar o adaptar tecnologias y elevar la produccion y productividad de los sectores paperos.

PRODUCCION DE SEMILLAS

Es importante implementar sistemas de multiplicacion de semillas que garanticen volúmenes suficientes y en forma oportuna, de aquellas variedades mejoradas, de forma que se satisfagan las necesidades de los productores de las tres regiones.

Requerimientos de recursos humanos

R E G I O N E S				
	(1)	(2)	(3)	
Fitomejoradores	1	1	1	3
Fitopatologos	-	1	1	2
Entomologos	-	1	1	2
Fisiologos	-	1	-	1
Agroquímicos	1	1	1	3
Esp. prod. semillas	1	1	1	3
Coord. Investig. Extens.	1	1	1	3

TOTAL	4	7	4	17
=====				

- (1) Subsede Carchi
- (2) Sede E.E. Santa Catalina
- (3) Subsede Cañar

Requerimientos físicos

- Vehiculos: 11 (5 para sede, 3 para cada subsede)
- Bombas fumigadoras a motor de mochila: 10
- Equipos de riego (incluye bomba, motor y red mediana de distribucion): 3
- Verdeaderos de semilla: 300 m²
- Laboratorios: Suelos, Entomologia, Fitopatologia, Fisiologia vegetal, Cultivo de tejidos.
- Invernaderos: 4
- Oficinas
- Bodegas
- Audiovisuales: 4
- Otros equipos: maquinas de escribir, copiadora, etc.
- Microcomputadoras: 3
- Tractores con implementos: 4
- Sembradoras-Fertilizadoras: 3
- Cosechadoras de disco: 3
- Cosechadoras de cadena: 3
- Cosechadoras combinadas: 2
- Bombas Aspersión John Bean 600 lts.: 2
- Montacargas: 3
- Bodegas Refrigeradas: reparacion de la existente en Santa Catalina

D. ENLACES INVESTIGACION-EXTENSION

El proyecto para debiera identificar 3 coordinadores para establecer enlaces con la clientela de extension, localizados uno en cada area de influencia de la sede y subseca. La clientela de extension estara formada principalmente por los extensionistas publicos y privados, y ademas por grupos organizados de productores.

Los coordinadores jugaran el papel de relacionadores del proyecto, facilitando asi tanto el flujo de la informacion generada e investigacion, como la retroalimentacion desde los campos de los productores hacia las sedes y subseca.

E. SITUACION ACTUAL Y PROPUESTA

1. Recursos humanos

AREA	ACTUAL	PROPUESTA
Lider	--	1 Lider
Colider	--	1 Colider
Fitomejoramiento	1 Ing. Agr.	3 (1 PhD, 2 MSc)
Fitopatologia	1 Ing. Agr. MSc	2 MSc
Entomologia	Ing. Agr. MSc	2 (1 MSc, 1 Ing. Agr.)
Fisiologia	1 Ing. Agr.	1 MSc
Genetica	--	2 (1 MSc, 2 Ing. Agr.)
Produ. semillas	2 Ing. Agr.	3 (2 MSc, 1 Ing. Agr.)
Coord. Invest.-Extens.	--	3 Ing. Agr.

2. Recursos Fisicos

RECURSO	ACTUAL	PROPUESTA	DIFERENCIA
Camiones	2	1	1
Equipos para el cultivo	-	1	1
Equipos para el cultivo	-	3	3
Bancos Aspersión (1, 2, 3, 4)	1	1	-
Tractores e Implementos	2	4	2
Sembradoras-fertilizadoras	-	3	3
Doseadoras disco	1	3	2
Doseadoras cadena	-	3	3
Doseadoras combinadas	1	2	1
Imbricadores	2	1	1
Montacargas	-	3	3
Equipos suales	-	1	1
Computadores	1	1	-
Maquinas de escribir	1	3	2
Copadora	-	1	1
Verdeadores de semilla/m2	100	300	200
Bodegas (m2)	300	500	200
Oficinas (Cancha, Cañal) m2	-	250	250
Laboratorios: Suelos, etc. mal estado	-	Adequarlos	-
Bodega Refrigerada Santa Catalina	en funcionamiento	Adequarlos	-

F. INSTITUCIONES COLABORADORAS

F.1. Instituciones publicas nacionales

- MAG (Programa de Tuberculos y Raices)
- MBS (SEDRI)

F.2. Instituciones privadas nacionales

F.3. Instituciones internacionales

- Proyecto PRACIPA : US\$ 56.000 en tres años, mayormente para insumos
- Proyecto PROCIANDINO : US\$ 29.000 en tres años, para insumos y suministros
- CIP : US\$ 3.000 anual, para gastos de movilización e investigación
- IBPGR : US\$ 20.000 en dos años, para coleccion de germoplasma

G. PRESUPUESTO ESTIMADO

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g.1 Salarios

Lider	1	35.0	35.0
Colider	1	40.0	40.0
PhD Mejoramiento	1	15.0	15.0
MSc Mejoramiento	2	5.0	10.0
Patologia	1	10.0	10.0
	1	5.0	5.0
Entomologia	1	10.0	10.0
Fisiologia	1	5.0	5.0
Agromonia	1	5.0	5.0
Prod. Semillas	2	5.0	10.0
I.A. Entomologia	1	3.5	3.5
Agromonia	2	2.5	5.0
Prod. Semillas	1	3.5	3.5
Quim. Inv. Ext.	3	2.5	7.5

TOTAL	19	---	144.5
=====			

g.2 Equipamiento

SUBPO	COSTO UNITARIO	No.	TOTAL	PROTECA	PRACIPA	PROCI-ANUNC	FEDIA
Vehiculos 4x4	15,000	1	90,000	30,000	---	---	60,000
Vehiculos F-350	30,000	3	90,000	---	---	---	90,000
Equipo de Riego	50,000	2	150,000	50,000	---	---	100,000
Bombas Asp. JB	30,000	1	30,000	30,000	---	---	---
Tractores, Impl.	25,000	2	50,000	25,000	---	---	25,000
Sembrad-Fertil.	12,000	3	36,000	---	---	---	36,000
Cosechadora Disco	5,000	2	10,000	10,000	---	---	---
Cosech. Cadena	8,000	3	24,000	---	---	---	24,000
Cosech. Combinada	30,000	1	30,000	30,000	---	---	---
Invernaderos	25,000	2	50,000	---	---	---	50,000
Montacargas	25,000	3	75,000	---	---	---	75,000
Audi-visuales	1,000	4	4,000	1,000	1,000	1,000	1,000
Microcomputadoras	5,000	2	10,000	---	---	---	10,000
Maquinas de Escri.	1,000	2	2,000	---	---	---	2,000
Calculadoras	4,000	1	4,000	---	---	---	4,000
Verdesco. Sem.m2	150	200	30,000	5,000	5,000	---	10,000
Bodegas m2	200	200	40,000	---	---	---	40,000
Oficinas m2	200	250	50,000	---	---	---	50,000
Adacua. Bodega							
Refrigerada	--	--	20,000	---	---	---	20,000

TOTAL			795,000	181,000	7,000	1,000	686,000
=====							

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g.3 Apoyo a Laboratorio

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	Santa Catalina	Cañar	Total
Suelos Analisis	15.0	5.0	20.0
Patologia	10.0	6.0	16.0
Entomologia	4.0	3.0	7.0
Fisiologia	8.0	-	8.0
Prod. Semillas	10.0	6.0	16.0

TOTAL	47.0	20.0	67.0
=====			

g.4 Total

Salarios	164.500
Equipamiento	795.000
Apoyo Labs.	67.000

TOTAL	1'026.500
=====	

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V-2 PROGRAMA NACIONAL DEL CAFE

A. ANTECEDENTES

La producción cafetalera genera ocupación e ingresos a un gran número de pequeños y medianos agricultores y divisas al país por concepto de exportaciones.

En 1983 la superficie cultivada fue de 427.000 has. distribuidas en 130.000 unidades de producción (UPC), ubicadas en 17 provincias. La producción total en este año fue de alrededor de 90.000 TM.

La producción y productividad de cultivo son muy bajas. El rendimiento promedio por hectárea es de 250 Kg para el tipo Arabigo y 500 Kg para el tipo Robusta, contrastando con rendimientos de 1.000 Kg y 2.000 Kg. obtenibles para cada tipo de café, en otros países latinoamericanos.

El país exporta normalmente alrededor de 80.000 TM, generando divisas alrededor de 200 millones de dólares. La tendencia actual del mercado mundial se inclina hacia un incremento de los precios y de las cuotas de exportación.

El consumo interno asciende a aproximadamente 10.000 TM, manteniéndose relativamente estable.

B. FACTORES LIMITANTES

b.1. Indole técnica

El 42% del área sembrada corresponde a variedades de tipo Robusta y el 58% al tipo Arabigo. Dentro de este 58%, alrededor de las tres cuartas partes corresponden a la variedad Típica, susceptible a todas las razas de Roya y a otras enfermedades, siendo además de poco potencial de rendimiento, aunque de buena calidad. Por tanto, es necesario desarrollar cultivares de tipo Arabigo; de porte mediano a bajo; de alto rendimientos, resistentes a enfermedades, manteniendo las características de calidad exigidas por los mercados.

Otro aspecto importante de la problemática se relaciona con el desarrollo e implementación de paquetes tecnológicos. A pesar de existir actualmente algunas recomendaciones sobre fertilización, podas, regulación de sombra, control de malezas y tratamientos fitosanitarios; entre otras, los caficultores no lo han adoptado por varias razones. Entre estas sobresalen la falta de un adecuado servicio de transferencia de tecnología y la falta de recursos financieros que permitan al agricultor aplicar la tecnología básica recomendada.

Por otro lado, los resultados de investigación disponibles al momento necesitan ser expandidos adecuadamente, dando soluciones específicas a problemas como fertilización, podas, regulación de sombra, control de malezas y aspectos fitosanitarios.

Se estima que más del 50% del área cultivada está constituida por plantaciones de edad avanzada que necesitan ser renovadas o rehabilitadas. En el primer caso se requiere de una cantidad adecuada de materiales de siembra que actualmente no

se encuentran disponibles. Para el segundo caso se necesita informacion tecnologica sobre manejo de huertos.

b.2 Otros

Un factor que incide en el incremento de la produccion nacional de cafe es el precio internacional del producto. Cuando este es atractivo, los productores realizan inversiones en mejorar los cafetales. Cuando los precios bajan, los productores pierden el interes en el cultivo, disminuyendo asi la produccion nacional.

C. PROBLEMAS SOLUCIONABLES A TRAVES DE LA INVESTIGACION Y/O TRANSFERENCIA

Investigacion

Es indispensable reforzar el programa de fitomejoramiento de cafe del INIAP a fin de desarrollar cultivares mejorados de tipo Arabigo y Robusta, para las principales zonas productoras como: Manabi, Los Rios-Pichincha, El Oro-Loja y Napo. Estas variedades servirian para todos los estratos de caficultores, dentro de cada zona.

De igual manera, es necesario desarrollar tecnologias apropiadas en todos aquellos aspectos relacionados con el manejo del cultivo. Esto se relacionan con: fertilizacion, podas, manejo de sombra, control de malezas, cosecha y beneficio, control de enfermedades y plagas.

Con el proposito de acelerar la entrega de apreciables volumenes de materiales de propagacion, es necesario tambien investigar sobre metodos de multiplicacion masiva, que eventualmente permitan satisfacer adecuadamente la demanda.

Transferencia de Tecnologia

A corto plazo, mientras se desarrolla la tecnologia a traves de las actividades de investigacion anteriormente descritas, es necesario identificar la tecnologia basica existente a fin de capacitar a los extensionistas tanto publicos como privados. Esto permitira divulgar la tecnologia existente, contribuyendo asi al incremento de la produccion y productividad del cultivo a corto y mediano plazo. Este es un proceso constante que dependera del flujo de informacion tecnica hacia los caficultores, y la retroalimentacion desde el campo hacia la estacion experimental, a traves de los enlaces respectivos.

Las actividades de investigacion y transferencia de tecnologia se realizaran basicamente en cuatro localidades :

Los Rios-Pichincha	Pichilingue (Sede)
Manabi	Portoviejo
El Oro-Loja	Piñas
Napo	Payamino

Requerimientos de Recursos Humanos

	(1)	(2)	(3)	(4)	TOTAL
Fitomejoradores	1	1	-	1	3
Fitopatologos	1	-	1	-	2
Entomologos	1	-	1	1	3
Agronomistas	1	1	1	-	3
Esp. Suelos	1	-	-	1	2
Esp. Prod. Semillas	1	1	-	-	2
Coord. Invest. Ext.	1	1	-	1	3
<hr/>					
TOTAL	7	4	3	4	18

ZONAS:

- (1) Pichilingue: Los Rios - Pichincha
- (2) Portoviejo: Manabi
- (3) Piñas: El Oro-Loja
- (4) Payamino: Napo

Requerimientos Fisicos

- Vehiculos: 8 (dos para la sede, uno para cada subsede y uno para cada coordinador investigacion-extension)
- Bombas aspersoras de mochila a motor: 20
- Equipos de Riego: 3
- Higrotermografos: 8
- Aspergigrafos: 8
- Despulpadoras: 4
- Umbraculos: 5
- Laboratorios: Quimica de Suelos, Entomologia, Fitopatologia, Calidad, Cultivo de Tejidos.
- Equipos audiovisuales: 4
- Otros equipos: maquinas de escribir, copiadoras, etc.

D. ENLACES INVESTIGACION-EXTENSION

Se propone identificar tres tecnicos con el fin de que ellos establezcan los enlaces necesarios entre las actividades de investigacion y la clientela de extension. Esta clientela esta formada primordialmente por los extensionistas del MAG y otras entidades publicas y privadas, y por grupos organizados de productores.

Se preve que estos tecnicos coordinadores representaran el papel de relacionadores del programa, uno a nivel de sede (Pichilingue), el que puede responder tambien por la subsede de El Oro-Loja, y uno en cada una de las otras dos subsedes (Manabi y Napo).

E. BRECHA ENTRE SITUACION ACTUAL Y PROPUESTA

e.1 Recursos Humanos

AREA	ACTUAL	PROPUESTO
Lider	--	1 Lider
Co-Lider	--	1 Co-Lider
Fitomejoramiento	1 Ing.Agr.	1 PhD, 2 MSc
Fitopatologia	1 Ing.Agr.MSc	1 Ing. Agr., 1 MSc
Entomologia	--	3 Ing. Agr. (1 MSc)
Agronomia	2 Ing. Agr.	1 PhD, 1 MSc, 1 Ing.Agr.
Suelos	--	2 Ing.Agr. (1 MSc)
Prod. Semillas	1 Ing. Agr.	2 Ing. Agr. (1 MSc)
Coord. Inv-Extension	--	3 Ing. Agr. (1 MSc)

e.1 Recursos Fisicos

RUBRO	ACTUAL	PROPUESTO	DIFERENCIA
Vehiculos	2	8	6
Bombas motor	3	20	17
Equipos de Riego	0	3	3
Higrtermografos	2	8	6
Aspergigrafos	2	8	6
Despulpadoras	1	4	3
Umbraculos	0	5	5
Microcomputadoras	0	3	3
Audiovisuales	0	4	4
Maquinas de escribir	0	4	4
Copiadoras	0	2	2
Laboratorios	en mal estado, se comparte	Mejorar los existentes	

F. INSTITUCIONES COLABORADORAS

f.1 Instituciones Nacionales Publicas

- Programa Nacional del Cafe: existe poca coordinacion con el INIAP. El PNC no contribuye economicamente.
- SEDRI: a traves de los proyectos DRI

f.2 Instituciones Nacionales Privadas

- Federacion Nacional de Cooperativas Cafetaleras del Ecuador (FENACAFE): no existe contribucion economica alguna. Actualmente se esta discutiendo un posible convenio.

f.3 Instituciones Internacionales

- Junta del Acuerdo de Cartagena (JUNAC), ha financiado los estudios de control quimico de la Roya en la provincia de El Oro con una contribucion de alrededor de 3 millones de sucres en 2 años.
- Sociedad Alemana de Cooperacion Tecnica (GTZ): ha contribuido con alrededor de 10 millones de sucres en los ultimos 3 años para financiar equipos, vehiculos y pago de salarios a personal nacional. Ademas, tiene asignados 2 tecnicos alemanes en Pichilingue.

G. PRESUPUESTO ESTIMADO

g.1 Salarios

Lider	1	35.0	35.0
Co-lider	1	40.0	40.0
PhD Mejorador	1	7.0	7.0
Agronomo	1	7.0	7.0
MSc Mejorador	2	5.0	10.0
Fitopatologo	1	10.0	10.0
Entomologo	1	5.0	5.0
Suelos	1	10.0	10.0
Agronomia	1	5.0	5.0
Prod. Semillas	1	5.0	5.0
Coord. Inv. Ext.	1	5.0	5.0
I.A. Entomologia	1	3.5	3.5
<i>Plant Pathology</i>	1	2.5	2.5
Agronomia	1	3.5	3.5
Prod. de Semillas	1	2.5	2.5
Coord. Inv. Ext.	2	2.5	5.0
T O T A L		20	164.5

g.2 Equipamiento

RUBRO	COSTO UNITARIO	NO.	TOTAL	PROTECA	GTZ	FEDIA
Vehiculos 4x4	15.000	6	90.000	15.000	15.000	60.000
Bomba Mochila motor	62	17	10.540	2.400	2.400	5.580
Equipo Riego	50.000	3	150.000	50.000	--	100.000
Higrotermografo	1.500	6	9.000	1.500	1.500	6.000
Aspergigrafo	1.500	6	9.000	--	--	9.000
Despulpadoras	3.500	3	10.500	--	--	10.500
Umbraculos	20.000	5	100.000	20.000	--	80.000
Microcomputadora	5.000	3	15.000	--	5.000	10.000
Audiovisuales	1.000	4	4.000	--	--	4.000
Maquinas de escribir	1.000	4	4.000	--	--	4.000
Copiadoras	4.000	2	8.000	--	--	8.000
			410.040	88.980	23.980	297.080

g.3 Apoyo a Laboratorios

	Pichilingue	Portoviejo	Piñas	Payamino	Total
Suelos Analisis	10.0	10.0	6.0	6.0	32.0
Patologia	8.0	6.0	4.0	4.0	22.0
Entomologia	15.0	10.0	8.0	8.0	41.0
Fisiologia	4.0	4.0	3.0	3.0	14.0
Prod. Semillas	18.0	15.0	2.0	6.0	41.0
T O T A L	55.0	45.0	23.0	27.0	150.0

g.4 Total

Salarios	164.500
Equipamiento	410.040
Apoyo a Laboratorio	150.000
T O T A L	724.540

V-3 NATIONAL SOYBEAN PROGRAM

Soybeans are relatively new in Ecuadorian agriculture. It is estimated that in 1973 there were only 1,200 ha. of soybeans in the country. Currently about 40,000 ha. are seeded, producing about 70,000 mt at a yield of about 1800 Kg/ha. This relatively rapid increase has been largely in response to the increasing need to produce edible oils domestically. More recently, GOE import and pricing policies have further encouraged domestic oil production. Estimates of oil needs to be met by soybeans would generally require 100,000 ha. or more; decreasing interest in sesame, and increasing acreages of african palm and, perhaps, sunflower have, thus far, appeared to offset one another so the soybean estimate is relatively stable. Soy oil and other soybean product imports have decreased from about 29 million 1980 to virtually zero in 1986.

Thus, soybean oil is both quantitatively and qualitatively a product of choice for the country. Soybean oil meal (cake) however, is currently in surplus. To a degree this surplus is related in that to controlled oil prices that favor the consumer and force processors to increase meal prices. Feed manufacturers, therefore, turn to alternative protein sources whenever possible. Given these conditions recent rates of expansion have been somewhat depressed. Lowered costs of production and alternative uses for meal, in addition to policy changes, could relieve this situation relatively quickly.

Factors Constraining Production:

At present there are two general areas of soybean production; the upper central region, essentially centered on Quevedo, and the lower drier central zone, the zone of influence of the EEA Boliche. An area for potential expansion is the Manta-Esmeraldas band; here, production appears to be constrained by problems related to tenancy. It is reasonable that these might be resolved simply by encouraging contractual arrangements with the processors based in Manta. Within the central zone (Pichincha, Manabí, Cotopaxi, Los Rios, Guayas, Bolivar) both full-season and double-cropping systems are common (in the higher zone up to three crops per year is feasible).

Within this geographic breakdown, socio-economic strata may be identified. About 80% of the current production is from units larger than 50 ha. However, within farming systems and seasons, units as small as five ha. are not unusual. Small-holders find it difficult to obtain adequate and

timely credit. Credit, costs of production, pricing policy, and marketing problems are, to a degree, non-technical constraints that overarch all zones, systems and strata of the industry.

Researchable Problems:

- a) Varietal improvement including stress drought tolerance, pod height (related to combine harvesting); disease (SMV, Cercospora, etc) resistance, plant height and lodging resistance, seed quality, and zonal cultural requirements.
- b) Physiological studies relating to photoperiodic responses (seeding to flowering, flowering to maturity), drought tolerance, symbiotic nitrogen fixation, water-use efficiency, and growth analysis.
- c) Soil fertility problems as they are associated with geographic regions.
- d) Selection of superior stracks of Rh. japonicum for inoculum production.
- e) Post-harvest seed physiology with specific regard to decreasing germination potential.
- f) Weed control - itchgrass, etc.
- g) Water management - time and quantity of irrigation.
- h) Alternate uses of soybean oil meal or cake.
- i) IPM for both insects and diseases, including pest population dynamics and phenology.

Because of the zonification evident in soybean production, the program headquarters should be at Pichilique with a satellite at EEA Boliche and, possibly, another at EEA Portoviejo to service and promote smallholder production in the Esmeraldas-Manta corridor.

Support facilities will be necessary but, given the relative ease of communication among the three stations, can probably be located at EEA Pichilique. In this case, junior staff could be posted at the satellites to be back-stopped by senior specialists at the headquarters station. In most cases the time of these senior specialists, and their facilities, can be shared with other programs; in these instances, pro rata proportions are indicated in the resource needs set forth below.

Staffing Pattern

	<u>Pichilingue</u>	<u>Boliche</u>	<u>Portoviejo</u>
Human Resources Headed:			
<u>Coordinator/Co-leader</u>	xxxx		
<u>Plant breeder</u>	1 Ph.D. 1 Ing. Agr.	---- 1 M.S.	--- ---
<u>Agronomist</u>			
soil fertility	1 M.S.	1 Ing. Agr.	---
soil physics	1 M.S.	1 M.S. (Water Mgt.)	---
weed control	1 M.S.	1 Ing. Agr.	---
crop mgt.	1 Ing. Agr.	1 Ing. Agr.	1 Ing. Agr.
<u>IPM</u>			
pathology	1 M.S.	1 Ing. Agr.	---
entmology	1 M.S.	1 M.S.	---
virology	---	1 M.S.	---
nematology	1 M.S.	---	---
<u>Physiologist</u>	1 Ph.D.	1 M.S. (water mgt.) 1 Ing. Agr.	---
<u>Economist</u>	1 M.S.	---	---
<u>Biometrician</u>	1 M.S.	---	---
<u>Microbiologist</u> (rhizobiology)	---	1 M.S.	---
<u>Seed specialist</u>	1 M.S.	---	---
<u>Ext. Specialist</u>	1 M.S. 1 Ing. Agr.	--- 1 Ing. Agr.	--- 2 Ing. Agr.

Physical resources needed:

Vehicles	2 suburbans 5 - 4 WD	7 - 4 WD	3 -4 WD
Screenhouse	1	1	---
Irrig. equip.	---	1	---

	<u>Pichilingue</u>	<u>Boliche</u>	<u>Portoviejo</u>
Moisture meter (Steirlite)	1	1	---
Combine	1 for plots	---	---
Plot-harvesting equip.	2	2	---
Stationery thresher	---	1	1
Pumps	1	1	---
Tractor & access	med.	small	---
Microcomputer	1	---	---
Desk calculator	---	1	1
Back-pack sprayers (20l)	2	2	2

Support labs:

Soil/tissue anal.	1/4	1/4	1/5
Soil physics	1/4	1/2	-
Entomolgy	1/2	-	-
Pathology	1/4	1/4	-
Virology	-	1/2	-
Microbiology	1/4	-	-
Physiology	1/3	1/3	-
Seed dryer	1	1	-
Seed storage facility (2x3x4)	1	1	-
Work/Storage area (6x8)	1	1	1
Extension office	1	1	1
Loudtrailers	2	1	2
Projectors	2	1	2
Cameras	2	1	2

Research/Extension Linkages:

Technology-transfer is a major problem with a relatively new crop like soybeans. This is particularly true if production is expected to move into a new area such as the Manta-Esmeraldas belt. Therefore, soybean extension specialists (some of whom are already working in the National Cotton & Oilseeds Program) will form an integral part of the soybean program, as indicated above. Their responsibility will be to maintain contact with all the clientele groups in the soybean-production scheme, including processors and input-suppliers. They will be responsible to the program leader.

Gaps between Current and Proposed Programs:

Current staffing

Pichilingue: 1 M.S. & 1 Ing. Agr. - breeders
 Support staff - 1 entomol.
 1 soils spec.
 2 pathologists
 Boliche 2 Ing. Agr. breeders

Recruiting/training needs:

Breeding	1 Ph.D.		
Agronomy			
	fertility	1 Ing. Agr.	
	soil physics	1 M.S.	2 Ing. Agr.
	weed control	1 M.S.	1 Ing. Agr.
	crop mgt.		2 Ing. Agr.
IPM			
pathology	1 M.S.		
entomology	1 M.S.		
virology	1 M.S.		
nemotology	1 M.S.		
Physiology	1 Ph. D.	1 M.S.	1 Ing. Agr.
Economics	1 M.S.		
Biometrics	1 M.S.		
Microbiology (rhizob.)	1 M.S.		
Seed Physio/Produc- tion	1 M.S.		
Extension specialist	1 M.S.		

Within this group a Program Leader must be identified and a co-leader, perhaps a short-term advisor, should be recruited.

Physical resources needed: (\$1,000)

Vehicles	2 suburbans at 18,400	
	15 4 WD at 15,000	261.8
Combines	1 plot combine 20,000	20.0
Plot harvesting equip.		
	Movers 4 at 600	
	Stat. thresher 2 at 1,200	4.8
Moisture meters (Stein-lite)	2 at 1,600	3.2

Water pumps		2 at 7,200	14.4
Back-pack sprayers (20 l)		6 at 200	1.2
Loudhailers		5 at 200	1.0
Projectors		5 at 1,000	5.0
Cameras		5 at 370	1.8
Irrigation Installation (Station-budget level)		1 at 50,000	50.0
Tractor & acc.	1 med.	30,000	
	1 small	15,000	45.0
Microcomputer	1	5,000	5.0
Desk-top calculator	2 at 120		0.2
Screenhouses (256 m ²)	2 at 53,000		106.0
Seed dryers	2 at 14,000		28.0
Seed-storage facility (2x3x4)	2 at 8,300		16.6
Work/Storage area (6x8)	3 at 7,000		21.0
Extension offices & Furnishings	3		80.5
Support Laboratories			
Soil/tissue analysis	70%		25.0
Soil Physics	75%		26.5
Entomology	50%		17.5
Pathology	50%		18.0
Virology	50%		17.5
Microbiology (soils)	25%		9.0
Physiology	60%		24.0

Collaborating Institutions:

The program currently has weak linkages with INTSOY, IITA and EMBRAPA. No operational support is provided by these institutions.

Budget:

Salaries and Wages	US\$213.0
Vehicles	261.8
Buildings and Structures	302.1
Equipment	<u>239.1</u>
TOTAL	1016.0*

This budget assumes that all costs and salaries will accrue during one year. However, considerable time-sharing among programs may be anticipated for staff from support departments.

* Of this total, INIAP will assume US\$17.0 in wages, PROTECA could assume US\$320.0 in equipment, vehicles and construction and PROCIANDINO has budgeted about US\$4.0 for soybeans in equipment and institutional support.

V-4 NATIONAL DENT CORN PROGRAM

Corn in Ecuador is primarily of two classes, flourey and dent. The first is used largely for human consumption and the latter for feed. In response to the demand for the domestic production of feedstuffs, specifically mixed feeds, the harvested acreage of hard (dent) corn increased over 40% in the decade 1971-1981. Wet-season acreage in Ecuador in 1986 is estimated to approach 125,000 ha. and the national average yield is about 1.7 t/ha. Demand traditionally outruns production; and apparent costs of production approach 3x world-market prices. However, production from the last (1986) crop cycle exceeded demand (by 25%). High production costs both render profitable exports difficult and constrain more widespread internal usage for purposes alternative to mixed rations. Moreover, a significant part of this increased production is the result of expansion onto areas that are marginal for corn production. This has increased both production costs and resource deterioration, i.e. visibly increased soil erosion.

Factors Constraining Production:

Corn producers appear to fall into 3 broad groups; small, less than 20 ha., 85%; medium, 20-50 ha., 10%; with the remainder being fairly large operators. Credit, inputs and access to information follow this same ranking. It has been estimated that for the smallholder group evidently all technology-transfer flow is via input suppliers who, notoriously, lack objectivity. The upper 5% of the producers are, obviously, in a position to obtain, and pay for, information from any source that holds promise.

Given this situation the availability and terms of credit for the majority of the corn producers represents a significant constraint. Further, their economic base, in the absence of reasonable and timely credit, will not accommodate any innovation that implies increased risk or cost of the input, the production or the marketing stage of the process. For the more wealthy producers, price and market policies are the major concerns.

Researchable Problems:

- a) Regardless of size of operation, cost of production is the major problem and is associated with changes in yield per ha. with economically viable technologies;
- b) Associated with farm size, for the smallholder the major problems relate to timely and effective use of

fertilizers and pesticides (specifically insecticides and herbicides), choice and availability of appropriate cultivars, cultural practices (as they relate to crop and soil management), and limited access to objective advice;

- c) For the medium and large producer the major problems are inappropriate use of pesticides, irrational cultural practices contributing to soil erosion and structural deterioration and, on a regional basis, integrated pest management.

Superimposed on this socio-economic stratification is a regional demarcation. General research areas such as varietal improvement may, therefore, be specified by both region and socio-economic stratum. We recommend four locations for dent-corn research, with the headquarters and program leader at Pichilingue and satellite facilities and teams at Portoviejo, Loja and Napo-Payamino.

The following human and physical resource break-down is based on this hierarchy, i.e., Pichilingue with the other three as sub-stations. In the case of some support facilities, sharing among programs or among sites within a program is reasonable and proper. In such cases, pro-rata indices are provided. In other instances, we suggest a specialist, in most cases a junior scientist, be directly assigned to the program but be supported by a core (a support department) of senior scientists which can provide both specific technical advice for difficult problems and on-the-job training to the junior member on a day-to day basis.

This project involves only hard corn, primarily in the coast. A truly national program would involve both dent and flour corn with equivalent investment in both the Coast and the Sierra as well as the complementary feed-grain, sorghum.

Staffing pattern:

	<u>Pichilingue</u>	<u>Portoviejo</u>	<u>Loja</u>	<u>Napo/ Payamino</u>
<u>Coordinator/ Co-leader</u>	xxx			
<u>Plant breeder</u>	1 Ph. D. 1 M.S.	1 M.S. 1 Ing. Agr.	1 M.S.	1 M.S.

	<u>Pichilingue</u>	<u>Portoviejo</u>	<u>Loja</u>	<u>Napo/ Payamino</u>
<u>Agronomist</u>				
soil fertility	1 M.S.	1 Ing. Agr.	1 Ing. Agr.	1 M.S.
crop management	1 Ing.	1 Ing. Agr.	1 Ing. Agr.	----
weed control	1 M.S.	1 Ing. Agr.	-----	1 Ing. Agr.
<u>IPM</u>				
pathology	1 M.S.	-----	---	1 Ing. Agr.
entmology	1 M.S.	1 Ing. Agr.	1 Ing. Agr.	1 Ing. Agr.
<u>Biometrician</u>	1 M.S.	-----	---	-----
<u>Physiologist</u>	1 Ph.D.	-----	1 M.S.	1 M.S.
<u>Economist</u>	1 M.S.	---	---	-----
<u>Extension</u>				
<u>Specialist</u>	1 M.S. 1 Ing. Agr.	1 Ing. Agr.	2 Ing. Agr.	1 Ing. Agr.

Physical resources needed:

	<u>Pichilingue</u>	<u>Portoviejo</u>	<u>Loja</u>	<u>Napo/Payamino</u>
	2 Suburbans			
	8 4 WD	6 4 WD	6 4 WD	5
1 Combine (corn header)	med. combine	---	---	
Back-pack 20(1)	6	6	8	12
Pumps	---	1	---	---
Foggers	2	---	---	---
Moisture meters				
portable	2	2	2	2
Steinlite	---	1		
Tractor & acc.	1 lg.	1 med.	1 small	1 small
Microcomputer	1	---	---	---
desk calculator	---	1	1	1
Support labs.	Pichincha	Portoviejo	Loja	Napo
Soil/tissue anal.	1/4	---	1/4	1/4
Soil physics	1/4	---	1/4	1/4

	<u>Pichilingue</u>	<u>Portoviejo</u>	<u>Loja</u>	<u>Napo/Payamino</u>
Entomology	1/4	---	---	1/5
Pathology	1/10	---	---	1/5
Physiology	1/3	1/4	1/4	1/4
Extension office	1	1	1	1
Landtrailers	2	1	2	1
Projectors	2	1	2	1
Cameras	2	1	2	1
Seed dryer	---	1	---	1
Seed storage Facility (2x3x4)	---	1	1	1
Work/Storage area (6x8 m)	---	1	1	1

Research/Extension Linkages:

Implicit in an integrated commodity program is an in-built technology-transfer capability. As indicated in the above staffing and materials-procurement pattern, the outreach specialists will be coordinated by the Pichilingue staff but assigned to regional and program/clientele with specific responsibilities. These corn extension specialists are expected to interface with all the public and private sector technology transfer entities that are in contact with producers/consumers in their geographic areas. However, their complete integration into the program, as compared to a general extension agent, is emphasized by including their personnel and physical requirements as an integral part of the dent-corn program.

Gaps between the Current and Proposed Programs:

Current staffing:

5 Ing. Agronomos, primarily breeders
 2 Agronomos
 1 Tecnico

Recruiting/training needs:

Breeding 1 Ph.D., 4 M.S.

Agronomists
Soil fertility 2 M.S., 2 Ing. Agr.
Crop mgt. 1 Ing. Agr.
Weed control 1 M.S., 2 Ing. Agr.

IPM
entomology 1 M.S., 3 Ing. Agr.
pathology 1 M.S., 1 Ing. Agr.

Biometrics 1 M.S.
Physiology 1 Ph.D., 2 M.S.
Economics 1 M.S.
Ext. Specialists 1 M.S., 5 Ing. Agr.

In addition to the listed needs, a Program Leader (and perhaps an ex-patriot co-leader) will have to be recruited.

Physical resources needed: (\$1,000)

Vehicles	2 Suburbans at 18,400	
	18 4 WD at 15,000	306.8
Combines	1 large with corn header 38,000	
	1 small picker 20,000	58.0
Back-pack sprayers (20 l)	32 at 200	6.4
Pumps	1 at 7,200	7.2
Foggers (200 l)	2 at 620	1.2
Moisture meters, portable	8 at 1500	
Stein-lite	1 at 1600	13.6
Tractors & tillage Equipment	1 large at 49,000	
	1 medium at 30,000	
	2 small at 15,000	109.0
Microcomputer	1 5,000	5.0
Desk calculators	3 at 120	0.4
Support labs (summed across loca- tions)		
Soil/tissue analysis		27.0
Soil physics		27.0

Entomology		16.0
Pathology		10.5
Physiology		39.0
Extension Offices	4 offices plus equipment	147.0
Loudhailers	6 at 200	1.2
Projectors	6 at 1000	6.0
Cameras	6 at 370	2.2
Seed dryer	2 at 14,000	28.0
Seed storage facility	3 (2x3x4) at 8300	24.9
Work/storage area	3 (6x8) at 7000	21.0

Collaborating Institutions:

National: The corn program maintains linkages with extension personnel within MAG, with CONADE and CONACYT, and with some universities and schools in the country, for example in Loja. There are no current links with the private sector.

Among international institutions, AID and BID provide support, primarily for training, and CIMMYT provides both technical assistance and materials, including breeding links.

No entity supports the program with direct financing.

Budget:

Salaries and wages (assuming a leader and co-leader)

Physical facilities:

Vehicles	306.8
Buildings and structure	180.9
Equipment	<u>369.8</u>
TOTAL	1,075.0*

This budget assumes that all expenses will accrue during the first year and that all salaries will be paid from this project, even though considerable time sharing of support departments may be anticipated.

- * Of this total, INIAP will assume US\$36.0 in wages, PROTECA could assume US\$250.0 in vehicles, construction and equipment and PROCIANDINO has budgeted about US\$9.6 for equipment and institutional support for the corn program.

V-5 Dairy: Constraints to Increased Milk production Associated
Research Needs, and Estimated Costs

I. Background

Ecuador has very favorable conditions for milk production, with the mountains of the central highlands (Sierra) being particularly well-suited for dairy cattle. This area has 1.9 million hectares of pastures, over 40 % which is seeded with improved forage varieties. Because of the favorable agro-climatic conditions these pastures can be grazed, or cropped year-around. There were an estimated 1,560,000 herd of dairy cattle in Ecuadorean 1983, with 700,000 milk cows in lactation. These dairy cattle are concentrated in the Sierra which produces 80 percent of Ecuador's milk.

The most important Sierra provinces for milk production are Pichincha, Cotopaxi, Tungurahua, and Chimborazo. About 60 percent of the milk is produced in large herds of 50 or more animals, and another 35 percent is produced in medium-sized herds of 6-50 cows. Small herds (1-5 animals) account for 8 percent of the cows and produce 5 percent of the milk.

Milk production was estimated to be about 990 million liters in 1984, with 315 million liters used on the farm for various purposes, especially raising calves. The balance of 675 million liters was for human consumption. Per capita consumption of milk and milk products from domestic sources was the equivalent of 77 liters of milk on average, with only 12 liters in fluid form.

Productivity on most dairy farms is relatively low, with outdated technologies and management practices, limited genetic capacity, especially in medium and smaller herds, high incidence of disease, and generally inadequate nutrition. In Ecuador, the yearly average production is only about 1,500 liters per cow. This results in relatively high costs of production, a limited supply of milk and upward pressure on prices.

Because of low levels of productivity, Ecuador is unable to meet its demand, and powdered milk is imported to fill the deficit. Imports were 4,500 metric tons (45 million liters) in 1984 and 7,000 metric tons in 1985. Thus, in 1984 imports amounted to consumption of another 5.1 liters per capita on average for a total per capita

consumption of milk of 81.8 liters from domestic production and imports. Thus, imports were nearly 7 percent of domestic consumption.

Imports of powdered milk constitute a significant drain of foreign exchange, and an opportunity for import substitution. High production costs, resulting from low productivity, mean that imports are likely to continue, unless resource productivity in dairying is increased through adoption of improved technologies (better management pastures, disease control, improved nutrition, improved genetics, etc.)

Currently, imported milk costs about S/.106,000/metric ton while domestic costs are estimated at S/.160,000/metric ton. Moreover the demand for milk is likely to increase more rapidly than the rate of population growth, because of the high income elasticity of demand for the product. Inelastic supply capability with its attendant high costs, and increasing demand represent both a challenge and an opportunity to address the constraints inherent in low levels of productivity.

II. Major production Constraints

Five major production constraints have been identified by MAG, INIAP, the Cattlemen's Association, and scientists from Utah State University. Included are: (1) inadequate nutrition and energy; (2) infertility and low reproduction efficiencies; (3) poor technical management practices; (4) generally low genetic potential; and (5) inadequate farm management and economics. These constraints are closely interrelated and there may be interactions among them. For purpose of presentation each is now considered in turn.

A. Inadequate Nutrition and Energy:

Inadequate energy intake (and resulting malnutrition) is perhaps the most serious constraint to significant increases in milk production. While genetic potential also places an upper limit on response to increased energy levels, it is felt that significant increases in milk production can be realized from increased energy intake and better nutrition, before inherent genetic potential becomes a limiting factor.

The principal problem is the poor quality and low productivity of pastures that provide the only feed supply for most dairy cattle. The majority of these pastures is in native grasses which yield both a low

Volume and relatively poor quality feed, both in terms of energy levels and nutrients. Moreover, most forage is grazed, or fed green-chopped. Because of high water content, it is difficult, if not physically impossible for a cow to consume enough of green forages to reach her production potential.

Supplemental feeding of hay, or wilted forage, and of feed-grain concentrates is a common practice for maximizing milk production for dairy cattle on pasture. (Indeed, the highest levels of milk production are realized when dairy cattle are fed on dry forages and concentrates.) Also, the supplemental feeding of concentrates permits vital micro-nutrients and trace elements to be added to the cows' diet.

Feed-grains in Ecuador are relatively scarce and expensive. While many of the larger dairy farmers recognize the technical production relationship between feeding of concentrates and increased milk production, this is apparently not economically feasible.

The basic problem, then lies in relatively high costs, and low productivity in the production of forages, and feed-grains.

B. Infertility and Low Reproductive Efficiencies

Infertility and low reproduction rates are a second major constraint to increased milk production in Ecuador. This problem is probably just as serious a restriction to increased milk production as nutrition, with which it is closely interrelated, and deserves priority attention.

The problem is manifest in high abortions rates (some herds have averaged as high as 38 percent abortions in one year), interruption of lactation cycle (which reduces a cows lifetime milk production); loss of replacement heifers; the spread of disease and ensuing costs for control; and low pregnancy rates (with multiple A.I.'s and lower calving rates). Disease, poor nutrition and energy intake, and poor cultural practices all appear to be causal factors. The end result is higher production costs, reduced milk production, and profits.

C. Poor technical management practices:

Poor practices associated with a range of day-to-day technical activities in dairy management also tend to

restrict milk production, and increase costs of production. While these poor practices are discussed separately, they are closely related to, and indeed an integral part of the nutrition and infertility constraints identified above. These poor technical management practices occur at every stage of the milk production process, including breeding, feeding, calving, calf-rearing milking, disease control, pasture management, etc.

Several examples will suffice to illustrate the nature of this constraint:

Breeding: Heirfers are not usually bred until 2 years of age when they could be bred much sooner. Also cows are often not bred until 100 days after calving when they could be bred as soon as 30-45 days. Both these practices reduce the potential milk productin of a cow by reducing lifetime lactation days.

Calf Rearing: Calves are fed milk for up to six months when it appears milk replacer and calf starter can be used economically as early as two weeks of age, thus freeing up milk for sale. Calves are raised in side-by-side stalls, often in an enclosure, which spreads disease. Individual calf stalls have been proven to be much better.

Disease Control: Cows that have aborted (probably from Brucellosis or Leptospirosis) are often placed back with the herd on pasture, when isolation until the uterus is dry would eliminate much of the chance for infecting other cows. Positive tests or reactors for Brucellosis are not followed up. In one sample of a herd a reactor was identified, but no follow-up was done. A few months later brucellosis was found in about 30 percent of the cows. Had the reactor been removed, the bigger problem might have been avoided.

Milk Quality: Milk quality is poor. Some farmers only milk once a day; strainers are not used, udders are not washed or disinfected, milk is not cooled properly, and containers are not cleaned. The result is dirty or sour milk with significant losses in both quality and quantity.

Many other examples could be given, but these few serve to illustrate the degree to which poor technical management practices reduce milk production.

D. Low Genetic Potential

The genetic potential of Ecuador's dairy herd is, on average, relatively low, although there tend to be better quality animals in the larger herds. The animals in small herds are predominantly criollo and criollo/Holstein-Friesian crosses. The medium and larger herds are dominated by Holstein-Friesian blood lines and a few of the herds are grade Holsteins with some registered animals. Dairy farmers with medium and larger herds tend to use artificial insemination with both imported and domestically produced semen, so there is some general upgrading of genetic capacity. There is a Holstein-Friesian Association and Dairy Herd Improvement Association with about 17,000 cows on test, most of which are pure-blood, or pure by cross.

Thus, while genetic potential is on average low, there are some herds with potential for significantly increasing productivity, and gradual improvement in genetics from A.I. generally. If nutrition, infertility/reproduction, and technical management problems were resolved, milk production could be increased significantly. Consequently genetic improvement is a second level constraint, and not as high a priority for resolution as nutrition, infertility, and technical management problems.

E. Inadequate Farm Management and Economics

A pervasive constraint to increased milk production is inadequate farm management. Farm records generally are poor, with little economic analysis of factor costs, and product price relationship relative to various alternatives for crop-livestock enterprise combinations. Solutions to each of the production constraints discussed above must all stand the test of economic viability. For example, the costs of introducing improved calf-rearing and techniques must be less than the value of increased production, in order for the change to be profitable. Moreover, a farmer must decide which of several possible alternatives for increasing the productivity of his dairy is most profitable, given limited financial and other resources.

Making these decisions require farm management skills including adequate records, knowledge of how to analyze them, and how to make appropriate decisions for adopting improved technologies. Most dairy farmers lack these skills, which tends to constraint milk production and limit profits.

III. Major Researchable Problems:

This section identifies a series of major researchable problems, which focus on resolving the production constraints set forth in Section II. This section first discusses briefly the current state of dairy research in Ecuador, and of external assistance to the sector. Then the researchable problems are set forth, and a global estimate made of the cost of scientists, technicians, equipment and material needed to carry out the needed research.

A. Dairy Research in Ecuador, and International Science:

Research on dairy production in Ecuador is non-existent for all practical purposes. The Instituto Nacional de Investigación Agropecuaria (INIAP) has an extremely limited capacity to carry out needed research. A major constraint is lack of scientists and technicians, and of a modern veterinary laboratory. Experiment Station facilities are outmoded and operation support is extremely limited. INIAP has identified the principal areas of needed research, but lacks the resources to mount a viable, sustainable research effort.

The Faculty of Veterinary Medicine at the Central University is mainly a teaching faculty, although some limited research but unfocused is carried out by students in their last year. Students are heavily trained in theory and little or no practical experience. The Faculty has a veterinary laboratory which is sorely in need of renovation.

One of the major constraints to dairy research in Ecuador are the extremely weak and tenuous linkages to the international network of dairy science. Unlike the small grains, rice, beans, potatoes and tropical pasture research in Ecuador, which receives substantial support from the International Agricultural Research Centers (CIAT, CIP, and CYMMIT, dairy livestock research has no comparable linkages now in existence.

This deficiency has been partially addressed by the Dairy Production Subproject of the AID-financed Rural Technology Transfer System (RTTS) project, with technical assistance from Utah State University to the Livestock Producers Association (LPA), and the Holstein-Friesian Association. This project provides one D.V.M./Ph.D., and one Ph.D. Animal Nutritionist/ Herd Management Specialist who provide an essential

link to a major U.S. research program in Dairy Science at Utah State University. The LPA/USU Project is, however, primarily an extension effort with the two advisors serving mainly as dairy extension specialists, and sometimes as change agents at the farm level. In essence, they link a body of existing research knowledge at USU to farm-level problems among LPA members in Ecuador. The project is carrying out some very limited, applied research as a by-product of its central extension thrust. It does, however, offer potential for institutionalizing linkages between dairy research in Ecuador and the U.S.

B. Determining the Primary Causes and Solutions for Reproduction Failure

A major effort needs to be mounted and sustained to examine the various causes and solutions for reproductive failure and infertility. It is known that Brucellosis, Leptospirosis, and Ureaplasma are widely distributed throughout the Sierra. It is also known that inadequate nutrition, and energy intake can cause in reproductive failure. Finally, it is known that technical management practices can cause infertility, reproductive failure, and low rates of reproduction. The following general research programs and additional human and physical resources are for mounting effective programs identified as the most important:

1. The incidence and relative importance of diseases in infertility, abortions and low levels of reproduction;
2. The effect of inadequate nutrition and energy intake on reproductive failure; and;
3. The effect of technical management practices in reproductive rates, and reproductive and failure, especially date of first breeding, breeding after calving, and techniques of A.I. (control of urea-plasma).

The following resources would be required to mount a successful research program in the above areas. These scientists and equipment would work as a team to address the research topics with assistance from the Animal Nutritionist recommended in C. below to examine infertility-nutrition/energy interactions.

<u>1. Scientists</u>	<u>Speciality</u>	<u>Costs (US\$1,000)</u>	
		<u>Year</u>	<u>5 year</u>
1 DVM/Ph.D.	Pathology	150	750
1 DVM/Ph.D.	Microbiology	150	750
1 DVM/Ph.D.	Reproductive	150	750
	Physiology	450	2,250
<u>2. Technicians</u>			
1 laboratory		150	750
<u>3. Training Abroad</u>			
3 DVM/Ph.D. (3 yr. each at 30)		90	270
3 MS/Lab. tech. (2 yr. each at 20)		60	120
		150	390
<u>4. Veterinary Laboratory</u>			
1 fully equipped laboratory with building furnished		350	350
<u>5. Equipment Materials</u>			
2 vehicles (replaced once)		40	80
Lab supplies		10	50
Office Equipment		15	15
Misc.		5	25
		70	170
<u>6. Total</u>		1,170	3,910

C. Determining the Effect of Improved Nutrition and Energy Intake on Milk Production, and the Options for Increasing Forage Production from Pastures

An on-going research project needs to be mounted to investigate the relationships between improved nutrition and energy intake, and milk production. A separate but closely related effort should be made to investigate options for improving forage production on natural and irrigated pastures in the Sierra, and associated plant, water, and soil relationships. The following research problems, and associated resource needs are recommended:

1. The effects of supplemental feeds on milk production;
2. The role of micro-nutrients and trace elements on production;

3. Options for increasing energy intake through wilting and drying of forage;
4. Improved pastures and associated cultural practices (seeding rates, fertilizers, irrigation) for increased forage production; and
5. Soil, water, plant relationship in natural and improved pastures.

Additional resource requirements to carry out this interrelated set of research topics are:

<u>1. Scientists</u>	<u>Speciality</u>	<u>Year</u>	<u>Costs (US\$1,000)</u> <u>5 year</u>
1 Ph.D.	Dairy Cattle		
	Nutrition	150	750
1 Ph.D.	Agronomist	150	750
		300	1,500
<u>2. Training Abroad</u>			
3 Ph.D. (3 yrs. each)		90	270
3 MS (2 yrs. each)		60	120
		150	390
<u>3. Laboratory</u>			
Up-grade 1 Lab for feed-stuffs analysis		150	150
<u>4. Equipment/Materials</u>			
2 vehicles (replaced once)		40	80
Lab supplies		10	50
Office Equipment		15	15
Misc.		5	25
		70	170
<u>5. Total</u>		670	2,210

D. Examining the Effectiveness and Viability of Various Technical Management Practices

There are very highly productive technical management practices that have been researched and proven in various parts of the World that are not commonly utilized in Ecuador, although they appear to offer great potential. The following is a partial list of such practices which need to be tested in the Ecuadorean environment in an applied research project:

1. Using milk replacer and calf starter in raising calves;
2. Using individual hutches for rearing calves;
3. Timing of breeding for heifers, and for cows after calving;
4. Optimal lactation period;
5. Technologies for A.I. in the presence of urea-plasma;
6. Disease control in individual herds; and
7. Milk quality control and sanitation.

We suggest the following resources be provided to carry out these, and other related applied research to test improved technical management practices.

1. <u>Scientists</u>	<u>Speciality</u>	<u>Costs (US\$1,000)</u>	
		<u>Year</u>	<u>5 year</u>
1 Ph.D.	Animal Science (Dairy Herd Mgt.)	150	750
1 Ph.D.	Food Science Nut. (2 months year)	<u>30</u>	<u>150</u>
		180	900
2. <u>Training Abroad</u>			
	1 Ph.D. (3 yrs.)	30	90
	1 MS (2 yrs.)	20	40
		<u>50</u>	<u>130</u>
3. <u>Up-grade 1 Laboratory</u>			
		150	150
4. <u>Equipment/Materials</u>			
	Vehicle (replaced once)	20	40
	Lab supplies	10	50
	Office Equipment	15	15
	Misc.	5	25
		<u>50</u>	<u>130</u>
5. <u>Total</u>			
		430	1,310

E. Other Research

No other research programs are recommend now for addressing genetics, and farm management/economic deficiencies. The other research areas recommended above are of much higher priority. Moreover, genetics, and farm management/economic deficiencies can be addressed more effectively in the research-extension linkages program recommended below.

IV. Research-Extension Linkages

One of the major constraints to productivity increase in agriculture throughout developing countries is the lack of viable linkages between research, and extension efforts. Increasing productivity in Ecuador's dairy sector will depend both on mounting a production research program along the lines recommended above, and assuring that improved technical knowledge (from either domestic or international sources) is more available widely to farmers. Significant planning and resources are usually devoted to the research and to the extension functions, but mechanisms and resources for linking research and extension into a reliable, integrated system are seldom considered or provided.

In this Section, we recommend that as Research, Extension Linkage Unit (RELU) be developed as an integral part of an overall Dairy Research Program. The unit would provide vital communication between researchers and extensionists. Staff would serve as specialists in key problem and disciplinary areas. They would work closely with researchers, help prepare recommended practices for release, and would train extension agents in the application of these practices. They would also provide a communication bridge between farmers and researchers. Such specialists would help to determine the economic viability of recommended technologies, and would also help to organize an effort to upgrade the genetic capacity of dairy cattle in Ecuador.

The RTTS project with technical advisors from USU, is largely providing such linkages to the international dairy research network, with USU advisors serving largely as extension specialists (as indicated above). These specialists are working directly with producers' associations which has proven quite successful. In any future effort, a similar arrangement should be considered, but with more formal ties between a Research-Extension Linkage Unit (RELU) and INIAP.

The following resources are recommended, along with those above for a RELU as part of an integral research program for dairy, with two qualifications: (a) the RTTS project currently is providing these resources, with evidence of success and these resources would need to be continued, if the research program recommended above were to be successful; and (b) resources would have to be provided simultaneously for an integral extension effort, beyond the RELU recommended in this section.

<u>1. Scientists</u>	<u>Speciality</u>	<u>Costs (US\$1,000)</u>	
		<u>Year</u>	<u>5 year</u>
1 Ph.D.	Dairy Herd Mgt. (Nutrition)	150	750
1 Ph.D./DVM	Reproduction/Fertility	150	750
1 Ph.D.	Farm Management/ Economics	150	750
		<u>450</u>	<u>2,250</u>
<u>2. Training Abroad</u>			
6 MS (2 yr at 20)		120	240
<u>3. Equipment/Materials</u>			
2 Vehicle (replaced once)		40	80
Supplies		10	50
Office Equipment		15	15
Misc.		5	25
		<u>70</u>	<u>130</u>
<u>4. Total</u>		640	2,660

V. Collaborating Institutions/Qualifications

The principal collaborating institutions in the recommended Dairy Research Program (DRP) include INIAP (with primary responsibility for the research programs, and the Research-Extension Linkage Unit); the Livestock Producers Association, and Holstein-Friesian Association (with primary responsibility for upgrading genetic capacity and for extension, and secondary responsibility for the RELU; MAG (with shared responsibility for extension; and FEDIA, which would provide funding support in collaboration with the international community (AID, Germany, USU, etc) to carry out the DRP.

The costs of the DRP presented above and summarized in Table 1 are the additional costs necessary to mount a Dairy Research Program above and beyond those currently incurred by INIAP, MAG and related efforts in the sector (excepting the current RTTS subproject in dairy which roughly corresponds to the cost of the recommended RELU). The proposed research in technical management is relatively small compared to reproduction fertility, and nutrition research, and the RELU. It is expected that scientists attached to the RELU will devote about one-half their time

to applied research on technical management practices. In fact, USU advisors under the current RTTS are becoming involved in applied research in technical management practices. In a conceptual sense, research on technical management practices is the arena which links more fundamental (but not basic) research in reproduction/fertility, and in nutrition to improved management practice. In fact, activities in applied research on technical management practices, and the function of the RELU overlap considerably.

The above program costs have been estimated assuming that scientists would have to be imported for up to five years while Ecuadorians are trained abroad. To the extent well-trained Ecuadorian scientists can be obtained, the program costs may be reduced considerably.

However, it is extremely important to recognize that scientists from abroad can provide the vital linkages to an existing international body of scientific knowledge and to the international network of agricultural science if they are obtained via formal ties to their home institution(s). There is a substantial body of literature which demonstrates that without such international science linkages, investments in national REE systems are relatively unproductive. The ideal would probably be a mix of Ecuadorian, and institutionally supported advisor scientists at least for the next five years.

One other way to reduce costs, might be to consider utilizing fewer long-term (resident) advisor-scientists, and more recurring short-term advisory consultations from institutionally-tied advisor scientists.

It is important to recognize that the gestation period for developing and strengthening Ecuador's capacity in dairy research and associated extension efforts is a long term. It will probably require a decade or more to assure a self-sustaining capacity, and perhaps even longer. Therefore, this effort should be conceptualized as the first phase of a longer term effort.

FEDIA, with international donor support will have to bear most; if not all of the estimated costs of the DRP suggested here, with complementary support from INIAP, and MAG, and the producer Associations. Again the costs presented herein are the additional resources necessary to mount a DRP over and above what is being done (excepting the RTTS/producers association effort with USU advisement).

TABLE 1
Summary of Additional Costs
Necessary to Mount an Integral Dairy Research Program

Resources Needed	Reproduction and Infertility	Nutrition/ Forages	Technical Management	Research Extension Linkages (RELU)	Total Annual	Total Five Year
1. <u>Scientists</u>					1380	6900
DVM, Ph.D	(3) 450				450	2250
Ph.D		(2) 300	(1.2) 180	(3) 450	930	4650
2. Technicians	(1) 150				150	750
3. Training Abroad	150	150	50	120	470	1150
Ph.D	(3) 90	(3) 90	(1) 30		210	630 (3 yrs)
M.S.	(3) 60	(3) 60	(1) 20	(6) 120	260	520 (2 yrs)
4. Laboratories	(1) 350	150	150		650	650
5. Equipment/ Materials Vehicles	70	70	50	70	260	640
(Replace once)	(2) 40	(2) 40	(1) 20	(2) 40	140	280
Lab Supplies	10	10	10	10	40	200
Office Equip.	15	15	15	15	60	60
Miscellaneous	5	5	5	5	20	100
6. TOTAL	1170	670	430	640	2910 ^a	10090

^a Includes first year capital costs.

FEDIA support for this effort should produce some rather quick results, given the base already in place in the RTTS project, and other results that are coming on-stream. Such early pay-offs, and high visibility should help FEDIA to obtain additional support for sustaining a long term, broad-based REE effort.