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AGRICULTURAL SECTOR ASSESSMENT

FOR THE

DOMINICAN REPUBLIC

PREPARED BY:

THE USAID MISSION TO THE
DOMINICAN REPUBLIC

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US$1.00 = RD$1.00

One Hectare = 15.9 Tareas

One Acre = 6.5 Tareas

Small/Medium Farm. This term, as it appears in this assessment, refers to small and medium farm sizes in the Dominican context. Thus, this term refers generally to farms of less than 32 hectares (80 acres or 500 tareas) and specifically to farms of averaging about 10 hectares in size. Nearly all farms in the Dominican Republic are "small" by the definition normally used in AID since only about 8,000 of the 455,000 units are larger than 32 hectares.

PREFACE

A. Purpose of Sector Assessment

A large amount of information is presently available on many aspects of the agricultural sector, but not in an integrated fashion. The Secretariat of State for Agriculture (SEA) has recently established an office for planning and analysis to obtain and use additional and better data in carrying out its functional responsibilities. Formal mechanisms do not yet exist for a fully coordinated, ongoing analysis of the sector as a basis for policy and program formulation, although the Dominican sector assessment process, initiated by the Secretary of Agriculture, has made a significant and useful start in this direction. Overall evaluations of the agricultural sector have been made by the National Agricultural Council. Agricultural policies and programs have been reviewed frequently in meetings of the National Development Commission.

The Secretary of Agriculture has concluded that a systematic assessment is necessary as a precondition to a continuous process of sound policy and program planning, implementation and evaluation. This is indeed requisite to the formulation of a genuine long-term Dominican agricultural development strategy in which the central issues of policy, resource allocation and institutional strengthening and coordination can be addressed. In this context realistic production targets can be set, inputs calculated and outputs estimated, and human and financial resources mobilized. The Government's objectives and priorities then can be better determined. Conflicts, e.g., maximizing agricultural output vs. improving incomes and income distribution, can be objectively appraised and decisions made.

The assessment which follows has drawn heavily from the SEA's production goals and analytical materials. It attempts to synthesize and evaluate much information, to highlight problems and opportunities and thus to facilitate the development process.

B. Interest of AID in Sector Assessment

As a major bilateral donor and contributor to international agencies, AID has an interest in broad assessments which help the GODR to determine its objectives and help ensure that any external aid provided in response to requests from the Dominican Republic will be as constructive and helpful as possible in attaining these objectives. Thus the assessment which follows has immediate utility. The present sectoral assessment and the parallel analytical process which the Secretariat of Agriculture is undertaking will provide analytical benchmarks to be used in considering a request for a sectoral loan. An ongoing sectoral assessment of Dominican agricultural progress can also be invaluable in evaluating the effectiveness of donor assistance and serve as a basis for determining future needs.

The United States Government, as a member and significant contributor to international organizations such as IBRD, IDB and FAO (as well as a provider of assistance through other U.S. organizations such as Peace Corps and Department of Agriculture) has an interest in helping assure the maximum benefit from external resources made available to assist the Dominican Republic.

C. Brief Summary of Available Analytical Efforts

Studies approaching sectoral assessments have been made on several occasions. National Development Plans and the Integrated Project for Agricultural Development (PIDAGRO) have been important and useful. Most such studies have been project-oriented. They have provided a useful basis for evaluating project proposals, and to some extent the interrelationship among a number of projects. They have not as a general rule examined alternative choices and trade-offs under a variety of assumptions. Consequently, some senior Dominican officials have concluded that for given investments of funds in the past, the economic and social return could very likely have proved greater under a different mix or application of resources. While this may be of somewhat academic interest now, the present challenge and opportunity is to obtain the best possible use of resources -- internal as well as external -- in the future.

The current attention to a sector approach is very encouraging indeed, given the problems facing the Dominican Republic.

Outside the Dominican Government, the Economic Research Service of the U.S. Department of Agriculture made a limited sector assessment in 1972 with major emphasis on agricultural trade prospects. Partial sectoral assessments have also been made by the IBRD and IDB in connection with financial assistance activities of these two organizations. Such partial assessments have had limited utility to date but contain useful information and observations which are being drawn upon both by the Government of the Dominican Republic and by AID.

D. Methodology, Major Contributors, and Source of Financing

The methodology used in the assessment which follows is intuitive reasoning, historical experiences and the application of professional judgments, utilization of available information and data from many sources in a practical and systematic manner to arrive at reasonable conclusions. Insufficient data -- particularly as it applies to individual farms, inputs and costs of production -- is a significant problem and a limiting factor on the use of more sophisticated techniques of analysis. This situation will in time be improved by using data obtained from the advanced sampling methodology in rural surveys now underway with USAID/USDA assistance, and, with the addition of certain baseline data collections.

The planning office of the Secretariat of Agriculture is specifically engaged in making a thorough agricultural sector assessment as a basis for establishing economic and social goals and is keyed to production targets through 1980. The Dominican sectoral assessment of major resources and their utilization, and the past performance of the sector as a whole constitutes a basis for this assessment, as well as a point of departure for the continuing Dominican analytical process. The Dominican sectoral assessment effort is largely their conception. It has been organized by the Secretary of Agriculture who has drawn in experts from the principal agricultural and planning agencies

of the Government, including universities and other entities. Up to 30 technically competent Dominicans have contributed to this effort during the past several months.

The AID assessment has been prepared by USAID, consultants, USDA/PASA and contract personnel, relying heavily on the GODR efforts and cooperation.

E. The Model-Based Approach to Development Analysis

Countries where peasant agriculture is of dominant importance, particularly where peasants have only begun to emerge from a subsistence economy to become producers of cash crops, pose particular difficulties for builders of econometric models. This results partly because it is difficult to determine a given relationship between inputs of capital, materials and skills and a measurable output. It also results from the difficulty in determining the readiness of farmers to adopt new production techniques. Since about 60% of the labor force in the Dominican Republic is working in agriculture, mostly in subsistence agriculture, these difficulties are applicable here. In addition, some of the essential data for model formulation is not available. For example, the flow of investments to exclusively defined sectors, so important in calculating incremental capital-output ratios, is not known with certainty. The composition of import data essential to any input-output analysis, has not been published since 1969. This being the case, the development of models as a means for formulation of alternative development strategies is limited by the data which is available. There is, consequently, a constraint placed on rigorous quantitative analysis.

F. Organization of the Sector Assessment

The present sector assessment begins with a summary followed by consideration of three overall strategy alternatives for developing the agricultural sector and evaluates the Dominican choice. This is followed by major sections on (1) agricultural goals; (2) major resources bearing on the agricultural sector; (3) performance in the agricultural sector; (4) production targets, accompanying policy changes and investment costs; and (5) the underlying constraints and what can be done about them.

The constraints are largely extracted from the current Dominican sectoral assessment but with inclusion of certain judgments. Some conclusions about policy changes, resource allocations and measures to strengthen institutions and institutional coordination to overcome the constraints are set forth.

Production targets for each major agricultural commodity are thus stated, together with inputs which would be required. The deficiencies and problems throughout the entire production, marketing, processing and consumption cycle for each of the major and some of the minor commodities are identified. An indication of some things which each agency or organization (government and private) can do to overcome the problems is made and, generally, is costed.

Developmental quality of life goals are also identified and evaluated from the perspective of consequences of program actions. Where possible, budget and investment costs needed to overcome constraints during the target period are indicated.

I. SUMMARY

A. Development Prospects

The Dominican Republic ranks with Japan and Brazil in terms of the rate of economic growth which it achieved in the past several years. Agriculture has played a significant role in this growth. Since 1965 the institutional, technical and professional foundations for agricultural development have developed in the Dominican Republic progressively. As part of this process production increases have been impressive, particularly since 1968.

With the appointment of a new Secretary of Agriculture in January 1973, the professionalization of public agricultural services was accelerated markedly. Concommitantly, the need for systematic planning so as to assure the rational allocation of scarce resources was recognized and initial steps were taken to bring this about. The Secretariat of State for Agriculture (SEA), in part by bringing together recently created sources of professional talent, has asserted its leadership in elaborating a longer-range, sector-wide approach to agricultural development. Prominent policy-makers of other institutions have supported SEA in these initiatives. The analytical process initiated by SEA involves inputs from all major agricultural institutions as well as the National Planning Office and the influential Central Bank. At the operational level, inter-institutional cooperation and coordination has improved sharply on specific production programs being implemented under SEA's direction.

The international economic situation with the scarcity and rapid price rise for imported foods, in addition to the mounting population pressure of a three percent annual growth rate, has provided further impetus to programs to increase agricultural production. Many recent official statements by the President of the Republic, and ministerial level officials, respected Dominican economists as well as the Secretary of Agriculture are replete with references to the necessity and intention of the Government to address itself to agriculture as

the primary sector for development investments and the need for positive policy changes. This is already reflected in stepped up and substantial new investments in irrigation projects.

Further, the small and medium farm group has been cited as having the most potential for rapid production increases and being most in need of priority assistance. In the words of the Secretary of Agriculture, presented during his February 21, 1974 speech to the American Chamber of Commerce in Santo Domingo, the public and private sectors should:

> "Apply and reorient agricultural and agro-industrial credit in a way that would increase private bank credit participation and establish incentive mechanisms so that a greater share of agricultural credit reaches a larger segment of small and medium borrowers".

The Secretary's speech was approved by the President, according to SEA spokesmen, and it is substantially supported by a recent study of the Central Bank as well as the current SEA sectoral assessment and the public and private views of many agricultural policy-makers. Commercial bankers have also indicated their willingness to augment agricultural lending.

The confluence of economic realities, population pressures, increasing professional capacity and sharpened concern for the conditions of the mass of the Dominican rural population has made accelerated agricultural development a distinct possibility in the Dominican Republic. Indeed, the timing is most propitious for a careful and well-conceived expansion of external assistance to the agricultural development efforts of the GODR - an expansion based on adequate coverage of the areas where assistance is needed and rationalized in terms of the sector-wide priorities set by the Government itself.

B. Current Situation

Sixty percent of the Dominican population is rural and derives its livelihood from agriculture, which produces about 22% of the gross domestic product and 75% of foreign exchange earnings. The development of the Dominican economy is indeed heavily dependent upon agriculture to sustain overall development, feed the population and earn foreign exchange. Agricultural resources are limited and must be allocated in ways which progressively contribute to development as well as equity. The Dominican Republic will double or triple its population within 25 years. In the face of possible world food shortages, the country confronts the problem of how to allocate its resources to provide for that population.

The notable growth of the past several years has not visibly improved the lot of the majority of rural people. The Government is aware of the problem and the necessity for corrective action since its concept of development embraces equity and quality of life concerns as well as economic growth rates. It recognizes that policies which create rapid growth may not produce the requisite equity.

The economy has grown rapidly, about 10.6 per year in the past five years. However, this growth is not reflected in the primary sector of agriculture, in which GDP per capita is now below the level claimed in 1960, indicating a scarcity of capital and underemployment in this sector. Agriculture's share of GDP has fallen since 1960 and investments in agriculture have dropped in comparative terms, although Government figures indicate the beginning of a reversal of this trend in the years 1971 through 1973.

C. Alternative Choices

Realistic alternatives for maximizing economic and social returns on agricultural resources and investment exist between the extremes of (a) a reliance on export crops to earn foreign exchange and the purchase abroad of the large bulk of

food needed for domestic consumption, and (b) a systematic emphasis on food production for domestic consumption at the expense of exports. Both of these extremes have obvious defects and strongly indicate a middle way between the two -- a way which recognizes the comparative advantages of specific commodities which provide export earning and import substitution, where such advantages are consistent with social goals. Simply stated, investments and credits in general agriculture can and should be increased and better distributed in recognition of agriculture's major importance to the economy. The agricultural sector can be expected to produce more, both for domestic consumption and for export, while concommitantly striving toward more rural employment and righting the scales of income distribution.

The GODR has opted for this middle way and is in the process of formulating an agricultural development strategy which mirrors this decision through the elaboration of programs of domestic food production and related infrastructure and through efforts to rationalize and augment productivity and production on lands devoted to traditional export crops. The USAID endorses this strategy as the most feasible alternative to accommodate and achieve the goals and targets which broadly define the results sought.

D. Goals and Targets

In the parallel assessment now being conducted by SEA, the following goals were developed as a basis for policy formulation within the context of the selected strategy.

1. Achieve a more equitable distribution of income among those who earn their living from the agricultural sector. Improve the quality of rural life.

2. Provide food and fiber to consumers at reasonable costs.

3. Provide agricultural products for industrial uses, exportation and import substitution.

4. Obtain the kind of agricultural production which will improve national nutritional levels.

5. Achieve optimum utilization of renewable natural resources.

On the basis of these economic and social goals as well as resource limitations, and human and technological capabilities, a set of preliminary production targets for 1980 was selected to afford a reasonably adequate diet for the nation as a whole and provide the margin of production which would give the country the impetus toward solving its longer-range problems. Basically, the targets call for a shift away from an overly starchy diet to one containing more protein. They were also designed to promote a reasonable amount of import substitution where dietary considerations would not intervene. Crop targets for 1980 centered on nearly doubling rice and bean production in the country while holding wheat imports to a minimum and permitting edible oil and oil seed production and importation to meet effective demand and nutritional requirements. To satisfy animal protein requirements in the human diet, dairy and poultry products were defined as priority production targets with increases of 100% projected.

E. Underlying Constraints and Courses of Action

The major problems of the sector relate to land use and tenure, inputs and their use, credit, particularly institutional credit, the marketing system, including the road network and the institutional and human resources base. These constraints weigh most heavily on the small/medium farm. A broad, integrated series of corrective actions are being considered by Dominican policy-makers and planners to moderate and progressively overcome these constraints so as to release productive capacities in the agricultural sector.

1. Land Problems

The problems of land utilization and tenure are manifold and complex, socially, politically and economically.

They are inextricably tied to undue fragmentation and parcellization of land holdings, a demand for land in excess of availabilities, a stagnant market for commercial land transfers and the virtual absence of land taxation. There are no easy and short-term solutions. However, the GODR with IDB support is taking a necessary first step through a national cadastre and there is growing recognition, particularly in SEA, of the need to develop effective and comprehensive land policies geared to a more rational utilization of this scarce resource. Though the solutions will have to be formulated through evolution in a political as well as an economic context, SEA's ongoing analytical process will be of great value in evaluating alternative approaches and determining the appropriate timing for the necessary actions.

2. Inputs and Their Use

Inputs -- fertilizers, plant protection chemicals, plant materials, improved seed and machinery -- are beyond the reach of most small and medium farmers. If production is to increase, credit will have to be made profitable through an expanded and timely use of such inputs. SEA plans a broad frontal attack on the problem: stimulation of the private sector delivery systems; direct credit to cooperatives for establishment of input stocks and systems for sale to members and non-members; and use of regional and subregional extension stations as alternative channels when and where necessary to assure supplies at reasonable prices to small/medium farms. This supply system will be linked to a radio extension outreach network and to the conventional extension system.

The focal point of the foregoing actions is the small/medium Dominican farmer with potential for viable family size farm operations. The selection of this target group is both humanitarian and pragmatic. In this group lies the greatest economic need and the greatest untapped productive potential.

3. Credit

With respect to credit, the realization that agriculture has been neglected in comparison with other sectors has become clear and monetary and fiscal measures are at hand which will shift credit marginally from the industrial/trade sectors to agriculture. These include a discount mechanism, a guaranteed loan fund, a reduction in the maximum loan size in the Agricultural Bank and higher, more realistic interest rates for agricultural lending.

4. Marketing

In marketing, SEA has developed a plan for instituting a Market Research/Information unit which will be linked with specialized marketing offices in the Price Stabilization and Export Promotion Institutes. This new unit will develop and disseminate market information vital to farmers, tradesmen and consumers as well as direct action programs supported by credit, when necessary, in order to develop a marketing system which is at once more stable and efficient for its array of clients. Intimately relating to a more serviceable marketing system is the Government's intention to expand selectively its penetration roads into outlying rural areas so as to incorporate a considerable number of subsistence primary producers into the market economy.

5. Human Resources

Human resources at the farm level are seriously underutilized, due both to over-population on the land and lack of basic skills.. At the professional level, the base of well qualified agriculturalists needs to be expanded if the present impetus to development is to be sustained and extended. The development of the human resource base of Dominican agriculture from the top downward and from the bottom upward is fundamental if expected short-run gains are to evolve into longer-term, irreversible patterns of growth.

With regard to farm-level human resources, SEA plans to undertake a pilot vocational education project to develop the experience necessary to create a system of mass vocational training in agronomic and manual skills. On the professional level, SEA plans to identify future manpower needs in terms of the required skills and numbers and to develop the capacity to produce B.S. level agriculturalists in-country along with selected post-graduate degrees.

The present extension system reaches few, perhaps only about 18% of Dominican farmers. SEA is upgrading its outreach system under an IDB loan but this will not produce generalized benefits. SEA, therefore, plans quantitative and qualitative improvements through: radio outreach programs which broadcast marketing, technological, credit and other useful information; an increase in the number of extensionists by sponsoring and directing university extension efforts; linking the extension network to the credit system for group lending and group technical assistance; forming a Farm Management Office to formulate usable management packages for regions and subregions which will be linked to the market research and information functions and the extension/radio outreach networks; and upgrading the qualifications of extensionists by formal in-service training at Dominican universities.

This institutional upgrading of the extension system is not only designed to provide a higher quality, more timely and expanded set of services at the micro-level of production but also to facilitate greater coordination and integration of efforts between sector institutions such as SEA and the AgBank as well as between these public agencies and key private institutions such as the universities, the Dominican Development Foundation (DDF) and the commercial banks.

F. Consolidation of Recommendations and Probable Costs

1. Land Problems

The assessment outlines a possible self-amortizing series of actions -- modernization of the land records system,

identification of all Government lands appropriate for distribution, movement toward clear titles for agrarian reform land recipients, imposition of a general real property tax and establishment of a land transfer/mortgage institution. Government outlays for land would not be continued and the operating costs of the Agrarian Reform Institute (IAD) would thus be substantially reduced. In effect, an immediate net savings of resources could be realized for use elsewhere in the sector and the land tax would generate revenues almost immediately.

An investment of about RD$10.0 million would be sufficient to capitalize the land transfer institution. If the GODR were willing to trade land for shares in the institution, it could hold shares in the institution at no real cost. Assuming the GODR would account for 40% of capitalization, there would be a need for about RD$6.0 million in private credit to complete the financing. Low interest donor financing could be employed to attract the private domestic investment needed, perhaps on a pari passu basis.

IDB is financing the necessary cadastre to initiate the process and IDB representatives have indicated that modernization of the records system is targeted. Adequate financing in this area appears to be available, but the tempo of the progress could be substantially speeded up.

2. Inputs and Their Utilization

a. A new system of input supply through cooperatives and extension stations in combination with training of private sector personnel in the use of inputs is contemplated in this assessment. The RD$2.0 million initial costs are subsumed in the credit activity. To ensure optimum employment and profitability of inputs new functional units focusing on regional and sub-regional agronomic/economic problems of small farmers are being organized as described below.

b. The formation of a farm management unit in SEA is a new activity which was not anticipated in the budget. Since personnel costs represent the bulk of the necessary outlays, the program lies within the means of SEA, except in

the area of dollar expenditures for equipment. FAO is considering the provision of an advisor to the new office for a two year period. Some additional expenses for post graduate training of key personnel may be necessary and could be financed by donor loans.

c. Upgrading extension services will represent a continuing outlay for budgetary resources which, because they are entirely local currency, should be eventually provided through the normal budgetary process. PIDAGRO has stimulated expansion and training of the extension service in the specific areas funded by the project, but a comprehensive system for constant upgrading of the service has not heretofore been considered or financed. In the long run it is the institutionalization of in-service training and coordination with university efforts that will improve the effectiveness of the service and this is the area that should receive donor attention.

The radio outreach program has been identified as the most effective and least expensive means of reaching target groups. It is now being tried in various locations but will be applied nationally under the marketing information system. Extension, of course, will be a major function of the network. The approximate additional costs of improving the extension services to small/medium farms will be:

Farm Management Unit

Year	US$	RD$
1st.	18,800	167,200
2nd.		167,200
3rd.		167,200
Total	18,800	501,600

Extension and University Outreach

Year	RD$
1st.	160,000
2nd.	160,000
3rd.	160,000
Total	480,000

3. Credit, Particularly Institutional Credit

Both government and donor support of credit programs has been substantial. However, not nearly enough credit has been available to small and medium farms. Commercial banks with appropriate incentives stand ready to lend to "all good risks" in the agricultural field, and to expand their technical backstopping capabilities as required to assure profitability. This will mean additional credits in the sector amounting to RD$20.0 million in the first year of operation, to be drawn mostly from other sectors.

Commercial bank entry into agriculture in a serious way will free-up AgBank funds for lending to smaller borrowers in the amount of RD$17.0 million or more. These assets can service between 8,500 and 34,000 new borrowers with average loans of from RD$500 to RD$2,000.

The IDB/PIDAGRO loan contemplates RD$17.0 million in credit to farm operations. These will be spread over the next four years. Average loan sizes are about RD$500 which means that, at the peak of PIDAGRO credit operations, an additional 12,000 farm units could have access to credit.

A December 1973 farm survey shows that in that year 17.9% (81,455) of the 455,000 farm units received credit. This includes all except industrial sources and indicates that some farms use more than one credit source, since the lending institutions collectively count more than 100,000 customers. Eliminating, for the moment, the lower 100,000 farms in terms of economic potential, 355,000 should be able to use credit in some amount to improve operations and income.

The new small/medium farm production credit required to service 60,000 additional farmers (over and above present AgBank resources as augmented by PIDAGRO) would be RD$12,000,000, assuming an average loan size of RD$200 applicable to groups of smaller farms. It is currently estimated that one credit agent can service about 200 borrowers assuming that group lending practices are widely employed. This will require approximately 300 new credit agents (in addition to SEA extension personnel) and 100 clerical backstop personnel divided among the AgBank, SEA's Supervised Credit and the DDF. The estimated additional personnel costs are RD$1,750,000 annually.

The cost of training new personnel at the Pedro Henríquez Ureña National University (UNPHU) or directly by the AgBank, SEA and DDF is estimated at RD$650 per person, slightly higher for credit agents and slightly lower for on-the-job training of backstop personnel. The sustained overhead required to maintain these personnel in the field is within the budget resources of the GODR. Some vocational high school and university graduates will comprise the group of new agents, thus raising the level of professional expertise, and permitting rapid disbursement of new credit funds in conjunction with profitable technological packages and inputs.

The estimated costs of all proposed new credit activities, e.g., inputs, marketing and machinery, are consolidated below in Table I-1.

TABLE I - 1 Estimated Costs of Proposed Credit Activities

Activity	1st Year US$	1st Year RD$	2nd Year US$	2nd Year RD$	3rd Year US$	3rd Year RD$	Total US$	Total RD$
	(000)		(000)		(000)		(000)	
Training		200		60				260
Personnel		1,750		1,750		1,750		5,250
Vehicles	490						490	
Credit 1/								
Small Farm Credit		12,000						12,000
Input Credit	2,000						2,000	
Marketing Credit	250	750					250	750
Input Credit	500						500	
Machinery Credit								
Guarantee Loan Fund		5,000 2/						5,000
Total	3,240	19,700	1,810		1,750		3,240	23,260

1/ Note: Initial amounts are estimated to be sufficient to establish the portfolios required to continue activities as revolving funds using start up capital indefinitely. The credit fund should be considered as one unit to permit capital flows to the most successful elements and away from the area of less demand.

2/ May not represent actual outlay but rather a reservation of funds.

4. Prospective Recipients and the Uses of Credit

The Beneficiaries

Current portfolios, including industrial source credit, reach 150,000 of the 455,000 farm units. The IDB loan and changes in policy e.g., higher interest rates, lower ceiling on AgBank loans, discounting and the guarantee mechanism, can bring about 46,000 new borrowers into institutional credit systems. The additional RD$12.0 million credit for small farms contemplated in this assessment is designed to reach another 60,000 small farms. Recipient farms will be those below 32 hectares in size with commercial potential but without access to other credits.

b. The Uses of Credit

With current technology and prices, a loan of about RD$200 can return profits of up to RD$740.00 on 20 tareas of land. This profit could more than double incomes of many small farms. The use of credit will be coordinated with market and farm management information to maximize farm profits.

5. Marketing

a. The System

The development of a comprehensive institutional capability in marketing aimed at resolving both macro and micro-economic problems in market channels and on farms is a new element in Dominican agriculture for which funding has not been anticipated, either by the GODR or by other donors. Some short-term assistance from AID, IICA and others has been available but has never been focused on key institutions with sector-wide responsibility. The global requirements of market-related activities and their vital importance in all phases of agriculture from production to consumption dictates immediate government attention and the flow of additional resources in this field. The potential sector-wide benefits of a positive program as well as the development of institutional capacities

in this area also should invite serious consideration for donor assistance at a meaningful level not heretofore contemplated.

Costs of Implementing Recommendations

Recommendations require additional funding for the establishment of a market research/information service. Annual costs are estimated as follows:

Year	US$	RD$
1st.	155,000	280,000
2nd.	135,000	265,000
3rd.	135,000	265,000
Total	425,000	810,000

b. Transportation

To open new areas to market access, stimulate the interchange of inputs and agricultural products, provide sorely needed employment opportunities in rural areas and reduce urban-rural migration, a labor-intensive feeder road building program is proposed in this assessment. Adding RD$2.0 million to the present RD$1.2 million level of expenditure will produce 3,600 man years of employment and build 430 Km of new roads in areas selected by SEA for their employment needs and productive potential.

6. Human Resource Development

a. Professional Education

Neither the GODR nor external assistance institutions have thus far approached the subject of professional manpower needs in any systematic way although such action will soon be initiated through an agreement between the Dominican Education Credit Foundation (ECF) and IDB. Though nearly all institutions of higher education receive government financing, their effectiveness has not been evaluated. If the country is

to have professional agricultural service institutions, it will need a continuous supply of agriculturalists in specific, though as yet undetermined disciplines. In the long run, the country should be largely self-reliant in this respect through the B.S./M.S. degree level, simply because the costs are lower per unit of education in-country than abroad. The program means recommended to move quickly toward this end is an interchange of Dominican-US university faculty designed to create a solid B.S./M.S. agricultural curricula and faculties in Dominican universities.

b. Vocational Training

There are, at present, no financial resources budgeted for this activity. Given the inadequacies of formal rural education, the improbability of near-term improvements, and the paucity of agricultural and manual skills on the land, the value of developing such skills among the rural population is manifest. To reach as many as 30,000 rural inhabitants with up to six weeks training in vocational areas would require an equivalent of ten installations, each with an annual capacity of 3,000. The financial commitment of the magnitude required to inaugurate such a system could not be justified without prior trial and experimentation and evaluation. A pilot institution under SEA administration will be needed to initiate the process of development in this area. This would be an appropriate area for concessional financing.

c. The Costs

The following costs are estimated for funding an interchange of Dominican-U.S. college agriculture faculty:

Year	US$	RD$
1st.	400,000	50,000
2nd.	400,000	50,000
3rd.	400,000	50,000
Total	1,200,000	150,000

To finance a pilot project in mass vocational education, the following costs are estimated. No construction will be necessary since basic facilities exist and are under-utilized.

(000)

Activity	1st. Year		2nd. Year		3rd. Year		Total	
	US$	RD$	US$	RD$	US$	RD$	US$	RD$
Equipment		200						200
Teacher Training	35		35				70	
Teacher Salaries		45		45		45		135
Operating Expenses				45		170		215
Technical Assistance	10		40		30		80	
Total	45	245	75	90	30	215	150	550

7. Importation of Commodities and Production Inputs

The most important imports required to achieve agricultural production targets are fertilizers, plant protection materials, machinery and feed grains. Concommitant nutritional objectives call for additional imports of oil and oil seed and focus on projections for expanded domestic output of high food quality crops.

The projected imports needed to achieve the targeted agricultural production and consumption levels would cost approximately $36.0 million in 1975 and steadily increase to $78.0 million at the end of the period in 1980.

a. Rice Production Options and Wheat and Fertilizer Imports:

In response to SEA's proposed policy decision to restrain wheat imports and substitute expanded rice output, three rice production options were prepared. Each of these options reflect a different rate of increase in the adoption of high yielding rice varieties together with additional fertilizer and other recommended cultural practices.

The low input option, the one chosen by SEA, provides for the application of 220 lbs. of fertilizer per acre on an accelerated number of tareas over the seven year period to 1980.

The production of rice would increase from 234,000 MT in 1974 to 400,000 MT tons by 1980 and would permit holding annual wheat imports to approximately 100,000 MT during the period 1974-80.

SEA is interested in applying the new technologies for rice cultivation in marshy areas which could produce enough rice to release some present rice lands to other uses.

b. Corn, Soybeans and Soybean Oil

The high dairy and poultry production goals are based in part on the assumption that the shortfall in domestic feed output will be made up through imports; mainly of corn and soybeans - i.e., the soybean meal remaining after the oil extraction.

In addition, the increased oil provided for in the nutritional goal assumes imports of oil to supplement domestic oil production. Thus, Table I-2 is an attempt to project a rate of growth in these imports from 1974 to 1980 and the related costs.

There are, of course, many alternative import rates of growth depending on such factors as foreign exchange availability, relative commodity price changes and the actual growth rate of income in the Dominican Republic over the seven year period. The imports, as shown, relate to projections of effective demand and a gradual path to achieving nutritional targets. SEA is interested in rotational cropping of sorghum, corn and soybeans with rice using new minimum tillage techniques. These techniques may reduce the need to import these commodities.

TABLE I - 2

UNCLASSIFIED

Imports Needed to Accomplish Agricultural and Nutritional Sector Targets

Commodity	1974		1975		1976		1977		1978		1979		1980	
	000 MT	000 $	000 MT	000 $	000 MT	000 $	000 MT	000 $	000 MT	000 $	000 MT	000 $	000 MT	000 $
Fertilizer 1/	NA		3.0	654.2	4.2	889.4	5.9	1,065.8	6.3	1,323.0	7.3	1,528.8	11.4	2,388.8
Plant Protection Materials 2/	NA		NA	358.0	NA	450.0	NA	550.0	NA	650.0	NA	750.0	NA	1,200.0
Minerals & Vitamins 3/	NA		NA	407.0	NA	470.0	NA	596.0	NA	795.0	NA	753.1	NA	1,004.0
Dairy Farm Equipment 4/	NA		NA	50.0	NA	50.0	NA	50.0	NA	-	NA	-	NA	-
Corn 5/	53.8	3,700.0	43.9	4,800.0	61.4	6,800.0	85.7	9,400.0	120.2	13,200.0	168.3	18,500.0	214.0	23,500.0
Soybean 6/	63.1	9,300.0	79.5	11,800.0	98.5	14,500.0	120.0	17,500.0	147.5	21,700.0	177.0	26,300.0	177.0	26,300.0
Soybean Oil 7/	10.7	3,800.0	13.3	4,600.0	16.7	5,800.0	20.4	7,100.0	25.1	8,800.0	30.0	10,500.0	30.0	10,500.0
Wheat 8/	100.0	13,000.0	100.0	13,000.0	100.0	13,000.0	100.0	13,000.0	100.0	13,000.0	100.0	13,000.0	100.0	13,000.0
TOTAL		29,800.0		35,661.20		41,960.40		49,261.8		59,468.0		71,331.8		77,892.8

1/ Data on fertilizer imports for 1974 are not yet available but are expected to be about 100,000 tons, which in current prices would cost about $15 million. The fertilizer import projections provided only for use with the improved practices recommended for rice and beans. It is presumed that an additional amount (perhaps 100,000 tons) will be imported annually for traditional uses, mainly sugar and rice crops.

2/ Plant protection material imports have been projected at approximately 50% of the cost of fertilizer imports, but may reach closer to 100% of fertilizer cost as producer adopt the full potential of the new rice technology.

3/ The projected imports of mineral and vitamin additives were calculated on the basis of a cost of $3.00 per ton of total concentrates fed in the poultry industry and $150 per ton for the dairy industry. The cost per pound for the poultry additive is $2.20 and $1.10 for the dairy additive. These are added to the feed at the rate of $1.36 pounds per metric ton. These projections are based on the important assumption that projected corn and soybean imports are realized and that domestic rice bran production is on target.

4/ These imports would consist of rotary movement and electric fence for 200 dairy farm units which are being provided with technical assistance by UN-FAO. The import costs reflect current U.S. price levels.

5/ Assumed (a) that corn demand and imports will increase 30% in 1974 and 1975, 40% during 1976-1979 and drop to 25% in 1980; (b) values for 1974-1980 assume a CIF price Dominican Republic at one-half the February 1974 price, i.e., $110 per MT.

6/ Assumes a U.S. F.O.B. price of $148 per MT for 1974-1980 period.

7/ Assumes a CIF Dominican Republic price of $350 per MT or about one-half February 1974 price. The division between soybeans and oil imports is based on information that the Dominican Republic can process projected bean imports with present facilities.

8/ Constant wheat imports of 100,000 tons assumes: 1 - that rice production will achieve the low option 1980 target of 400,000 tons; and 2 - that Dominican consumers will accept this degree of substitution of domestic rice for imported wheat.

United States exports of soybeans and oil to the Dominican Republic for the average of fiscal years 1972 and 1973, were abnormally low. Thus, the increase in the imports of these commodities, projected for 1974, appear to be rather large. However, the quantities indicated appear to be in the prospective range of effective demand. Also, existing in-country soybean processing facilities are adequate for processing the projected soybean imports.

The most important price assumptions made in calculating import costs were: 1. that wheat, corn and soybean oil prices will decline, starting later in 1974 and early 1975; and 2. that about one-half the present (Feb. 1974) prices can be expected as an average for the 1975-80 period.

The soybean price is the December future price plus $20.00 shipping cost and fertilizer price at recent levels is $210 per MT.

In conclusion, although the 1980 quantities in the table are an important part of the production and consumption targets of the sector study, the path to 1980 will require periodic updating.

G. Conflicts Between Goals

The sector program set forth in this assessment posed certain conflicts between goals. Some of these have been resolved through an ordering of priorities and the goals. Others have been resolved through an effort to obtain the maximum returns from scarce technical and financial public resources. Some conflicts remain unresolved; for these, suggestions are made for mitigating their impact.

The proposed sector program places major stress on the goals of: (1) improving the nutritional base for the national diet of the Dominican Republic; (2) increasing the volume of production and income and the quality of life of the people living in the rural areas.

A conflict exists between the nutritional goal and the goal of raising the income of the sector, as illustrated by the bean production program. This crop was chosen as the best local source of vegetable protein adapted to the customary eating habits of the population. It is not a high yielding crop, however, and there are other crops which will produce a greater volume of food production per tarea. This points up the need for stepped up SEA research designed to increase red bean yields and thereby increase the productive ability of the crop, or to attempt to shift the eating habits of the population to other types of higher yielding beans. The nutritional goal of improved quality of diet was weighted heavily in this case, leaving income considerations in the hands of the price support program.

The proposed poultry program involves a conflict between the goal of improving nutritional levels and improving the distribution of income. The choice of the commercial feed and poultry industry as the vehicle for carrying out the program was based upon a desire to capitalize on (1) the technical and organizational expertise now available in the commercial feed and poultry industry; and (2) the ability of the commercial industry to draw on private financial sources for its major investment needs. This greatly mitigates the pressure on the scarce technical and organizational talent in the Government and frees public sector financing for other developmental purposes.

However, the proposed poultry program increases the likelihood of developing undue monopoly power in the hands of a few feed and poultry marketing firms. It also runs counter to the goal of improving the distribution of income, for it will improve the incomes of a limited number of producers in contrast with the results of a program designed to stimulate production in a large number of small flocks. However, the constraints of the limited technical base and public sector investment funds were considered overriding. Furthermore, the alternative approach would be much slower and offer little hope of achieving the nutritional target of doubling availability of poultry meat and eggs.

To counter these conflicts, it is important that the Government assert its influence to: (1) restrain monopolistic tendencies in the poultry industry and to encourage entry of additional firms as soon as economically feasible; and (2) insist that the maximum number of producers at the minimum size levels of production efficiency be financed by the poultry and feed industry integrators, rather than concentrating on a smaller number of large producers.

The rice and wheat programs involve a conflict between the nutritional goal and the goal of import substitution. More rice and less wheat is proposed than the most desirable nutritive balance would provide. The balance proposed, however, is within the range of nutritionally acceptable substitution and the limitation on wheat imports restrains the need for foreign exchange. Furthermore, the expansion of rice production provides a sizable output of rice bran by-product, which offers a significant import substitution for corn in the feed base for the livestock program.

The production target for plantains and tubers likewise exceeds the most desirable nutritive balance. In fact, the target is based upon a combination of a recognition of local crop patterns and eating habits and a decision to let these products find their own competitive level in the market place. This production target is more a recognition of reality than an aspiration.

The proposed livestock sector program poses a conflict between the nutritional and distribution of income and employment goals on the one hand, and the need to earn foreign exchange on the other. Foreign demand for Dominican beef is rising rapidly, offering a lucrative market. However, dairy products offer an efficient solution of nutritional problems and dairy production is more labor intensive. The demand on the technical resources of SEA would be lower for beef projects since the level of technical management demands are not as high for beef as for dairy. But the income would flow to fewer and larger owners, and most important, the nutritive needs that can be filled rapidly and more cheaply by increased milk consumption could not be met. Furthermore, the meat ingredients of the

diet can be met more efficiently through the expansion of poultry coupled with the spin-off of meat production from a larger annual dairy calf crop.

Although the expansion of beef would generate foreign exchange, there is a trade-off with dairy in that expanded dairy production serves as import substitution -- dairy products represent a substantial current foreign exchange outlay. Finally, with the investment in dairy processing equipment largely in place, its fuller utilization holds the possibility of reducing per unit costs of dairy products to the consumers. Therefore, a recommendation was made to allocate scarce technical and financial resources to the dairy segment, recognizing that some development in the beef segment would take place as an outgrowth of the increased calf crop in the proposed dairy program. The feed base proposed in the sector program, furthermore, is ample to accommodate such a development in the beef subsector.

Looking further, there is no doubt that if the Dominican economy were to put the necessary technical and financial resources into pasture and management improvement, the potential exists for doubling both the beef and dairy output, even if some pasture lands were shifted to crop production.

Concentration of more government sponsored credit in the hands of the larger producers, might result in somewhat greater short run gain in output than will result from the proposed credit sector program. However, in the longer term the potential output is much greater from an agricultural sector in which more producers have well developed technical and managerial talents. Agriculture is a production process with many inherent variabilities among almost all the inputs. Consequently, standardized national recipes are seldom workable. This is especially true in a country such as the Dominican Republic with its many microclimatic zones. Therefore, the overriding objective is one of directing efforts toward helping the individual operators grow in understanding of the activity in which each is engaged, so that each operator may make the best productive judgment taking into account the unique bundle of inputs at his command.

The sector production target assumes no substantial increase in acreage under sugar production, allowing for the possibility of some shifts between cane and other crops in local areas to make the best use of the soil. Increased production of sugar cane is best obtained by increasing the yield per tarea. The sugar companies have the assets, the research capability and the access to technology to take steps to raise yields. The proposed sector program would encourage the Dominican Government to adopt this alternative of raising unit output in order to take advantage of current high sugar prices, rather than to displace production of other crops by expanding the area planted to sugar. Again, this represents an attempt to resolve the conflict between the goal for nutrition and the goal of earning foreign exchange.

H. Follow-Up to This Assessment

Recognizing the need for continuous self-evaluation in the sector, SEA began its sectoral assessment in November of 1973. Much of the material presented in this USAID document was derived from first draft documents of the SEA assessment and many of the conclusions presented herein are the result of consultations with SEA personnel. This assessment reflects the basic thrust of the SEA assessment which will be completed in June and is expected to be more comprehensive and precise.

To accomplish its first assessment and lay the groundwork for development of an analytical capability for future analyses, SEA has restructured and augmented its Planning and Evaluation staff and sought AID assistance to initiate the activity. USAID/DR responded by funding a project providing two years of technical assistance for that purpose.

Providing base line data for assessments and analyses is the SEA Office of Estimates and Forecasts which will receive USAID/USDA/PASA technical assistance through June, 1974 and short-term assistance as needed for two years thereafter. This office will be incorporated into the Market Research/Information Unit and will expand to permit

coverage of price and stocks information as well as socio-economic data needed to measure results of the sector program.

The two offices -- Planning and Market Research will be the focal point for an ongoing analytical system. The form of analysis to be employed will be determined during the first SEA assessment before June 30, 1974. The lack of data on the Dominican economy as a whole may limit the model which can be developed to structure the analytical process. The form of analysis, however, is not as important as the very fact of a methodical approach to problems of economic and social targets related to the allocation of scarce resources.

II. OVERALL STRATEGIES FOR DEVELOPING AGRICULTURE: ALTERNATIVES AND THE DOMINICAN CHOICE

A. The Situation

A population growth rate of about 3 percent a year, rapid industrial expansion based in large part on agricultural products and a rising volume of agricultural exports are placing unusually heavy demands on the agricultural sector of the economy.

Agriculture employs about 60% of the labor force and contributes about 22% of the gross domestic product. There are about 455,000 farm families.

About 75% of the nation's exports are agricultural products or products derived from agriculture.

The agricultural sector provides foods for virtually the entire population. Nutritional levels are seriously inadequate.

The agricultural sector contributes to the development of the Dominican economy in three major ways:

1. Provides an adequate source of appropriate food and fiber products at a reasonable cost although the sector need not supply all the food and fiber it consumes.

2. Provides a livelihood to the largest segment of the population. Agriculture is the largest single source of family income in the Dominican Republic.

3. Generates formation of capital for the Dominican economy by producing more than is consumed.

Development of the Dominican economy is therefore heavily dependent upon the ability of the agricultural sector to maintain a high rate of sound growth, sufficient to meet expanding demands. The resources available to produce the

required agricultural growth are severely limited. Thus, resources should be allocated and employed in ways which will contribute the most to development in all of its aspects, including a more equitable distribution of development benefits to ever increasing numbers of Dominicans.

A large part of the population presently lives under a threat of continued deterioration of their economic condition unless, inter alia, increased quantity -- and quality -- of food can be grown or imported to feed the expanding population. With the prospect that cost of food sufficient to satisfy mass consumption may become increasingly difficult to import because of world demand, even if present prices were to prevail, the Dominican Republic has to face the issue of how to feed a population that will double, and could nearly triple, in the next 25 years with restricted resource possibilities at its disposal.

Despite the impressive overall economic growth of recent years, the Dominican economy continues to have serious problems of unemployment, a substantial underemployment of the adult work force and sharply skewed income distribution in favor of the wealthier few. In the Dominican Republic this is still more of an economic and social than a political problem.

One central assumption is made in this assessment: a relatively greater share of development resources will be directed to the agricultural sector so that expenditures will increase annually in absolute terms by some $25-50 million as compared with past expenditure rates. Our conversations suggest that this is a reasonable assumption. A basic question of agricultural development strategy is how this net addition of development resources is to be distributed among alternative uses within the agricultural sector -- to assist small farmers, to improve land resource use and to expand cash crops for export, among others. The question is not only how to invest additional financial resources, but also, how to improve human resources.

A strategy which aims at a more equitable distribution of income, maximization of employment and increasing

greatly availability of food, and food having more nutritious value, will not necessarily be one that maximizes economic growth. However, growth measured solely in gross quantitative indices, targeted principally in the monetized sectors of the economy, is not paramount. The Government's development perspective embraces concerns of equity and quality. The relative weight which will be given in the decision-making process will vary from time to time and is a Dominican decision. However the Dominican commitment to improving conditions of its poorest inhabitants is one which current U.S. foreign assistance legislation was designed to aid.

B. Nature of the Dominican Economy

1. Importance of Agriculture

Agriculture plays the dominant role in the Dominican economy. As stated earlier, it accounts for about 22% of GDP and 60% of total employment. Moreover, the next two largest sectors (commerce and industry) which together account for 36% of GDP are predominantly engaged in the processing and sale of agricultural products. Sugar accounts for about a third of value added in manufacturing, a sub-sector that produces virtually no capital goods or consumer durables. About 90% of exports have traditionally been agricultural products, although the percentage has fallen during the past two years as mineral exports have increased in volume. One feature of the agricultural sector's structure is that small farmers, composing 70% of agricultural work force, work about 25% of the arable land. Remaining usable land is cultivated by large producers for cash crops, mostly destined for export.

Thus a dual economy exists in which small farmers who account for over half of the country's total labor force are subject to widespread and increasing erosion of their living standards, given the continued growth of the labor force in a static land situation. In contrast most Dominican producers using more advanced technology have vastly improved their economic position in recent years.

2. Rapid Growth of the Economy

The outstanding feature of the economy is the accelerated rate of growth trend during the past decade. The rate of growth of GDP rose from an annual compound rate of 4.2% for the period 1960-1966, to a rate of 8.0% for 1967-1971 but about 10% since 1969. This last rate puts the Dominican Republic in rank along with Japan and Brazil as among the most rapidly growing economies in the world although obviously from a much smaller base.

Unfortunately, this rapid growth was not equitably shared by primary small producers whose declining productivity during the past decade has resulted in their continued impoverishment. The trend which reflects serious maldistribution of income and unemployment constitutes a basic and serious problem for the country. The following data taken from the Central Bank publication, Cuentas Nacionales illustrates this by index numbers representing gross domestic product per capita at constant prices (1962 = 100):

TABLE II - 1

	1960	1965	1971
Primary Sector	112.8	91.0	102.6
Secondary Sector	83.3	74.1	146.9
Tertiary Sector	85.4	97.2	124.3
Total	92.7	91.3	122.9

In this calculation the primary sector includes agriculture and mining; the secondary sector manufacturing industry and construction; the tertiary sector includes commerce, finance, transportation and other services. The growth of productivity in the secondary and tertiary sectors reflects the concentration there of capital investment and new technology. The decline of per capita output in primary production not only reflects the relative scarcity of capital, but also increasing underemployment and unemployment.

3. Agriculture's Share of Output

The share of agriculture (including cattle raising and silviculture) in GDP at constant prices fell from 32.8% in 1960 to 24.4% in 1967 and 21.1% in 1972. The rate of decline, since 1967, of agriculture's share of GDP, reflects a slower growth rate compared to other sectors. Real agricultural output has nevertheless grown more rapidly during recent years. The decline of the agricultural sector's share in total output has also been associated with a decline, proportionately, in the rural population from 70% of the total in 1960 to about 60% in 1970. Thus, the classical shift of unemployed workers from rural to urban areas has occurred. Migration, however, has not been sufficient to prevent a significant absolute increase in the rural population.

4. Imports

Imports of goods and services have tended to increase somewhat more rapidly than GNP. Thus the ratio of imports to GNP gradually rose from 0.23 in 1966-1967 to 0.28 in 1971 and 0.27 in 1973. Cost of food imports in 1973 were about double the previous five year average and the relative size in figures on ratio of imports to GNP is a reflection of the growing dependence of the economy on international trade.

In 1969-1970 food imports constituted 13.1% of the value of total imports but food for mass consumption (milk and grain) accounted for only 2.2%. This does not mean there was not a need for greater imports of food for mass consumption, but that at the present level of per capita income and the present distribution of income, commerce in mass consumption of food imports is clearly limited. Had not many of these items been made available under P.L. 480, total imports clearly would have been lower. This points up a fallacy in the argument that with sufficient exports, a country can import all the food it needs. Depending on the level and distribution of income this is not likely to occur without direct government intervention to finance the procurement and distribution of food.

5. The Basis for the Economic Expansion

The continual rise in exports since 1966 has contributed to the rapid economic growth since 1969. Exports increased from $213 million in 1970 to $448 million in 1973 largely because of greater production of traditional agricultural products and increased world prices and new exports, e.g., ferro-nickel. The rise of gross fixed investments, as a percent of GDP, from 14.4% in 1967 to 22.4% in 1972 was also important for total growth. There was a doubling of gross investments from $161 million in 1968 to $322 million in 1971. While there is no complete sector breakdown of total investments, they were generally concentrated in mineral extraction, oil refining, electric power, highways, urban public works, urban real estate and industry. Only a little of this increase has directly benefited the agricultural sector.

CIAP data available show that the share of agriculture and irrigation in public investments fell from 13.4% of the total in 1969 ($9.7 million) to 8.3% ($8.8 million) in 1971. Greater investments are beginning to occur in the agricultural sector, as illustrated by projections of the National Planning Office for 1974, showing that an allocation of 27.9% of total public investments ($39 million) is to agriculture and irrigation. However, it is fair to say that over the past decade the agriculture sector has been neglected in the allocation of resources. Furthermore, bank credit which has been readily available to industrial/commercial ventures has been in short supply for agriculture.

C. Alternative Strategies

The brief description above of significant elements in the economic development of the Dominican Republic points to the nature of the strategy which was followed up to 1971. It has been described in Government planning documents as the classic strategy of exports of traditional crops as the leading sector, high domestic profits for protected domestic industry and commerce plus easy credit to provide the means for developing the industrial private sector. A tax policy that exempted

land, real estate and profits raised the net profits of business and large landowning interests.

Public investments, which amounted to as much as one-third or more of total investments, were directed in part to urban public works, roads and communications with the intent of alleviating urban unemployment. Given the political situation at the time this allocation was undoubtedly needed.

But, the fact is that agriculture's share of public investments was low, e.g., only 13%, or $10 million, as late as 1969. The low priorities placed on agricultural development were also reflected in low imports of farm machinery and equipment, fertilizers and other chemical inputs, e.g., about $8 million per annum in 1969-1970 (3.5% of total imports). Although it is estimated that about 21% of bank credit has been directed to agriculture, a relatively small share has gone to small and medium sized farmers. Furthermore, an unknown proportion of this total probably found its way back to industrial/commercial sectors. Additionally, it is estimated that less than 15% of farm families receive any institutional credit.

There is accumulating evidence that during the past several years a higher priority was assigned to agriculture, but increases in allocation of resources have been slow and insufficient to obtain the dramatic increases in production now being asked. Planning Office sources indicate that agricultural projects costing $178 million are in various stages of preparation and execution, of which $43.3 million were invested during 1972. There was no basis for judgment, however, in the absence of a complete sectoral assessment, that these investments were the best choices to achieve the increases in production now being targeted.

The Government has considered, generally implicitly although more recently explicitly, whether to concentrate more heavily on exports (Alternative A), more heavily on crops for domestic consumption (Alternative B), or a judicious mix of the two (Alternative C). These are discussed below.

1. Alternative Strategy A: An obvious alternative would be to put relatively greater emphasis on export crops, particularly sugar, to take advantage of the high prices prevailing in world markets. This would mean not only increasing the inputs of fertilizers and other chemicals, but also extending the acreage under export crops. It would involve greater financial resources for supporting the growth of new export processing industries, and finally, new investments would be required to increase the capacity and efficiency in milling sugar.

The objective would be to use the greater export earnings to finance the increasing food imports needed for a growing population as well as the imports of equipment and raw materials needed for industrial growth and the continued expansion of urban infrastructure. The growth in urban areas would hopefully absorb into an expanding labor market the surplus population from rural areas, thus holding down or moderating unemployment. However, the sugar industry which employs some 10-12% of the labor force does not offer extensive employment potential. It is however, fairly well-distributed geographically throughout countryside.

This policy would logically imply no net additional resources for extending the acreage under crops for domestic consumption or for increasing output by small and medium-sized farmers.

The policy in its extreme application would be risky in several respects. There is uncertainty about the longer term price prospects for traditional crops. It would take several years, for example, to bring new coffee and cocoa acreage into production. Prices for these products could well be unfavorable when new output would be ready for marketing. Grains would have to be imported for mass consumption under

this policy. Because of inadequate supplies resulting from world-wide shortages, cost would be high. For example, 1973 food imports are calculated at about $80 million. Even if the grain supplies were available, the country's present marketing and distribution channels, which aims to move food from countryside to city, are not geared to a situation where the reverse would to some extent apply. Furthermore, in the absence of earning capacity in the countryside, the wherewithal would be absent.

Subsistence agriculture may have one advantage: it feeds people with little cash outlay. However, the point is about to be reached where population pressures are such that subsistence agriculture is no longer a viable alternative.

The historical record suggests that a policy depending only on investments in urban areas for the prevention of growing unemployment and underemployment in rural areas is excessively sanguine. Moreover, the past concentration on such investments would suggest that the increasing emphasis on agrarian reform and additional investments being placed on irrigation and access roads, given their labor intensity, can have longer run economic benefits.

Finally, a policy emphasizing excessive investment in traditional crops for exports, would do little to improve, and would even have a negative effect on income distribution.

This alternative strategy at least with respect to sugar, appears to have credence by some within the Government. It was reported in El Caribe on February 7, 1974, that there is some disposition to approve a plan of the State Sugar Council (CEA) to increase the acreage under sugar sufficiently to raise output as soon as possible by 100,000 M.T. at a cost to the Government of $25 million. The plan contemplates continual annual increases of 100,000 M.T. until production is doubled. In the short-run, such investment could be beneficial, but a long-term commitment carries the dangers cited above. Given land scarcity, such plan would also compete with food for human consumption. In the Balance of Payments section and

in Annex IV, there are calculations to show that if rice targets were adhered to under one set of assumptions, there could be a net saving in foreign exchange of $93 million between now and 1980. This is not an inconsiderable saving in foreign exchange.

An article in the New York Times of February 11, 1974, cites the price of raw sugar in New York to be 18.5¢ per pound or, twice the price of a year ago and far above the price of 1.5¢ in 1968. It further pointed out, however, that since 85% of the world supply does not enter freely into international trade, the world price can be subject to violent fluctuations because of relatively minor shifts (e.g., 200,000 tons) of supply entering international trade. One expert is cited as projecting a half a million ton increase in stocks by the end of this year.

The Government's fixed capital expenditure program for 1974 was estimated by IBRD to be $173.3 million of which $14.5 million was for irrigation and $8.5 million for agriculture. To allot $25 million for an extension of the acreage under sugar could divert scarce resources from where they are desperately needed -- if they were taken from activities which would benefit agricultural production for the domestic market.

2. Alternative Strategy B: At the other extreme, Strategy B would emphasize autarkic policies of extending tariff protection now given to industrial products to the import of all major food items with the object of displacing as far as possible the country's agricultural imports which amounted to about $80 million in 1973, a large part of which were wheat, rice, edible oil, beans and feed grains.

The net increment in agricultural investments would be directed to the long-run development of production of commodities for domestic consumption, essentially production on medium and small farm units. It would also seek to build up agro-industry as rapidly as possible to displace imports of processed food products. Progressive shifts in acreage from traditional export crops to permit the production of crops for domestic consumption would be required.

Major investments would be made in irrigation and land development projects to bring new areas into production for domestic consumption and a major effort would be made through additional production inputs to increase the yields of lands already in production.

Emphasis would be given to labor intensive investments. Customs duties would be raised to increase the cost of capital goods imports for urban-based capital-intensive industries. Credit policies would be directed toward augmenting the flow of credit to small and medium farmers.

Reliance would continue to be placed on traditional export crops at static levels, and on mineral resources being developed through foreign capital for maintaining an adequate level of foreign exchange earnings. However, essential additional resources for agricultural investment and related supporting policies would seek primarily to augment production of products for domestic consumption, particularly by small and medium sized farmers, with a view to redistributing income and increasing employment in rural areas.

This alternative is perhaps even more unrealistic than Alternative A. It would require more than a marginal shift of resources to bring about significant results, thereby depriving other sectors of the economy of means for a more balanced type of development. Furthermore, as we have seen in the past, there is no guarantee that incremental increases in earnings from primary crops will be sufficient to finance needed importation of industrial products.

This alternative would tie up excessive resources in expensive land development and irrigation projects which would be so slow in gestation that significant effects on production would not appear for some years, thereby contributing to domestic inflation.

A narrow emphasis on agricultural protection, employment intensity, and income distribution would lead to an uneconomic allocation of resources for the high volume production and processing of commodities in which the country lacks

comparative advantage, given its level of technology, human skills and infrastructure.

This autarkic approach is of interest primarily in underlining the inherent constraints of a strategy that would seek to emphasize only that sector of agriculture which has been largely ignored in the past and which consequently remains underdeveloped relative to the rest of the economy.

3. Alternative Strategy C: This alternative is the middle ground between Alternatives A and B. It would not ignore traditional crops, but rather would seek to encourage sufficient investment to improve efficiency of areas presently under cultivation and to allow only moderate and perhaps temporary expansion to benefit from short term price situations. Emphasis would be on greater productivity and sustained capacity rather than expansion. It would be necessary, for example, to replace overage trees in coffee and cocoa plantings and increase the use of inputs such as fertilizers, substituting, where desirable, sun instead of shade-grown coffee technology. In addition, there should be investment in the development of small or medium firms to process raw products and increase value added to exports.

A larger share of public funds and bank credit would be needed for developing rural infrastructure, for choosing crops which make more efficient use of land potential, and for generally raising productivity among small and medium farmers who produce for the domestic market. The major share of an increase in credit and public funds would be directed to these objectives since greater investments in traditional crops can be largely supplied from the assets and profits of the larger, more efficient agricultural enterprises which produce for export.

Import substitution production would mainly be confined to raw materials for industry and items of mass consumption (meats, grains, dairy products) that can be grown efficiently and in volume in the country. No attempt would be made to produce domestically all food imports of the higher income urban population, but custom duties and taxes should

reflect scarcity value of foreign exchange. Substitution normally should occur only when domestic output can compete with imports without high protection. Nevertheless, there may be income redistribution and employment benefits from growing, for example, peanuts, even when cost of importing edible oil or peanuts for processing, would be more economical

The marginal though significant shift of resources to agriculture, expressed as a greater proportion of total investments, whatever the absolute level of such investments, would take two forms: an increase in the allocation of public development expenditures and an increase in the share of total bank credit directed to satisfying the needs of small and medium farmers. There is, of course, a marginal group of farmers aggregating ten to fifteen percent who are likely to remain outside any institutionalized credit system devised. They can only be reached effectively through donation programs of seed, root stock, etc.

The projections of IBRD and the National Planning Office shown below indicate how public fixed investments are planned to increase from 1970 to 1974.

TABLE II - 2

Million RD$

Sector	Actual	Estimated	Projection 1972 Prices	
	(1970)	(1972)	(1973)	(1974)
Agriculture	3.6	6.8	4.5	8.5
Irrigation & Flood Control	6.5	29.7	19.0	14.5
All Sectors	96.6	156.5	170.4	173.3
Agriculture & Related Expenditure as a Proportion of Total	10.5%	23.3%	13.8%	13.3%

The data show that while a significant increase occurs between 1970 and 1972, subsequently the share falls to a figure not significantly above that prevailing in 1970. The increase, while inadequate, reflects at least a modest shift of resources to agriculture and increases in fixed investment expenditures for administration and technical assistance. The agricultural sector which accounts for 22% of GDP and 60% of the active labor force receives a share of resources which is not proportionate to its importance. Furthermore, the employment effect of agricultural investment is at least twice as great as for industrial investment in the Dominican Republic. A strategy based on increased employment, a more equitable distribution of income and progressively higher levels of domestic food production would require a very significant increase in the share of public expenditure by 1980, perhaps as high as 25 to 30%.

While agriculture receives a share of total credit approximately equal to its share in GDP, small and medium sized farmers receive a very small share of institutional credit, a share far smaller than would be indicated by their contribution to GDP. Thus, Alternative C would require an increase in the share of credit going to small and medium farmers within a total volume of credit that is consonant with the country's monetary policies and condition.

This strategy of shifts and increases in public expenditures and credit in favor of food production for domestic consumption would require a series of administrative, tax and credit policies calculated to approach the efficient use and absorptive capacity of a sector where there are distinct management and technical limitations.

The strategy of Alternative C would seek a balance between reducing costs and increasing efficiency in the production of traditional crops and further diversification of exports on the one hand and a significant increase in food production for domestic consumption and the development of agricultural resources on the other. The manner in which the allocation of increased resources would be distributed between these two

subsectors of agriculture can only be determined through a careful appraisal of relative costs and benefits and the capacity of the two areas to utilize additional resources.

D. The Dominican Choice

While there is not yet a clearly-articulated consensus within the Government, the Secretariat of Agriculture, and its Secretary, have adopted Alternative C as the policy basis for its current sectoral assessment. Further, this is consistent with the President's guidance to the Secretary. Alternative C provides the matrix for a long-term agricultural development strategy which will be keyed to quantitative production targets as well as qualitative goals.

Emphasis will be placed on a mix of agricultural commodities which can be produced with a measure of efficiency, including as much of the national food needs as is reasonable. It will continue to produce for export those crops in which the country has a comparative advantage in the world market.

Experience of other developing countries suggests that this policy choice is sound. Alternative C provides a basis for building upon the positive Dominican assets within and outside the agricultural sector. It provides a suitable framework for striking a rational balance in the allocation of scarce resources, and at the same time minimizes the substantial political and social risks entailed in Alternatives A or B.

Given intensifying population pressures throughout the rest of this century, Alternative C provides the best prospect for keeping the population constructively engaged while meeting the food requirements of the growing Dominican population (expected to be from ten to fourteen million people by the year 2000). It also accomodates equity requirements of better income distribution and increased employment.

III. GOALS FOR DOMINICAN AGRICULTURE

Within the context of alternative C, the Secretary of Agriculture has formulated a series of qualitative goals and quantitative targets for 1980, together with intermediate targets.

If these goals are achieved, the Government would have measurably and significantly improved its possibilities for attacking successfully its development problems for the remainder of this century.

If these goals were not achieved, or if there were significant shortfalls, the GODR would have seriously prejudiced its opportunities for making timely rational policy choices, advantageous resource allocations, decisions strengthening institutional structures and coordination in the agricultural sector.

Our analysis to date confirms to our satisfaction that the Dominican goals and targets are both reasonable and realizable. Their achievement would net substantial economic and social returns and benefits would be widespread, particularly among the rural poor.

A. Qualitative Goals

The following general goals were selected by the Secretary of Agriculture as an integral part of the sector assessment.

1. Achieve a more equitable distribution of income among those who earn their living in the agricultural sector. Improve the quality of rural life.

2. Provide food and fiber to consumers at reasonable cost.

3. Obtain the kind of agricultural production which will raise the level of nutrition nationally.

4. Achieve better utilization of renewable natural resources.

5. Provide agricultural products for industrial uses, exportation and import substitution where economically feasible.

To attain these goals the Government strategy proposed by SEA takes into account substantially-underutilized productive capacity in agriculture. Failure to use fully productive capacity is rooted in poorly-managed land and water resources; lagging agricultural capital formation; underutilized labor; underdeveloped human resources; and fragmented and inefficient marketing channels for both agricultural inputs and products. SEA has also identified an underlying set of constraints: inadequate information and concommitant deficient and uncoordinated planning in sector agencies at the national level. In addition, there is a complex set of national programs, some politically-favored, which sometimes conflict with one another in attainment of national objectives.

SEA's approach is to exercise leadership in planning and evaluation and execution of programs designed to achieve national quantitative and qualitative goals in agriculture. Thus far, other institutions with important roles in the agricultural sector, particularly the Office of the Presidency, the National Planning Office and the Central Bank have supported SEA's effort. The second phase of this approach is to analyze critically significant programs in the agricultural sector to determine their contribution to achievement of these goals. The third phase will be to seek Presidential decisions in changing and augmenting these programs based on a thorough analytical assessment.

Several premises are included in SEA's approach to policy formulation in the agricultural sector.

First, if optimum production levels are to be reached and maintained, the policy and economic means must be selected to influence national land use and assure that lands attain their greatest productive capacity given the possibilities and constraints at any given time.

Second, the land's potential capacity to employ people fully and directly in farming has already been surpassed. A portion of unutilized or underutilized labor can be turned to productive farming efforts but a large group will have to be given employment opportunities off the farm in derivative agricultural industries, and in other sectors, if rural incomes are to rise and the quality of rural life is to be improved.

Third, most of the excess productive potential in farming lies below the level of the large commercial farm but above abject subsistence farm units. Although nearly all farm units can be made more productive with appropriate stimulation and incentives, the group at the same time neglected and most able to make significant contributions to production, employment and distributional objectives is composed of small and medium farm units presently having minimal or no access to institutional credit.

Fourth, attainment of agricultural goals will depend on the effective contribution of all subsectors, agricultural, agro-industrial, credit, marketing, and the media, both public and private. All should perform their functions professionally, efficiently and with the minimum of conflict and overlap. This implies articulation and in many cases a reorientation of basic policies, laws and administrative authorities to help modernize agriculture. No doubt some institutional changes will be needed. It will also mean redirection or elimination of some high cost activities, e.g., production and distribution of seed and plant materials and machinery imports, now in the hands of the Government. Further professionalization of sector institutions is required and efforts are needed to improve indigenous capacity. It will most certainly mean support and adherence to a continuous cycle of analysis, planning, execution and evaluation with consequent regular adjustments of programs and policies to meet goals. The products of this cycle can provide a basis for fundamental policy guidance and regulation for implementation of programs.

Fifth, for this strategy to achieve full effect, certain conditions (secondary goals) will also have to be met. The nation must assure:

1. A sufficient remuneration to the producer to make it economically advantageous to him to produce, i.e., increased production must improve his economic position.

2. Farm and crop credit on time and in the amounts needed to help assure profitable production.

3. A modernized marketing system to increase efficiency of operations, increase farm income and serve consumers with improved quality products at more reasonable prices.

4. A transportation network to give more farmers easier access to markets and means to obtain inputs.

5. Availability of technical education for farmers in the skillful use of scarce resources and improved communication which will keep farmers in current touch with market conditions.

6. Development of managerial responsibility and ability among operators of individual farms so each can adjust the production program of his farm to the peculiar and unique combination of inputs, soil, climate, power, skills, financial situation, aptitude, and market available to him.

7. Coordination of all measures for agricultural development at the national and local level, i.e., the recipe for new technology must be relevant to the local situation and the technical and financial assistance must be orchestrated to function effectively at the local level.

B. 1980 Production Targets

SEA recognized that it had to make a number of value judgments concerning choices in developing a set of major production targets for 1980. These were based upon economic,

social and political factors which had importance for the agricultural sector.

The Secretariat set forth specific major food production targets for 1980, primarily with regard to basic food requirements for domestic consumption. The available 1973 supplies from both domestic and imported sources were compared with what would have been required to have had a reasonably nutritional, low cost diet for the population, adjusted by probable consumer preferences and consumption patterns. This comparison indicated, as might be expected, a heavy overdependence in 1973 on carbohydrate foods with substantial deficit in proteins, vitamins and minerals. This deficit is reflected mainly in the shortages of meat, fish, eggs and poultry, milk, vegetables, oils and sugar.

With this in mind, an "ideal" consumption pattern was developed. A production target mix for 1980 was selected which, given the expected population increase and food acceptability patterns, would represent a reasonable effort to provide an improved diet for the nation as a whole. The modified production mix concluded upon a synthesis of domestic production potential and cost, cultural eating habits, and expected domestic purchasing power.

The 1980 domestic food crop output targets are oriented toward a shift from an overly-starchy diet toward one containing more protein and toward providing some import substitution commodities. Costs in the production of rice were related to the prospective increased foreign exchange costs of wheat imports, and the choice was made to increase rice production targets, reducing in relative terms the dependence on wheat imports and elimination of rice imports. A sharp expansion in the production of beans was targeted for 1980, in order to provide a low cost, culturally-acceptable domestic source of vegetable protein. Edible oil production/import targets were raised to cover projected needs. Sugar needs were to be met by drawing more heavily on domestic supplies, perhaps implying an increase in refining capacity. Total 1980 output targets for plantains and tubers were held to a slight increase over 1973 production levels since these are less valuable nutritionally.

The 1980 output targets for poultry and dairy products were increased greatly over 1973 levels -- about double the current output. Poultry are efficient converters of grain. However, this target implies greater grain imports and much will depend on either P.L. 480 availabilities or greatly improved foreign exchange prospects which can not reasonably be expected. With a commercial production base already established, fewer production expansion constraints are encountered than in attempting to expand greatly the production of hogs which are currently produced mainly on a pennage basis. With limited land availability, dairy operations offer greater protein production possibilities per unit of land than do beef cattle and are more labor intensive. Moreover, a sizeable beef spin off is also possible from culled bull calves, cows and heifers. Specific production targets, by crop, appear in Table I, Section VI.

IV. DESCRIPTION OF MAJOR AGRICULTURAL RESOURCES

A. Human Resources

Productivity of Dominican labor in agriculture is among the lowest in Latin America. A 1969 OAS study indicated that nearly one-half of the rural labor supply was marginal to requirements. With annual population increases of three percent, little improvement can have occurred since.

Problems of physical and mental development of the rural population remain generally unresolved. Most persons need a higher level of protein, vitamin and mineral as well as caloric intake. Poor health in young children is largely a consequence of poor nutrition. A majority of rural families do not have ready access to medical service facilities although the Government's program to expand the net of rural clinics with AID's support is having some beneficial results. Rural people who may be quite ill often have to walk or ride a horse, mule or burro a considerable distance to receive limited, and usually inadequate, medical care. For example, 52% of the nation's pharmacies are in Santo Domingo. Although medical services constitute a large share of the Dominican budget (about 10% in 1973), the bulk of the budget goes for hospitalization in the larger and intermediate cities. Preventive services account for no more than 5% of the health budget and a "low-cost health delivery system" is still an abstract and largely unfamiliar concept. Without doubt, better, and more generally available, health services can be provided for no more money than is now being expended.

A study in 1968 indicated that over one-third of the farm operators had no formal education. Less than one-fifth had more than five years of schooling. In 1972, 62% of the non-enrolled primary-age children lived in rural areas.

The typical rural home has three rooms with wooden walls and a thatched roof. Nearly two-thirds have dirt floors. Over one-half had no water at the homesite and nearly one-half had not even the most elementary sanitary facilities.

A sizable portion of rural people belong to no organizations. For many, social life is limited essentially to their participation in family and, for some, religious activities. Too often in the past, they have had unfavorable dealings with outsiders and are reluctant to invest in groups where there is a chance someone will misuse the funds. Nevertheless, the campesinds basic distrust of organizations appears to be fading, given his increased social mobility, access to better communications and exposure to the process of change and modernization. For example, cooperative organizations are viewed with favor in many areas, in part because of the soft credit that has been made available through them. The 1973 cacao survey showed that only nine percent belonged to cooperatives or producers' organizations, but 53% desired membership.

There are differences in cultural patterns which are generally defined by regions and sometimes by ethnic origin but attitudinally the country is relatively homogeneous, with the overwhelming majority embracing Catholicism. Racial blending has resulted in a population that is 70% mulato. Skin color is not a major determinant of mobility and opportunity.

Though not unique to the Dominican Republic, the "patron" mystique is quite strong, and the public tend to focus attention on welfare actions it can expect from the Government. Self-help is not inherently a strongly-held concept, but is readily accepted when encouraged and aided. Direct and continuous assistance is thus expected from the Government. The Government tends to respond to needs in a direct manner, e.g., distribution of food and water during times of scarcity, distribution of land, distribution of seed and plant material, promotion of labor intensive, high-visibility public works programs, etc.

B. Land Resources

The Dominican Republic's 19,000 square miles of land were studied and classified in the "Study of the Development and Planning of Natural Resources" by the OAS, published in 1969, an exceptionally-detailed and well-documented source. This study is summarized and related to the current land utilization pattern in Chart 1. With the exception of the arid regions of the

southwest, all land of currently acceptable productive capacity is presently being used for cropping or livestock. Relatively high-cost irrigation projects will be required to bring permanent agriculture into these arid western valleys.

Because of the population pressure on scarce land resources -- the ratio of cultivated (not necessarily tillable) land per person is one of the lowest in the world -- much mountainous and steeply-rolling land is intensively cultivated. In the general absence of terracing, this is threatening accelerated land resource deterioration.

There are now two large unused tracts of agricultural land in the country. One is a low rainfall area in the northwest which could be developed for dry land farming of beans and sorghum. The other is the swampy flood plain of the Yuna River system, which offers development potential in expensive irrigation projects or perhaps in adopting the new technology of paddy rice production developed by CIAT. Most significant production increases must, however, come from increased productivity or from a change in the land-use patterns from lower to higher yield crop or livestock enterprises. In 1973, about 58% of the land in cultivation was devoted to the production of major export crops -- sugar, cacao and coffee, as shown in Chart 2. Some of the lowest altitude cacao and coffee plantings could well be shifted to areas of higher elevation and the released lowlands shifted to food crops. Likewise, some of the land now in pastures is capable of sustaining cultivated crops on a selective basis.

Land is used more intensively in the rich, heavily populated alluvian plains of the Cibao valley, the southwestern Yaque del Sur valley, and in the southeastern portion of the country. There are several smaller pockets of intensive land use in localized areas.

The Cibao is the largest and most fertile valley of the country. It is approximately 150 miles long and 10 to 30 miles wide. Almost one-half of the nation's inhabitants live in the valley -- often called the Dominican food basket.

The land situation is complicated by the lack of coherent land policies and the lack of any tax on land other than an inheritance tax. These constraints have discouraged capital investments in land and the more rational land use that prevails when land represents a real cost.

See Annex I for a systematic description of land capability and major life zones.

C. Management Units (Farms)

Land tenure is one of the more serious constraints to rural development, working against incentives to use land resources more efficiently. The current SEA estimate of 455,000 rural units (farms) follows in Table IV-1.

TABLE IV-1

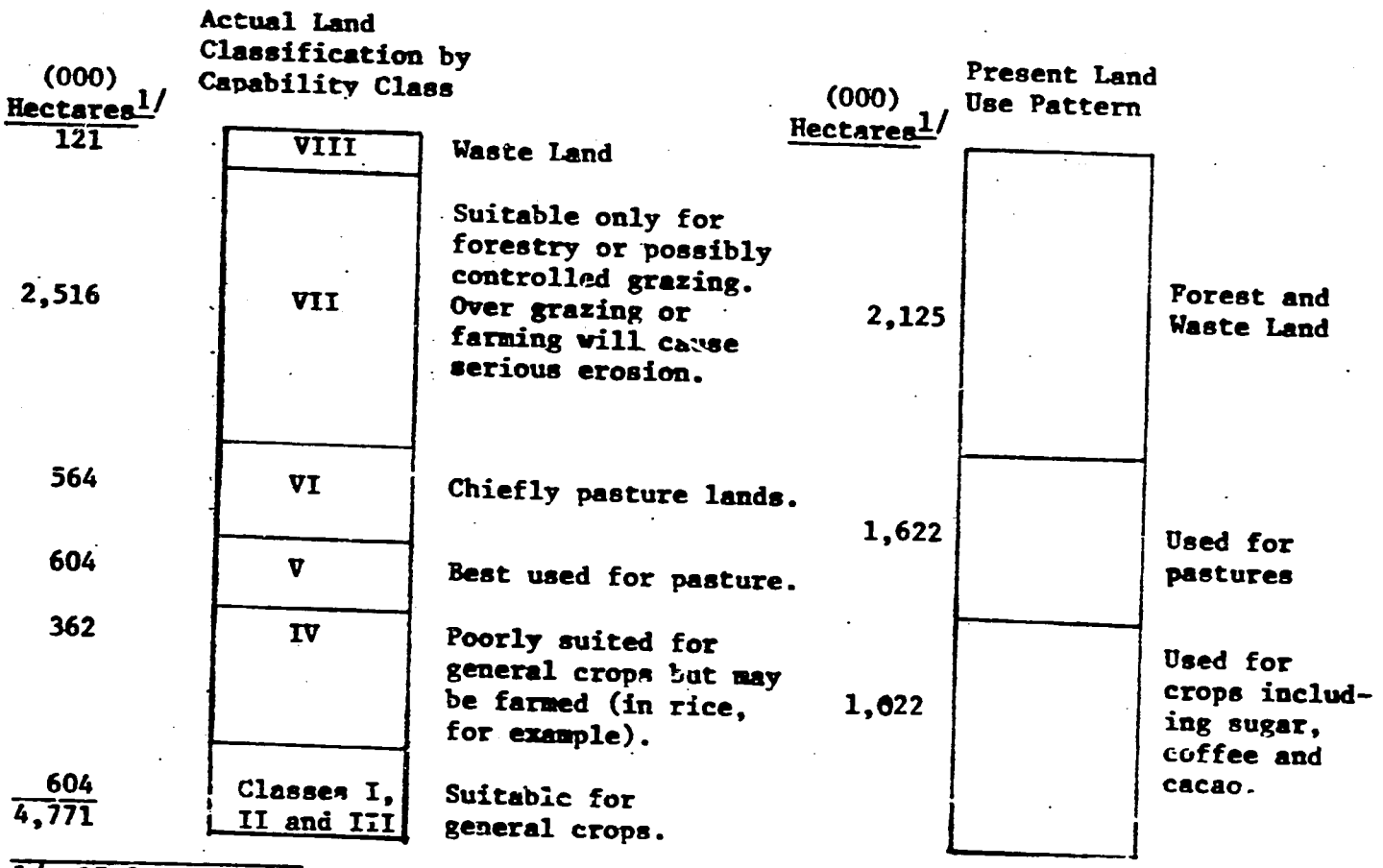
FARM SIZE BY FAMILY UNITS

Size of Units	Number of Units	Percentage of Total Land in Farms
Sub-family units 1/ (20 tareas 2/ or less)	236,510	6
Family units (21-500 tareas)	210,240	44
Medium multi-family units (501-5,000 tareas)	7,775	25
Large multi-family units (5,001 and more tareas)	475	25

Surveys of farm owners' intentions indicate that progressive property subdivision will undoutedly continue as it has in the last two decades.

1/ Units not capable of providing a living for an average farm family.
2/ 1 Tarea = approx. 0.15 acres; 6.5 Tareas = 1 acre; 15.9 Tareas = 1 hectare.

CHART IV-1

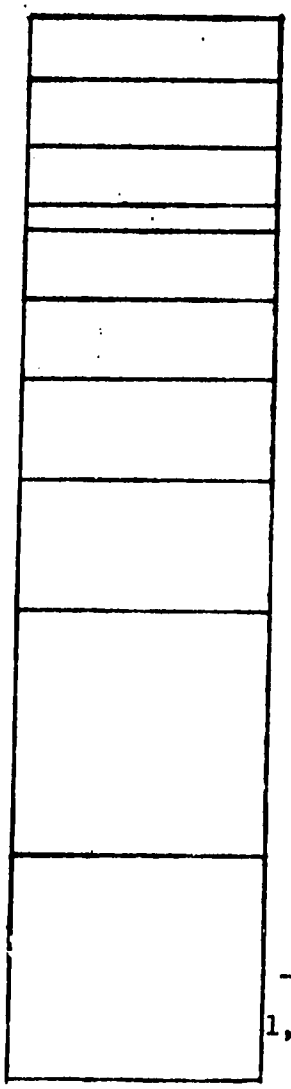


1/ 15.9 Tareas = 1 Hectare

IV-5

CHART IV-2

CROP LAND USES
JUNE 1, 1973



Uses	Hectares	% Total
Misc. Crops.	40,126	3.9
Corn	57,358	5.6
Peanuts	54,780	5.4
Beans	23,396	2.3
Rice	65,535	6.4
Yucca	86,667	8.5
Plantain	99,182	9.7
Cacao	138,302	13.5
Coffee	220,817	21.6
Sugar	236,352	23.1
	1,022,515	100 %

The farm units containing the larger tracts of land generally follow an extensive production pattern, such as cattle grazing, in which the land often is used below its productive capacity. Furthermore, large tracts of land are sometimes held for cultural or speculative reasons and are used only in a limited way. Inefficiencies due partly to poor management and landlord neglect are apparent in many of these situations. They manifest themselves in inadequate investment, limited adoption of new technology and contribute to a level of output below productive capacity.

The economic and social implications of the sizable number of small units are far-reaching when one considers that each farm unit must provide a living for families of from five to ten persons, severely limiting the ability of the small farm family to participate fully in the market economy. Many of the small and subsistence operators probably are producing about as efficiently as possible with the skill and resources available to them. Their productivity undoubtedly can be raised somewhat by improved production methods and by use of more and better production inputs. Even so, a large part of their family labor will remain under-employed during a good part of the year and, if they are to achieve a reasonable living standard, their income will have to be supplemented from sources outside the farm itself. The majority of this group present serious developmental problems requiring application of several solutions simultaneously.

While 62% of the nation's farms are operated by owners, a sizable number of those farmers who claim ownership of their farm units lack proper legal papers recognizing that status. Further complicating the problem is the fact that in many instances the farm boundaries are obscure, poorly-drawn, and in some cases not known. Until titles to rural land are registered properly, the resulting insecurity of ownership constitutes a significant constraint on long-term land investment by the operator or as security for loans.

Parcelization is a problem for many farm operators with a third of the farm units in 1968 consisting of two or more parcels of land (13% have 3 or more parcels). Parcelization is greater among renters, sharecroppers and squatters.

Mechanization is little advanced in Dominican agriculture. Most farms use human labor and animal power, with the traditional hand tools and oxen-drawn plows, seeding machines and cultivating equipment. However, many of the smallest farm units have only hand tools and it is estimated that only one-fourth have access to the machinery needed for optimum results.

Fertilizers and insecticides are used by limited numbers of farm operators. Inadequate technical knowledge and lack of financing are the inhibiting factors for the expansion of the use of these inputs. With the exception of rice, well-adapted and improved seeds are not used extensively. In general, farm operators are very sensitive to risks, particularly weather and price uncertainties. It is apparent that farm operators generally are not informed on the marketing system. Lack of management information and knowledge on how to make management decisions with respect to organization of farms is a prime constraint on production, productivity and farm income at present. 1/

D. Water

1. Irrigation. More than 110,000 hectares are currently under irrigation, or about seven percent of the land developed for agriculture. Irrigation programs are being extended into new zones of the arid southwest and the Cibao valley, which will bring an expected 65,408 additional hectares under irrigation by 1980. This would increase the area irrigated to almost 13% of the land devoted to agriculture.

In mid-1973, almost half (53,500 hectares) of the extant irrigation grids covered rice land; corn and beans were planted on an additional 6,949 hectares of irrigated land. The Dominican Republic has no effective national water-use policy, nor are tariffs on agricultural water use efficiently and equitably applied. Upstream land often is heavily irrigated -- frequently resulting in downstream land being under-supplied. With poor user maintenance, the irrigation systems of the Dominican Republic

1/ See page 1, Annex III for a description of management choices available to farmers with improved technology and market information.

tend to deteriorate rapidly. Much of the currently irrigated land is underutilized. The current administration of water rights and the system for delivery of water, at the time and place, and in the quantities needed is one of the serious constraints on agricultural production in this country.

2. Ground Water Resources. Very little is known about the ground water capacity of the various aquifers in the Dominican Republic. The O.A.S. in 1965-1966 carried out a limited study of potential ground water supplies, primarily through interpretation of limited existing reports, field inspection of existing wells, an exploration program and a study of the lithologic and structural aspects of the major geologic systems.1/ However, no integrated geologic, geophysical, statistical or drilling program has so far been undertaken.

3. Surface Water Resources. There are 108 independent river systems in the Dominican Republic. Only five of these are classified as large river basins, i.e., those of the Artibonito, Yuma, Azua, Yaque del Norte, and Yaque del Sur rivers.

The most economic surface water irrigation projects have already been developed or are underway. New projects to supplement old or to develop new lands will become progressively more costly to the point where development is uneconomic in relation to output.

A definite concern both for the GODR and for developmental agencies is that of relating new developments requiring capital investment to the management and maintenance of existing systems. Any decision to construct irrigation works should be tied to rational headwater conservation plans. Most of the major rivers of any length are carrying a very heavy sediment load, which is deposited in distribution systems making delivery inefficient and maintenance costly. Definitely, the whole picture of water charges, system maintenance, and management of water rights, should be rationalized before more commitments are made to invest in irrigation.

1/ Survey of the Natural Resources of the Dominican Republic, O.A.S.

A more detailed report on water resources and irrigation potential appears in Annex II.

E. Inputs

1. Machinery. Despite limited absorptive capacity for farm machinery under Dominican agricultural conditions, importation of agricultural machinery and equipment has grown steadily. The basic problem of the degree of mechanization appropriate for the Dominican Republic, however, has not yet been resolved. Machinery is potentially a substitute for hand labor or animal power -- but it can also improve production if it results in more timely operations and better cultural practices.

The Dominican economy has a sizable number of small and medium size farm units -- too small to purchase and operate their own power machinery economically at current prices. Yet the inability to perform their land preparation on a timely basis frequently limits the ability to establish multiple cropping patterns. Power machinery is needed to prepare a proper seed bed, one of the first steps in raising the land's productivity. This obstacle could be overcome by developing private custom operators. The SEA sectoral assessment has recommended the immediate commencement of an educational program directed at machinery dealers, machinery owners, and the operators, which would cover the selection, proper use and maintenance of farm machinery.

The private sector could, and undoubtedly would, fill the need for increased custom machinery operators to provide custom services to medium size farm units, except for four serious constraints: a shortage of medium or long-term credit to finance such enterprises; the lack of training for mechanics, tractor drivers, maintenance personnel and agronomic technicians; the inability to obtain needed replacement parts on a timely basis; and the inability of a great number of farmers to pay for the services.

Delay in obtaining parts and repairs constitutes one of the constraints on the use of farm machinery in the agricultural sector. There is a need and a potential for development within the country of a small farm machine manufacturing and assembling industry, which would put small low cost machines within the economic

reach of the small and medium farms. The larger processors of agricultural products, e.g., edible oils, tomatoes for canning and for paste, now usually provide custom land preparation paid for by deductions against the sales of the crop to the processor.

2. Seed, Plant Materials and Foundation Livestock. Improved and adapted plant materials are in short supply in relation to their current acceptability, with the possible exception of rice, corn and cacao. Outside the severely limited facilities of the public institutions, there are virtually no distribution systems. Concurrently, there is virtually no knowledge on the part of most farm operators about the possibilities or availability -- other than for rice -- of improved seed varieties.

At the direction of the President, SEA has begun to develop its recommendations for a certified rice seed law which could be applied in principle to other farm crops as well. In addition an 80 acre plant bank designed to provide a basic supply of improved plant material, primarily for tree crops, is under development at Azua.

Knowledge needed to introduce, produce and test improved plant and seed material is available in the country, requiring only a modest level of outside technical assistance. Numerous commercial opportunities would be available for the reproduction and distribution of these improved varieties among rural residents. Governmental licensing, quality standards, and enforcement of regulations of a law governing plant materials should be initiated. Some credit and technical assistance probably will be needed to encourage the required private entrepreneurial interest and participation. The lack of a production and distribution system for improved seed varieties is a primary constraint to achievement of higher productivity and incomes in the rural areas.

The systems and methodology for maintaining genetic records for livestock are almost totally lacking with the exception of a few specialized purebred operations. Improved genetic lines tend to degenerate rapidly under these conditions.

Moreover, with current management practices, genetic advances are largely dissipated because of inefficient handling, particularly in the dairy and swine industries. While there is a need for continued infusion of new genetic strains, the advanced state of knowledge about artificial insemination virtually eliminates the need for further live animal importation in cattle.

3. Fertilizers and Agro-Chemicals. The use of fertilizers, pesticides and herbicides is concentrated mainly on rice and sugar, with some use on vegetable and fruit crops. But in total, use is very limited. For both fertilizers and the agro-chemicals, inadequate knowledge of the potential returns from the use of these inputs as well as the lack of technical knowledge about their use have been responsible for their limited employment. Farmers who do use fertilizers typically do not apply scientific principles but rather follow their neighbors' methods and practices.

The current distribution system for petrochemical products is fragmented and disorganized. Fertilizers are brought into the country by five to ten importers, who either import mixed fertilizer or the ingredients to blend in their own plants according to their own formulas. The largest importer also has soil laboratories for testing; the other large importer uses the laboratories at the Superior Institute of Agriculture in Santiago. The importers distribute fertilizers to a combination of buyers, users and distributors. The largest importer employs about 90 distributors throughout the country. Fertilizer prices are set at the mixing plant or FOB Santiago for the distributors. At secondary and subsequent distribution points, the price is adjusted upward, depending upon the size and conditions of sale and the terms of payment or credit involved. The mark-up is sometimes unreasonably high and charges are often hidden.

Obviously, if the primary impediments to use of these agro-chemicals were removed -- such as unawareness about potential profitability or how to most effectively use them -- problems of both lack of supplies and lack of credit would soon become even more serious.

F. Credit Institutions

1. General. Credit alone will not solve the problems of the small farmers; however, the improved guidance and coordinated employment of agricultural credit is crucial to any long-term development strategy fashioned to achieve national economic and social objectives.

Exact measurements of credit allocations and users are very difficult to obtain. The following table gives breakdowns based on the best information currently available.

TABLE IV-2

ESTIMATED 1973 CREDIT TO AGRICULTURAL SECTOR
(In thousands)

Source	Crops RD$	Livestock RD$	No. Farm Units
Agricultural Bank	56,100	8,400	47
Commercial Banks	13,200	10,000	2
Investment Banks	800	3,800	.25
Dom. Dev. Foundation 1/	700	-	6
IDECOOP	1,800	300	4
Industrial Sources 2/	8,000	-	70
Rice Mills	6,000	-	3
Merchants			
Money Lenders	35,000	6,000	100
Self-Family			
None	-	-	200
Sugar Employees	-	-	23
Approximate totals	121,600 $\pm$	28,500 $\pm$	455 $\pm$

1/ Breakdown crops/livestock not available.
2/ Including but not limited to SID, LCA, Portela, Barceló and Famosa.

A recent nationwide survey disclosed that 18.1% of the farmers interviewed had solicited credit from institutional sources during 1973. Further, 17.2% reported having received credit for their farm operations. Of those receiving credit, 92.3% reported disbursements were timely and 73.8% reported the amounts received to be sufficient. This number cannot, however, be said to represent the effective demand, since those who asked can be said to have reasonably expected to have received credit. Of those who received credit, 81.4% indicated it was used for crop production and 19.1% stated they had used credit, at some time in the past, for machinery, while 10.9% had used credit for fertilizer purchases. Of the approximately 80% of farmers who did not solicit credit, a variety of reasons were given.

- Operations are self-financed.
- Located too far from credit source.
- Past rejections.
- Had delinquent loans.
- Too small to qualify.

The fourth reason above, is of considerable importance since it applies to a significant portion of the target group. As many as 70,000 farmers may have been denied credit as a result of having delinquent loans. It is difficult to absolve all of these borrowers from all past obligations but consideration should be given to a rehabilitation and workout program to make this group more viable and productive.

At the end of 1973 the total deposits in government and commercial banks were RD$452,485,397, of which agriculture's credit allocation was RD$91,200,000 or 20% of total loans and discounts. Total deposits were up by 23.64% and total loans and discounts up by 32.7% over December 31, 1972. 1/

There are eight commercial banks in the Dominican Republic, of which one is government owned. Five of these banks are financed with private foreign capital and two by private Dominican capital.

1/ Tables IV-3, 4 and 5.

The Central Bank reports RD$64,500,000 of the agricultural sector's available credit to be in the hands of the Agricultural Bank (AgBank), 2/ an autonomous Government agency. The AgBank operates 20 branches (some are classified as representational offices but operate as branches), well-distributed geographically in major production areas.

The AgBank operates with little or no direct budgetary support for operating expenses but has received substantial Government inputs in other forms in the past. In 1972, Law 347 provided for bond sales to commercial banks and others in the amount of RD$25,000,000. As this money became available, lending was increased over the second half of 1973.

Two finance companies are in operation, one funded by private Dominican capital and one by foreign and Dominican capital. Their entry into agricultural lending is recent and heavily weighted toward livestock. 3/

The Cooperative Development and Credit Institute (CDECOOP), the Dominican Development Foundation (DDF) and the Office of Community Development (ODC) have all made minor contributions to institutionalized credit for agriculture.

Commercial banks have not been required or stimulated to make loans to agriculture and have done so although they regard these loans to be the least profitable portion of their portfolios. The Central Bank has not afforded discount privileges, for any kind of lending, to commercial banks except in rare, quasi-emergency situations. Even when discounting was granted, loans of the banks were frozen at the level existing on the day discount privileges were granted. To the best knowledge of the Central Bank personnel, no agricultural loan has ever been discounted.

The commercial banking system's most significant contribution to agriculture credit came about as a result of Law 347 cited above. This permitted commercial banks to purchase bonds

2/ Tables IV-3, 4 and 5.
3/ Tables IV-3, 4 and 5

under firm guarantee and convertibility with special consideration given under the very stringent reserve requirements laws.

2. The Role of Institutional Credit. Government agencies serving agriculture, including those dealing primarily in credit, have jealously guarded their functions. The AgBank and IDECOOP maintain veterinarians, agronomists and livestock specialists, citing lack of confidence in the personnel of other agencies. The obvious duplication of effort and increased governmental costs have been largely overlooked in the past.

In the absence of an effective, overall policy on credit, agricultural credit has not supported economic and social objectives as well as it might have. It has tended to be inbred and opportunistic. Nevertheless, in the past two years the AgBank has begun to utilize SEA personnel in technical assistance for coffee lending and even more recently in cacao. Initial results are good and bode well for expanded cooperation in the future.

The small farmer normally cannot provide the collateral necessary to obtain institutional credit which would allow him to adopt practices which would increase his profits and savings. This has led to a dependence on informal and high cost credit sources such as private money lenders and intermediaries. The cost of inputs associated with improved varieties generally requires that a farmer apply for credit. Timeliness of application is of great importance and adds to the risk involved. This risk potential is often a greater inhibiting factor than any promise of profit can offset. As a result many are reluctant to change from traditional to improved practices.

Agricultural credit distributed through commercial banks, Fund for Industrial Development (FIDE) programs, finance enterprises and industry are generally accompanied by adequate technical assistance. However, these loans are few in number, the loan size is relatively large and borrowers are generally educated and adequately informed about their agricultural ventures.

Commercial banks provide virtually no small farm credit. Rather they have loaned to large, commercial farmers. A survey in late 1973 indicated no loans having been made to farmers having net worth values below RD$50,000. Real estate guarantees are common with commercial banks but, in 1973, the AgBank executed only 261 loans, with a value of RD$1,916,387 whereby real estate mortgages were taken. 1/ This represented less than one percent of total loans made by that institution. A system of crop and chattel mortgaging is needed but would perhaps have little application for the mobile subsistence farmers. The AgBank has tended to favor net worth, family or other favoring considerations and previous loan experience in preference to real estate and crop mortgages.

The length of loans varies directly with crop requirements. More than 50% of commercial bank credit has been defined as production credit with an average roll-over of two times per year. The balance has been in livestock (mostly cattle), credit and machinery. The AgBank reports 50% of total loans made in 1973 were for less than six months and more than 90% were for less than 18 months 2/, which covers all but tree crops. The AgBank reports only 1.7% of loan funds disbursed in 1973 to have been for machinery. 3/

Interest rates of institutional credit are generally low, the AgBank charging eight percent (plus one percent closing) and commercial banks charging nine percent to twelve percent per annum, depending on the source of funds. The AgBank, IDECOOP, DDF, and ODC are governed by decree, law or the requirements of special lending programs and cannot increase rates without changes in these regulations.

Great variations exist in informal credit interest rates (zero to as high as 20% per month). In order to assure markets for inputs such as seed, fertilizers, and pesticides and to guarantee adequate supplies of commodities to operate their

1/ Table IV-6.
2/ Table IV-8.
3/ Table IV-7.

facilities, rice merchants and others often charge no interest. They can recover lost interest by selling inputs above market price and by purchasing commodities below market price or by discounting against purchase price of services and inputs provided.

Most institutional loans are coupled with some form of technical assistance. Funds from external donors, generally have required technical assistance to be provided as a condition precedent to granting of subloans. This has also been true in commercial banks utilizing FIDE or AID loan funds. The cost of such technical assistance is quite high, particularly in view of low interest yields and is a serious constraint to encouraging the expansion of commercial bank lending under the present interest structure.

Commercial bank credit has not been responsive to small farmer needs. Opportunities for short-term commercial lending outstrip funding availability and such credit does not require costly technical assistance. Nor does it carry the inherent risk of weather and market uncertainties that influence agriculture in general.

Although one purpose of the AgBank is to serve the needs of small farmers, they have received less than one-half of credit available. Slightly over 93.5% of AgBank loans in 1973, were for less than RD$2,000, yet the 6.46% of loans which were above RD$2,000 used fully 52.79% of all the funds lent by AgBank in that year. 1/ The AgBank claims more than 100,000 customers but does not distinguish loans from farm units. Total farms served should probably be reduced by one-third to compensate for double cropping credit, etc. There is an offset, of course, from existing loans made in previous years for longer terms. Some bad debts are carried in the books and probably enter calculations of farms served. The AgBank does not charge off loans, even though their reserve for bad debts (RD$23,000,000) appears more than adequate to cover potential losses, an observation made by the Arthur D. Little survey team.

1/ Chart IV-3 and Table IV-10

As many as 70,000 farmers may now lack access to institutional credit solely because of non-payments of previous AgBank loans, regardless of the reason for non-payment or the amount involved. In fact, many of these are carried as bad-debts as the result of soft loans made on an emergency basis after floods or hurricanes, for which repayment should, in fact, never have been expected.

In the sector as a whole, however, demand for credit greatly exceeds the supply of institutional credit. This is magnified by the artificially-low interest rates. Many individuals who are viable and would be credit-worthy recipients of commercial bank credit seek governmental credit because of lower interest rates and lower collection pressures. This effectively denies credit to smaller borrowers. Government lending agencies also tend to favor this more credit-worthy customer since loan servicing costs of providing technical assistance and inspection are lower. The AgBank is expected to pay operating costs more as a commercial bank than a developmental bank and, understandably, is reluctant to see good risks "graduated" to commercial banks.

Credit for commercially-viable Dominican farmers is less risky than for small producers for a number of reasons. Large farmers are generally located adjacent to good roads, have trucks, machinery, and the education necessary to take advantage of new technology and inputs. The small farmer is generally not so advantaged and even if credit is advanced he may not be able to find the necessary inputs at reasonable prices or to have them delivered on a timely basis. This is even more critical for improved crop varieties since inputs of fertilizer and insecticides, if not delivered on schedule, may cause yield reductions. Thus expansion in credit to small and medium farmers must be accompanied by technical and logistical services. These are also expanding.

The foregoing factors and limitations bear most heavily on small and medium independent farmers -- those without organizational links to credit supplies who go without financing or rely on informal sources. The AgBank and commercial banks mostly attend financially-solvent borrowers in low risk categories. Few institutions serve subsistence borrowers, and for those who do, it is normally a marginal part of their portfolio.

The number of promoters of institutional credit has been relatively small. They have tended to work in areas of easiest access and have more potential customers than they can reach, rarely going into more remote areas. Lack of roads, transportation and knowledge all discourage farmers in these areas from going to the towns where institutional credit has been traditionally available.

Past rejections and experiences of relatives and neighbors influence the decision to seek credit. The fear of rejection in tightly knit rural communities, where few secrets exist, may be deterrent enough to discourage solicitation of credit. Additionally, many farmers are just too small to meet any of the usual requirements for credit, even under so called social loan programs.

The 1973 survey cited earlier indicated nearly all farmers could use additional credit. However, the majority had not set forth specific ways in which it could be utilized. Rather, they tended to say they needed and would use credit for all inputs, none of which seemed to have priority.

With appropriate inputs, technical assistance and price incentives, the productivity of many of these farms could be raised to commercially attractive levels.

3. Distribution and Patterns of Use of Agricultural Credit. Commercial banks have a fairly reasonable split between crop and livestock loans. (See Table IV-3) The AgBank is heavily skewed toward crop production. Rice lending is the major activity of the AgBank (25.8% of total loans and 41.6% of total money during 1973). 1/ No direct credit goes to rice millers who lend to farmers in cash and kind. Approximately 50% of total rice credit is provided by the AgBank, 25% by rice millers and the balance by self-financing and various other informal means.

1/ Table IV-9.

The Central Bank is the major financial institution of the nation and has substantial interest in agriculture. It is developing direct linkages with the Secretariat of Agriculture and other sector institutions to facilitate direct participation, and extends lines of credit to INESPRE, the AgBank, and other governmental agencies in the agricultural sector, as well as to private lending institutions serving the sector, such as Financiera Dominicana. Through its Fund for Industrial Development (FIDE), the Bank finances private intermediate credit institutions which serve as a source of financing for commercial enterprises. From FIDE's inception in 1966 through 1973, 713 loans totalling $66.5 million were granted through this means. In 1972, agriculture accounted for 19% and in 1973 for 22.5% of FIDE's total lending activities, a substantial increase over earlier years. FIDE programs were designed to assist large and medium sized commercial farms and have had little or no impact on small farm credit. The seven year period, 1966 through 1973, showed only 108 agricultural loans closed. None were below RD$10,000 and ranged upward to RD$600,000. None of this credit was short-term production money. Total value of the 65 loans approved in 1973 was RD$3.9 million. Four of the commercial banks, two finance companies and the AgBank participated in FIDE loan programs.

The Central Bank has taken the initiative in promoting intensive beef and pork production. With USAID concurrence, the Central Bank has arranged for the use of RD$145,000 in local currency for promotion and technical assistance in this project.

The Central Bank is partially filling the agricultural credit policy gap in the absence of aggressive action by other institutions and lack of an articulated national policy. With its broad orientation it is in a position to channel credit into some of the parts of the agricultural sector for other than production purposes -- marketing and distribution, for example. Its expanding role in the agricultural sector should facilitate needed credit expansion in some of these less traditional agricultural credit areas.

The Dominican Development Foundation (DDF) is a private non-profit organization established in 1966 with the

purpose of stimulating social and economic development in low income sectors, particularly in the rural area. The DDF is funded through donations of the Dominican private sector, external donors and loans from international agencies.

Its primary program is a revolving loan fund which is used to provide loans to groups of low income people who cannot obtain loans from normal institutional sources. Technical assistance is also provided to these groups. In 1972, a program of the DDF with three commercial banks was initiated whereby loans were granted to groups of small farmers. After one to three years of favorable experience with DDF a group is graduated to a participating bank. DDF provides technical assistance and a graduated guarantee -- 75% the first year, 50% and 25% respectively for the second and third years. After three years, the participating bank assumes all risk. Participating banks are very pleased with initial experiences and collections are good, averaging above 95%. They see their participation as having more social benefit than financial profitability. This program has potential for expansion but, to date, DDF's limited funds (RD$657,332 for agriculture in FY 1973) have made the program little more than a pilot effort.

In terms of diversity and loan numbers, the AgBank has been the primary source of small farm credit. Approximately 25% of their annual lending has been channeled through the Managed Credit Program, however, and this credit is designed for more commercially-viable producers. This is a residual program of an earlier AID loan and is probably the best loan portfolio in the Bank. It was not designed to give primary consideration to small farms but rather to increase production and it has served that purpose well.

The additional RD$25,000,000 to the AgBank from bond sales to commercial banks allowed the AgBank to increase loan totals over 1972 by some RD$12,000,000 to RD$43.3 million. The PIDAGRO program of credit began to move in late 1973, but loans formalized by the year's end were not in the amounts anticipated.

A residual AID loan program of supervised credit is jointly administered by SEA and the AgBank. This program was designed to help small farmers but few have been graduated to programs such as managed credit. Further, many loans have been granted in amounts many times greater than the target range of up to RD$300. Total loans granted (approximately 7,000) are not significant when compared to total farm units.

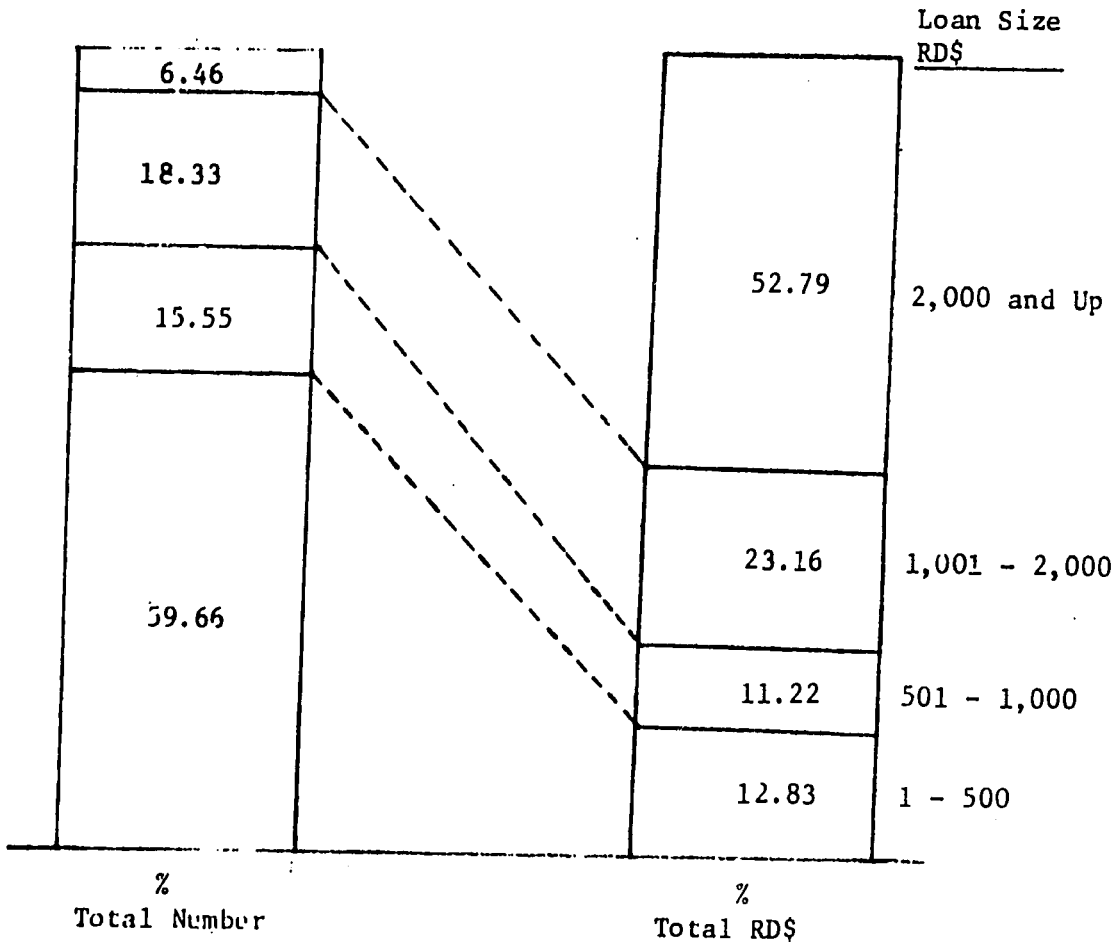
To cut administrative costs and reach greater number of farmers, SEA and AgBank are considering a program of group lending similar to that of DDF.

The primary source of cooperative credit has been IDECOOP. On October 31, 1973, IDECOOP had RD$3,615,087 outstanding in loans to cooperatives. Approximately one half of this amount was invested in production, one third in pignoration and the balance in working capital, machinery and construction loans.

CHART IV - 3

LOAN DISTRIBUTION

AGBANK - 1973



Source: AgBank Statistical Bulletin, 1973

TABLE IV - 3

Total Deposits in Financial Institutions: 1973

	Dec. 1972	Dec. 1973	% Increase
Total Deposits	365,959,284	452,485,397	23.64
Loans and Discounts	317,018,089	420,681,321	32.70
Insurance Company Investment	27,087,993	31,512,392	18.33
Savings and Loan Investment	17,201,940	22,300,000	30.00

Agriculture's share from insurance investment and from savings and loan investment is practically nil. However, Banco Nacional de la Vivienda has been anxious to enter the field of agricultural lending in production, farm improvement and rural housing.

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TABLE IV - 4

Details of credit allocation: Mid 1973

Agriculture	RD$ Value	Total % of Country Investment
Crops	69,500,000	15.8
Livestock	21,700,000	5.0
Industry	139,400,000	31.8
Construction	19,400,000	4.4
Other Productive Loans	13,500,000	3.1
Commercial	72,500,000	16.5
Miscellaneous	55,800,000	12.7
Government	14,000,000	3.2
Other Public Institutions	32,900,000	7.5
	438,700,000	100.0

Formalized or institutional credit is not limited to the above however, at least in terms of agriculture.

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TABLE IV - 5

Agriculture's Vs. Industry's Share of Total Credit

	Commercial Banks		AgBank		Financieras		Institutional Credit	
	Value	% Total	Value	% Total	Value	% Total	Value	% Total
Crops	13,200,000	3.7	56,100,000	87.0	200,000	1.0	69,500,000	15.8
Livestock	10,000,000	2.8	8,400,000	13.0	3,300,000	16.2	21,700,000	5.0
Total Agr.	23,200,000	6.5	64,500,000	100.0	3,500,000	17.2	91,200,000	20.8
Industry	126,800,000	35.8	0	0	12,600,000	61.8	139,400,000	31.8

IX-37

TABLE IV - 6

AgBank Lending Pattern

5 Year Comparison

Year	Crops	%	Livestock	%	Poultry	%	All Others	%
1969	20,613,062	73.5	4,335,285	15.5	1,481,034	5.3	1,609,969	5.8
1970	21,798,893	74.5	4,755,284	16.3	1,387,490	4.7	1,304,624	4.5
1971	22,068,243	73.3	5,049,636	16.8	1,871,062	6.2	1,114,456	3.6
1972	22,304,123	70.9	5,401,005	17.2	1,801,986	5.7	1,958,234	6.2
1973	31,173,053	71.9	8,807,253	20.3	1,864,368	4.3	1,509,765	3.5

Source: AgBank Statistical Bulletin, 1973.

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TABLE IV - 7

AgBank

Loan Breakdown by Time Increments

1973

Time (Months)	Number	% of Total	Value	% of Total
1 - 6	19,821	49.87	16,329,538	37.66
7 - 12	12,219	30.74	10,002,332	23.07
13 - 18	4,372	11.00	5,029,016	11.6
19 - 36	1,958	4.93	4,675,384	10.78
37 - 60	1,097	2.76	4,298,384	9.91
61 - 84	165	0.41	1,244,474	2.87
85 - 120	109	0.27	1,619,207	3.73
121 and More	5	0.01	155,730	0.36
	39,746		43,354,065	

Source: AgBank Statistical Bulletin, 1973.

TABLE IV - 8

AgBank

Loans by Type of Guarantee - 1973

	Number	% of Total	Value	% of Total
Signature	39,422	99.18	40,540,425	93.51
Real Estate	261	0.66	1,916,287	4.42
Other	63	0.14	897,253	2.07

Source: AgBank Statistical Bulletin, 1973.

TABLE IV - 9

AgBank - 1973

Lending Activity	Number	%	Value	%
All Crops	34,472	86.73	30,702,801	70.82
All Livestock	3,478	8.75	7,580,512	17.50
All Poultry	192	0.48	1,878,189	4.30
All Bees	48	0.12	165,352	0.40
All Other	1,556	3.92	3,027,211	6.98
Total	39,746		43,354,065	
Rice	10,248	25.8	18,033,299	41.6
Tobacco	3,740	9.4	2,783,987	6.4
Coffee	4,805	12.1	1,795,250	4.1
Plátano	1,201	3.0	832,345	1.9
Beans	2,824	7.1	823,265	1.9
Cacao	1,337	3.4	652,170	1.5
Corn	2,011	5.1	572,568	1.3
Peanuts	3,221	8.1	469,911	1.0
Yautía	1,139	2.9	431,286	1.0
All Other	3,946	9.9	4,308,720	9.9
Sub-Total	34,472	86.7	30,702,801	70.8
Dairy	764	1.9	3,203,706	7.4
Beef	1,366	3.4	3,294,467	7.6
Swine	1,106	2.8	663,094	1.5
All Other	242	0.6	419,245	1.0
Sub-Total	3,478	8.8	7,580,512	17.5
Poultry	192	0.5	1,878,189	4.3
Bees	48	0.1	165,352	0.4
All Other	1,556	3.9	3,027,211	7.0
Grand Total	39,746	100.0	43,354,065	100.0

Source: AgBank Statistical Bulletin, 1973.

TABLE IV - 10

AgBank - 1973

Loan Distribution

LOAN SIZE	NUMBER	%	AMOUNT RD$	%
1 - 500	23,712	59.66	5,562,936	12.83
501 - 1,000	6,182	15.55	4,863,322	11.22
1,001-2,000	7,285	18.33	10,043,106	23.16
2,001-5,000	1,640	4.12	5,317,719	12.26
5,001-10,000	551	1.39	3,983,515	9.19
10,001-50,000	321	.81	5,830,422	13.45
50,001&Up	55	.14	7,753,045	17.88

Source: AgBank Statistical Bulletin, 1973.

G. Agricultural Sector Institutions

The form and structure of the present set of agritural institutions were developed largely after 1961, as the Dominican Republic attempted to respond to the needs of its much neglected and most important sector. These include:

1. Public Institutions

a. The Secretariat of State for Agriculture (SEA) is legally charged with formulating and directing the agricultural policy of the country, administration of essential components of modern agriculture, and coordination with associated decentralized agencies on virtually all aspects of the agricultural sector.

The most important working components of the Secretariat are the Sub-Secretary groupings of Production and Marketing, Research and Extension, the Livestock Department, and lately the Office of Estimates and Forecasts (Statistics) and the Office of Planning, Evaluation and Coordination. The Secretariat's primary focal points of activity and physical facilities include the National Agricultural Investigation and Training Center (CNIA) and seven regional research and extension stations with their substations. It performs essential services -- research, extension, statistics, and distribution of seed and plant material and employs 2,199 of the approximately 6,000 public sector employees in agriculture. Of these 1,597 are in administrative and support roles, and 602 are classified as technicians while 254 have university training.

Despite problems of low qualifications of middle and lower level technicians, lack of field experience, and too large a number of non-professional positions, the Secretariat is asserting increasing leadership in the sector. Under the present Secretary, SEA has accelerated the professionalization process and service orientation. Qualified professionals have been placed in many key positions and improved coordination is evident within SEA and between sector institutions.

By law, the Secretariat of Agriculture should forward annual budget requests of all agriculture sector institutions to the National Budget Office, where the final budget is prepared. Subsequent requests for disbursements are to be similarly forwarded to the Secretary of State for Finance through the Secretariat, who in addition must approve individual expenditures made against those disbursements. This mechanism gives the Secretariat theoretical control over both the programs for which funds are budgeted and over actual expenditures. In practice, the control has not been effective. Until recently the Secretariat has lacked the staff to analyze programs effectively. Its authority to enforce its role has not been decisively affirmed. Its capacity to exercise such role is improving with the significant upgrading of the professional competence of SEA personnel and the appointment of a highly-qualified and able Secretary.

The decentralized institutions and the Secretariat all have capital resources available which do not appear in the National Budget and can be spent on the authority of the head of the institution. The Price Stabilization Institute (INESPRE) requires little of the National Budget since it is able to employ profit from commodity sales. The Agrarian Reform Institute (IAD), the Institute for Cooperative Credit (IDECOOP), the Hydraulic Resources Institute (INDRHI), and the AgBank have had residual funds from AID generated local currency or development loans to spend at their discretion. These represent considerable resources.

Expenditures for agricultural purposes made from the President's Special Fund may be channeled through a decentralized institution or may go directly to a private contractor without reference to the SEA.

In effect, the opportunity for the Secretariat of Agriculture to influence the nature of public investment in the agricultural sector through fiscal controls has been limited by the past weakness of its policy formulation and planning mechanism and by the unwieldy volume of transactions which the Secretary himself must approve and sign.

SEA has a core group of capable technicians who carry out problem-oriented research. The leadership of this group is composed mainly of USAID-sponsored, university level participants, many of whom were trained at Texas A&M University. There are about 170 graduate agriculturalists in the country, about fourteen times as many as nine years ago.

Agriculturalists are now being trained in Dominican universities and high-schools. Including veterinarians, these will total 320 graduates in 1973 and 1974. From this pool and from returning graduates of foreign universities, the Secretariat is obtaining improved professional staff and increasing the number of extensionists relative to other personnel. The process is being encouraged by the Integrated Program for Development of Agriculture (PIDAGRO) loan. But more support will be required if adequate numbers of farmers are to have access to adequate technical assistance. Coordinating extension activities with university participation and activities of commercial firms is now being actively pursued.

b. The Agrarian Reform Institute (IAD) is a semi-autonomous agency with a broad set of responsibilities and powers related to agrarian reform. In administrating some 150 agrarian reform projects, IAD undertakes public works, irrigation, extension and credit functions. It has approximately 450 permanent employees in Santo Domingo and 250 distributed throughout the country. In addition, 818 provisional employees appeared on the rolls in 1972, the bulk of which were outside Santo Domingo.

The present agrarian reform model, as it operates, has institutionalized the dependency of the farmer on IAD. Few farmers have received firm land titles and are therefore dependent on IAD for credit, inputs and sometimes, living expenses. The administrative and financial burden placed on this organization is beyond its efficient capacity with no relief in sight, as the number of people and projects continues to mount. Since 1962, the agrarian reform program has provided land to 35,000 families and another 10,000 settlements are projected for 1974. Settlement involves conditional sale contracts, but with no guarantee that title will ever be granted. Nevertheless, the program is popular among landless campesinos. At last count, IAD had 57,000 names on the waiting list.

c. The Institute of Development and Cooperative Credit (IDECOOP) is an autonomous agency which was formed to administer cooperative activities in the Dominican Republic. IDECOOP presently serves 236 cooperatives of which 46 are agriculturally-oriented. Total cooperative membership is about 53,000, including the 8,000 members in the agricultural cooperatives. IDECOOP's major activities have been in agriculture, however, since major credit assistance has been available for that purpose.

Total employees in IDECOOP and its eight regional offices number 250, of which 16 can be classified as professionally-trained agriculturalists. Additionally, IDECOOP receives technical assistance from SEA which assigns some personnel to IDECOOP's regional offices. Even though major improvements have been made in IDECOOP's organizational structure over the past two years, it still lacks sufficient operating funds, policy guidance and personnel to be an effective promoter of the cooperative movement. The December 1973 SEA survey showed a positive response to cooperative membership, with 57% of respondents indicating a desire to belong to a cooperative.

IDECOOP has depended on the USAID and more recently on IDB for program financing. Its operational budget comes directly from the GODR. A serious lack of trained personnel has been somewhat overcome by a series of in-country training programs, started in 1972 and financed by the USAID under Loan 517-L-020.

Although IDECOOP lists 8,000 members in the 46 agricultural cooperatives, perhaps 20 of these cooperatives have achieved viability. Further, rarely are as many as half of the members of any cooperative on the active roles. In terms of technical assistance and credit, the cost of cooperative development in the Dominican Republic is very high.

Many cooperatives have been formed over the years to take advantage of special lending programs -- only to fail as a result of poor management. This has hurt both the cooperative movement and the credit environment in selected areas and the country as a whole.

No more than five cooperative managers in the system have had formal training beyond high school. For this reason, IDECOOP often assigns its employees to serve in management roles. Such Government employees do not gain any direct benefit from profitable operations of the cooperative and cannot be expected to take more than a moderate interest in the management of the cooperative.

Ongoing training programs within IDECOOP and the National University Pedro Henriquez Ureña (UNPHU) are providing an opportunity for upgrading management, but progress will take time. Cooperative members seldom are willing to pay the cost of adequate management, especially in view of their own low incomes.

d. The Price Stabilization Institute (INESPRE) assumed the price stabilization functions of the AgBank in 1969. Its basic mandate is to assure fair prices to consumers and producers in basic commodities. It has an authorized capital of RD$25.0 million and employs approximately 200 operational, administrative and management personnel.

The Institute has the physical capacity to dry, grade, store and maintain nearly 800,000 cwt. of paddy rice (about two months supply), 850,000 cwt. of corn (about four months supply), and 270,000 cwt. of beans (about two months supply). This capacity is being expanded by construction of four silos in key rice areas. Off-loading facilities for imported grains are being planned.

Initial operating capital and funding for construction of primary facilities were USAID-sponsored. The Institute has proven its financial viability and has become a significant factor in the internal market. Common to nearly all Dominican agricultural institutions there is a lack of coordinated policy orientation. To resolve this problem, the Institute has developed departments of marketing and special studies and has received foreign technical assistance and initiated some market investigation work. Since this function has been carried forward separate from activities of other institutions and because the private sector is somewhat suspicious of INESPRE's intentions in marketing, given its intervention in private commerce and trade,

efforts to set incentive and commodity prices may have caused conflicts. In 1973, INESPRE imported 31,200 MT of rice, 54,450 MT of corn, and 11,170 MT of beans to assure adequate supplies and to stabilize domestic prices for these commodities. By such operation INESPRE was moderately influential in holding prices to consumers down. In contrast, there are some indications which suggest that its domestic operations in the rice market may have depressed production by cutting producers off from capital resources of the mills.

There is some criticism that INESPRE's actions are unpredictable, e.g., sudden interventions in major commodity markets and unanticipated price announcements. To some extent its actions may have increased uncertainties, rather than reduced them, if only because this was the perception of those in the market.

The Dominican Republic also has a price control policy, applying to commodities identified as of prime necessity, operated by a separate agency under the Director of Price Control. The two policies are theoretically coordinated through a technical commission, but ultimate decisions in each case lie with the separate agencies. Items listed for price control change rather frequently and normally are not predictable. Activities of the Price Control Agency and INESPRE to some extent may conflict.

Substantial variations in seasonal prices exist for many commodities. Yet dry storage and refrigerated storage in the country is not fully utilized. It is not certain to what extent this is caused by uncertainty over government stabilization or price control activities.

e. The State Sugar Council (CEA) is a wholly government owned enterprise which administers over 640,000 acres of sugar land and all 12 government sugar mills. As such, its importance to the country's economy is paramount. CEA was formed by Law 7 in 1966 to produce sugar and sugar by-products. Its RD$50,000,000 annual payroll also gives it unparalleled importance as an employer. CEA employs as many as 80,000 people during the year. Living permanently on the plantations are 15,000 employees and, at harvest time 40,000 cutters, mainly Haitian, are employed.

Industrial employees number 25,000, part of whom are seasonal. CEA's significance and efficiency as a profitable enterprise has grown as the world demand for sugar has risen.

As a dominant enterprise, CEA has single-mindedly pursued its goal of sugar production. It is regarded as somewhat less efficient than its principal private sector competitor, La Romana Corporation (Gulf & Western). Modernization efforts have until recently been slow. Nevertheless, between 1969 and 1972, it improved its efficiency by almost one-quarter. It has formed expanded cane areas rather than concentrating on increasing unit efficiency as a means of rapidly expanding total production.

f. The Dominican Center for the Promotion of Exports (CEDOPEX) was created by Decree 137 in April 1971, and in September 1972 became the single agency responsible for seeking foreign markets and servicing the export industry.

With the Dominican Exporters Association (ADOEXPO), a private group, CEDOPEX has begun publication of a professional magazine to provide general information on export opportunities. It has established a technical reference library on markets, prices, grades and standards for the use of exporters and planners. CEDOPEX also publishes up-to-date export data.

The consensus is that the organization, although relatively new, has performed well, with a good potential as an effective export promoter, especially if linked to an effective crop and market information system.

g. The Hydraulic Resources Institute (INDRHI) manages over 110 irrigation systems and, with its 635 employees, maintains nearly complete management responsibility for all systems. Recommendations that water users associations be formed to assume these responsibilities have not been acted upon.

The Board of Directors of INDRHI consists of the Secretary of Agriculture as President, the heads of the Planning Board, IAD and AgBank and three private sector representatives. This representation has improved coordination among agricultural agencies.

Coordinated distribution of irrigation water is vital to the continued growth of agriculture. The President has recognized this and given it top priority in the Government's assistance to the sector. Several problems will have to be solved, however, if the needs are to be met. The utilization of water at the field level must be improved and the projects and programs of INDRHI must be even more closely coordinated with other agricultural efforts and priorities.

2. Semi-Private and Private Institutions

a. Santiago Development Association and the Superior Institute of Agriculture. A group of private sector individuals interested in promoting economic development, particularly in the Cibao, organized the Santiago Development Association in 1962. Since 1965, the Association has gained support from the Ford Foundation, OAS, USAID, and, more recently, FAO. Its most notable achievement to date has been the establishment and development of the Superior Institute of Agriculture (ISA) into a competent agricultural secondary school and two-year agricultural college.

The school's physical plant and faculty along with research and extension capabilities are being used in coordination with the Secretariat of Agriculture and FAO to promote crop diversification in the Cibao. Early graduates of ISA who subsequently attended U.S. universities are employed now as faculty and staff members. ISA has become an institution of great potential influence in the Cibao.

b. Commercial. With the growth in competence of technicians available to the public sector, contact between the Government's agricultural technicians and private commercial interests has increased. The poultry industry relied heavily upon the Secretariat for guidance in its development and the same is apparent for the beef industry as it expands. CEDOPEX is attracting more interest from the private sector as its technical capacity and services are extended. The present policy of the Secretariat of Agriculture is to engender closer cooperation with the private sector in stimulating production and the spread of technology to small farmers. The result has been a rapid growth

in the number of small farmers producing under contracts with processing firms sometimes under the auspices of public agencies such as IAD,

There has been significant expansion of private investment in a wide range of physical facilities serving agriculture (such as milk processing, transportation, vegetable oil and fruit and vegetable processing). In addition, many private companies have increased their interest and participation in all phases of production and marketing of specific products. The two vegetable oil companies, for example, provide some credit, improved seed, technical assistance, land preparation, and other services to contract producers. Companies producing soap, milk products, canned fruits, juices, tomatoes and tobacco products are similarly involved with their producers. Participation by the private sector has increased rapidly as confidence in long-term stability has grown and as Government policies have become more conducive to increased private investment. The number of farmers under these arrangements is estimated at 70,000.

Most processing industries are operating well below optimum capacity. The problem is to increase production, to use facilities more efficiently and reduce unit costs.

On the other hand, the notable lack of private response to expanding distribution and marketing of agricultural inputs is recognized as a serious constraint to development. Input suppliers are reaching small and medium producers only marginally. In significant measure this occurs because of insufficient credit and lack of technical services to small producers.

3. Other Sector Services

a. Research

Agricultural research is conducted at 22 locations throughout the country by 32 post-graduate, 94 university-trained and 76 medium level researchers. These efforts involve seven institutions: SEA, INDRHI, Autonomous University of Santo Domingo (UASD), Catholic University Madre y Maestra (UCMM),

CEA, Loyola Polytechnic Institute and the Gulf and Western Corporation. Of the 22 locations, 15 are run by dependencies of SEA.

Although RD$1,833,000 are allocated to research efforts, budgetary uncertainties tend to choke off funds when and where needed, except when international lending institutions are involved. Moreover, about RD$900,000 of these funds are spent by CEA and Gulf and Western Corporation.

The Director of the National Agricultural Research and Training Center in his report on this subject noted the following problems regarding research activities:

(1) Research organizations operate without specific budget allocations.

(2) The integration of research and extension is poor.

(3) No mechanism exists for programming research funds according to national policy.

(4) The proliferation of agencies dedicated to research has resulted in a fragmentation of effort and resources.

To the foregoing problems might be added (a) less than functional integration of Dominican research efforts with international networks to take advantage of research already accomplished outside the country and (b) lack of a plan for constant improvement of the capabilities and preparation of researchers.

The National Committee for Agricultural Research was formed by decree in June 1972. It is composed of key officials with interests and responsibilities in research and headed by the SEA's Sub-Secretary for Research and Extension. Associate members are included from CEA, all universities and other interested organizations. The Committee reviews research

programs but has no budgetary control. Its major responsibility is to compile, classify and file research results at CNIA, publish an annual research report and give awards for significant research contributions. The Committee lacks the necessary budgetary controls and policy formulation functions to effectively apportion research responsibilities and guide overall efforts.

b. Extension

At least six organizations are presently engaged in extension activities of various kinds.

The SEA Extension Department accounts for most of the personnel engaged in such activities. Its 23 offices have 175 employees, 39 of whom are university graduates. The department has 77 middle level technicians (high school agronomists) and 59 administrative personnel. Nearly all of the university graduates have less than one year of experience in the field but all have had some training in extension methodology, farming techniques, credit use and farm planning.

At the middle level, 69% have had at least one course in extension methodology. The remainder are being evaluated as to their suitability for further training or selection for other work. DDF has 22 extension and promotion personnel in the field with an average of five years of experience in extension and loan supervision. IDECOOP has eight technicians whose primary occupation is loan evaluation. ODC has a number of extension personnel whose work is not integrated or technically supervised. IAD's project managers engage in some minor extension work but are mainly concerned with project administration details.

Assuming a maximum of 200 extensionists from all institutions and enterprises, the outreach capability of this uncoordinated extension system is severely limited. If extensionists deal only with individual farms (as most have in the past) each would have to maintain contact with 2,250 farm units. Lack of financial support, vehicles, and materials has hampered outreach efforts to a point where this is clearly impossible, even if all extension activities were coordinated to avoid duplication and conflicts.

The most obvious means to achieve greater outreach capability is to increase the number of extensionists in the system and to develop ways in which their influence can be expanded beyond face-to-face contact with individual farmers. This is an objective under PIDAGRO whereby 45 additional personnel in SEA are planned. But greater numbers also mean bringing in and training inexperienced personnel, providing more vehicles and more materials and requiring higher overhead.

It is doubtful therefore that the financial and human resources can be joined to meet all extension requirements under present operational patterns. At a minimum, consolidation of nearly all extensionists under one administrative grouping and doubling the total number should be considered.

Other means of improving outreach should also be emphasized. One tactic is to provide extension services to groups of farmers as the DDF has done successfully. This tactic is being tried by SEA at present and holds promise of success.

Two major means have been only marginally employed to achieve greater outreach: the radio network and commercial agricultural input suppliers. The potential utility of these resources is obvious. Farmers depend on the radio for entertainment and news and place a good deal of credence in what they hear, be it correct or mistaken. Radios are cheap and ubiquitous. Nearly all Dominicans have access to them. A well-planned radio extension program for each region and subregion could go far toward reducing extension costs and supplying farmers the technical and economic information they need to improve practices and make decisions. Information on the market situation, credit programs, family planning, health, nutrition and home economics could be added in ways beneficial to the entire population.

Input suppliers have a direct, profit-oriented interest in promoting the efficient use of their products. Heretofore their interest has been concentrated on large commercial farms and governmental agencies engaged in agriculture. Small and medium independent farms have lacked either the knowledge or the financial means to purchase inputs.

Some in Government have considered certain input suppliers more as predators who must be controlled, rather than as sources for cooperative endeavor in technical training and educational activities. With Government incentives, the input suppliers could become influential change agents and modernizers through sales operations such as advertising and demonstrations aimed at the great mass of Dominican farmers. Promotion of such programs is under consideration.

There is the obvious proposal to put more financial resources in the hands of small and medium farmers and adapt some simple credit procedures to assure payment to suppliers for input purchases. Another program, suggested by SEA, is for the GODR to train input salesmen in extension subject matter and techniques.

Direct extension by institutional agents is probably the most expensive outreach method. While certainly necessary and worthy of support, this method cannot be truly effective without supplemental systems, such as those described above, which can be developed at very low cost to the Government.

Specific recommendations applicable to SEA's extension service and contained in its sectoral assessment include:

(1) Integrate the Departments of Research, Extension and Training to facilitate problem oriented interchange.

(2) Provide in-service training [illegible]echnicians in specific crops and products.

(3) Improve delineation of responsibilit[illegible]

(4) Develop more precise extension policies.

(5) Improve supply of vehicles, equipment and materials to the extension program.

(6) Improve the quality of SEA's competence in extension activities to a point where its leadership will be readily accepted by IAD, ODC, DDF, etc.

Eventually, SEA could assume full control of all official Government extension with the other organizations depending on SEA to provide services in accordance with their needs. This would imply placing all extension personnel under the Department of Research and Extension in SEA, in order to permit logical programming and execution of activities, and to have SEA exercise technical supervision.

c. Marketing and Processing

In this sector assessment, marketing, processing and transportation are considered part of the agricultural "system" -- that is, of a continuous spectrum from the decision to produce to the final disposition of the product to the consumer.

Except for a very few export commodities (sugar, coffee, tobacco, and cacao) the marketing of Dominican agricultural products is the factor of greatest continuous uncertainty and risk. All farmers anticipate favorable and unfavorable climatic conditions. Needed credit may arrive late and inputs are likely to be scarce. But they can never fully anticipate or cope with the influences that the marketing matrix brings to bear. In the face of this uncertainty, cropping patterns tend to become static, with farmers depending from year to year on crops they know will yield a minimum return or can be consumed directly by the farm family. The tendency to shun opportunities to profit by investment in technological improvement is reinforced by years of experience with unsatisfactorily low farm prices and, perhaps more importantly, being unable to estimate rationally what the market price of a product will be at the time of harvest.

Low farm prices do not necessarily translate into low consumer prices, however. The fact of scarcity intervenes to produce the opposite effect. The marginal profit of the middle man has been considerable. Many commodities are ridiculously inexpensive during brief periods of peak production -- only to be unavailable or prohibitively expensive during the off season. Sufficient quantities of some commodities -- meat, fish and eggs, for example -- are generally priced beyond the reach of most of the population year-round. This results in heavy dependency on plantains, tubers, rice and cereal grain products by the great

majority of the population.

At present, nearly half of the Dominican population resides in urban areas -- about a fourth in the two largest cities. Those urban residents spend forty to fifty percent of their total available incomes for food and as much as half of that is absorbed in market channels. Thus, the market system performance is important to urban consumers as well as to rural consumers and producers.

The population residing in rural areas is fairly specialized by region of production. What is more, while all farmers produce food for home consumption, during a good part of the year they also depend upon local retailers to supply some of their basic food needs.

At present, the food assembly and distribution system serving both urban and rural consumers is a highly fragmented, complex, and poorly coordinated ad-hoc system of truckers, processors, several levels of wholesalers, and several types of retailers. The thousands of producers sell to independent truckers who in turn sell to a large number of wholesalers. In many cases, several layers of intermediaries lie between the farmer and retailer. Thousands of small retailers, usually within walking distance of the consumers, serve as the final link in the marketing channel. The consequence of this complex organization of completely independent farmers and businessmen with limited marketing knowledge and skills, is a very thin market. Prices are highly variable and uncertain.

The Secretariat of Agriculture collects wholesale and retail market price data and quantities on 90 products from municipal markets in five cities. While the data are published in newspapers, they are not in a form easily used by producers or the trade. Little analysis or research use has been made of these data. No market news is transmitted by radio.

Marketing channels and practices vary depending on the type of product:

(1) Industrial or Export Crops (such as sugar, peanut, cacao, coffee, processing tomatoes). This market segment usually reflects the highest degree of coordination, planning and economic performance. Coordination is imposed either by export market requirements or by large scale buyers for processing. The Government has additionally intervened to require a public bidding procedure for sugar. Market prices are determined by world (or U.S.) market. Market prices of these items entering the domestic market are stable.

(2) Specialty Export Crops (such as fruits and processed fruit products, cucumbers, eggplant, okra, peppers, yucca). Such products usually face a somewhat unstable export market and continued sales are highly dependent on level of prices in export markets. In many cases Dominican markets are thin and internal sales opportunities are quite limited.

(3) Cereal Products (such as rice, beans, corn, sorghum). Market channels usually include local grain assembly buyers, millers or feed processors. Distribution for human food products is through a system of large scale wholesalers who resell to smaller scale wholesaler-retailers for distribution to small retailers.

(4) Beef and Pork. Market channels include live animal buyers at the farm and live animal intermediaries who have the animals custom slaughtered in public slaughterhouses. Some animals are sold to private slaughterhouses and meat processors who process the meat and distribute through supermarkets, small food stands (colmados), or specialized meat stores.

(5) Poultry and Eggs. Production is increasingly concentrated in the hands of relatively few large producers who market through supermarkets, "colmados" and market plaza distributors (in the case of eggs). Small amounts of live poultry are still marketed in public market plazas throughout the country.

(6) Tubers, Plantains, Bananas, Vegetables, and Fruits. Market channels are a system of independent truckers who usually buy on their own account or lease their transport services to an intermediary who purchases at or on a road near the farm.

Occasionally, farmers pay for transport services and go along to the market to sell their products or pay the trucker a combined transport and marketing commission to sell their products for them. The trucker tries to sell his product as quickly as possible (usually in three to four hours) to a wholesaler who is willing to stay in the market all day -- every day. Some argue that elimination of such intermediaries will automatically reduce marketing costs. That is not always true. Each case must be analyzed individually. In the case where wholesalers buy from truckers it may be less costly for the wholesaler to pay the truckers a small margin for their time than to pay the opportunity cost of an expensive vehicle sitting idle as well as the time of the driver and his assistant.

(7) Milk. Market channels are diverse. Four milk pasteurizing plants purchase about 15% of the nation's milk supply for pasteurization and distribution through home delivery and retail stores. Large numbers of independent intermediaries purchase raw milk directly from producers and distribute to urban households. Two or three large milk manufacturing plants purchase milk directly from farmers to produce and distribute powdered milk, cheese, butter and ice cream. Finally, small cottage industries (especially in small rural communities) buy milk from farmers to be processed into cheese and butter, or farmers themselves produce those products for local sales through public market stalls or retail stores.

Thus, except for industrial and export crops where large processors assemble supplies, the rural assemblers or small millers are the producers' main link to the marketing system. In some cases, these buyers enjoy near monopoly power. For the most part, they operate without benefit of market information or analysis, and so are not able to provide much assurance to either suppliers or to buyers. This contributes to the problem of poor coordination. Each purchase must be individually inspected and negotiated -- which consumes a lot of managerial time. Management practices thus remain traditional.

The few supermarkets in the large cities appear to overcome some of these problems, but that really is not the case. The high margins the wealthy are willing to pay on luxury

items cover the inefficiencies of the management scramble to obtain supplies from hundreds of wholesalers. Retailers should be able to depend upon a limited number of wholesalers who can supply them regularly with good quality merchandise and service at low margins and high volumes.

d. Transportation

The transportation system in the internal market is basically a highway vehicle system. There are three aspects of the system; first, the infrastructure, i.e., the adequacy of penetration roads, highways and streets; second, the operating equipment, i.e., the types of vehicles available and related problems; and finally, the institutional arrangements for operating the vehicles to deliver efficient transport services.

The country appears to have a reasonably good and in some cases very good major highway system linking major cities. Secondary roads linking other towns to major highways are not well maintained. Furthermore, there are obvious places where secondary roads are needed. Perhaps the greatest need is for additional penetration roads and improved maintenance. There are several productive agricultural areas that are not a part of the economy for lack of roads. Also urban streets in many secondary cities are in very poor condition. In some cases vehicles are unable to travel at more than 10 miles per hour due to very deep holes in the pavement.

The northwest, southwest and frontier regions are particularly affected by lack of roads but the problem exists throughout the entire country where farms are separated from major highway networks. There is little data on the magnitude of the problem as it applies to all farms. In 1973 cacao farmers classified 38.1 percent of the roads to their plantations as "bad or unserviceable" in response to a survey question. Only 18.3 percent stated that the roads were in good condition. Only 31.7 percent used motor vehicles to transport the commodity to market, indicating both bad roads and low economic status.

For perishable commodities a mule trip to market reduces quality and the price the farmer is able to command in the market. It can also result in significant wastage. The costs to some producers resulting from poor quality, waste and time in transit to and from markets are obviously high enough to discourage all but the most traditional, non-perishable commodities for the market.

The Penetration Roads (Caminos Vecinales) Division of the Secretariat of Public Works has developed a minimum feeder road program in recent years. Construction is capital-intensive and the roads are perhaps of better quality than actually required. Costs are about RD$15,000 per kilometer. Informal sources indicate that there are about 17,000 kilometers of construction already approved by the Executive Authority or RD$2.5 million worth of construction projects pending. However, the Caminos Vecinales operational budget is only RD$100,000 per month and the period between submission of a request and initiation of projects is long indeed. To add to the problem, there is no formal system or budget for maintenance. Most roads are constantly in need of repair and many require extensive rehabilitation. Complicating matters still further, no Government agency has reliable data on the physical magnitude of the problem.

There is little basis to evaluate the adequacy of the truck fleet in relation to food transportation needs. But repair parts are very difficult to obtain -- and the efficiency of the transport system is consequently impaired. Obviously the country cannot continue to depend on the small automobiles in its público system as the principal form of passenger transportation. It should be possible to operate buses for about a fifth the cost of automobiles. More privately or government-owned bus systems for rural and urban areas would improve mobility of low income people who can least afford público travel. It should give them access to additional market facilities making it possible for them to shop at more distant markets or stores when economically advantageous. Regularly scheduled bus service in rural areas connecting towns and cities would make it possible for retailers to travel more economically to and from their supply points.

V. REVIEW OF PERFORMANCE IN THE AGRICULTURE SECTOR

A. In Relation to the Total Economy

Agriculture's contribution to the Dominican economy has been declining in relative terms with the development of highly-protected industries dependent on imported raw materials and heavy capital investment. The rise of ferro-nickel production alone has served to reduce agriculture's relative contribution to the economy. Tourism, if promoted and developed to its full potential will further reduce the percentage of GNP received from the agricultural sector. Nevertheless, the country will continue to look to agriculture as the largest single driving force in the economy as demands for agricultural products increase dramatically in real terms, to feed a growing and increasingly urban population and to provide more domestically produced raw materials for industry.

1. Gross Domestic Product

Agriculture's share of GDP has fallen from 25.3% in 1966 to 21.1% in 1972. During the same period the value of production increased from RD$253.8 to RD$335.5 million, an average annual compound increase of 4.70%, i.e., somewhat better than population growth. The most rapid increases (5.70%) have occurred since 1969, as shown in the Central Bank figures below (constant 1962 prices):

TABLE V - 1

Year	GDP (Millions)	Ag. Sector	%	GDP Per Capita Total	GDP Per Capita Ag. & Mining
1966	1,001.2	253.8	25.3	276	73
1967	1,035.0	252.9	24.4	278	72
1968	1,040.4	255.0	24.5	271	70
1969	1,167.1	283.7	24.3	295	76
1970	1,286.6	301.2	23.4	312	77
1971	1,413.9	318.0	22.5	332	79
1972	1,591.3	335.5	21.1	363	91

The national average per capita GDP of RD$363 rests on a wide disparity between industrial versus agricultural productivity per worker and on extensive underemployment in agriculture. In 1970 the economically active farm worker produced RD$739.57 worth of goods while the industrial worker's output was pegged at RD$2,403.10. Government policies designed to establish an industrial base, which has tended to be capital intensive, and the expansion of the monetized commercial sector in part to service the rapid growth of industry are the principle causes of this disparity. Most farm units are non-monetized and have an excess of under-utilized, unskilled labor. Capital is more scarce in agriculture than in other sectors, further depressing productivity.

The process of industrialization will continue, but possibly at a slower pace. New extractive mining operations will likely be initiated. Agriculture's share of GNP can, therefore, be expected to drop further in relative terms over the years. In real terms, however, agriculture's absolute contribution must rise at an accelerated rate if other sectors are not to be impeded or disrupted for lack of raw materials and if the nutritional requirements of an expanding population are to be met.

Targets for increasing per capita productivity among the active labor force in the agricultural sector must take into account the fact that progress claimed in this area between 1960 and 1970 has been based largely on an artificial reduction in the economically-active rural population. Ages 10-14 were included in that category in 1960 when the labor force was estimated at 504,000. But they were not included in 1970 when the figure was placed at 407,000. The best available 1973 figure (from the United Nations) places the number at 595,000. These workers provide income for some 2,800,000 rural inhabitants. On the basis of an aggregate goal of eight percent per annum production increases to be maintained for the seven year period 1974-1980, agricultural output could increase by 70%. Assuming a more equitable price structure and higher employment levels in the rural area, additional increments could be achieved to nearly double rural incomes. Because per capita farm income in 1973 was only about a fourth of the

national average, it is apparent that it will take a considerable period to raise farm income to levels comparable to that of most other workers today. Although there are no conclusive data on migration from rural to urban areas, the population growth of urban centers relative to rural areas indicate that it is substantial. However, since rural fecundity is higher than urban, the rural population will continue to grow in real terms for some time to come. The burden placed on the economically active rural population will continue to grow, (although the number or economically active residents may remain static) due to the relatively greater number of dependents, children, and elderly people being added to the population.

2. Per Capita Income and Distribution

As noted above, per capita incomes in the rural sector are perhaps as low as one-fourth of those outside that sector. Rural income is also maldistributed, judging from the imbalance in farm sizes, educational levels and productivity per worker in the sector. It would be possible to double, in real terms, per capita income in the rural sector by 1980 and achieve more equitable distribution through relative concentration of assets on currently less favored groups. During that period it is assumed that incomes for other sectors will also rise, but perhaps not quite as rapidly as in rural areas. Thus there will still be a marked disparity favoring the urban over the rural worker.

Among farm people, hired labor is the least well off economically. A hired worker earns between RD$300 and RD$500 per year, according to estimates of the National Planning Office. Small farm operators earn somewhat more but generally still not enough to meet basic living requirements. Economically active people in the rural areas turned out an average of RD$739.57 in goods and services in 1970, according to the National Census. This compared to industrial productivity of RD$2,403 indicates the wide disparity in productivity and probably income -- 65% lower for rural than for industrial workers. This situation is explained at least in part by the fact that almost 60% of the farms in the country are two hectares or less. The economic and social importance of this

becomes more meaningful when one considers that each farm unit must provide a living for families of from five to ten persons. At present levels of production and income the difficulties of incorporating this group of farmers into the economy are apparent. If population continues to grow, much increased productivity will be eaten up in maintenance of the present level of living of the lower strata of the rural population.

The sector's past programs have not seriously addressed income distribution problems. However, data is being developed by SEA to define the parameters of the problem and to facilitate the formulation of programs aimed at more equitable income distribution.

3. Agriculture Exports

In the composition of Dominican exports, agricultural commodities accounted for 70.1% in 1973, down from 89.6% in 1960. In the same period, minerals rose from 5.2% to 22.8%. However, exports of products originating in agriculture have risen steadily in value since 1968. Sugar has led the way in this increase and non-traditional exports have shown great promise as the country learns to deal in export markets. As production expands incrementally, export markets have a definite role in keeping prices up and earning foreign exchange to pay for imports. Moreover, while mining, manufacturing and tourism can be expected in time to reduce pressure on the agriculture sector to earn foreign exchange, the country still faces a serious balance of payments problem steming from the increasing prices for petrochemicals, fertilizers and manufactures needed for a rapidly growing economy. Also, the recent scarcities and dramatically increased costs of fossil fuel products has tightened further the balance of payments straits of the government.

The current policy regarding agricultural exports will probably remain in effect. Simply stated, it is to export as much as possible consistent with satisfying internal demand. Under the conditions of growing population and expanding production rapidly through relatively heavy investments in agriculture, the country will be able to continue

expanding exports, though at a rate somewhat lower than it expands production. The value of agricultural exports (crude and processed) required by 1980 will be in the neighborhood of RD$600 million, most of which should originate in traditional export crops (including tobacco) and in specialty crops such as casava and plantains that are relatively poor nutritionally but enjoy favorable markets in Puerto Rico, Miami and other nearby locations. Higher values for these commodities should be sought through domestic processing.

4. Population

The heavy burden of population increase and attendant underemployment/underdevelopment of human resources is felt in every facet of Dominican life -- health, nutrition, productivity, and education. Unless this population growth can be stemmed there is little hope of long-term resolution of Dominican social and economic problems. It is all but inevitable that the Dominican Republic will count between 10 and 14 million people by the year 2000. Maximum government effort should be placed on achievement of stability of the population at that point. With the current rate of increase, all development efforts are doomed to be too little and too late.

This analysis must proceed, however, on the basis that much of the population increase is rooted in poverty and ignorance. Children are regarded as a form of social security and, since poor health and nutrition contribute to high infant mortality, parents tend to overcompensate by having more children than they would if their survival seemed more probable. However there is little resistance to family planning on the part of females; abortions are not uncommon. If, as is now planned, family planning information is mixed, on an expanded basis, with other radio extension information, more women will be made aware of the availability of family planning measures and understanding can evolve into active participation. The agricultural goals for 1980 can be reached, however, without a reduction in the population growth rate. The population in that year will be approximately 5,748,000, roughly 1.0 million more than in 1973. The longer term prospects are, however, poor without a significant diminution in the population growth rate.

5. Employment

For purposes of this assessment underemployment and unemployment are used interchangably, simply because there is no meaningful way to differentiate between the two with the data now available on the subject. A farmer who grows one four-month crop per year and has no off-farm job would be termed unemployed two-thirds of the year or underemployed all year. A cane cutter who works six months of the year and seeks no work for the remainder may not consider himself as being out-of-work during his period of inactivity.

Employment targets are therefore hazy. Although the available rural labor force of 600,000 may be underutilized by 40%, this does not mean that there are 244,000 permanently unemployed laborers in the Dominican countryside. It means simply that the labor force works only 60% of the time a fully employed labor force would work, although most workers may be partially employed.

Agriculture accounts for approximately 60% of the nation's labor force. A large portion of hired agricultural work is in the sugar industry which provides extremely low income and seasonal jobs for the most part. Paradoxically a large number of the cane-cutting jobs are filled by imported Haitian labor. Dominican worker, even though unemployed, will normally refuse to work in the cane fields, in part because the pay is low and in part because of cultural reasons.

There is an excess of labor in the agricultural sector. One indicator is that there is only .18 Ha. (less than half an acre) of cultivated area per person on the basis of total rural and urban population. Hired labor thus plays only a minor role in meeting total farm labor needs although this role is critical in key crops such as sugar. Obviously the rural labor supply is not an inhibiting factor in agricultural production. A recent ILO study has placed a figure of 41% on unemployment and underemployment in the rural labor force of 600,000.

Basic skills such as carpentry, mechanics, machine operation and metalwork, are generally lacking in

rural areas as well as country-wide. This tends to severely limit work opportunities both on and off the farm and to hold productivity and production down.

SEA is developing base-line data on this key area to determine the extent of underemployment and derive some indications as to how the sector program can attack the basic problems.

Urban public works have served to alleviate unemployment but are believed to have stimulated additional rural-urban migration and to have generated inflationary pressures as well. Rural-urban migration and inflation are major problems facing the Government. Its investments in urban public works, particularly in Santo Domingo, while important, have not solved the longer-term problem of employment.

Public works programs in rural areas and intermediate cities are believed necessary to slow migration to large cities; to provide gainful employment for large segments of the unskilled work force; and to support long-term agricultural growth. However, ideas in this area have not as yet been translated into plans and programs. The problem facing the Government then, is how to use public works for the long-term benefit of the economy and particularly for the rural economy. The obvious solution is to increase public expenditures to create employment in the countryside and to expand and better maintain rural infrastructure -- roads, dams, irrigation grids and the like which can make the countryside more viable economically. This can be done using mostly labor-intensive, pick and shovel methods. Some consideration is being given to this.

Off-farm employment in agro-industries stimulated by Government marketing, export and credit policies is another way of providing employment in the rural area. The target for reducing underemployment by 1980 is difficult to quantify because the means have not as yet been developed. The effect of more equitable land distribution under the system elaborated in this assessment could perhaps reduce rural underemployment one-half by 1980.

6. Balance of Payments as Related to Exports and Imports of Major Commodities

The balance of payments of the Dominican Republic has historically (e.g., from 1966-1971) shown a deficit in current trade and services offset by a surplus on capital account from foreign loans and private capital inflows. This, of course, is fairly typical for a developing country. Since 1968 the capital surplus was sufficient to permit some annual net improvement in the country's net foreign exchange position. Largely because of rising export prices a surplus on trade account was earned in 1972 and 1973. This situation may be reversed in 1974 as a result of a sharp rise in imports resulting from the higher price of petroleum and a high propensity to import associated with the rapid increase in national income and domestic inflation. As a result, in this year an overall deficit on combined current and capital account may result in a decline in net foreign exchange reserves.

Agricultural products have traditionally accounted for about 90% of total exports, although the percentage had declined appreciably to 75% by 1972 and 70% in 1973.

Sugar and by-products have always been the most important single export, amounting to 60% of the total in 1967 and still 42% in 1973. Other agricultural exports in the order of their importance in 1973 were coffee, tobacco, cocoa and by-products and meat. Due to rocketing international sugar prices, sugar exports in 1974 are expected to increase by 54% to a total of $296 million, which will constitute more than one-half of total exports.

The structure of imports in 1969[1/] shows that consumer goods accounted for 37.5% of the total, intermediate goods 26.1%, investment goods 36.4% and other items 3.7%. Out of total imports of $217 million, goods essential to raising

1/ Import data for more recent years are not available.

agricultural output (machinery, fertilizers and farm chemicals) amounted to only $7.8 million, 3.6% of the total, while food for consumption totaled $31.3 million or 14.4% of the total. The very minor role of imports of production goods for the agricultural sector of the economy in part accounts for its relative poverty. Except for large farmers producing largely for export, modernization and technical advance in this sector has lagged. Despite the fact that over one-half of the population is providing agricultural commodities for domestic consumption, and that rich soil constitutes the country's greatest national resource, the paradox prevails that most farmers have been unable to acquire the knowledge and means necessary for modernization and greater productivity. This exemplifies one of the vicious circles of underdevelopment: because farmers are poor and have difficulty in acquiring credit or foreign exchange, they cannot obtain the production goods necessary to raise productivity; because they cannot raise productivity they cannot acquire the income necessary to enable them to obtain imported production goods. The circle can only be broken by government policies designed to assure that the small farmer has access to the goods and services necessary for him to increase the volume of his production.

The composition of the country's imports in 1969 dramatically illustrates the functioning of the dual economy and supports the data presented earlier showing the decline in per capita production in agriculture. Implicit in the targets for 1980 is an increased volume of imports essential to agricultural production from roughly 3.6% of the total in 1969 to something like 10-15% of the total by 1980.

7. Price Trends for Agricultural Products Relative to the General Level of Prices and Credit

Any study of price movements is limited by existing data, i.e., a consumer price index and a wholesale price index exists for Santo Domingo only. The index for consumer prices shows that prices for agricultural products rose at about the same rate as the general indexes from 1962-1971. Unfortunately, the extent to which the consumer price index and the GNP deflator reflect prices paid to the producer is

not known. There is therefore no firm evidence as to whether the terms of trade for farmers have changed. However, farmers producing for the domestic market frequently are unable to take full advantage of a general rise in food prices, or are forced to sell at the seasonal low of prices. This is due to lack of competition at various stages of marketing, the fluctuations of prices and a generalized lack of market information. This situation is exacerbated by the lack of institutional credit which forces small and medium farmers to borrow at exorbitant interest rates from private money lenders. Frequently these money lenders are also the merchants who buy the farmers' produce at an unfavorable price and deduct repayment of the debt from the proceeds of the sale. This condition, largely endemic in developing countries, constitutes one of the principal reasons for the continuation of rural poverty and one of the principal constraints on the broad scale development of the agricultural sector.

The Dominican Republic experienced its first serious bout with inflation during 1973 when consumer prices rose by 17 2%, partially in response to a 32.7% increase in credits of the banking system largely to the industrial/ commercial sector. Clearly credit expansion, along with rising import costs and export receipts, contributed to inflation. Consequently, if the Government is faced with the need to expand credits during 1974 and 1975 for agriculture, some shift in destination appears to be required. Policy actions should be considered from the viewpoint of inflationary effects. Peso loans to farmers would not be inflationary if the country were supplied with increased imports equivalent to net peso credit creation -- monetary creation from credits offset by monetary extinction from payments to the Central Bank to purchase foreign exchange equivalent does in fact result in a net increase in imports that otherwise would not have occurred. In the production stage, a deflationary effect would occur to the extent that the importation of investment inputs raises production in the short-run and increases supplies of food for consumption. In summary, increased credit to agriculture in the form of production loans would have no inflationary effects and could assist in reducing inflationary pressures within the economy, particularly if the bulk of agricultural credit represents shifts from secondary and tertiary sectors.

Finally, it should be noted that agriculture's share of total credit has been declining sharply from 33.1% in 1968 to 20.0% in 1972.1/ Thus today agriculture receives only about 11% of capital and operational expenditures from the budget and public institutions and 12% of credits, although its share in GNP remains at about 21%. A sector so central to the country's economy requires substantially more financial support for its future development.

The Secretary of Agriculture in a recent speech to the American Chamber of Commerce pointed out with respect to loans by the AgBank that 60% of agricultural borrowers receive loans of up to RD$500 in value which account for only 12.8% of the total value of credits extended to farmers. He stressed that the AgBank, which has accounted for 68% of agricultural loans, should extend the bulk of its loans to small and medium sized borrowers, leaving the large farmers to be financed by other institutions.

B. In Relation to Policy Formulation, Planning and Coordination

1. Structure of the Policy Formulation and Planning Mechanism

The National Development Commission has authority to issue general policy directives on the formulation and execution of development plans and to approve or disapprove plans and programs before their submission to the Presidency. This Council serves primarily as the forum for discussion of proposals with a view to achieving a consensus where possible.

Proposed policy decisions are screened by the Technical Secretariat of the Presidency. It, too, has authority to make and execute development programs, to coordinate their execution and evaluate results. This office is an important conduit to the top decision makers. It controls both budgetary

1/ Included in agriculture is fisheries, forestry and cattle raising.

formulations and disbursements and occasionally involves itself in execution of projects. It normally acts in response to Presidential decisions.

The Secretariat of State for Agriculture through its Office of Planning, Coordination and Evaluation functions in coordination with the National Planning Office of the Technical Secretariat to provide overall short, medium and long-term planning for the entire agricultural sector.

Decentralized institutions affiliated with the Secretariat of Agriculture, i.e., IAD, AgBank, INDRHI, IDECOOP, and INESPRE, by law maintain planning mechanisms empowered to prepare specific action plans, taking into account the overall guidance from the Secretary of Agriculture.

2. Functioning of the Policy Formulation and Planning Structure

The Secretary of Agriculture sits as a member of the Board of Directors of each of the affiliated decentralized institutions but he is not represented on the board of the AgBank. In actual practice, however, few policy matters are handled at the board level.

Below this management level, ad hoc working groups composed of officials of several entities are occasionally formed to develop specific short-term production plans and coordinate their execution, but there is no permanent mechanism for coordination. The Planning Office of SEA has been assigned the task of filling this vacuum and is using the analytical assessment process to set a foundation for long-term coordination and freer flow of information between agencies. The Office of Estimates and Forecasts of SEA is influential because of the value of the statistical information being generated by its surveys.

There are two basic impediments to effective policy coordination among the agricultural sector institutions. First, many functions overlap. AgBank, IDECOOP, IAD and SEA each have credit programs. SEA, IAD and IDECOOP perform

extension functions. INDRHI and IAD overlap in the area of irrigation. All engage in statistical activities. Second, long-term priorities are not well-articulated. Consequently there is less impetus to plan systematically for the long-term. Plans are often developed and programs executed in response to more immediate requirements, e.g., shortages of staple crops, or to meet anticipated foreign demand for specific commodities, i.e., sugar and beef. Only recently has there been a systematic sector-wide approach calculated to orchestrate policy formulation and planning as an integrated process and in a longer-term framework.

Inter-institutional relationships between public institutions are established by law and decree, but prescribed relationships are not confirmed in practice. Thus, the function of the Secretary of Agriculture has been to influence but not to coordinate directly other agency activities within an overall agricultural policy or plan. There is no effective centralized policy and budget resource allocation process although the SEA has such responsibility in law.

Nevertheless, there have been several specific recent instances when public institutions have cooperated closely and effectively on specific programs. Examples are IAD's rice production effort on redistributed land, the Secretariat/AgBank Cacao Improvement and Coffee Production Programs, and the cooperation of several institutions in the Secretariat's statistical survey projects (supported by USAID technical assistance). The assignment of SEA extension personnel to credit promotion duties among groups of small farm units holds promise. Credit applications elicited by extensionists are handled by the AgBank. In effect, a new cooperative procedure between the two agencies is in operation. Hopefully it will be expanded and strengthened.

The Secretary of Agriculture is engaged in trying to bring sector efforts together. He has assigned to his Planning Office competent personnel capable of fulfilling planning coordination functions assigned to SEA by law. He has reactivated the National Agricultural Council composed of key public officials and private agriculturalists to discuss

policy and advise him. The President is Chairman of the Council. Its first meeting consisted of a vigorous self-evaluation by the heads of the several agricultural agencies. Weaknesses in programs and institutions were noted and freely discussed. Some corrective action is underway.

Since his appointment in January 1973, the Secretary of agriculture has conducted a vigorous campaign to professionalize his Ministry. A focal point of this campaign is the Planning Office which is now staffed with Dominicans who have degrees from U.S., Mexican and Argentine universities. This planning group has been a significant force in creating an awareness of advantages to be obtained from a sectoral approach to agricultural development. They are receptive and counting on external technical assistance to achieve further improvements in the planning process.

The relationships outlined by Decree 8 of 1965 have not functioned to produce a unified approach to agricultural development. There are two basic reasons: (1) The decree assumed a competence within the Planning Office of the Secretariat that is only now being developed; and (2) agricultural institutions are many and decentralized both organizationally and functionally. Overall coordination is an inherently difficult problem.

As the current effort by the Office of Planning in the Secretariat to function as a constructive and useful policy formulation, planning, evaluation and coordination mechanism for the Secretariat gains momentum, the first constraint should be lessened. The degree of success will to a large extent depend upon the quality of its work.

Success in overcoming the second constraint will depend upon a number of factors, of which the most important obviously is the President's wishes in the matter. Decisions in this respect will no doubt depend significantly on the demonstrated efficacy of measures of the Secretary of Agriculture to improve sector performance. The critical factor will be effective control over the flow of resources to agricultural agencies to carry out programs of increasing size, complexity

and importance. A realignment of agricultural agencies, their professionalization and perhaps their integration may well serve to improve sector performance appreciably. There are many considerations however to be taken into account with respect to alternative approaches and when it would be most advantageous to take concerted actions.

3. Budgets and Expenditures

As the central agency of the agricultural sector, SEA has been assigned yearly budget allocations as follows:

TABLE V - 2

Year	Budgeted	Released	% Released	Difference
1966	12,941,955.00	8,486,241.50	65.6	(4,455,713.50)
1967	11,364,640.00	9,427,384.88	83.0	(1,937,255.12)
1968	9,472,420.00	9,124,093.07	96.3	(348,326.93)
1969	11,148,870.00	9,187,764.83	82.4	(1,961,105.17)
1970	25,686,715.00	9,387,768.43	36.5	(16,298,946.57)
1971	11,670,231.00	7,842,905.97	67.2	(3,827,325.03)
1972	17,196,241.00	13,542,927.00	78.7	(3,653,314.00)
1973	21,198,865.00	13,762,970.96	62.5	(7,935,894.04)
Total	120,679,937.00	80,262,056.64		(40,417,880.36)

Source: SEA Planning Office

The above represents only the amounts budgeted and released through the normal national budget process. The percentage of the total budget assigned and released through these channels is shown in the following table:

TABLE V - 3

Years	National Budget	Agricultural Budget	Agr. % Total	Total Budget Releases	Budget Released to SEA	% SEA Budget Released
1966	253,669,400	12,941,955	5.1	198,010,765	8,486,242	4.3
1967	225,895,210	11,364,640	5.0	198,192,437	9,427,385	4.7
1968	198,271,300	9,472,420	4.8	207,631,085	9,124,093	4.4
1969	230,324,219	11,148,870	4.8	235,325,454	9,187,765	3.9
1970	247,558,599	25,686,715	10.3	264,800,414	9,387,768	3.5
1971	264,312,333	11,670,231	4.4	304,981,215	7,842,906	2.6
1972	300,928,100	17,196,241	5.7	334,315,756	13,542,927	4.1
1973	325,300,079	21,198,865	6.5	N.A.	13,262,971	N.A.
Totals	2,046,259,240	120,679,937	5.9	1,743,173,126+	80,262,057	-

Source: SEA Planning Office.

Of the RD$80,262,057 released to SEA in the period 1966-1973, nearly half, RD$38,422,291, represented transfers to IAD, INDRHI, IDECOOP, and the Tobacco Institute. Of the remaining RD$41,839,766, salaries accounted for RD$33,163,253, fully 80% of the releases. The following table shows the use of funds actually received from 1966-1973.

TABLE V - 4

	Budgeted	Released	% SEA Budget	% Budget Released
Personal Services	34,472,986	33,163,252.90	41.3	96.0
Non-Personal Services	2,182,641	619,695.69	0.7	28.4
Materials & Supplies	6,464,791	2,059,034.93	2.6	31.8
Machinery & Equipment	2,999,222	206,405.67	0.3	6.9
Land Acquisition	4,500	-	-	-
Construction	2,066,145	236,775.29	0.3	11.5
Current Transfers	37,584,832	38,422,290.82	47.9	105.9
Capital Transfers	30,721,820	5,282,320.75	6.6	17.2
Financial Disbursements	400,000	-	-	0.0
General Funds	3,783,000	272,280.59	0.3	7.2
Totals	120,679,937	80,262,056.64	100.0	66.5

Source: SEA Planning Office.

The foregoing tables illustrate clearly that the present budgetary process is not part of the overall planning function in agriculture and that agriculture, in general, has not received the high priority it needs to accomplish its objectives. It demonstrates that, apart from salaries, agricultural institutions have not been able to rely on expected budgetary releases to operate programs. Consequently, personnel are less effective for lack of materials, transportation and operating funds.

Offsetting this poor budgetary performance, though certainly not compensating fully for it, is the funding available from the President's Fund. Figures for all years are not readily available. However, in 1972, RD$11,848,580 were transferred to agricultural institutions from the President's Fund, primarily in support of investment projects. The bulk went to irrigation works, including Valdesia. Data on 1973 transfers in this category are not yet available. However, it is known that RD$13,000,000 was expended to purchase land for agrarian reform and additional long-range commitments were made through bond issues for the same purpose. In addition in May 1973, a national planning office inventory of projects showed planned investments of RD$384.0 million through 1976. Of the total, projects representing RD$178.4 million were underway with planned outlays in 1973 amounting to RD$77.2 million; INDRHI was to receive RD$20.7 million of the latter and the lions share of investment for the remainder of the period, in the country's effort to complete as many irrigation works as possible.

Despite these heavy investments, most executing agencies are hard-pressed to perform their day-to-day functions because of budgetary uncertainties. Except for salaries, each budgetary allocation is obtained as a consequence of a lengthy justification process which results in project execution by fits and starts. Agency heads are forced to borrow from one project fund to support another. The budget resource flow process represents a significant constraint on development. The IBRD has observed this in its reports as well. The roots of this constraint are found, in some measure, in the weakness of the policy formulation and planning process. Without clear

objectives, action plans, more often than not, lack comprehensiveness and are uncoordinated. Understandably expenditures come under considerable scrutiny before final, definitive approval.

C. In Relation to Nutrition

In this assessment, the recommendations from the Instituto de Nutrición de Centro América y Panamá (INCAP) for the daily per capita consumption of nutrients (Table V - 5) have been used as an acceptable norm upon which to judge the success or failure in meeting nutritional requirements. This is compared in Table V - 6 with per capita, per day food production in the Dominican Republic in 1964 and 1968. The decrease in per capita availability is notable during that period.

TABLE V - 5

Food Balance Sheets of the Daily Per Capita Availability of Nutrients for 1964 and 1968

Nutrient	Recommendation 1/	1964		1968	
		Available	Adequacy in Percent	Available	Adequacy in Percent
Calories	2,122	2,265	107	2,151	101
Protein, gms	53	54	102	51	96
Calcium, mgms	600	610	102	617	103
Iron, mgms	14	16	114	14	100
Vitamin A, I.U.	1,937	3,976	205	3,454	178
Thiamine, mgms	1.2	1.1	92	1.0	83
Riboflavin, mgms	1.2	1.1	92	1.1	92
Niacin, mgms	14	14	100	13	93
Vitamin C, mgms	47	192	109	177	377

1/ Based on INCAP's recommendations.

The apparent surplus shown in these figures is not real, because of underestimated wastage. Moreover, the inequity of distribution of foods in the country mitigates against the vast majority receiving an adequate diet. A national nutrition survey in low and middle income groups, comparing consumption against the same INCAP recommendations, found serious shortage in caloric, protein and other nutrient consumption. Table V-6 shows even more clearly the geographic differences in food consumption patterns.

TABLE V - 6

Regional, Rural, Urban, and National Averages of Daily per Capita Food Consumption

Food (Grams)	National District	District Cibao	Northern	Eastern	South-western	Rural	Urban	Nation-wide
Milk Products, Fluid	78	95	65	112	39	92	64	78
Dried	10	3	0	0	1	1	5	3
Cheese	0	7	2	2	0	2	2	2
Eggs	4	8	5	1	1	3	4	3
Meat, Beef	15	26	11	32	7	14	23	18
Chicken	7	4	0	11	2	2	7	4
Dried Fish	20	7	5	27	17	11	19	15
Pork	0	7	12	3	2	3	7	5
Sausage	6	4	1	1	0	1	4	2
Other	0	9	2	0	1	1	4	2
Beans, Red	25	33	44	35	36	28	42	35
Other	9	0	0	1	0	3	1	2
Fresh Vegetables	24	55	34	39	11	38	27	32
Green Plantain & Bananas	64	244	198	99	146	136	164	150
Other Fruits	35	20	30	85	6	53	18	35

(Continued)

TABLE V - 6 (Continuation)

Food (Grams)	National District	Cibao	Northern	Eastern	South-western	Rural	Urban	Nation-wide
Fruit Juices	1	3	4	6	6	53	18	35
Starchy Roots	77	59	91	66	39	69	64	66
Cereals, Rice	132	117	144	147	112	129	135	132
Wheat Bread	22	13	8	29	5	13	18	15
Spaghetti	5	9	12	14	5	9	9	9
Corn	6	0	0	7	0	2	4	3
Oats	0	3	2	0	0	1	2	1
Other	0	0	2	0	0	1	0	0
Sugar	26	36	46	30	17	34	27	30
Fat, Vegetable Oil	31	29	23	29	16	23	29	26
Butter	0	2	0	0	0	1	1	1
Coconut Milk	0	0	0	0	16	1	5	3
Lard	0	1	6	0	0	2	1	1
Coffee	3	6	5	6	2	5	5	5
Chocolate	3	5	2	1	0	3	2	2
Carbonated Beverages	2	14	2	13	1	5	8	6

Further, nutrient requirements are increased by the high incidence of parasitic and febrile diseases. Accurate medical data is lacking, but all indications are that these problems are severe. Thus, the National Statistics Office recent estimate (from the 1970 Census) that 110 infant deaths occur per 1,000 live births strongly indicates that malnutrition is a severe problem. (In a recent PAHO study in Latin American cities, malnutrition was identified as an underlying or associated cause of two-thirds of child mortality.)

Table V-7, prepared from available food production estimates, is not strictly comparable to Table V-6. Again it is compiled from rough estimates and does not take wastage and unequal food distribution into account. However, it reflects a deteriorating situation -- that of an increasing caloric supply with a decreasing proportion of protein. There are only some 83 grams of meat available per person per day, and about 1/2 of one glass of milk. Vegetables which are important sources of vitamins and minerals are almost non existent in the ordinary diet. About 23% of the available calories would come from strictly carbohydrate sources (plantains and tubers, and sugar) which have almost no additional food value. In addition, rice, a dietary staple is over-polished and not vitamin fortified.

TABLE V - 7

Approximate Food Balance - 1973

Product	Total Available for Consumption Metric Ton	Per Capita Per Day Equivalent (gms)	Protein Per Capita Per Day (gms)	Calories Per Capita Per Day
Meat & Eggs	142,608	83.59	13.37	250.77
Poultry	58,000	34.00		
Beef	31,274	18.33		
Pork	17,000	9.96		
Eggs	22,155	12.99		
Fish	14,179	8.31		

(Continued)

TABLE V - 7 (Continuation)

Product	Total Available for Consumption Metric Ton	Per Capita Per Day Equivalent (gms)	Protein Per Capita Per Day (gms)	Calories Per Capita Per Day
Milk & Cheese	263,088	154.21	5.24	49.96
Sugars	168,365	98.69	0	253.30
Vegetables				
(Available)	73,560	43.17	1.15	20.14
Production	93,480			
Exports	19,920			
Fruits				
(Available)	1,083,586	635.16	1.59	311.22
Production	1,121,760			
Exports	38,174			
Legumes				
(Available)	61,697	36.16	8.14	122.94
Production	61,207			
Imports	11,170			
Exports	(698)			
Rice				
(Available)	235,200	137.87	8.27	499.09
Production	204,000			
Import	31,200			
Wheat				
(Imports)	98,549	57.77	6.93	210.28
Plantains & Tubers	363,707	213.19	2.13	275.01
Plantains	104,938	60.98		
Casava	139,669	81.88		
Potatoes	25,000	14.65		
Sweet Potato	95,000	55.68		

(Continued)

TABLE V - 7 (Continuation)

Product	Total Available for Consumption (Metric Tons)	Per Capita Per Day Equivalent (gms)	Protein Per Capita Per Day (gms)	Calories Per Capita Per Day
Fats & Oils				
(Available)	50,578	29.65		261.51
Production	33,900			
Import	17,690			
Exports	(4,000)			
Totals		148.95	46.82	2,254.22

Thus, the nutritive content that is apparently available in the foodstuffs will be significantly underutilized given the present economic status, distribution systems, cultural habits, and physical condition of the population. To further complicate the problem, the probable deficit of calories indicates that the protein that is available is probably being consumed to provide calories, instead of being used as a tissue building source.

The goal of providing food at reasonable cost to the population is not being met, even with high levels of imports of basic commodities. The effect of this basic deficit on productivity evokes a picture of the classic vicious circle of poor nutrition leading to low productivity which, in turn contributes to low nutrition. Undernourished persons are more subject to enfeebling diseases and death. Death of young children is said to reduce receptivity to family planning suggestions.

Table V-8 is a tentative analysis of availability levels which would provide a relatively low-cost balanced diet.

TABLE V - 8

Year	Population 2/	Food 1/ Consumption Total (000)	(MT) Meat, Etc.	Milk	Sugar	Fruits	Vegetables	Legumes	Rice	Cereals Products	Platano & Tubers	Fats & Oil
1973	4,674	2,800	168	868	252	692	252	84	168	84	168	84
1974	4,814	2,880	173	893	259	691	259	86	173	86	173	86
1975	4,958	2,970	178	921	267	713	267	89	178	89	178	89
1976	5,107	3,060	184	949	275	734	275	92	184	92	184	92
1977	5,260	3,150	189	977	284	756	284	94	189	94	189	94
1978	5,418	3,240	194	1,004	292	778	292	97	194	97	194	97
1979	5,581	3,340	200	1,035	301	862	301	100	200	100	200	100
1980	5,748	3,440	206	1,066	310	826	310	103	206	163	206	103

IV-35

1/ Based on a diet which corresponds to current Dominican Republic consumption behavior but meeting INCAP protein and calorie recommendations.

2/ Assuming a 3% growth per year from 1973 to 1980.

D. Performance within the Agricultural Sector and Desired Level by 1980

1. Crops

Total production of agricultural products increased very little between 1960 and 1968. Food output failed to keep pace with population growth -- per capita production declined almost 25%. Only rice, potatoes and some types of livestock showed a clear pattern of increase. However, beginning in 1968, food production improved significantly, gaining rapidly on population. The index of food production rose from 114 (1957-1959 = 100) in 1968 to 147 in 1972. Total value of agricultural production (in constant prices) increased at an average annual rate of over 7%.

This rapid rise in total agricultural production has not always been in the areas of greatest need. The result is occasional shortages of key agricultural items -- causing crash programs with heavy allocations of resources and somewhat of a crisis to crisis type of assistance to the sector. Nevertheless, the Dominican agricultural sector has done a reasonable job of meeting the effective demand of a rapidly growing population and increasing export demand. The country has several advantages which can contribute significantly to meeting its goals and objectives over both the near and long-term. It has favorable climate with a varied range of micro-climate areas, and some rich soils. It is capable of producing a wide selection of agricultural products. Traditional markets for sugar, coffee, cacao and the like provide reasonably reliable sources of foreign exchange earnings. Industrial crops have been basic agricultural commodities in the Dominican Republic for several years and have received priority attention.

Sugar. Sugar production for 1973 set a new record for the third consecutive year but was short of the 12% increase forecast. Exports were about three percent higher than 1972. The area has been increasing about two to four percent per year despite emphasis on increasing the per unit production on lands most suitable for sugar production. Plantings have been limited by legislation but these limits have not been

closely enforced. In 1972, Government action authorized increases under certain circumstances and set a total sugar production goal for 1973 of 1,400,000 short tons. An estimated 255,000 hectares were planted to sugar cane in 1973.

Sugar exports in 1972 were 1,221,444 short tons with 741,230 tons going to the United States and 480,214 tons to the world market. The world price of sugar is presently between 19 and 21 cents per pound and quotas under the agreement do not begin to apply until world prices drop to 5.25 cents per pound. The outlook, therefore, is for several more years of a very favorable market situation. There has been considerable discussion concerning the need to shift those lands less suitable for sugar to more productive uses. If present production were to be maintained, this would require significantly greater sugar production on the better lands, implying greater application of capital resources and improved technology.

The Dominican Government will undoubtedly maintain that sugar production must continue to increase, both for export earnings and to meet internal demand. Increases can be achieved by various combinations of land, labor and capital. For example, the intensification of capital inputs, such as tractors, mechanical harvesters and loaders, would reduce manual labor requirements. Capital expenditures for improved cane varieties, irrigation works and fertilizers would increase production per unit, thus reducing land requirements but with less effect on labor.

Well over half of the field work force is of Haitian origin since cane cutting is regarded as the most denigrating employment possible in the Dominican culture. Substantial reduction of the work force in sugar could be accomplished with few, if any, ill effects in the Dominican rural economy if marginal sugar lands were efficiently shifted to other labor intensive activities, compensating for reduced employment in sugar. Given the importance of sugar to the balance of payments situation, any reduction in sugar exports during the current strong world market period would be most unwise. But any release of land for other production which

can be done without jeopardizing increased sugar production and exports should receive high priority.

Coffee. Coffee production in the Dominican Republic is meeting domestic demand and providing about twenty-five million dollars in export earnings annually. There has been no noticeable recent changes in coffee production or export volume. Many of the coffee plantings are old and relatively unproductive. Technology has not kept pace with the principal coffee producing countries. Both yields and quality could be increased. Production sufficient to meet potential domestic and foreign demands could thus be obtained from a smaller land base.

Some coffee processing is done in the country but almost ninety percent of the export is in green form. There is no soluble coffee production in the Dominican Republic and no known plans for such production. Increased employment and significantly greater foreign exchange earnings would probably be generated with a move toward in-country processing.

Coffee exports are partially controlled on a world-wide basis. The Dominican Republic is a signatory to the Geneva Coffee Agreement. The presence of coffee rust in South America and the possibility that it will not reach this country because of its isolation, makes coffee a crop with excellent longer term prospects, particularly because of (1) its labor intensive character, (2) its potential to assure a cash income for the rural poor and (3) its suitability to lands which are not appropriate for other forms of agricultural cultivation.

Cacao. Cacao production is centered in the Cibao valley and raised mostly on small farms. Little attention is given the trees except at harvest time. As with the coffee, plantings tend to be overage but otherwise in good condition. Few fertilizers, herbicides or fungicides are used. A long, gradual decline in the annual production of cacao beans was checked in 1969 through USAID-supported efforts of the Secretariat of Agriculture. Since then, production has varied from about 26,000 tons to 40,000 tons depending on the season.

Cacao is ranked fourth in value among agricultural exports. As with coffee, most sales are in the form of beans. The United States is the principal market -- most of the European demand is for high quality, partially processed cacao. At one time a substantial part of Dominican cacao exports was processed but the practice has declined. In 1972 some processing activity was revived and more than 10% was exported in processed form -- up from almost zero the previous year.

Improved cacao varieties were brought into the country (by the USAID Mission) beginning in 1966. This material presently is being distributed. A Cacao Improvement Program (1972-1976) is in the early stages of implementation. This crop offers significant potential as an earner of foreign exchange and production conditions are excellent. Cacao is a good generator of employment and income for marginal rural families.

Tobacco. Tobacco is growing in importance both as an export and import substitution crop. In 1973, tobacco was third in value among agricultural exports. Considerable improvement can be made in type and quality of the Dominican tobacco, which could further increase the value of both exports and domestic sales.

The level of technology in tobacco production varies widely but can be improved. Greatest attention should be given to varietal improvement and to expanding the amount of processing carried out in the country prior to export. A recently imposed special tax on domestically produced blond tobacco, presumably a means of maintaining import levels, should be reviewed. Tobacco is one of the most labor intensive of all crops and thus merits priority attention. But as a non-food crop, the nutritional requirements of the population must be weighed in the balance since tobacco and food crops compete for scarce lands.

Oil Crops. (Peanuts, coconuts, soybeans and others). The production of edible vegetable oils has increased each year for several years but has not kept pace with increased demand or nutritional requirements. The principal oil crop is peanuts. Consumers have a high preference for peanut oil,

although the acceptance of coconut oil is increasing as a result of INESPRE information efforts. Imports of edible oils have been rising but the volume declined slightly in 1973 because large carryover stocks were available at the beginning of the year and because prices were relatively higher.

Both peanut acreages and yields have been increasing. Continued production increases can be obtained from further expansion and higher peanut yields but alternative oil sources from other crops should be tested and evaluated. A significant potential for coconut oil production exists in areas less suitable for crop production. New disease resistant varieties have been introduced here and are ready to provide the seed necessary for expansion. Small trials of African oil palm were established in 1967-1968 and are now being evaluated. If found suitable to the Dominican environment the African oil palm should be given attention since it is the most efficient producer of edible oil in appropriate climates.

Soybeans are being grown in some areas of the country. Its is doubtful, however, if they can be fully competitive with more efficient oil crops here except in special circumstances such as in rotation with tomatoes near Azua and Santiago. They also require more attention, e.g., fertilizers, insecticides, water, than, say, peanuts if an adequate and economic crop is to be obtained.

To date policy makers and planners have looked at each oil crop separately. Edible oil crops should be considered as a group with the objective of developing plans and programs for the best mix of the entire group which will most quickly and efficiently meet the growing edible oil requirements of the country, estimated at 103,000 MT in 1980.

Food Crops. Among food crops (rice, plantain, beans, corn, root crops, fruits and vegetables) rice and wheat are the staple food grains in the Dominican Republic. The latter is imported at the rate of 100,000 MT or more each year. Corn and sorghum are used mainly as animal feed. Plantain, sweet potatoes, casava and potatoes are also important sources

of starchy foods. Rice, beans and pigeon peas are principal protein sources, especially in lower income families.

Rice. Rice production had been keeping pace with the growing demand for several years. But in 1973, rice imports reached 32,000 MT.

The Dominican Republic has had an active rice research program for more than 10 years. During this period at least four new rice varieties have been developed within the country and one has been introduced from Colombia. Some of these have been grown extensively throughout the Republic for the last five years. Also many technicians have been trained in rice production methods. As a result, rice output in 1972 set a record high and was up a fifth from 1968. Yet, it was necessary to import a sizable quantity in 1973 because of the drought affecting substitute crops such as plantain and, perhaps, because of agrarian reform and its attendant uncertainties.

Per capita consumption of rice has also increased considerably during the past six years for several reasons. Migration to cities has created a greater dependence on and taste for rice than exists in rural areas where other basic foods are home grown. Greater per capita income from the expanding economy increased demand for more preferred foods such as rice. Marketing irregularities also magnified the disparity between supply and demand as millers and wholesalers tended to group together to influence prices. INESPRE has been reasonably successful in tilting prices in favor of consumers while maintaining a reasonable market price for producers. Nevertheless, rice production and marketing is a sensitive political issue which concerns nearly all public institutions associated with agriculture. Some observers have speculated that INESPRE may have damaged future rice production by driving some millers out of the market, thereby erasing a credit source for small farms.

Preliminary indications are that the Dominican Republic has only a marginal advantage in rice production. As more data become available, the country will be better able to formulate policy with regard to rice and its relationship to starchy root crops and plantains. Land use patterns show

that much land devoted to rice could better produce alternative crops. On the other hand, unused marshy lands ideally suited to rice culture (and little else) have not been fully developed. As more rice lands are assigned to IAD and its marginal farmers, a sizeable extension program in rice production will be indispensable to meet production targets. Beyond 1980 the Dominican Republic must arrive at a policy of optimum, not maximum, rice production and hope to achieve a balance wherein the country produces only the rice it can efficiently produce, imports the required balance and pays for the deficit by producing other commodities efficiently.

Beans. Beans are a basic protein source for most Dominican families. Over the years production has varied widely depending upon input availabilities, market prices and the prevailing weather. Production programs have had only marginal success in the face of serious marketing and distribution problems. In 1973, 11,170 MT were imported to meet 27% of effective demand.

Fruit and Vegetables. Dominicans are increasingly aware of the possibilities for fruit and vegetable production, both with relation to the need to improve the nutritional balance of Dominican diets as well as the potential export market for these commodities. Efforts are being made to enter these export markets with reasonable success being achieved with a few selected commodities. However, the problems and complexities are difficult to overcome. The technology required and the quality demands of foreign markets are difficult for the inexperienced producer to meet. The first emphasis should be put on meeting some of the unfilled domestic nutritional needs, probably though education and improved marketing systems.

2. Livestock and Livestock Products

The Dominican Republic always has produced enough beef to satisfy effective local demand. Meat exports became important after 1931 and Dominican beef was widely shipped live throughout the Caribbean. Government policies and the tax structure in the early 1960's resulted in a virtual collapse

of the meat production and its export marketing system. Poultry, dairy and swine production declined sharply and beef remained an extensive, no-imput operation. Beef exports to the United States and Puerto Rico revived in the late 1960's when poultry production began to satisfy the local demand for meat.

The prospects for expansion of the livestock industry in the Dominican Republic are good. From 35 to 50% of the land now in farms is better suited for grazing than for any other purpose and more intensive livestock production should be encouraged on these lands to meet food needs.

However, the coefficient of total employment generation, direct (on farm) or indirect (in marketing and processing) varies widely depending upon the enterprise and the extent of processing. Beef production generates only 2.2 cents of direct employment per dollar of output. When marketing and processing are added the ratio increases to 13.9 cents of employment per dollar of output. Milk production and marketing (direct and indirect employment) generates 31.3 cents of employment per dollar of output. The direct and indirect effects of swine and poultry fall between beef and dairy as employment generators.

Modernization of the livestock industry is beginning to take hold at the production level. Ample livestock credit appears available for the immediate future and interest in increasing production is widespread.

Dairy and Beef. Dairy and beef production are not clearly identifiable separately. Approximately 35% of herds are classes as dual purpose. Of the 727,000 head of cows estimated in June 1973, between 360,000 and 500,000 are milk cows. Until the late 1960s, beef production was not regarded as sufficiently profitable to compete with other agricultural alternatives. Estimated beef production was relatively stable between 1960 and 1965 at around 25,000 metric tons. But since that time beef production has risen considerably. Per capita consumption remained relatively stable, however, while exports to United States and Puerto Rico rose sharply. In 1973 they amounted to more than RD$10 million.

Changes in policies affecting meat production and export coupled with rising domestic and world prices are now creating strong incentives for expanding the industry. As average levels of income continue to rise gross domestic demand will undoubtedly continue to grow with no reduction in sight, even in the long-range, of demand for meat in the export market. No foot-and-mouth disease is present in the Dominican Republic. This country is one of the few in the world that can export fresh beef and pork to the United States and Puerto Rico.

There is ample opportunity to expand livestock production. However, except under more extensive operations, beef is more expensive to produce in the Dominican Republic than are dairy products, poultry and swine. Thus the beef component of the dairy enterprise is likely to become an increasingly important source of red meat. Nevertheless, considerable increase can be achieved through improving herd and pasture management practices. The majority of the cow-calf operations have very low efficiency. Even greater increases could come from more intensive production based upon feed lot operations using locally available supplements (a recent trend) to produce higher quality beef.

Milk. Milk output has been increasing rapidly since 1967. Yet it has been barely sufficient to meet consumer demand and considerable amounts of processed dairy products have been imported annually -- requiring significant foreign exchange expenditure.

Milk consumption is extremely low in the Dominican Republic -- averaging about a half a glass of whole milk daily per person. It is consumed mostly in the raw form with less than 15% pasteurized. About 37% is distributed directly as raw milk and another 25% consumed on the farm or processed into homemade cheese. The remaining 30% is commercially processed into cheese, butter, powdered or canned milk. Sanitation and adulteration are serious problems in distribution of raw milk.

Average output per cow is very low -- about 2,000 pounds per cow per lactation. In the better managed herds the figure is higher but much lower for non-commercial herds. Under

current pasture conditions and management practices, most cows remain in production only about seven months per year. Serious fertility and mortality problems also exist. The undependability of the feed grain supply and wide swings in feed prices have constrained growth in the dairy industry. Further aggravating the problem, government controls on some milk products have affected both profit margins for producers and the processing/ distribution structure.

With present income levels, marketing practices and milk price relationships, consumers obviously are not immediately able to consume large quantities of fresh milk. However, production costs and prices can be reduced over time with better farm management practices and improved market conditions.

Swine. Traditional rather than modern management practices have been applied to swine raising even though pork has long been an important source of meat in the domestic market. The average farmer maintains a few hogs to salvage waste material and as a source of ready cash. Since 1969, pork production has increased rapidly, yet it is only beginning to satisfy effective domestic demand at relatively high prices. There is a strong demand for pork products in Puerto Rico that could be filled by the Dominican Republic if production were to exceed domestic demand. Almost no pork is exported.

Swine production has only recently been recognized as a potential commercial enterprise. It can develop to a position of national importance only through systems with high levels of management. The problems of commercial production in the Dominican situation are manifold, however. The incidence of disease and internal parasites is high. Good quality breeding stock is limited and production costs are extremely high. In any event, a primary requirement for the continued development of the swine industry will be the availability of an adequate and dependable feed grain supply. In this respect, the swine industry will have to compete with much more advanced poultry and dairy systems.

3. Poultry

Domestic poultry production has virtually eliminated the need to import poultry meat and eggs for local consumption even though the effective demand for poultry meat would probably increase at least 50% if competitively priced supplies were constantly available without interruption in a competitive market. Occasional shortages and interruptions in the importation of hatching eggs is being eliminated as a problem with the advent of a domestic supplier with ties to the U.S. industry. Production presently rests in the hands of a diminishing number of very large producers centered in the area surrounding Santo Domingo -- 90% of the poultry industry is made up of flocks of 5,000 birds or more. This commercial segment of the industry is well organized in production and marketing. There still are large numbers of small flocks in rural areas producing for home and local markets, however. This picture could change with better input supplies being developed by the major feed producers and the hatching egg enterprise. More credit could probably stimulate competition and production as well.

Poultry provides the most efficient conversion of feed to meat and the feed efficiency of the commercial industry here approaches that of the United States. Poultry has the added advantage of the shortest production time requirement and so responds more quickly to market demands. Sufficient know-how, facilities and labor are available to expand the industry. Such an expansion, increasing the availability of high quality poultry on a more regular basis would undoubtedly increase poultry consumption at the expense of beef, permitting increased availability of beef for sale in the export market. It would also permit the local consumer to purchase his meat protein at a lower per unit cost.

Future trends in the livestock industry are greatly dependent upon a few key factors. Government policies with respect to the availability of hatching eggs and chicks will greatly influence the poultry industry. Expanded technical assistance to livestock producers can increase numbers and efficiency. In the final analysis, however, the most important factor is the availability of a dependable feed supply. In the

case of poultry, dairy, swine and high quality beef this means the availability of feeds on a regular and expanding basis.

With regard to the latter factor, the Government's policy has been responsive. Exports of feed ingredients such as peanut and coconut meal have been almost eliminated. Grain production has received priority attention, albeit with limited success, and greatly expanded imports of grain have been allowed.

4. Forests

Forest resources of the Dominican Republic are administered by the Armed Forces with direct guidance from the Executive authority under a modification of Law 206 of 1967. This law closed all private saw mills and provided the money necessary to compensate for their investments and losses of future income.

The valuable forests which once covered the island have been reduced to about 16.25 million tareas, first by direct exploitation and more recently by slash and burn farming techniques and forest fires. Much of the land thus cleared is not suitable for agriculture and should be returned to forests. A 1965 evaluation indicated that 8,123,000 tareas of the Cordillera Central should be replanted to forests. The Armed Forces reforestation effort may have reached 195,000 tareas by 1971, assuming that the 12,000,000 trees reportedly planted were distributed according to the recommended density of 400/acre. The rate of reforestation has reportedly increased in the last two years.

A FAO forestry project started in January of 1968 and terminated in May of 1972. The project provided assistance to the GODR in the following: establishment of a secondary forestry school; the preparation of a new forestry law; the reorganization of the agency responsible for forestry management; an inventory of forest resources; and a model plan of forestry management.

The GODR has followed the FAO recommendations with relation to reforestation, conservation, fire control,

and education. In February of 1974, the GODR announced the continuance of the government monopoly of forest exploitation and management.

Exploitation of forest resources is now illegal, although the degree of enforcement is not known. The absolute prohibition of logging, coupled with poor forestry management has increased the incidence of fires through a higher density of dead and fallen trees.

As indicated by the FAO inventory of forest resources, the country could extract 100,000 to 150,000 cubic meters of lumber per year (about half of total annual demand) for the next 10 years and, assuming proper reforestation and management, could meet all local requirements for cut lumber and pulp from 1980 to the end of the century.

Employment generation is difficult to estimate during the transition period. Certainly a sustained harvest program following reforestation would provide permanent jobs for a considerable segment of the rural population. At present the majority of the conservation, fire control and replanting activities are being carried out by the Army.

The movement toward implementation of the FAO recommendations is probably the best course at the present time. The FAO research and recommendations made in order to conserve watersheds, reduce scarce foreign exchange expenditures for wood product imports and to stimulate employment in the rural areas provide an adequate policy framework for this subsector.

5. Fisheries. The data base for the fish catch is practically non-existent and conflicting statistics may be found. Some marginally reliable estimates of the catch indicate 1973 totals were nearly double the previous five years average of fish and sea food, (marine species including land crabs). Production in 1972 was estimated at 5.5 million kilograms and in 1973 at 9 million kilograms.

Significant harvest increases in conch, lobster and crabs were noted to the endangerment of these species.

Species	1972	1973
Conch	136,884 kg.	220,491 kg.
Lobster	45,501 kg.	322,984 kg.
Land Crabs	1,376,074	2,421,162

In 1966 exports were reported to be 2% of total catch. In 1973 this increased to 11% of total catch. The majority of exports were to Puerto Rico and thetotal value of exports was RD$1,003,473.

The most recemt data (1971) indicates nearly RD$6 million dollars worth of imported fish and sea food products. Codfish and sardines were the most important items. Dried cod, long a dietary staple of poorer classes, has increased in price to the point that it hardly competes with fresh red meat products. The Dominican Republic has no processing facilities for fish and sea foods and all indigenous production is consumed fresh or frozen.

The department of fish and game in SEA lists 2,624 registered fishermen. Data from IDECOOP aludes to 6,062 fishermen. The vast majority of all fishermen operate boats of less than 25 feet, many of which have no power other than rudimentary sails. Only a handful have refrigeration in the form of ice storage bins. Under current practices, from one to five fisherman per boat fish at night with hand lines and return at dawn to sell the catch at the beach. Prices received are generally low and the consumer in the capital pays from 2 to 4 times the beach price.

In 1971 IDECOOP organized six fishing cooperatives with a combined membership of 200. These are located at Manzanillo, Puerto Plata, San Pedro de Macorís, Azua and Barahona. This group provided the basis for a joint GODR/BID financed project for ocean fishing. The program can not yet be evaluated since initial disbursements were made in late 1973 and have yet to reach the cooperative members.

Based on consumption preferences the most important species of ocean fish are the inshore varieties such as bass, which are accessible to the small fishing boats.

While production totals are not large the SEA is presently raising tilapia, trout and carp under pond culture conditions. Fifteen ponds located in San Cristóbal are used for the final growth period for the fish which are harvested at maturity and sold to distributors who resell for domestic and export markets.

Additional research is necessary and perhaps concessionary loans for private sector development. It would now appear that the best potential for pond culture is with shrimp, crab, and the fishes, carp and tilapia.

Two private sector marine culture enterprises have been established in the past year, both are producing and processing ocean species for export markets. Both operations are too new to evaluate at this time and are not labor intensive or adaptive to rural areas or low income segments of the sector.

VI. PRODUCTION TARGETS, ACCOMPANYING POLICY CHANGES AND INVESTMENT COSTS

The choice of strategy alternative C, in combination with nutritional objectives and known population growth, enabl the fixing of production targets for 1980, and intervening years, with reasonable accuracy and confidence. By assessing requirements, agricultural product by product, it becomes possible to calculate inputs required to achieve targets and to make assumptions concerning costs under various alternatives since inputs, to some extent at least, are substitutable for each other. This methodology has been generally followed as a part of this assessment.

Figures are indicative rather than definitive. With the availability of increasingly better data, this analytical process can facilitate planning and evaluation as a basis for improved decision-making.

A. Production Targets, and Nutritional Consequences

The following tables reflect the magnitude of production in various categories projected for 1980, with two possible goal alternatives 1/, compared with today's estimated availability levels. It should be noted that 1973 and 1980 'Balanced Diet' columns represent suitably balanced diet for tropical populations and are projections based on INCAP recommendations.

1/ Alternatives for some crops are based in part upon levels of intensity of technology and commensurate levels of inputs to be applied.

TABLE VI - 1

Metric Tons	1973 Availability	1973 Balanced Diet	1973 Differences	1980 Balanced Diet	1980 Alternative I	1980 Alternative II
Rice (Milled)						
Production	234,000 2/	176,000	71,120	210,000	400,000	350,000
Import	31,200 3/					
	265,200					
Wheat and Other Cereals						
Import	98,549 3/	84,000	14,549	105,000	100,000	100,000
Legumes						
Production	61,267 2/	68,240	3,457	84,000	120,000	120,000
Imports	11,170 3/					
Exports	698 4/					
	71,097					
Edible Oil						
Production	33,000 5/	35,300	(34,722)	105,000	103,000	103,000
Imports	17,690 3/					
Exports	4,000 4/					
	50,578					

VI-2

(Continued)

TABLE VI - 1 (Continuation)

Metric Tons	1973 Availability	1973 Balanced Diet	1973 Differences	1980 Balanced Diet	1980 Alternative I	1980 Alternative II
Sugar	168,365 5/	255,901	(87,536)	315,000	310,000	310,000
Platanos	104,038 11/ (edible portions)				110,000	115,000
Cassava	137,669 12/ (edible portions)				160,000	170,000
Miscellaneous Tubers						
Potatoes	25,000 12/					
Sweet Potatoes	95,000				130,000	140,000
Total Plantains & Tubers	363,707	170,661	193,601	210,000	400,000	425,000
Poultry	53,000 6/				100,000	110,000

(Continued)

Table VI - 1 (Continuation)

Metric Tons	1973 Availability	1973 Balanced Diet	1973 Differences	1980 Balanced Diet	1980 Alternative I	1980 Alternative II
Beef	31,274 5/				35,000	36,000
Pork	17,000 7/				20,000	24,000
Eggs	22,155 8/				40,000	44,000
Fish	14,174 9/				15,000	20,000
Total Beef, Pork, Fish, Poultry, Eggs	142,603	170,601	(27,998)	210,000	210,000	234,000
Milk & Cheese	263,088 10/	853,005	(589,971)	1,049,000	500,000	500,000
Fruits						
Production	1,121,760 13/	682,404	400,982 14/	839,000	1,340,000	1,340,000
Exports	38,174					
Available	1,083,586 14/					

(Continued)

TABLE VI - 1 (Continuation)

Metric Tons	1973 Availability	1973 Balanced Diet	1973 Differences	1980 Balanced Diet	1980 Alternative I	1980 Alternative II
Vegetables						
Production	93,480	251,816	(178,336)	315,000	150,000	150,000
Imports	19,920					
Available	73,560					

1/ Based on estimates of nutritional requirements provided by INCAP.
2/ Source: Secretariat of State for Agriculture's Office of Estimates and Forecasts.
3/ Source: INFSPRE.
4/ Source: CLDOPEX.
5/ Source. Agricultural Attaché Office's estimate.
6/ Source. AgBank, estimate based on production of 25,000,000 commercial broilers and 4,000,000 non-commercial birds (last figure according to the Office of Estimates and Forecasts).
7/ Non-verifiable estimate based on apparent production trend, USAID/TAMC. Confidence factor not established.
8/ Source: Commercial production -- AgBank. Non-commercial (flocks under 1,000) -- Office of Estimates and Forecasts.
9/ Based on latest available (1971) imports (National Office of Statistics) and IDECOOP estimate of domestic production. Reliability factor not established.
10/ Source: Weekly rate of production from Office of Estimates and Forecasts survey, June 1973. Imports not included. Weekly rate projected for one year.
11/ Secretariat of Agriculture raw production estimate May 31, 1973 - June 1, 1974 of 686,637 inputs. Each unit 1/2 pound, reduced one-third to estimate edible portions.
12/ Secretariat of Agriculture raw production estimate: May 31, 1973 - June 1, 1974 = 164,363 MT reduced 15% to obtain edible portion.
13/ Estimate based on 1968 availability updated to current population.
14/ Probably not consumed, because of wastage.

VI - 5

TABLE VI - 2

Food Balance Sheet

Daily Per Capita Caloric and Protein Input

VI-6

Unit	Suggested Ideal Per Capita Consumption			Proposed Alternative I			Proposed Alternative II			Present Per Capita Consumption as of 12/1/73 (SEA Consumption Survey)		
	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein
Meat, Fish, Eggs & Poultry	100	300	16	100	300	16	112	335	17.8	60 1/	240	13 1/
Milk & Cheese	500	162	17	236	77	8	236	77	8	142	26	5
Sugar 4/	150	385	0	148	378	9	148	379	0	59	151	0
Vegetables	150	70	4	70	33	1.9	70	33	1.9	(47) 2/	(22) 2/	(1.3) 2/
Fruits	400	196	1	640	313	1.3	640	313	1.3	(690) 2/	(338) 2/	(1.4) 2/
Legumes	40	136	9	57	194	12.8	57	194	12.8	46	156	10
Wheat and Other Cereals	50	182	6	48	175	5.8	48	175	5.8	(30) 3/	(180) 3/	(6) 3/

(Continued)

TABLE VI - 2 (Continuation)

Unit	Suggested Ideal Per Capita Consumption			Proposed Alternative I			Proposed Alternative II			Present Per Capita Consumption as of 12/1/73 (SLA Consumption Survey		
	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein	Grams/ Capita Day	Calories	Protein
Plantains & Tubers	100	129	1	191	246	1.9	202	261	2	275	355	3
Fats & Oils	50	441	0	49	433	0	49	433	0	28	245	0
TOTAL		2,363	60		2,841	59.2		2,804	59.6		2,341	50 1/

1/ Meat consumption did not allow for wastages and inedible portions such as bones, fat, etc., therefore protein input is too high.
2/ Vegetable and fruit consumption were not taken on survey, therefore estimates were used. The fruit consumption estimates seem unreasonably high, since exports and wastage are not considered.
3/ Wheat & other cereals were taken from importation statistics.
4/ Sugar includes soft drinks, sweets, etc.

NOTE: Table VI-2 represents the approximate nutritional results of achieving the alternative production targets on Table VI-1.

The proposed alternative production targets for 1980 do not fully achieve needs for an ideal nutritional diet although these represent significant improvement over the average diet at present.

1) In alternative I, the suggested rice consumption per capita is 191 grams of raw rice. While this may appear excessive in bulk -- especially considering the age distribution of the population -- the recent agriculture consumption survey did show a per capita consumption of 168 grams per capita per day. Further, in some countries rice consumption is much higher than the 1980 target.

2) The suggested fruit consumption for both alternatives is also high, especially taking into consideration that fruits are not extensively consumed in this culture. However, an outlet for excess production would be available in export markets.

3) The availability of milk (240 grams per capita per day) is still too low to meet calcium and riboflavin requirements even though it is nearly twice the current availability. This is particularly so since the Dominican diet is traditionally low in green leafy vegetables. Nevertheless, prospective improvements proposed probably accord more closely with both buying power and anticipated cultural change prospects.

4) The proposed vegetable production (70 grams per capita per day) is much too low to provide what might be regarded as adequate dietary requirements. Increased consumption patterns would be dependent on the effectiveness of nutritional education programs designed to promote changes in Dominican dietary habits. Production can, to some extent, be made to respond to changing needs.

5) The projected production of plantains and tuber roots (191 and 202 grams per capita per day), which takes into account, but modifies to some extent, cultural preferences, is still too high and provide excessive bulk and 'empty calories to fill stomachs and would substitute for nutritionally better foods, especially since much of the protein intake will be in the form of bulky foodstuffs.

It may be noted that the 1973 Secretariat of Agriculture consumption survey reflected a better overall diet than previously estimated. It also provides some basis for calculating the 1973 food balance sheet. As can be seen, the total consumption of calories and protein in the consumption survey and the food balance sheet compare favorably, however, the meat consumption figure is overstated since waste and bones were included. This results in a poorer nutritional picture. Also, from visible observation it is a good surmise that the actual consumption of plantains and tuber roots is significantly higher than that reflected in the food balance sheet; unfortunately, these foodstuffs provide empty calories. The actual rice consumption is also higher than estimated on the food balance sheet, again reflecting an undesirable situation in which an unhealthy majority of calories are from high carbohydrate sources. Overall, the nutritional situation is serious when compared with today's estimated availability levels and the suggested ideal projection for 1980 based on INCAP recommendations.

As can be seen from the differences in the surveyed consumption figures, and the food balance sheet, there are shortcomings in the use of the food balance sheet even though it is a necessary tool for evaluation and planning in the agricultural sector.

Nevertheless, the 1980 targets would provide a significantly better diet than now available, assuming, of course, that preference patterns can be progressively changed and incomes more equitably distributed. In this way, effective demand would be better directed toward the rational selection of nutritionally desirable foodstuffs and production could be adjusted accordingly. The elements of such a coordinated attack are presented in the recommendations of this assessment and conceivably, the picture could be improved beyond the scope of these targets.

Part IV of the assessment presents an inventory of the resources at the command of the sector and an analysis of the constraints on the effective use of those assets which bear directly the capacity of the sector to achieve its goals and targets. Following this in Part V policy alternatives, necessary changes and approximate costs of reaching sector goals are examined.

We will now examine in detail micro-strategies for particular crops. This is an amplification and analysis of some measures which will be employed by the Government to achieve the 1980 production targets set forth above.

B. Rice

1. Alternative Strategies for Modifying Production

The current Dominican Republic rice industry encompasses a total of 144,590 hectares of land producing roughly 234,000 MT of milled rice per year with average yields of approximately 2.5 MT/ha. 1/

As in most crops, rice production and availability can be increased either through increased land for production of that crop, through increased yield per unit of land, or through prevention of loss between harvest and consumption.

The 1980 rice production goal of 400,000 MT, the target set forth as Alternative I, which has been adopted by the Government, requires an increase of 166,000 MT. The need to expand production of other crops militates against this increase being reached through expansion onto lands now in other crops. Some lands of capability Class V are available and under study for development.

One of the major proposals for meeting the rice production goal of 400,000 MT of milled rice is the development of 20,000 hectares of new or expanded irrigation systems to be devoted to rice production. This acreage should consist primarily of capability Class V lands. A study of the proposed areas matched against the life zone and capability land classification shows the following estimated land availability.

1/ Table VI-3.

TABLE VI - 3

Rice Production

(July 73 - June 74)

	Area Harvested (Hectares)	Production Per Hectare (MT rough rice)	Total Production (MT rough rice)	Total Production (MT milled rice at 65% conversion factor
June-Dec 1973	67,484	2.51	169,954	110,455
Dec-June 1974	77,106 1/	2.47 2/	190,455 2/	123,818
Total	144,590	2.49 (average)	360,409	234,273

1/ Planted December 1, 1973
2/ Expected production.

SOURCE: Area Probability Sample, SEA, Office of Estimates and Forecast, Dec. 1973.

- The western Cibao Valley. The proposed enlargement covers some 113,600 hectares. Class V lands represent only a very small part of the total but about 2,000 hectares should be used for rice.

- The San Juan Valley. Enlargement potential covers some 51,600 hectares. As much as 5,200 hectares are of Class V and could be converted to rice.

- The Limón area. The potential acreage is 6,000 hectares of which approximately 2,800 hectares are Class V lands.

- The San Rafael de Yuma area. The potential additional acreage is approximately 3,600 hectares, most of which are Class V.

- The Higuey area. The potential increase is 5,600 hectares which some 50% is Class V lands and could be planted to rice.

- The Guayubincito area. Approximately 3,600 hectares of which again some 50% is Class V.

In the above listed areas there is a total of at least 18,000 hectares under consideration for development that could be shifted to rice production. Other developmental areas will come under investigation and can make up the balance required.

The major effort to reach the goal will be made through increased production per unit of land, requiring improved seed and coordinated application of other inputs at increasing levels each year.

Wheat consumption, primarily as bread and pastries, is traditional in the Dominican Republic but wheat production is not suited to the climate, though it has been tried. Because wheat purchases represent a foreign exchange outlay and because wheat and rice are nutritionally comparable, the country

is committed to holding wheat importations as low as possible, probably at about 100,000 MT per year with the deficit covered by increased rice production. Assuming wheat imports are held to this level, substitution requirements will be 7,000 MT milled rice in 1975 increasing to at least 63,000 MT in 1980. The projected increase in rice yields is adequate to cover reduced per capita wheat availabilities, at least until 1980. SEA supports this wheat import policy and is promoting rice production accordingly. Of course, if the rice production program fails to meet its increased production goals, wheat imports will have to be allowed to rise. If P.L. 480 Title I wheat could be assumed under long term financing, the Government would want to reconsider its plan for a greater measure of self-sufficiency in rice.

- Trade-offs in production of rice vs. imports of wheat and rice are set forth in Annex 4.

2. Methods and Constraints

The more rapid introduction and expanded use of the high yielding rice varieties is the most effective way to increase production per unit of land. After nearly 10 years of rather intensive rice efforts through research and related programs, the proven new varieties still occupy only some 14,480 hectares (approximately 10%). Experimental and commercial production of these new varieties give yield increases of 700 to 1,200 kilograms per hectare.

To reach the 1980 production goal, approximately 15,000 hectares will be shifted to new varieties each year between 1975 and 1980. This action alone will step up annual output by an estimated 90,000 MT milled rice - but the major reason for promoting new varieties is that, without them, increased yields through inputs of fertilizer are limited. Traditional Dominican varieties respond to fertilizer by producing more vegetative growth which causes lodging and consequent loss of yield. A second method for increased production per unit of land is through the proper application of fertilizer, herbicides, water control and improved cultural practices, in general. For

reasons stated above, this method should be limited to lands planted to the improved varieties.

A successful input program requires determination of requirements along with the capacity of the government or private enterprise to manage the necessary importation and delivery systems. Input requirements in relation to desired output, are based on the general rule that inputs will be provided at a level of intensity that are economically efficient. A rice crop of 4,000 pounds of grain per acre removes 40-80 pounds of N, 8-12 pounds of P_2O_5 and 50-90 pounds of K_2O. Based on available research data, the range of required inputs and current recommendations are as follows:

Low rate application - 60# N, 40# P205, 20#, K20 per acre. Additional 20# N top dressing 75-80 days after emergence.

High rate application - 80#N, 40# P205, 40# K20 per acre. Additional top dressings of 20# each roughly 6-10 weeks after emergence.

It is expected that rates of applications will be perfected through continuing research to determine site-specific recommendations which maximize profit and minimize input requirements.

3. Operational Procedures for Modifying Production

a. Low rate option:

The low rate option would require a fertilizer application program in conjunction with the program for the spread of the new varieties to rice lands by 1980 as indicated in Table 4 following.

TABLE VI - 4

Increased Yield from Low Option

(in milled rice)

Year	Areas Affected		Yield Increase (MT)	Traditional Production (MT)	Total Production
	New Areas 1/ (Has.)	New Technology 2/ (10% each year) (Has.)			
1975	-0-	15,000	15,000	234,000	249,000
1976	4,000	30,000	40,000	234,000	274,000
1977	8,000	45,000	65,800	234,000	300,000
1978	12,000	60,000	91,200	234,000	325,000
1979	16,000	75,000	116,600	234,000	340,000
1980	20,000	90,000	142,000	234,000	376,000

1/ Production of new areas estimated at approximately 4 MT/ha rough rice (2.6 MT milled).

2/ Increased production from new technology estimated at 1.5 MT/ha rough rice or 1.0 MT milled rice.

The additional production of 90,000 MT on 90,000 hectares of old lands, plus the production on the traditionally treated rice lands, will be supplemented by the additional production on 20,000 hectares of new lands to approach achievement of the target of 400,000 MT by 1980. These additional rice areas will be obtained primarily on Class V soils, and by expansion of irrigation and drainage systems bringing additional lands into production in existing rice producing areas.

With new varieties, fertilizer applications and better cultural practices, by 1980, the 20,000 hectares of new lands should have a production capacity of the additional 52,000 MT of milled rice (2.6 MT/hectare milled).

TABLE VI - 5

Import Requirements for Fertilizer under Low Rate Option

Year	N - MT	P20% MT	K20 MT	Total
1975	1,780	890	445	3,115
1976	2,420	1,210	605	4,235
1977	2,900	1,450	725	5,075
1978	3,600	6,800	900	6,300
1979	4,160	2,080	1,040	7,280
1980	6,500	3,250	1,625	11,375

b. High rate option:

If a high rate option, employing maximum fertilizer and plant protection chemical application were used, at August 1973 prices, the cost would run to $1,726,000 per year when the 400,000 MT goal is reached. In addition to fertilizer, costs of proper applications of herbicides could average $7.00 for ingredients yearly per hectare. This option would require total use of new varieties and full scale fertilizer application which would not maximize profit opportunities. Further, it would require a 1975 start up on a larger area which may be unrealistic to implement. The high rate option, therefore,

appears less desirable given increased foreign exchange costs and high land use requirements. Experience has shown that a low level of intensity of technology is usually more readily accepted by most farmers than a high level.

Dry land production, in the sense that there is no supplemental irrigation applied, does not change the computations. Rice grown without supplemental irrigation is in areas where rainfall is sufficient so that moisture is not a limiting factor. Hence per unit of land production remains the same as for irrigated rice. Shifts should be made to the newest IRRI varieties, such as IR 20 and 26 which have an improved or increased protein value and good taste and grain characteristics without the normal loss of yield capacity. A planned and organized system of keeping abreast of new developments in the plant breeding and cultural practices of the International Agricultural Research Centers would benefit SEA's rice program. There is reasonably close relationship with the International Center for Tropical Agriculture (CIAT). This should be strengthened and consultation should be more frequent in rice and on other crops.

The SEA is aware of the need to throughly investigate the possibilities of taking advantage of new technology that has recently been developed by CIAT in the application of low cost land preparation by machinery and minimum tillage techniques of rice culture in poorly drained, unutilized lands (see Section IV - Land Resources). This technology consists of the use of wide rototiller - like attachments mounted on medium sized conventional tractors with special tires, enabling the tractors to incorporate the existing vegetative growth into the mud where it disintegrates. These operations performed in standing water provide for land leveling and tillage at costs estimated at approximately $60 per hectare. Following land preparation, bunds (dikes) are prepared with hand tools (shovels or hoes) to manage the water depth. Minimum tillage cultural practices involve hand broadcasting of germinated seed, fertilizer and herbicides. Hand harvesting and threshing is accomplished by hand tools (sickles) and simple, home made threshing tables mounted on metal drum wheels to provide mobility into the fields. Such methods are labor efficient

and comparable in cost to sophisticated and expensive mechanical threshers usually used in large scale operations.

The use of this system is recognized as an extremely valuable innovation to reclaim land, to make it productive for rice, to allow for expansion of rice production at low costs and to allow shifting of some lands now in rice cultivation to other more appropriate and perhaps more valuable crops.

CIAT has indicated a willingness to cooperate in providing technical assistance in such efforts. Visits should be arranged by competent rice agronomists and agricultural equipment specialists of SEA to discuss and arrange for such assistance, to observe operations at CIAT and at a pilot operation near Monteria, Colombia and to arrange the procurement of equipment comparable to the prototype equipment used by CIAT.

As a part of a complete rice program several other ancillary programs need to be tied in with the increased production program:

- A seed certification program to assure quality seed;
- Certified seed growers associations to provide adequate pure seed of the adapted improved varieties,
- Improvement in grain handling, drying, storage and transport;
- A program for inspection and regulation of rice mill efficiency,
- Extension programs to promote better technology
- Marketing programs to assure incentive prices to producers as well as fair prices to consumers.

The primary limitations on the accomplishment of the 1980 rice goals stem basically from the fact that farmers generally lack access to the needed support systems. Lacking this access, the farmers -- especially the smaller ones -- are unable to become more efficient in farming methods. This leaves them with only a goal of subsistence farming and few opportunities to escape the system.

Small farm machinery within the farmer's ability to finance and operate is unavailable in the country. Farmers, especially the smaller ones, lack access to technical information regarding the availability and technology of the new varieties. Many areas are inadequately served by systems for transportation of needed inputs and for marketing. However, credit for rice appears to be relatively adequate for production credit loans, given the current official interest in rice production.

Probably the second greatest constraint is in the input delivery system for the fertilizer, herbicides, and other materials. In the plan a year's lag is allowed to begin implementation of the low option program in new areas to permit preparation of support systems. SEA, with the other interested agencies, has formed a working group to define target areas for the entire program. A monitoring group will follow-up the progress of operations and take corrective actions where necessary. Once the program is underway the following actions will be guided by SEA:

(1) All major credit institutions in the country will participate in the program. A working committee composed of high level administrators will apportion responsibilities for management and financing of the program. Technical assistance will be provided to groups of farmers along with credit.

(2) The seed multiplication program will be assigned to the research service which will determine what varieties are to be applied to each area and the amount of seed that will be needed. The lands on which seed will be grown will be identified. Private farmers are being contracted to grow seed. (These growers could form the base for seed growers associations.)

(3) Rice production will be encouraged in those lands most appropriate for rice, releasing marginal rice land for other crops as appropriate. Allocation of credit can provide an incentive for making these land use decisions.

The efficient production of rice should be considered in terms of the value of rice produced as well as that of other crops grown on the same land in rotation with rice throughout the year. In areas where irrigation water is insufficient for double cropping of rice, research efforts should be initiated to conduct studies of the rotation of sorghum, beans, sesame, peanuts, soybeans and other crops to determine the most appropriate crops and practices to make efficient use of residual moisture, residual nutrients as well as land and manpower resources. Rotation of minimum tillage sorghum following rice has been very successful in some countries of the world that have conditions similar to the Dominican Republic. Such culture of sorghum involves little more than planting sorghum seed in the tuft of the rice stubble which remains in the field after the rice is harvested. These practices, as well as others to be perfected for other crops through research, could increase production and productivity in areas that have apparent limited potential. Given the land base constraints which exist in the Dominican Republic, these more intensive cultural methods need to be developed and employed by farmers to produce the food and feed requirements indicated in this assessment.

C. Beans

1. Alternative Strategies for Modifying Production

The native red bean is a major contributor to the protein content of the Dominican diet. Production in 1973 was reported as 61,207 MT (Secretariat of State for Agriculture's Office of Estimates and Forecasts). This production compares with an estimated requirement of 68,240 MT, a deficit met with the import of 11,170 MT. The target for 1980 for dry bean production has been set at 120,000 MT. Red beans are important enough to justify an increase in area planted after other means of increasing production are exhausted.

2. Methods and Constraints

Present production is organized in two distinct systems. In one, during the wet season, beans are interplanted with crops such as corn and cassava or as a single crop. This system is followed on the steeper slopes and poorer soils in the lower rainfall areas, i.e., the subtropical dry forests with rainfall between 500 and 1,000 mm. and even on steeper slopes and poorer lands in the subtropical moist forest life zone with rainfall of 1,500 to 2,000 mm. Yields from these areas are low. Inputs would probably not yield an economic return.

In the other production system, beans follow rice on irrigated lands during the dry season. There are approximately 835,000 tareas (52,500 ha.) of beans grown under this practice, primarily in the Santiago, Higuey and San Juan areas or in the S - mf life zone. Here, yields are considerably better and with required inputs can be economically increased by an average of 65 pounds per tarea.

Dry red beans were selling on the Santo Domingo retail market for 28 cents a pound in February 1974. The support price is 19.5 cents a pound. Current prices should give ample incentive to the producer on the better lands to adopt the improved cultural practices required for better yields.

The preferred variety of dry bean is the Pompadour species with Pompadour Large being the most desirable. This is a well adapted variety and could be used as the basis for a selection and growing program. As is common for most crops in the Dominican Republic, the market basket is the farmer's source of seed.

From 90 to 95% of bean fields are estimated to be heavily infected with common bean mosaic. This virus is seed borne and transmitted from plant to plant by aphids and other sucking insects. The control of the disease, therefore, requires disease-free seeds and an insecticide program capable of controlling the insects which spread the virus in the field.

Seed improvement is basic to any production increase. Without improved seed as a base, fertilizer inputs and expensive insecticide and fungicide applications probably are not productive.

3. Operational Procedures for Modifying Production

A suggested seed improvement plan being considered by SEA follows:

A trained team of agronomists and plant pathologists should make an extensive field survey of various fields of beans growing during the dry season in the Santiago area. The objective is to find fields of disease-free and true to type beans and which will produce at least one-ton volumes -- then to contract for purchase of the crop from the farmer at a premium price of 20% above the support price, arrange for a pick-up date after threshing and transport to INESPRE storage centers.

The seed should be cleaned, graded and then released to selected farmers for reproduction under contract during the next dry season. These growers will form the nucleus of a seed growers' association for beans and will be guaranteed a premium price of 20% above the market for disease-free beans.

In the first year of the contract seed program the purchase goal should be 100,000 pounds of disease-free seed selected from farms yielding 120 pounds per tarea or more. In the second year dry season, the target should be to contract for planting of 5,000 tareas and receiving 750,000 pounds. In the third year, contract to seed 37,500 tareas with an expected harvest of 6,570,000 pounds. Each year only 50% of the best seed purchased would be placed out on contract for another seed crop. The rejected seed would be sold on the commercial market. This constant rejection of 50% provides a good basis for culling and selection to assure the best seed source. Starting with the second year, a full package of agronomic recommendations should be made available through extension services.

After the third year, it should no longer be necessary for the Government to contract at a premium for pro-

duction of additional seed. By this time the contract growers would be producing approximately a third of the seed requirements and could carry on under their own initiative along with other growers who would be entering the market with improved seed under a seed certification law and regulations. If an education program does not convince the farmer that certified seed is worth a premium price, then it may be necessary for the Government to subsidize the seed program through a payment for certification.

TABLE VI - 6

Direct Cost-Seed Improvement Program

1974 -- Purchase 100,000 lbs. seed at 24 cents	$ 24,000
1975 -- Purchase 750,000 lbs. seed at 24 cents	180,000
1976 -- Premium 6,750,000 lbs. seed at 4 cents	270,000
Contracting, transportation, storage, overhead	90,000
Total	$564,000

Since 50% of the seed would be rejected, the proceeds from its sale at market price would revert to the Government. Program costs would be correspondingly reduced.

There is little reason to believe that production on the 774,000 tarea wet season uplands can be reasonably or economically improved beyond the 20% expected from them through the use of improved seed. Hence, production would hold at around 80 pounds per tarea with the use of improved seed only, with no fertilizer or disease control. This would produce an annual yield of 27,200 MT.

For the 835,000 tareas of dry season beans grown as second crop following rice on better lands, a final program of full fertilization of 40 pounds 16-20-10 per tarea plus complete disease and pest protection is recommended to arrive at an annual yield of 119 lbs/tarea (present), plus 22 lbs/tarea from seed, plus 40 lbs. from fertilization to give a total of 68,270 MT.

Starting with the fifth year of the program, 100,000 tareas of additional land could be phased into the program each year through the seventh year. Thus in 1980, a total new area of 300,000 tareas with an additional output of 25,000 MT will be in beans, under irrigation from the lands released from second cropping from the rice program.

In the 1980 season, a total of 1,135,000 tareas with a projected production of 120,000 MT will be growing beans under a full input program. This will include the application of 20,000 MT of 16-20-10 fertilizer at a cost of $4,200,000 and the full complement of insecticides and other chemicals required for full crop protection. While costs change from time to time, using the general rule of thumb that protection costs equal fertilizer costs, this would add another $4,200,000, making a total of $8,400,000. The full treatment program could be phased in over a four year period starting in 1977 for 25% of the total area and increasing each year by a fourth.

4. Overcoming the Constraints

The primary constraint is in the seed production program. Other phases of the program such as the application of fertilizer, plant protection, etc., should be popular with producers if prices hold up in relation to other basic crops.

To overcome this constraint, a seed certification program for beans is necessary, with the ultimate responsibilities for seed production in the private sector. The Government can provide, through various sources of funding, the necessary capital to operate the seed program as outlined above, and if necessary, pay certified seed growers a premium for growing and marketing certified seed until the program is firmly established.

To implement this program, SEA would assign responsibility and authority to a specific section, giving monitoring responsibility to the Planning Office which would also assist the implementing body with a system planning approach for implementation. INESPRE must continue its current support

price on beans which is competitive with other crops and make its facilities available for seed handling.

SEA would assure the timely availability of fertilizer and protection inputs, either through the private sector or through public institutions or a combination of the two.

D. Oil Crops

Domestic edible oils in the Dominican Republic are mainly derived from peanuts and coconut. Imports are mainly in the form of soybeans with limited amounts of cotton seed oil and corn oil.

Nutritional requirements were placed at 85,300 MT for 1973 with a 1980 target of 103,000 MT. The 1973 availability from local production from all sources including processing of imported soybeans was 38,900 MT.

Coconut oil is the second most important source of oil. In the last three years, it has shown the greatest percentage of increase in production. The remaining production is mainly from processing imported soybeans.

TABLE VI - 7

Production (Oil Basis in MT)

Year	Peanuts	Coconut	Other
1971	59,000	9,300	300
1972	64,700	10,565	500
1973	62,900	12,000	2,500

In view of the tightening oil situation and the need for peanut cake and coconut meal for livestock and poultry feeding, the GODR has restricted export of copra and peanut cake.

The Dominican Republic has only marginal options in satisfying its edible oil needs. Because about 60,000 subsistance farmers depend on peanuts, the country is obliged to continue its production efforts. On the other hand, to meet global

requirements for edible oil, other crops, such as beans and rice would have to be sacrified. Within these limits then, the problem facing the country is to maximize production on present lands and to minimize the use of oil seeds and oils which will inevitably have to be imported. The advantage of importing oil seeds, as applied to importation of oil, is shown in Annex 4.

A continuation of the steady increase in the production of peanuts per unit of land noted in recent years is probable. There will be some shifting of plantings to better soils if the local price is allowed to reflect the increased prices for edible oils on the world market but total acreage should remain relatively steady. The extension and service efforts of the processing companies should continue to improve with experience. Relatively sound technical standards for production are available from both. In addition, the gradual shift to the Starr variety should continue giving a higher oil producing peanut, thinner shelled and less susceptible to disease. Also, a subsidy of about RD$1.70 per tarea probably will continue and might even be increased. Thus one can logically conclude that yield will increase by some 25% over the period from 1974 to 1980.

Further, the production and consumption of coconut oil also probably will increase as a result of the planned educational program. Higher market prices also will encourage better management and collection programs, laying the basis for an expected 35% production increase in 1980 over 1973.

These appreciable increases still will fall far short of meeting either effective demand or nutritional needs. Assuming that effective demand will increase 12% per year, the following total oil requirements reflected as effective demand in Metric Tons would emerge:

Year	MT
1974	58,900
1975	65,968
1976	73,844
1977	82,750
1978	92,680
1979	103,801
1980	103,801

Effective demand and nutritional need come together in 1979. Effective demand and nutritional demand are held steady for 1980, subsequent to another later look at the problem.

It is proposed that half of the difference between increased local production and effective demand be met through the import of unprocessed soybeans with imported processed oil meeting the other half. The resulting soybean meal and peanut cake by-products from local processing would adequately cover the meal and cake requirements for the livestock and poultry program projected in this assessment.

In 1973 in addition to the local production, 13,690 MT were imported. This left a 1973 shortfall of 34,722 MT below estimated nutritional requirements.

In effect, the total availability of 50,578 MT for 1973 comes close to being the current effective demand and is used as the base from which to project production increase programs to meet need.

1. Local Production vs. Imports

Local production of oil from peanuts is as follows:

TABLE VI - 8

Year	Tareas	Production in MT	(Oil, MT)
1971	1,113,000	59,000	23,000
1972	1,189,320	62,700	23,900
1973	1,224,300	62,900	23,900

The local peanut oil industry has an extraction rate of 42%. Approximately 90% of the production in the country is crushed for oil. Production is encouraged through the furnishing of seed, limited fertilizer, some machinery and limited credit to the producer by the two largest companies in the oil extraction business, i.e., Sociedad Industrial Dominicana and Lavador. Peanut oil is still the preferred oil of the

mass of the Dominican consumers, although they are slowly accepting more coconut oil and soybean oil. INESPRE is conducting an educational program in the use of other oils.

The following table shows the shortfall to be made up through the 50-50 importation of unprocessed beans and oil. This table takes into account the projected increase in domestic source oil production:

TABLE VI - 9

Projected Production - Oil Basis
(Metric Tons)

Year	Peanuts	Coconut	Local Prodc.	Effec. Demand	Shortfall to be Made up through Imports
1973	23,900	12,000	35,900		
1974	25,015	12,366	37,381	58,900	21,519
1975	26,130	12,732	38,862	65,968	27,106
1976	27,245	13,098	40,343	73,884	33,541
1977	28,360	13,464	41,824	82,750	40,926
1978	29,475	13,830	42,305	92,680	50,375
1979	30,590	13,196	43,786	103,800	60,009
1980	30,590	13,196	43,786	103,801	60,009

2. Imports

On the basis of an 18% soybean extraction rate, the following imports of unprocessed soybeans would be needed if the edible oil shortfall were entirely met from unprocessed soybeans:

Year	Soybeans	Oil Output	Meal Output
1974	124,200	21,519	104,781
1975	159,400	27,106	132,294
1976	197,300	33,541	163,759
1977	240,700	40,926	199,774
1978	295,000	50,375	244,625
1979	355,000	60,015	292,985

If only one half of the shortfall were filled in the form of unprocessed soybeans and the balance were in the form of processed oil, the alternative would require the local processing industry to double its output, which would be accomplished with present processing capacity -- currently utilized only on an eight-hour shift -- by putting on a second shift.

If only 50 percent of the shortfall were covered by importation of unprocessed soybeans, the total domestic availability of soybean meal and copra and peanut cake would be:

Year	Peanut Cake	Copra	Soybean Meal
1974	35,000	8,000	52,000
1975			66,000
1976			81,500
1977			99,500
1978			122,000
1979			146,500
1980	42,400	9,400	146,500

The dollar cost to the Dominican Republic of this program is estimated as follows. It is calculated on the basis of charge of 150 dollars a ton for beans in the Midwest U.S., plus 20 dollars handling and transportation charges. This price, while below present U.S. prices, represents a projection of average U.S. soybean prices for the 1975-80 period:

Year	Volume	Cost in Dollars
1975	79,500	13,515,000
1976	98,500	16,745,000
1977	120,000	20,400,000
1978	147,500	24,990,000
1979	177,000	29,990,000

The start-up cost of the foregoing importations could be covered by a commodity loan from the Government to processors and used on a revolving fund basis to continue the

program. Sale of the meal alone would virtually pay for the program. On the other hand, if crushing capacity were increased the trade-offs are shown in Annex 4.

Another alternative program would be to grow locally the raw materials for more oil production. Possibilities include increased peanut production acreage, increased coconut or oil palm plantings, and a soybean production program. Unfortunately the scientific research base for any of the above is not fully developed. There is local experience in peanuts -- yet beyond the modest increases expected, substantial increases could only come from additional land already occupied by other crops. In general, peanuts are not overly competitive with short cycle intensive crops already found in the country. A soybean program also would require displacement of other crops. Even with the most optimistic production estimates of one MT of soybeans per 5.6 tareas, over 700,000 tareas of irrigated land would be needed to meet 1974 requirements and over 1,975,000 for the 1980 target. Furthermore, considerable construction of local storage facilities would be needed to carry such a stepped up domestic production. This alternative is probably not feasible.

3. Constraints

The program would encounter very few constraints once the policy determination was made by the Government of the Dominican Republic to adopt the plan and the initial funding was arranged. The meal is needed in the livestock and poultry programs and its local value should cover the cost of purchase, import and processing of the soybeans. It is also possible to develop systems for processing oil by-products for direct human consumption, thus bypassing the livestock industry. There would be some added cost for the livestock and poultry program in the feed processing plants and the additives required in the form of vitamins and minerals. But the basic milling facilities are in place with experienced management and operators.

The Dominican Republic is experienced in the importation of agricultural commodities through organizations such as INESFRE. Thus, the only other problem is the availability of

unprocessed soybeans to import. This would require orderly placement of orders and scheduling of shipments to insure a continual flow of stocks for the processing and hold the volume of local storage facilities needed to a minimum.

F. Sugar Cane

The production, export and consumption of sugar in the Dominican Republic set new records in 1973. In all probability, this record will again be broken in 1974.

For some time the trend has been an expansion in both total land planted to sugar cane and in production per unit of land. In 1972, approximately 2,405,000 tareas were harvested and 2,590,000 tareas in 1973.

Cane production totalled 10,473,300 short tons in 1972. Estimated production of the 1973 crop is 11,475,400 short tons. Sugar production hit record levels during 1972 of 1,255,562 tons compared with 1,210,595 tons during 1971. The estimated production for 1973 was 1,400,000 tons. From these record crops, the Dominican Republic exported 1,082,176 short tons of crude in 1971, 1,221,444 short tons in 1972 and an estimated 1,270,302 short tons in 1973. By-product exports of molasses and furfural have also increased proportionately.

In the past, legislation regulated sugar cane planting. Under the push of increasing world prices, this legislation has been tempered and in 1972 in late September the GODR authorized marginal increases in sugar-cane plantings.

Local consumption has also been expanding rapidly from 144,456 short tons in 1971, to an estimated 168,365 short tons in 1973. Local consumption of molasses is estimated at 9.5 million gallons in 1971 and estimated 11.0 million in 1973.

This local consumption pattern is projected to grow further with rising affluence and expanding population. It poses a problem of the competition between desire for export earnings at swollen world market prices and the need for domestic consumption. The sugar production undoubtedly will meet

effective demand as long as the market reflects a fairly high price for the product. The consumption requirement based upon nutritional need is another matter. In 1973 there was an 87,536 ton shortfall. The goal for internal consumption has been set at 310,000 tons in 1980 against a requirement of the same figure.

1. Alternative Strategies for Modifying Production

There is no desire to modify or limit sugar production except as increased production comes at the expense of moving onto lands planted in other crops. At least for the near future, world sugar prices will justify increased inputs in the form of investment in machinery, fertilizer, plant protection, so the maximum potential yield can be reached. The strategy thus is to encourage the CODR to increase production to the maximum through technical and other inputs without expanding the land base of the crop.

2. Methods and Constraints

The production of sugar-cane in the Dominican Republic is controlled by CEA, La Romana Corporation and Vicini. These organizations have the required technical base, infrastructure and capital to remove most of the constraints controllable by man in the production of the crop. They have the staff and expertness required to adapt or develop new technology, obtain and use the inputs, provide the credit and manage the system.

The Dominican Government will undoubtedly maintain that sugar production must continue to increase, both for internal and external demand. Increases can be achieved by various combinations of land, labor and capital. Labor and land are of primary importance with the current technology. The basic trade-off however, is this: by intensifying capital inputs, e.g., tractors, mechanical harvesters and loaders, manual labor requirements can be reduced. Capital expenditures for improved cane varieties, irrigation works and fertilizers can increase production per unit and thus reduce land requirements with less effect on labor.

Well over half of the field work force is the Haitian origin since cane cutting is regarded as the denigrating employment for Dominicans. Substantial reduction of the work force in sugar could be accomplished with few, if any, ill effects on the Dominican rural economy if marginal sugar lands were efficiently shifted to other labor intensive activities, compensating for reduced employment in sugar. Given the importance of sugar to the balance of payments situation, any reduction in sugar exports during the current strong world market period would not be most prudent. But release of land for other production which can be done while increasing present sugar exports should be carefully considered.

F. Plantains, Tubers and Root Crops

Crops within this category consist of plantains, potatoes (both sweet and Irish), yautía and yucca. The majority of these crops are controlled in acreage and volume of production by effective demand and local consumption needs for a bulk diet. Generally, they are in oversupply insofar as the marketable portion of the crop is concerned. There is a considerable element of waste built into these crops since they are perishable and generally marketed with little or no processing. However, with the exception of plantains and bananas, production responds rather rapidly to price changes.

These crops under existing cultural patterns are important in the diet of low income groups. They are generally available through home production, are relatively cheap in relation to bulk and have become a part of the dietary habits of many people simply through custom or availability.

Supply and consumption at present are well above the levels appropriate for a suitably nutritious diet, particularly if the programs for production of higher protein foods are effective. At present they substitute, at least, in overall caloric intake, for the shortage of the higher protein crops. Supply is estimated at about 363,700 MT against a recommended intake level of 170,600 MT -- giving a theoretical surplus of about 193,100 MT.

Obviously the target of 206,000 MT in 1980 will be met and well surpassed. This, in total, is not all bad. These foods provide a food bank of substitution carbohydrate food for the less affluent through the transition period of raising per capita income, with crops which are highly responsive to effective demand and capable of rapid adjustment.

SEA's primary strategy is to avoid disruption of the present production pattern of these crops while encouraging shifts, through educational programs and the mass media, away from over-consumption domestically, and seeking export markets and other uses, such as animal feed, for the excess which could result from such preference changes.

G. Fruits and Vegetables

Fruits and vegetables are produced in scattered small operations countrywide, often served by poor roads, without domestic grading systems or market news reports. There are no large, specialized production areas, except for commercialized production for processing, and limited production of vegetables for export. This assessment is primarily concerned with the production of fruits and vegetables for domestic use.

The objective is to expand the production and consumption of fruits and vegetables. While a specific overall target for 1980 has been set, it is impossible to determine the extent of the production effort needed because data is not sufficient to determine the make-up of present production and consumption. There is, however, general acceptance of the fact that the national diet is deficient in these foods.

1. Alternative Strategies for Modifying Production

A combination of several strategies will be desirable. A major effort should be made to increase the yield according to market demand. Some expansion of area planted may be needed but the area affected by expansion will be too small to materially affect the global land use pattern developed in this assessment. Great improvement in methods of handling, storage and marketing (including consumer education) are needed to reduce physical loss.

2. Methods and Constraints

a. Varieties - Experimental work on development and selection of improved vegetable varieties is limited. Local trial plots on varieties used in other Caribbean countries should be inaugurated. There have been indications of superior varieties uncovered through trials under local conditions. These results need to be assembled, evaluated and developed into specific recommendations for different soil types and life zones.

b. Production Methods - Technical assistance on the most desirable methods of vegetable production is needed -- both with respect to small plots for local use and for commercialized production. Most vegetables have a short growing period. The combination of vegetables with other crops in a multi-cropping program should be investigated. Mechanization of land preparation may be needed to implement an extra crop on such lands. Stepped up research on fertilizer needs and response is needed.

c. Marketing - The most severe constraint on production and consumption of fresh vegetables is the marketing system. Unstable prices associated with unplanned (insufficient or excessive) vegetable production limits profit and output.

A municipal market planning organization and management technical assistance program is needed to determine administrative changes and regulations needed to make existing public markets function more effectively. Producer marketing associations must be organized to provide a better tie between individual producers, wholesalers and retailers and to provide for a better flow of information. Management training in market operation is needed for retailers and wholesalers along with a program of supervised credit as a way of inducing cost-reducing marketing innovations.

d. Consumer Decisions - Many consumers do not appreciate the nutritional value of fresh fruits and vegetables. A major nutrition education program which stresses the desirability of consuming fresh fruits and vegetables is needed to overcome this constraint.

3. Seed Supply - As with nearly all crops in the Dominican Republic, a reliable seed supply is one of the major limiting factors to reaching potential production. What is most required is a seed certification program which sets up procedures and methods for the production and certification within the country of a reliable seed supply of the major crops. Outside sources of seed are not dependable over the long haul. Further, a seed certification procedure offers the opportunity to build in an in-country industry of seed suppliers and distributers. To be effective, any seed supply program must be backed by official governmental sanction, monetary-support in the form of subsidy start-up payments of premiums for producers and thorough policing powers to control the abusers of the program.

The certification program should be coupled with varietal research work on existing stations with expansion through substations to different life zones as rapidly as qualified personnel and budgets become available.

This action cannot be quantified at present. It is covered more fully in the overview section of the crop picture.

H. Livestock, Dairy and Beef

1. Alternative Livestock Production Strategies

Three possible strategies exist for meeting the 1980 target of doubling the current milk production. One is to simply increase the number of cows milked, in other words milk twice as many cows by 1980. This is costly, however, for it involves producing enough food (mostly pasture) to double the present amount of dairy cattle which, in turn would require increasing the amount of land in pasture to support additional dairy cattle.

The second strategy would be to decrease beef production to shift pastures to dairy use. This would be preferable to the first alternative since dairy cattle make more efficient use of feed resources than do beef. The third plan would be to increase the milk output per cow. Given the present

low average level of milk production (2000 pounds per cow) in the Dominican Republic, this is the most economical choice since, first, it would overcome the necessity of using additional pasture to maintain the added number of dairy animals which the first alternative would require, and second, it projects a larger total (beef and dairy) output from the pasture resources of the nation. It should be possible to double the average production per cow through improved husbandry, nutrition and marketing incentives. This improvement will have to take place on the farms where dairy is treated as an enterprise. That portion of the nation's dairy cows which are handled by subsistence or very small farmers cannot be expected to show any appreciable increased production per animal unit.

The strategy for beef production is to improve the management level of the existing herds. Thus, no additional lands will be programmed for beef. However, the actual output of beef can be augmented by increasing the annual calf crop in both beef and dairy herds and shortening the time needed to get an animal to the desired weight for slaughter, which can be achieved by improved management and nutrition practices, such as improved pastures, pasture rotation and supplemental feeding on pastures. Success in this endeavor could nearly double the amount of beef available for domestic consumption or export by the end of the decade and probably release some land for crop production.

The strategy for pork production is to depend upon the increase in garbage and offal as the nation's population grows as the feed base for increased hog numbers. Expansion much beyond this would require specialized commercial operations based on imported corn. There is little evidence that hogs can compete economically with poultry for sizable quantities of imported grain, except by a few highly efficient and specialized hog producers. This means the continued importation of some selected pork products.

2. Methods and Constraints - Milk Production

a. Breeds - The predominant dairy breed in the Dominican Republic is the Holstein, with some Brown Swiss in

the northern region. In the eastern region on those farms following the so-called dual-purpose type of management, the typical breed is the Criolla or native-type.

In the majority of herds, bulls are used mainly as "cow fresheners". Only in the relatively few better managed dairy herds is an effort made to use improved bulls. Virtually no culling is done in an effort to raise herd production averages.

Use of artificial insemination should be encouraged in the more specialized dairy herds and bull calves from upper level production herds could be saved and distributed among the lower producing herds, in order to achieve an improvement in the genetic make-up of less specialized herds. A SEA-sponsored program to collect and distribute these calves is needed in which more desirable bulls could be exchanged for an ordinary calf. The latter would be sold for meat, with SEA absorbing any difference in price. Further, the increased use of Brown Swiss bulls in the dual-purpose herds should raise their production potential, without a serious loss in the meat component of the operation.

The Extension Service and the dairy processing firms both need to conduct educational programs stressing to the owners and administrators of dairy herds the importance of genetic improvement through the use of improved bulls and the use of simple production records for culling purposes. The ban on slaughter of female cattle should also be re-examined and, perhaps, eliminated.

b. Nutrition - Good pasture provides the cheapest feed for cattle. An abundance of good pasture is necessary for economical milk production. Unfortunately, in most of the Dominican Republic, good pastures are naturally available only part of the year. Thus proper pasture management as well as supplemental feeding are essential. Farm investment needs are limited to an electric fencer and a rotary mower for clipping the pastures.

Probably only the top fourth of Dominican dairymen feed any concentrate to their dairy cattle, and even at this level generally the same amount of concentrate is fed all cows, regardless of the level of production or stage in lactation. Frequently the rations are not balanced with minerals, vitamins and protein; very little grain in total is fed. Domestic supplies of corn and sorghum, wheat and rice bran, soybean and peanut meal, molasses and salt are available, however, the overall supply of feed will not be adequate if poultry production is expanded as targeted. So, imports, particularly of grain and feed additives will be needed to complement local feed supplies.

Pasture management is virtually lacking. Experience in Puerto Rico, where soil and climatic conditions are very similar, indicate significant increases in feeding value and average carrying capacity of pastures, through improved pasture management and rotation grazing. Calf nutrition likewise needs improvemenet.

Educational programs on dairy nutrition by feed companies, dairy processing firms, the Extension Service and fertilizer companies are needed. Credit for pasture renovation may also be needed by some producers.

The typical interval between calving is 18 to 20 months. Coupled with the practice of keeping cattle for several years despite their failure to conceive, this results in 50 to 60% calving percentage. Both of these marks are well off the accepted standards of the leading dairy countries. Under the dual purpose management program, cows are milked only once daily. While under the more specialized dairy management programs the goal is to milk twice daily, frequent electricity interruptions often make it impossible on farms where cattle are milked by machine or the milk held in cooling tanks. Small standby electrical generators become highly important for well managed herds under such circumstances. Improved management practices likewise need to be stressed in educational programs by the Extension Service, feed companies and dairy processing firms.

c. Housing - Improved facilities which provide more sanitary conditions for milking and better feeding conditions are required on many dairy farms. Plans and designs for such facilities should be developed and made available by the Extension Service, feed companies and dairy processing firms.

d. Marketing - If these production constraints were overcome, the result would be a reduction in production costs per 100 pounds of milk. Hence milk prices per unit could be lowered in the long run -- assuming that feed costs remain reasonable. But in order to translate this into lower consumer prices, marketing costs per unit would have to decline. There is some evidence that marketing costs could be reduced.

e. Producer Pricing - Present farm milk prices are set by the Government Price Control Agency at 10 cents for processing milk and 19 cents per quart for Grade A milk for pasteurizing. No seasonal price variation is provided to reflect normal seasonal production variations -- other than the milk processor-producer agreement which provides for a farm price of 10 cents a quart for that part of the producer's output which cannot be sold as pasteurized milk and must be diverted for powdered milk. Some seasonal variation in the pricing formula at the farm level is needed to encourage management practices which would help smooth out fluctuations in milk production. Other raw milk typically sells for 8 or 9 cents a quart at the farm, also with no seasonal variation.

f. Assembly and Transportation - Milk which is to be pasteurized is hauled in bulk tanks from the farm. The smaller processors and the raw milk distributors assemble the milk in cans, buying from farmers as near the market as possible. Sanitary and health requirements are set by the pasteurizing plants on Grade A milk they collect. No requirements are enforced on milk for other uses. Assembly and transportation costs are high for smaller processors. As the volume of milk produced increases, these costs per unit should be reduced.

g. Processing - There are no serious constraints in the processing phase of the dairy production and marketing

system. During the past 3 to 4 years there has been a rapid expansion in milk processing capacity. Current pasteurizing capacity is 8 to 10 times actual current output. Total processing capacity for the nation in 1972 was estimated to be almost three times current output. Thus, except for improvement of sanitary conditions in some of the smaller plants, no serious processing capital requirements are apparent in the dairy industry.

h. Distribution - Raw milk distribution is carried out under very unsanitary conditions with evidence of adulteration of the product, especially in the dry season of shorter milk supply. The raw milk distributors handle small volumes at very high marketing costs per unit. Presently, the consumer pays 22 to 24¢ per quart in bulk for this raw milk, in comparison with 28¢ for delivered bottled pasteurized milk. When one takes into account the extra water in the typically adulterated bulk raw milk, the actual consumer cost in terms of pure milk equivalent is about equal to that of the bottled pasteurized product. Moreover, the raw milk is greatly inferior from a health standpoint and cost is added for home pasteurizing. Therefore, it should be possible to switch to a completely pasteurized whole milk system without affecting the actual net price to the consumer. In fact, if the pasteurizers were able to make more full use of the equipment already in place, they could reduce the share of the overhead each quart of pasteurized milk now carries. Thus a reduction in the cost per bottle of pasteurized milk could be effected. Furthermore, pasteurizers could cut the cost of milk to lower income consumers, by marketing a low fat content (2% butterfat) pasteurized product at a reduced price.

These milk distribution changes would require Governmental regulation to prohibit the sale of raw milk. Also the Government milk pricing regulations would need to be changed to permit the marketing of lower fat pasteurized milk at a reduced price. The proposed program should be tried first in Santo Domingo -- and then spread to Santiago and other major cities on the basis of the experience in the Capital.

Capital needs of pasteurizers would be limited to financing additional bottles and delivery trucks.-- which very likely could be handled through normal commercial sources.

i. Consumer Decisions - Educational and informational programs designed to acquaint consumers with the desirable qualities of pasteurized milk as compared with raw milk (as well as of the nutritional qualities of milk itself) will need to be mounted by the Extension Service, other Governmental agencies such as the Secretariat of Public Health, taught in the schools, and advertised by the dairy companies.

The major constraints in meeting the 1980 production target, center around the low production per cow and low consumption of dairy products. The low production is largely a result of nutritional and management deficiencies coupled with genetic deficiencies with respect to inherent production ability. The lack of consumption incentive is a combination of low levels of income and failure to recognize the nutritional values of milk. The following measures are being considered by SEA: (1) educational and action programs by dairy companies and the Government to increase consumption of wholesome dairy products; (2) a greatly stepped up dairy herd management educational program by the Extension Service, feed companies, milk pasteurizers and processors; (3) Governmental actions to provide more stable supplies of needed imported feed; (4) Governmental programs to make available for breeding purposes the bull calves from the higher producing herds.

First priority should be on increasing milk consumption and improving dairy herd management nutrition and management. A 25% increase in milk production should be possible in three years in this manner without any increase in total cattle numbers -- in view of the very low average production per cow. With continued improvements in dairy nutrition and management, coupled with the start of improved production from the program of genetic improvement, the 1980 target of a doubling of total production should be attainable with little increase in dairy cow numbers needed.

3. Methods and Constraints - Meat Production

a. Breeds - The predominant breeds are Criolla and Brahman. The genetic makeup of the beef industry, while it obviously could be improved, is not an overrriding constraint on its development. However, there are enough bulls being fed out for slaughter at places such as La Romana which could improve the genetic makeup of many herds if they could be diverted from slaughter to breeding purposes. In the general educational programs of the SEA, this could be stressed and programs facilitating such diversion developed. With the beef component of the dairy industry likely to become a target segment of the total beef industry as a result of shortened intervals between calving, the shift toward Brown Swiss in the dual purpose herds should be encouraged as a source of beef.

b. Nutrition - Little supplemental feeding at the time of short pastures is practices. Year round feeding of salt and minerals should be encouraged. Pasture management and improvement and controlled grazing are needed. Educational programs by the Extension Service, FAO, and the distributors of feeds on these matters are needed.

c. Husbandry - The majority of the cow-calf operations have a very low level of husbandry practices. They are operated as extensive units and lack the intensive supervision needed for success. Educational programs of technical assistance with both the administrators of the ranches and their urban owners are needed to improve the level of management.

d. Disease - Parasites and secondary diseases can be a problem. There is a large veterinary staff in the employ of the Government, but more emphasis is needed on training farmers how to handle and combat disease problems.

e. Marketing - The meat marketing system is not organized, with most cattle buying done by country traders or slaughter house operators. Market news information for livestock is lacking, indicating a need for a timely livestock market news radio program complemented with newspaper reports.

Accompanying this should be educational programs on how the producers can use this information - working through the Stockmen's Association and SEA. Research and analysis of livestock prices and numbers by SEA leading to livestock outlook information is needed also. Adequate meat processing facilities are available.

Cattle pricing according to grades reflecting the quality of animals should be encouraged by the SEA and the Stockmen's Association. Efforts likewise should be made to establish a live animal market system whereby cattle could be assembled and traded in manageable groupings of uniform size and quality.

Although no dramatic production targets have been set for beef, a management program which shortens the interval between calving from 18-20 months to 14-15 months would result in an increase of 33 percent per year in the number of calves born. This kind of an increase in animal production will require an improvement in carrying capacity of the grassland devoted to beef, as well as a shortening in the period of time the cattle are grazed prior to slaughter.

The increase in the production of sugar molasses and rice bran along with increased availability of oilseed meals should provide the feed base for the additional feeding necessary to accomplish this. Then, if feed grain-beef price relationships are favorable to beef production, additional corn importations can be made to further increase the amount and quality of beef for export. On the other hand, use of feed sources for direct human consumption must be weighed in the balance.

I. Poultry: Meat and Eggs

1. Alternative Poultry Production Strategies

The poultry industry of the Dominican Republic is divided into two subsectors; the commercialized, largely integrated sector with rather large to very large production units based on purchased inputs, and the very small enterprises where the chickens are essentially scavengers and few of the

products enter the market. There is little alternative but to concentrate on the first group if one is to have any hope of meeting the poultry production targets for 1980. It has the only production capability base upon which to build. Furthermore, it has the potential for private financing which can mitigate the financial constraints which accompany any sharp expansion.

Efforts will be made to spread the industry as widely as possible by discouraging the concentration in too few a number of managerial firms - thus preventing undue monopoly powers. Also, as many as possible of the minimum sized-efficient flocks will be encouraged in order to provide the maximum employment opportunities consistent with an efficiently operated industry.

2. Methods and Constraints

a. Producer Interest - The integration of modern poultry and egg production on medium and small sized farms should be encouraged, with technical assistance offered by the feed and market interests.

b. Breeds - The genetic level of poultry breeds in commercial enterprises in the Dominican Republic is high. To the extent that a constraint exists in this area, it is in the concentration of foundation stock in a few hands. Free and unlimited importation of fertile eggs and foundation stock, and government encouragement of entrepreneurs to produce hatching eggs is needed to give all poultrymen access to this basic input. The establishment of TATUM Dominicana, a fertile egg production company capable of producing nearly all present domestic requirements, will go far to eliminate this constraint. Free importation of hatching eggs and chicks is still recognized as necessary by SEA. Hatching facilities will have to be expanded in the latter part of the period to meet the 1980 targets.

c. Nutrition - The commercial subsector of the poultry industry -- particularly the integrated broiler segment -- generally has good nutritional levels. The feed conversion

ratio for both broiler and egg production of the top producers compares favorably with the United States. The smaller egg producers do less well. SEA should establish and enforce quality control regulations guaranteeing the nutritive value of processed feeds. The feed industry should be encouraged to promote the sale of well formulated mixed feeds and provide education to poultry producers on how to use them. Credit should be available to establish a network of smaller feed retail outlets and regional warehouses to facilitate the widespread use of mixed feeds.

INESPRE is undertaking the stabilization of feed supplies and prices through its import facilities and has, from time to time, used subsidies to smooth out sharp feed price fluctuations. Adequate feed supplies at stable prices are important to the continued growth of the poultry industry.

Feed mixing facilities are ample to provide the capacity for expansion over the next three years, but will need to be expanded in the latter part of the decade if the poultry meat and egg targets are to be achieved. The feed industry should have little difficulty in financing this expansion if the production of poultry products remains profitable. On the other hand, the feed supply is a major constraint in the growth and development of both the dairy and poultry industry in the Dominican Republic. Feed shortages and resulting price rises result in rapid adjustment in poultry availability and to a lesser extent, milk supplies.

The feed processing industry has been held back by the lack of a well organized distribution system, reliable quality standards which would give users confidence in using the feeds, and salesmen or fieldmen who could educate and advise the producers.

Basically the domestic feeds available for formulation are locally produced corn and sorghum and the by-products of the sugar, cereal, and oil industry. Wheat imported for local milling, provides by-products available for livestock. The increased availability of feed which has supported the expansion of the livestock industry since 1965 has been based primarily

upon expanding imports of feed grains and concentrates, increased supplies of wheat and rice bran, withholding sugar and oil industry by-products from export and increased local sorghum production.

The projected increases in rice, sugar and oilseed outputs will provide increased supplies of by-products, but not enough grain will be available to meet the increased livestock and poultry targets. There will be no increase in wheat by-products. Some further increase in sorghum is projected. But due to the high production costs, self-sufficiency in feed grain production is not economically feasible or consistent with social goals. Placing subsidies on feed grains to encourage their production would raise the feed cost to the producers of livestock and poultry and stifle the industry. Meeting the 1980 poultry production targets will require about 127,000 metric tons more of feed grains and concentrates than were consumed in 1973. Thus, corn and feed additive imports will have to be increased substantially and ready access is essential. P.L. 480 imports, if available and if assured in a continuing basis, could greatly facilitate the development of Dominican agriculture. If soybean imports are expanded to meet the vegetable oil targets, adequate supplies of oilseed meal will be available.

d. Husbandry - The poultry husbandry situation is similar to that for nutrition. To the extent that constraints on the farms exist, they are with the smaller producers. Education by technical specialists in extension and the feed mixing industry will be needed to raise the husbandry levels of this segment of the poultry industry.

e. Housing - The large commercial producers should have little problem financing the additional housing needed to expand. Some credit to construct additional housing by the smaller producers may be needed. Local construction techniques and materials, e.g., palm thatch, are adequate, inexpensive and suitable for most growers.

f. Marketing - Two poultry processing plants have dominated the broiler market. A third processing plant

was constructed in 1973, doubling the previous capacity. Increased cold storage facilities are needed to freeze and hold broilers and to store eggs during the periods of temporary excess production. Improved marketing also will require expansion of cold storage and retail levels. Credit lines should be established for this purpose. As the 1980 production targets are approached, additional storage and processing facilities will be needed but should encounter little serious financing problems from private banking sources.

There is no price incentive for egg producers or distributors to improve quality. Every egg, dirty or clean, small or large, fresh or nearly addled retails for six or seven cents, year around. Government standards for size and quality need to be established and enforced to encourage greater consumption of eggs. Price variations for eggs to reflect seasonality in production should be permitted. Efforts at integration of the poultry industry should be pushed in order to better organize and raise the efficiency of the marketing system for poultry products. Nutritional education is required to enlighten consumers on the value of eggs and poultry in their diet.

Additional statistics on production and storage stocks are important to the continued growth of the poultry industry, particularly as the number of firms engaged in the industry increases.

Overcoming of Constraints

(1) The GODR should continue to assert its full influence as a matter of policy, working through both SCA and the credit institutions, to influence the feed processors and poultry marketing firms to extend their integrating operation to as many medium and small sized farms as possible.

(2) Credit policy should encourage credit institutions to finance additional poultry marketing integrators where technically feasible rather than expanding existing integrators to the point they acquire undue monopoly powers.

(3) Feed companies should be encouraged to develop and expand extension activities in poultry nutrition and management and provide technical assistance particularly to the smaller sized producers. SEA will take the lead in developing improved communications between all segments of the poultry industry.

(4) Extension activity in production and marketing technical assistance and its coordination with similar activities of feed companies and poultry marketing firms should be extended.

(5) Through its proposed Marketing Division, SEA will have the ability to assist poultry marketing firms to improve their performance. The marketing section will presumably develop a competence in market price analysis and feed price outlook in order to make information available on a timely basis.

(6) A credit program will be made available where needed to finance such facilities as are needed to improve the poultry marketing system. Private credit should be made available to finance the needed development in the feed processing industry and in establishing a network of smaller feed retail outlets and regional warehouses.

(7) Free importation of chicks and hatching eggs should be permitted.

(8) Quality standards should be developed for the feed industry and regulations for their enforcement should be established. Grade standards for sale of eggs should be developed and regulations for their enforcement carried out. Sanitary regulations for processing and sale of poultry likewise should be developed and enforced.

(9) INFSPRL in its importation of grain should consider instituting a small stabilization fee included in the pricing formula, which could be used to finance selling at reduced prices during periods of rising prices -- thus

tempering price swings. Importation of grain should be governed generally by the needs of the livestock and poultry industry.

h. Overview

The dairy and poultry programs projected to meet the 1980 production targets for poultry, eggs and milk would require a total of about 310,000 metric tons of feed grains and 136,000 metric tons of oilseed meal. The projected output of copra and oilseed meals from the proposed edible oil program, total almost 193,000 metric tons, leaving about 62,000 metric tons of oilseed meal available for the pork and beef industries. The projected oilseed meal supply is ample and provides a margin for faster growth in the livestock economy should effective demand expand faster than projected.

The feed grain needs for the projected livestock and poultry programs greatly exceed the domestic availability. The production of rice bran will increase 50,000 metric tons as a result of the rice program and some expansion in the production of sorghum seems probable. But the priority of food crops on a limited land supply makes sizable imports of feed grain necessary -- about 215,000 metric tons of corn in 1980, well above the average of 26,167 metric tons imported in 1972-1973.

VII. THE UNDERLYING CONSTRAINTS AND WHAT CAN BE DONE ABOUT THEM

A. Introduction

As stated earlier the production targets are realistic and feasible. Their achievement is necessary to feed more adequately a growing population and to enable the Government to build a sound foundation for dealing effectively with the agricultural problems over the next quarter century.

Progress can be made in individual agricultural sub-sectors with the application of leadership, energy and resources. The preceding section of this assessment outlines production-specific constraints, choices and recommendations. However, progress would be limited, and in some instances severely circumscribed, unless there were appreciable progress in overcoming a number of underlying constraints which intervene throughout the entire production and consumption process. Furthermore, a piecemeal approach is usually inefficient and frequently demonstrates convincingly that timely action, for whatever reasons, had not been taken in the past.

This section of the assessment identifies a number of constraints, i.e. major obstacles, to be overcome if there is to be the most efficient application of resources to the problems of developing the agriculture sector. These are:

- Land, Land Use and Land Tenure.
- Inputs and Their Utilization.
- Credit, particularly Institutional Credit.
- Marketing, including both System and Access Roads.
- Institutional Infrastructure and Improving the Human Resource Base for Agricultural Development.

The foregoing are dealt with sequentially. In some cases, issues under consideration, but not yet resolved, are stated; in others, prescriptions, based on Dominican analyses of the problems, are stated.

The overall objective is, of course, improvement in the quality of life of the rural population. Thus, some assessment and conclusions are needed about consequences of prospective and proposed actions. These are:

- Improvement of Nutrition through increased production.
- Income Redistribution.
- Rural Employment.

B. Constraints

1. Land, Land Use and Land Tenure

As has been pointed out, land for agricultural purposes is limited. The ratio of persons to farm land in the Dominican Republic is one of the highest in the world. Also land is not used as efficiently as it might be. Land is cropped, not according to its potential, but in accord with customary practices and frequently uninformed inclinations of the owner/manager/occupier. Because of land scarcity, efficiency of land use must be increased.

An estimated 30,000 farm families are added to the rural population each year despite significant rural/urban migration. The Agrarian Reform program hopes to settle 10,000 farm families in 1974. This ambitious target, given political will, can no doubt be realized, but obviously even this will not solve the problem of either production or unemployment. In 1972 there were 57,000 farm families who had applied for land. The list of those wanting land will become significantly larger year by year, despite such actions as the Government is currently taking.

These matters are under study and there are no easy solutions. The problems are basically Dominican, and, at least for the time being, do not require application of new external resources toward their resolution. It might here be observed that land problems are the most complex of any in the agriculture sector. While actions may sometimes be drastic

and frequently are dramatic, solutions invariably remain elusive. Mistakes in most agricultural subsectors are troublesome and expensive; errors in this area are virtually always costly and are occasionally devastating. This suggests caution in acquiring land put to productive, even if inefficient, use and transferring it to what may be proved to be even less productive use.

Though it is not possible to quantify the constraint placed on production by the present conditions of land use and land tenure, it is acknowledged to be great. It is also generally accepted that these conditions are major obstacles to achievement of the full potential of Dominican agriculture. The detrimental effects are manifested in (a) ill-defined boundaries and titles and a consequent reluctance to invest in land improvement, inability on the part of many to use land as an asset to secure credit and a sluggish, almost non-existent market for agricultural land (as opposed to land bought for speculative purposes); (b) a constant and damaging tendency toward informal division of property (sometimes to avoid inheritance taxes) into uneconomically small units; (c) an equally harmful proclivity to hold land idle for cultural, recreational or investment reasons; (d) a tendency to continue less productive practices (because land, once owned or occupied, is usually, contrary to reality, assumed to have no real cost); and (e) a fear on the part of many large landholders that, should their land look too prosperous and suitable for colonization, it will be taken over by the Government.

The clear implication of the preliminary SEA assessment is that agrarian policy should be based on the principle that land should be used to employ the maximum number of people gainfully, consistent with (1) the need to conserve renewable natural resources, (2) production requirements and possibilities and (3) in accordance with the prospects for improving land use in accordance with its potential. With this policy as the guide, actions similar to those described below are being considered.

The national cadastre, being undertaken with IDB help can be used to regularize land tenancy relationships. To do this, the following specific steps are worthy of attention:

a. Identify agriculturally valuable Government land for distribution to farmers.

b. Modernize the registry system.

c. Institute a simple tax on real property which would be levied according to class of soil and climatological conditions and be structured so as to be less burdensome on economically small farms, but would nonetheless require all property holders to pay some annual tax on land in order to maintain clear title. The tax could be graduated upward on the larger holdings so as to create economic pressure, causing large land units to be utilized efficiently or to be sold. Tax scales could be adjustable upward or downward according to the size of holding determined by the Government to fulfill economic and social objectives.

d. Establish a land transfer mortgage credit system to facilitate land sales and purchases. A combination of public and private resources could be used, for example, to provide necessary capital for this mortgage institution to enable private expertise to be used in management while the Government maintains a policy role in its operation.

e. Acceleration of conversion of agrarian reform titles to titles free and clear of encumberances, with limitations as necessary, on the length of time the title must be held before resale of the parcel.

If such plan were put into effect the adjustment for the Institute of Agrarian Development would not be severe. It could coordinate distribution of Government land and resell land confiscated for failure to pay taxes. This could be in addition to coordinating Governmental assistance to farmers in agrarian reform settlement areas. SEA, INDRHI, the AgBank and other

agencies could, however, take over actual delivery of assistance to the farmers.

If undertaken, the above actions might even eliminate net Government outlays for agrarian reform while strengthening the Government's land affairs activities. Tax revenues should be sufficient to cover the operational costs of IAD as well as the registry system. According to a 1965 Clapp and Mayne study, a simple property tax would net about RD$11.0 million. Excess revenues could be used for developmental activities such as irrigation and road construction and maintenance in rural areas. One very considerable advantage would be that no further outlays would be necessary in the short and intermediate term to purchase land for redistribution. Farmers might be expected to make more efficient use of their land and to invest to improve their land. Undertaken step by step, this approach to agrarian reform could well prove to be more acceptable to more people.

IAD now administers 35,000 farm families in 150 agrarian reform projects. Direct costs of the present program are about RD$9.0 million annually plus whatever the Government spends on land acquisition ($13.0 million in 1973). The number of IAD families will arise to 45,000 in 1974 with correspondingly higher overhead and support costs.

2. Inputs and Their Utilization

Utilization of inputs is dependent on knowledge as to how they should be used. In this section we will therefore treat research and extension as well as the production inputs themselves.

a. Input Distribution and Use

Improved seed and varieties, suitable to local climatic and soil conditions are frequently unavailable. Little seed is certified. Fertilizers, chemicals and machinery are in short supply and costly. Ignorance about optimum use is widespread. Distribution and delivery systems are by and large inefficient, adding to input costs.

To overcome these constraints policies are under consideration which recognize the private sector's primary responsibility, putting emphasis on Government activities which stimulate private sector performance while reserving to the Government the obligation to intervene directly in input supply channels when private sector failure is apparent.

1) With regard to seed

Development and application of a general seed and plant material law is being considered to give SEA the right and responsibility to license producers and dealers and to establish quality, handling, and varietal norms for the seed and plant material required to produce all major crops of the country. Implementation will proceed gradually and should extend to each crop as the technological expertise is developed.

2) With regard to fertilizers and agro-chemicals

a) Assistance to the private sector in the training of distribution/sales personnel in extension techniques needed to convince farmers of the efficacy of proper application of these inputs.

b) Establishment of input supply points, supplementing the private sector where necessary, through viable agricultural cooperatives by providing training of cooperative managers and promoters in the use of these inputs, establishing simple accounting and warehousing procedures and standards and providing credit for the purchase of inputs for cooperative stores. Participating cooperatives would be required to sell both to members and to non-members and should have direct recourse to SEA for technical guidance and training.

In areas where private channels are inadequate and suitable cooperatives do not exist or do not wish to participate, regional or local SEA extension/research stations could be used as input sales centers with the objective of increasing knowledge of and demand for inputs which could stimulate the private sector to expand its distribution systems on a profitable, but equitable basis.

The radio outreach network described below under marketing recommendations could be used to spread information on this system and the assistance available at distribution/sales points.

3) With regard to machinery

a) Long-term credit could be made available to establish certain machinery operations, with each loan based on its economic feasibility in the area to be served.

b) Laws and regulations governing the obligations of machinery importers to provide a full line of spare parts and repair facilities has been suggested in SEA's preliminary assessment as a means to ensure these goods and services to operators.

c) An in-depth survey of machinery could be made with a view to limiting brands imported by decree or law with regulatory authority in the hands of SEA.

d) SEA, with the cooperation of machinery dealers, could provide training for owners and operators of machinery in maintenance, preventive maintenance, repair, operation and agronomic techniques.

e) A feasibility study on developing a small equipment industry based on the IRRI model is being considered and the enterprise could be capitalized if economically advisable.

The costs of the foregoing programs are estimated as follows:

TABLE VII - 1

	RD$ (000)
Seed:	
Law and Regulation	Intangible
Bean Seed Start-up Program	530
Fertilizers and Chemicals	
20 Cooperatives and five SEA Supply Points $80,000 per unit	2,000
Machinery	
Credit	500
Special Studies	20
Regulatory Expenses	Intangible
Training	
Cooperative Supply Managers 25 x $500	12.5
Input Supply Personnel 100 x $500	50
Machinery & Equipment Owners/Operators 100 x $500	50
	RD$3,162.5

b. Technical Assistance

1) Extension: The present number of personnel engaged in extension activities is under current practices insufficient to perform the tasks necessary to promote 1980 goal achievement. This weakness works a hardship on the sector by effectively denying access to new technology to the vast majority of Dominican farm units, probably 82%, equivalent to the number which do not use credit. SEA is planning to rectify this situation as quickly as possible by:

a) Implementation of a radio outreach program.

b) Consolidation, within SEA, of all extension personnel into the Extension Department to permit coordination of activities in conformity with national priorities.

c) Execution of plans for creating a farm management unit within SEA to perform regional and subregional microeconomic, farm level management research. This office will be linked to the Extension Department and to the radio outreach network so as to transform its results into useful farm information.

d) Establishment of a scholarship fund which will permit the orderly upgrading of present extension personnel through additional training at local universities either through part-time studies or long-term sabbaticals, targeting a minimum equivalent of two years of university training for all extension personnel by 1980.

e) Support of and coordination with university extension systems by direct funding and personnel interchanges, and

f) Combining the research and extension functions under one organizational group to facilitate coordination.

2) Research: The SEA assessment recognizes that better results from its research efforts can be obtained by:

a) Defining research objectives to support national goals.

b) Channeling all research budget allocations (except La Romana and CEA) through SEA and the National Committee for Agricultural Research to the using entitites and give the Committee effective control on annual or multi-year research planning and execution.

c) Ensuring timely disbursement of research funds.

d) Establishing ties with international research nets to take advantage of original research already accomplished and concentrating adaptive research on specific priority commodities in country.

3. Costs of Expanded Research and Extension Activities

The costs of implementing the foregoing research and extension activities are estimated as follows:

Creation and operation of a farm management unit would require additional budgetary resources for personnel, equipment, materials and operating funds covering survey costs. At the national level a unit of three M.S. or B.S. degree holders in Agricultural Economics, Crop Production and Soil Science would constitute the nucleus for farm management, either in the Planning Office or as a part of the Extension Service. In the field, 22 extension agents would be assigned to work as regional or sub-regional farm management specialists, responsible for executing microanalyses, developing recommended management practices for farms of the region and coordinating the dissemination of this information through the extension system and radio outreach programs. The national level technicians would train regional personnel in techniques of microeconomic analysis, crop production, market analysis and farm management. In addition they would evaluate recommended practices and information programs before public release in the respective regions. The estimated annual costs:

TABLE VII - 2

National Level		RD$ (000)
Personnel		
5 x RD$8,000	=	RD$ 40
1 (clerical) x RD$3,000	=	3
Per Diem	=	3
Materials, Equipment & Supplies	=	15

Regional Level		RD$ (000)
Personnel		
22 x 4,800	=	105.6
Clerical (no additional)	=	-
Per Diem	=	15
Materials, Equipment & Supplies	=	23
Training	=	6
Estimated Total		RD$210.6

Scholarship costs for upgrading the educational level of extension personnel are estimated below, based on a starting point of approximately 100 high school agronomists (after integration) who require more advanced training in economics, agronomy, animal husbandry, farm management and extension methods. It is assumed that the Extension Department would not be able to dispense with the full-time services of more than a few agents at a time. Therefore, the bulk of training would be in-service, after-hours training, primarily in the Santiago-La Vega area and in the National District. It is not possible to fix the total cost of this activity at this time. Nevertheless, if the system were to provide about RD$1,000 per agent requiring education, initially a full RD$100,000 per year would be required for selected personnel whose performance in the field and in after-hours training shows aptitude for full-time study.

University participants employed in extension work will probably be senior agricultural science students working in the field as extension agents and for academic credit. It is anticipated that 150 students per year would spend four months in the field under this program and would receive a salary of RD$150 per month, giving a total annual cost of RD$60,000.

The estimated annual costs:

Extension Scholarships	RD$100,000
University Extension	60,000
	RD$160,000

4. Credit, particularly Institutional Credit

As described in Section IV, the agricultural credit picture suffers from several weaknesses and represents a constraint on production in the following ways:

- Institutional credit is in short supply and informal credit is often usurious.
- The limited supply of institutional credit is allocated in disproportionate amounts to affluent borrowers, leaving most medium and small farm units without formal credit resources.
- The administration of agricultural credit sometimes results in untimely deliveries of needed credit, dissuading some potential borrowers from seeking credit.
- Agricultural credit allocations are often unrelated to National production priorities.

These weaknesses can be corrected by,

- A well-articulated and integrated agricultural credit policy.
- A shift toward emphasis on agricultural credit resulting in a better balance between agricultural credit and industrial and commercial credit.
- Higher interest rates for agricultural lending, (as compared to commercial or industrial) which realistically take into account relatively higher risks.

Provision of new guarantee and discount mechanisms to commercial lenders for higher risk loans in the agricultural sector.

The problem of the Government then, is how to mobilize resources to tap the latent productive potential of the maximum number of farm units. The following courses of action and policy changes are under consideration:

a. With regard to Total Agricultural Credit Availability

1) Re-Discounting and Guaranteed Loan Funds

To attract private credit to agriculture from other sectors, there is under consideration the establishment of a re-discounting mechanism in the Central Bank -- a step which has not yet been permitted in the Dominican Republic, but which has great potential for expanding and shifting credit.

The inflationary aspects of this step would be negligible (see Section V above). Further, re-discount systems have the marked advantage of being able to stimulate specific segments of the sector. Various formulae can be developed to determine what percentage of the agricultural portfolio should be re-discounted. Re-discounting could be permitted on some crops or livestock classes and prohibited on others, in accordance with production and nutritional goals and desired price levels.

Most large scale borrowers have land or other equity which could be pledged as collateral to commercial banks. For those who do not, and as an incentive to private bank lending in agriculture, a guaranteed loan fund (GLF) for agricultural lending could be established in the Central Bank.

The amount of money in a GLF should equal approximately 25% of the commercial sector's investment in agriculture. It is estimated that loans requiring guarantees would amount to less than one-half of total commercial bank lending in agriculture. Therefore, a GLF amounting to 50% of guaranteed loans or 25% of total loans should provide sufficient reserve for potential losses. Adjustments could be made as collection experience dictates.

The GLF need not lay idle. It could be used to provide re-discounting for agricultural loans or for direct lending to commercial banks for relending to agriculture. In other countries, such funds have provided instant disaster relief in cases of catastrophic events such as flood or hurricane, later to be restored by appropriate and timely government transfers.

Interest earnings of the fund from re-discounting or relending could be augmented by charging reasonable guarantee fees to participating banks. Fees of 1/4 to 1/2 of one percent would probably assure viability of the fund without deterring participation.

A GLF would provide the Government another means of encouraging specific crops or discouraging others. The fund could provide differing guarantees for specific crops (e.g., 80% on red beans, 60% on rice, with priorities subject to revision, based on experience and need.

The re-discounting and guarantee system transfers some major risks and servicing costs from Government to private enterprise but at costs not disadvantageous to the private sector. Commercial banks could operate on somewhat lower interest margins since their own risk and cost factor would be reduced.

2) Interest Rates

Interest rates on agricultural lending could be raised to levels nearly equal to other types and sources of credit. This could be done both to encourage commercial banks and to make commercial banks relatively more attractive, encouraging shifts of large AgBank borrowers to commercial banks and freeing AgBank credit for lending to smaller loan customers, for establishment of a guaranteed loan fund for discount purposes.

Present public credit practices constitute a serious constraint. Interest rates for agriculture are controlled at a level too far below that of commercial credit. This creates an unacceptably heavy demand on an institutional system, particularly the AgBank, with definite quantity limitations. The very nature of agriculture with its weather and other risks indicates that interest on agricultural credit should be

adjusted upward, closing the gap between the former and relatively safe commercial lending. Until this disparity is corrected, credit for agriculture will be scarce.

At present the better and larger farms (i.e., those which are commercially viable prospective borrowers) are the primary beneficiaries of the Government's subsidized interest programs. The AgBank reports that 0.14% of all loans are in the RD$50,000 and up size category; these loans claimed 17.88% of all money lent in 1973.[1/] Probably 95% of this group could qualify for commercial bank credit.

b. With Regard to the Allocation and Distribution of Agricultural Credit

1) Reduction of Loan Amounts

The AgBank has operated with an upper lending rate of RD$250,000 for several years. The question has been raised as to why customers with the capacity to employ such resources effectively should have access to concessional credit. Consideration is being given to reducing this upper lending limit substantially to perhaps as low as RD$10,000. Borrowers above that level could be assured of access to commercial credit through significant policy change with regard to commercial bank lending described above. If this were done, more than RD$17.0 could be made available to small and medium farms.

Exceptions to the limit could be made for poultry loans and livestock loans but only after commercial banks or FIDE participating entities had refused to grant such credits and after such requests for AgBank financing had been endorsed by SEA.

2) Group Lending

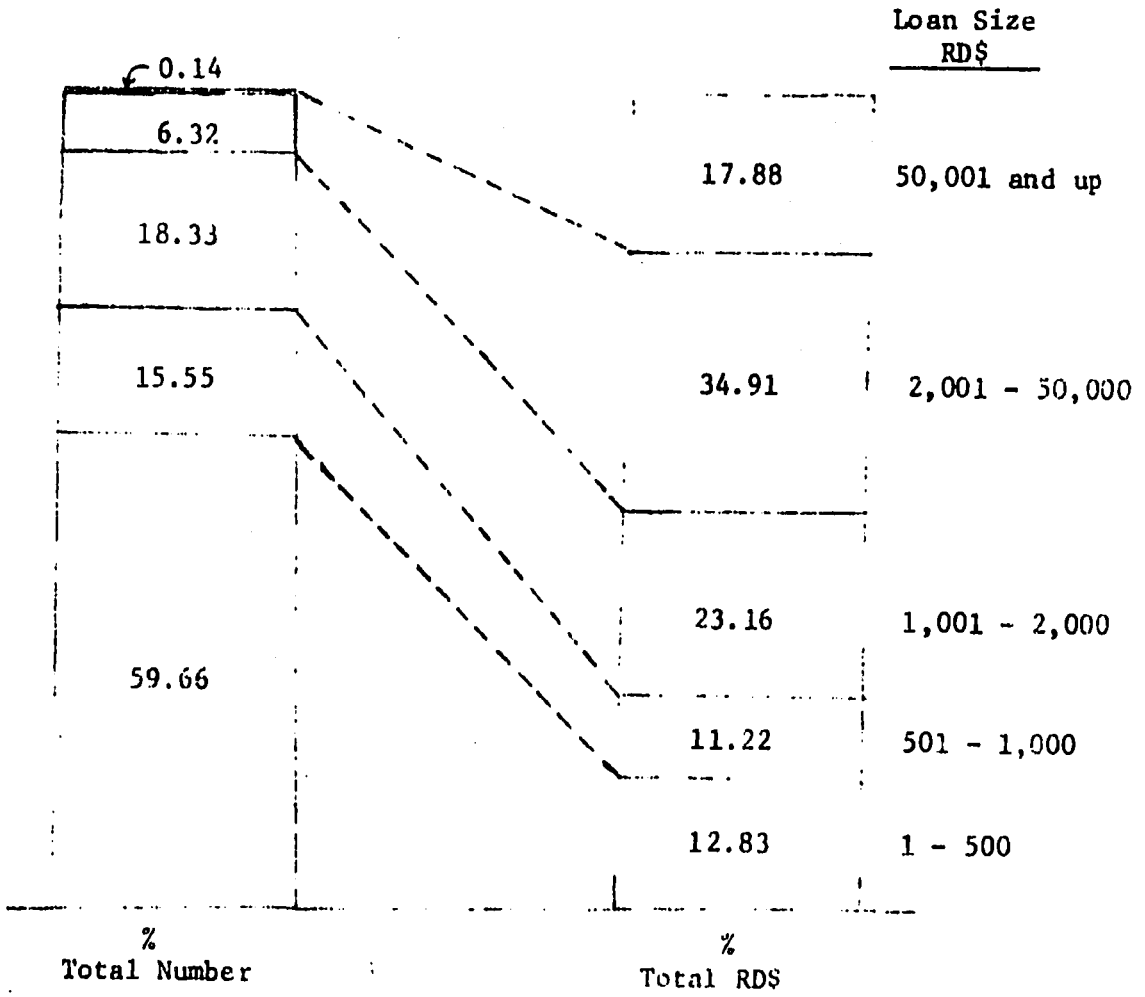
Lending programs within the AgBank and most other institutional sources of agricultural credit have historically made loans to individuals. DDF has pioneered groups loans to low income people who could not qualify for

1/ See Chart VII - 1

CHART VII - 1

LOAN DISTRIBUTION

AGBANK - 1973



Source: AgBank Statistical Bulletin, 1973.

credit through normal channels. The vast numbers of farmers who fall into this category and the acute shortage of qualified technicians and credit personnel dictate the expansion of this form of lending. SEA is considering a shift in its Supervised Credit program toward group lending. Additional funding is necessary for DDF and Supervised Credit if these entities are to meet their responsibilities in small and medium farm development. SEA extension agents can become a primary vehicle for group loan promotion so that technical assistance is available to new borrowers.

c. With Regard to the Administration of Credit

There is a need to expand and speed up the services of the AgBank as well as to provide an extensive training program for lending agents of all institutional credit agencies.

To continue the present system, while adding credit resources, would increase credit administration problems significantly. A continuing and serious complaint of farmers has been that loan approvals and subsequent disbursements often come after the various inputs are needed. Loan processing, approval procedures and disbursements have to be handled expeditiously.

The AgBank has not maintained regular training programs outside of the Managed Credit program, with the exception of limited on-the-job training. In fact, the program of training envisaged below is probably beyond the present administrative capabilities of the bank. A special training program for various types of employees (i.e., inspectors, appraisers, loan officers) could be designed by UNPHU. It has qualified instructors and experience in handling such specialized courses.

In 1973, the AgBank made 927 loans (2.34% of total loans) for more than RD$10,000. However, this group received 40.52% (RD$17,566,982) of the total funds which were lent in that year. If this same amount were channeled into the most numerous borrower category (under RD$500), the potential for new customers could exceed 35,000, nearly doubling total customers of the bank. Servicing these new customers would require an increased AgBank field staff. However, higher interest rates, could go far toward paying for these services.

To help meet demand the AgBank could extend services to outlying areas by providing mobile branches (buses) that make regularly scheduled stops throughout the countryside. This would reduce pressure on existing branches and improve the public image of the Bank. Additional inspectors and appraisers could then be stationed in outlying areas, reporting directly to mobile branches.

Field staff agronomists with experience in credit applications, inspections and crops, are critical to expanded lending programs for small farms. Of course, such employees must be backstopped by supervisors and clerical staff, and provided with transportation and working space. There is not an acute shortage of high school graduate agronomists but few have any credit training or experience.

It is doubtful that the existing institutions could instantly assimilate the target group of small and medium farms or the necessary additional employees. Intensive training should be programmed for the next two years, with provision for continuance beyond that time. Up to 300 additional fieldmen are necessary to meet the requirements for extension and credit in DDF, AgBank and the Supervised Credit program. A three-month course in extension methods, agronomic updating, credit, collection and loan promotion would adequately prepare these people for the task at hand. One hundred additional clerical/bookkeeping workers would be required. Specialized short course study would suffice for this group of employees in terms of acquainting them with forms and procedures. The additional supervisors, twenty-five to thirty, could generally be promoted from within the involved institutions and given two months of formal training in credit analysis, personnel management and collections.

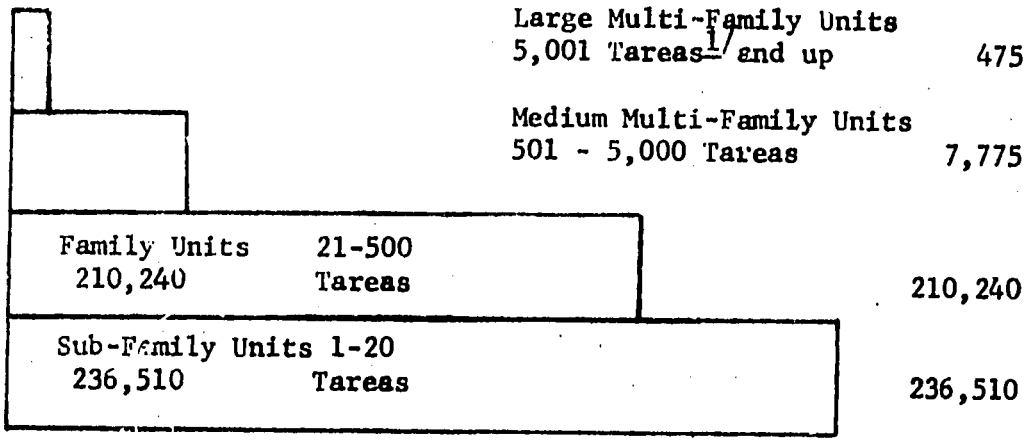
d. Prospective Recipients and the Uses of Credit

1) The Beneficiaries of Credit

The rural sector of the Dominican Republic is composed of 455,000 farm units. Surveys indicate that about 80,000 of these units have access to formal credit and about 70,000 are included in industrial production contracts. Through their association with credit sources, these farms also have access to some kind of technical assistance and inputs.

The chart below presents a picture of farm groupings and credit distribution as visualized in the SEA assessment. The groupings are generalized as to judgments about their economic vaiability.

CHART VII - ?



Credit is now applied most liberally to the large units by commercial banks and the AgBank. Virtually all units in the large and medium multi-family groups have access to credit as needed. The more modernized and monetized portion of the family-sized farms enjoy AgBank credit but are not afforded commercial credit under present conditions. In the family farm group, most agrarian reform parcels are found. These have access to AgBank credit under IAD auspices. In the sub-family group are found the minute plots dedicated to industrial crops and subsidized by processing industries, mainly of oil and tomatoes, as well as a large number of subsistence farm units. Though groups may overlap, e.g., some agrarian reform projects produce industrial crops and IDECOOP affiliates are found at all levels, the credit coverage is roughly as shown in Table VII-3.

1/ One hectare = 15.9 tareas
One acre = 6.5 tareas

TABLE VII - 3

Farm Category	No. Farms	No. Farms with Present Source of Credit	No. Farms to Receive Credit after Policy Changes	Farms Without Credit after Policy Changes	After Estimated Application of New Credit
Large Multi-Family 5,001 Tareas and up	475	475 AgBank/Commercial	475 Commercial	0	
Medium Multi-Family 501 - 5,000 Tareas	7,775	7,775 AgBank/Commercial	7,775 Commercial AgBank	0	
Family 21 - 500	210,240	37,000 - AgBank - IDECOOP - DDF - Other Formal	83,000	127,000	97,000
Sub-Family 1 - 20 Tareas	236,510	105,000 - Industrial - DDF - SEA Supervised Credit - IDECOOP	105,000	131,510	75,000
	455,000 (100%)		196,250 (43%)	258,510 (57%)	172,000 (38%)

III - 20

Also as shown in Table VII-3, most small/medium farms lack access to formal credit sources (industrial production contracts are classed as formal credit for purposes of this section) and either remain non-monetized, non-commercial subsistence farms or rely on informal high cost credit sources. With expanded delivery systems, the IDB/PIDAGRO loan could have some effect on this picture, adding perhaps as many as 12,000 family units to the borrower list.

The measures contemplated in this assessment, i.e., adding RD$20.0 million to sector credit from commercial sources and shifting the AgBank portfolio downward into the family farm category could add as many as 34,000 new borrowers to the AgBank rolls. Credit distribution would then be as shown on pp.-VII-20.

The recipients of the additional RD$12.0 million in agricultural credit will be located on small/medium family farms and farms now classed as sub-family units, but which could produce cash crops at a profit, given appropriate inputs and technical assistance. Assuming an average loan size of RD$200.00, the number of recipients would be 60,000 small/medium farmers (farm size less than 500 tareas or 80 acres) who now lack formal institutional associations which given access to credit. With extension personnel serving small/medium farm groups as credit agents, additional credit personnel in the AgBank, SEA and DDF and the adoption of group lending procedures, reaching this target group is well within the administrative capacity of the GODR.

2) The Uses of Credit

No firm guidelines should be established concerning crops to be financed. Profitability and agronomic considerations would be the primary criteria, as determined by regional and subregional farm management/extension personnel through area-specific microeconomic analyses. An average loan of approximately RD$200.00 could be used in the following ways:

TABLE VII - 4

Crop	Cash Costs of Prod./ Tarea (RD$)	Gross Return/ Tarea	Cash Costs/ 20 Tareas (RD$)	Net Return 1/ 20 Tareas (RD$)
Beans	7.40	32.00	148.00	492.00
Rice	16.00	40.50	320.00	490.00
Sorghum	12.75	21.25	255.00	170.00
Sweet Potatoes	11.00	48.00	200.00	740.00
Potatoes	58.60	120.00	227.20	252.80 2/

The technology needed to achieve these returns on invested capital are most completely developed in the Cibao valley. However, background research was begun country-wide at regional stations in 1965 and continues today. The purpose of the Farm Management Office is to re-examine existing technical data, coordinate it with market research information, inputs and credit and concentrate it at the farm level in area-specific production packages. SEA is now forming and staffing both the Market Research/Information and Farm Management groups.

e. With Regard to National Production Priorities

Coordination between SEA and other credit sources should be strengthened. In the past credit has not always been channeled in accordance with the country's economic and nutritional needs. SEA has responsibility for deciding or recommending priorities and credit resources should be allocated accordingly. At present, the Secretary is not a member of the AgBank Board of Directors as he is for other agencies and the constructive relations and cooperation which exist are basically in particular programs. Further, as indicated above, a need exists to use discounting as well as guaranteed loan fund procedures to influence types of credit which will be granted by commercial banks to make arrangements of this kind work

1/ Includes return on labor no counted as cash cost
2/ Four tareas only

effectively, that is, fashioned and implemented to meet national production priorities, inter-institutional coordination at both policy and operational levels will be at a premium.

The cumulative effect of the foregoing actions will add about RD$30 million total available agricultural credit which would grow in response to need. Shifts and increases in the allocation of credit will work to the advantage of as many as 80,000 small and medium farm units which heretofore have lacked credit.

The funding requirements of this program are estimated below:

	RD$ (000)	US$ (000)
Discount Costs	- 0 -	- 0 -
CLF	5,000	- 0 -
Small Farm Credit Fund	12,000	- 0 -
Training	258	- 0 -
Added Personnel Costs per Year		
AgBank)		- 0 -
DDF)	1,750	- 0 -
SEA)		- 0 -
Vehicles		491[1/]

5. Marketing, Including Both System and Access Roads

a. Marketing System

Weaknesses in this area are manifold and complex. As the population becomes progressively more urbanized, the weaknesses in turn are compounded and progressively become more serious and disruptive. The failures of the marketing system, as described in Section IV above, are based primarily on a ubiquitous lack of market information and marketing skills and failure to adopt more efficient marketing methods and procedures. Credit

1/ Six buses at $16,000
50 Jeeps 4 WD at $5,500
300 Motorcycles at $400

for marketing enterprises is also lacking. To overcome these fundamental weaknesses, SEA is considering implementation of actions similar to the following:

1) Creation of an institutionalized mechanism for market research and information (for producers, consumers and businessmen), and the development of marketing regulations as well as marketing education and training within SEA, working in close collaboration with INESPRE and CEDOPEX. These actions will be designed to accomplish the following objectives:

a) Provide the necessary technical information and statistical data needed to improve estimates of supply, demand and price relationships; provide needed storage, processing, transportation and marketing institutions and facilities; and, develop the type and level of governmental actions best suited to meet supply, demand and distribution problems on a timely basis.

b) Disseminate to producers and marketing subsector personnel information on present and probable future prices; acquaint producers with governmental policies, actions and services available to assist them in making profitable production decisions and in gaining access to the technical and financial assistance to carry out rational production and marketing programs.

c) Educate and train private sector marketing channel personnel in modern marketing procedures which yield more profits and create greater consumer demand for wider varieties of better quality food products.

d) Disseminate to consumers the information needed to make more intelligent nutritional decisions in the selection of food products.

e) Establish and enforce quality and purity standards for agricultural products as well as for food handling, processing, marketing and dispensing facilities so that consumer confidence in the quality of foodstuffs is promoted and maintained.

f) Develop a municipal market planning and action program to determine the needed administrative and regulatory changes which will enable public municipal markets to function more efficiently and to work with municipal governments to bring about those changes.

2) Address supervised credit to elements in the marketing channels in coordination with the training of the above-mentioned merchants, processors, wholesalers and retailers. This program should include provision of working capital where justified and should be used as a device to help the marketing system reduce uncertainties for producers, wholesalers, retailers and the transportation network as well as to stimulate healthy competition, higher volumes and lower price margins. It should be used to maximize utilization of the percentage storage, refrigeration and handling facilities and to expand or create new facilities where economically feasible. Supervised credit should be structured to enable borrowers to supply credit and inputs to producers under production contracts and to provide incentives to establish labor intensive operations.

3) Require, by law, all radio stations to donate up to an hour per day of on-the-air time to public service broadcasting including farm and consumer information. This air time should be used by SEA to aim broadcasts of market news, family planning, nutrition, farm extension and home economics information to farmers in all sections of the country.

SEA is of the opinion that establishment of the services described above will carry moderate costs over and above the present GODR budget as follows:

a) Personnel. A division of Market Research and Information will have to be staffed at the national level with a minimum of seven specialized professionals in the following disciplines:

Agricultural Economics/Marketing
Market Research/Analysis
Market and Consumer Information/Agricultural Journalism

Rural Market Management
Marketing Program Management
Grades, Standards and Regulations
Food Processing

b) Production Input Supply. Related services, such as statistics, crop estimates and forecasts and farm management research, will be provided by the personnel of other sections of SEA and fed into this Market Research and Information Division for use in its system of information gathering, analysis and information. However, a full clerical and support complement will be required. Total additional personnel costs are estimated at RD$100,000 for the first year, increasing thereafter to provide for additional personnel and salary increases.

c) Training. The professionals involved in this activity will require specialized training, much of which can take place on-the-job if a complement of technicians trained in these specialties can be obtained from abroad. IICA's marketing group has informally shown great interest in such an undertaking. In addition to on-the-job training, the Division will have to obtain formal post graduate training for its key personnel. During its first three years, the Division should attempt to upgrade its personnel to obtain one PhD in Agricultural Marketing and at least two M.S. holders, one in Grades, Standards and Regulations and one in Market Research and Analysis. The remaining staff should have B.S. Degrees or equivalent. The on-the-job training by foreign technicians will require about eight man-years of technician time at a cost of approximately $250,000 spread over three years. Academic training will cost about $50,000 over three years.

d) Vehicles and Equipment. The new market research division will require an investment estimated at $30,000 for vehicles and office equipment in the first year.

e) Operating Expenses. It is estimated that RD$200,000 per year will be needed to support the activities of this new office. The funds would be used to finance surveys and studies, train private sector personnel in marketing techniques and support informational campaigns, primarily through radio networks.

f) Credit Resources. The actual financial needs and absorptive capacity of the marketing system are not quantifiable at this time. These will depend primarily on the effectiveness of the new Market Research and Information Division. However, an initial fund of RD$1.0 million should be earmarked for the purposes described over a period of three years, to be adjusted according to demand and effectiveness.

The total estimated cost of this activity for three years is therefore:

	RD$	US$
Personnel	300,000	-
Technical Assistance		250,000
Training		50,000
Vehicles and Equipment	10,000	20,000
Operational Costs	500,000	100,000
Totals	RD$1,810,000	$420,000

6. Transportation

The highway network linking major cities is excellent for a developing country. Some farms are well-serviced by secondary and feeder roads, particularly in well-developed areas. However, in many areas of the country feeder or penetration roads are lacking or in continual need of repair.

Government expenditures for transportation and communications represented 15% of the 1972 budget or RD$49.2 million. Of this, only RD$1.2 million were invested in feeder roads and even with these, employment generated was not maximized because heavy equipment was used extensively. By comparison, twice as much (RD$2.5 million) was spent on highway maintenance and much more (RD$8.2 million) was spent on construction of major urban avenues. This pattern could be altered in order to: (1) emphasize rural sector development and provide ready access to markets, inputs and services; (2) open up isolated areas such as the frontier and the Lake Enriquillo area to profitable agriculture; (3) improve the market linkages with the areas removed from major highways; and (4) to provide increased employment opportunities in the

rural areas. In this latter regard, it would be feasible for GODR to shift its emphasis to labor intensive (pick and shovel) rural road maintenance and construction. Areas of high population density and greatest need could be identified by SEA in cooperation with Public Works and projects developed and funded so as to achieve maximum impact.

Within the GODR, a feeder road policy and plan is being developed to give greater priority to the solution of the market transportation and unemployment problems of farmers in rural areas. The present RD$1.2 million operational budget for feeder roads could be increased by at least RD$2.0 million without creating administrative problems. The present RD$1.2 million construction budget is spent on hand labor, yielding only about 1,200 man-years of employment. Assuming a working year of 250 days, 2,000 additional man-years of employment could be generated by the addition of RD$2.0 million to the operational budget under present operating procedures. Shifting operations to expend 90% of an RD$3.2 million on budget hand labor at RD$2.00/day, would provide 5,760 man-years of employment and construct 213 Kms. of roads. If, as has happened in other countries, use of hand labor reduces costs by 50%, 426 Km. could be produced. With greater investments in succeding years, employment generation would increase, helping to reduce urban-rural migration. If substantial shifts toward labor intensive rural public works were realized the inflationary influence of such expenditures would be reduced because of the lower velocity of money in rural areas.

The additional costs of labor intensive public works are initially RD$2.00 million per year.

Institutional Infrastructure and the Human Resource Base

a. Institutional Infrastructure

The principal institutional constraint to agriculture development has been the multiplicity of agencies, each following its own mandate, somewhat independently, in the absence of an overall unifying agricultural policy and a

clearly affirmed and accepted single channel of major policy direction.

Many specific agricultural problems in recent years have been overcome because of national need and the will to do so. Thus, there was an ample supply of rice in the market place last year, but it took the combined resources of every agricultural agency, plus the Central Bank in allocating the necessary foreign exchange for both production inputs and later rice imports.

It can be posed whether this was an efficient method of achieving the objective? Can the Government afford to deal with the growing number of serious agricultural problems in an ad hoc way? These problems revolve around keeping population and food in some reasonable balance. Is there a better way? These are questions which Dominicans are asking and which Dominicans will have to answer.

The interested observer could well conclude that there must be a better way, one where agricultural policy is reasonably unified and clear, where the allocation of resources is sufficient, timely and responsive to policy, where continuing coordination between agricultural agencies is at least as effective, and hopefully more so, as it is in on-spot near-crisis situations.

In these respects the SEA is taking the following steps:

1) The Secretary participates actively in the councils and boards of the agricultural agencies, except the AgBank where he is not represented.

2) SEA has taken the leadership in preparation of a sector assessment as a basis for overall policy formulation, a process involving many competent persons from other agencies. This accords with its legal mandate and brings planning staffs of agencies into a closer working relationship.

3) SEA is developing the capability and staff competence to exercise a more constructive and useful role in the budgetary process as the flow of resources can materially affect 1980 production targets.

4) SEA has proceeded rapidly with its own program of professionalization and creation of an agricultural civil service.

5) SEA is developing a technical capacity within its own organization in the areas of adaptive research and extension (particularly the latter), and market research and farm management, etc., which should materially improve its services to Dominican farmers, but in addition should be helpful to other agricultural agencies in the execution of their responsibilities.

b. The Human Resource Base for Agricultural Development

The programs undertaken to give many persons university training in the post 1965 period have augmented degree-holding agriculturalists from 14 to nearly 200. There has been an even more dramatic increase in the number of graduates from vocational agricultural high schools. There were only about 30 in 1965. Vocational agricultural schools now graduate over 200 each year and these are readily absorbed in the sector, in government, in private organizations and on farms where their skills are contributing to agricultural development.

1) Professional. SEA has recognized the need for an agricultural education policy developed on the basis of the level of preparation required by the country in various disciplines and as related to national goals. This will require an assessment of manpower requirements and prospective availabilities projected by year to at least 2000. SEA may be able in this regard to build on the work of the Educational Credit Foundation.

SEA has concluded, and this viewpoint is widely shared, that the Dominican Republic must have a well-developed national capacity to provide its university students degree training in agriculture. Current thinking is to begin with the Catholic University of Mother and Teacher (UCMM) in the Cibao because of its location, relatively better prepared faculty

and its relationship with the Superior Institute of Agriculture (ISA). The objective is to prepare a full agricultural curriculum and faculty to turn out B.S. graduates. It is generally agreed that, beyond the B.S. degree level the country should still rely on foreign educational institutions to secure advanced training simply because the cost of developing and maintaining graduate schools would be prohibitive at this stage of its development.

The primary requirements for university trained manpower are principally in the fields of economics, marketing and planning, crop production/protection, agricultural plant pathology and soil sciences. With SEA guidance and concurrence a complete agricultural science faculty and curriculum to the B.S. degree level should be developed using the above specialties as a nucleus. To accomplish this in the shortest possible time, a faculty interchange program with U.S. universities is required in order to (a) send Dominican Agricultural Science Faculty members to the United States to complete PhD Degrees or post-doctorate work in their fields or to obtain additional specialties, while performing some teaching functions and (b) make U.S. faculty members available in the Dominican Republic to develop curricula and teach undergraduate courses as replacements for the absent Dominican faculty. These steps would make B.S. degree training available almost immediately in-country and lay the basis for its continued availability.

It is estimated at present that a faculty interchange rate of 10 for 10 will be necessary. This would be subject to an in-depth evaluation of present and future faculty, and curriculum needs by SEA. The cost of sending Dominican faculty members to the United States is estimated at $100,000 per year for three years (over and above salaries). This would provide 30-man years of education and create a faculty of 15 full professors. The cost of maintaining a group of ten U.S. university faculty members for three years in-country is estimated at $1,050,000 of which $900,000 would be in dollars and $150,000 would be local support costs for housing, transportation and allowances.

In addition to the above, SEA has recognized the importance of exercising its legal responsibility to

influence the curricula of all educational institutions in agriculture with the purpose of relating university systems to the vocational high schools and establishing forms for accreditation between the two on a universal basis.

2) Vocational. As described earlier, the formal rural education system is weak and leaves the vast majority of rural people without skills or the opportunity to obtain them. Moreover, formal rural education is not related to the rural environment and the practical knowledge needed to survive in that environment. Under these circumstances, the GODR could by-pass the present system in order to impart basic marketable skills to the largest possible number of rural people through a vocational education system, tied to the present regional extension offices. A pilot project could be used to gain the experience necessary to the management of such an undertaking. The basic offerings of the system would be agronomic skills such as soil and moisture conservation and irrigation; use of agro-chemicals; agro-mechanical skills such as small machine maintenance and repair; the use and maintenance of irrigation pumps, tractor operation, maintenance and repair, welding, carpentry, masonry, plumbing, electricity and other skills as dictated by demand. The three-year cost of this activity would be approximately as follows:1/

(in thousands)

	RD$	US$
Equipment	50	150
Teacher Training		70
Teacher Salaries	135	
Operating Expenses	215	
Technical Assistance		80
	400	300

1/ Assuming a rate of participation (for three years) of 200 trainees/six week period.

c. Quality of Life Goals

1) Improvement of Nutrition

Accelerated production with emphasis on higher quality foods, as described earlier, would provide a greatly improved availability of food to make near-term gains possible.

Improvements in marketing, processing, and storage can reduce waste and create improved access to food as well as greater knowledge on the part of consumers which in turn would lead to wiser choices and a wider selection in the market place. The extent to which production of rice and cereal can replace the protein-poor starchy root crops and plantains is dependent on Dominican efforts to change cropping patterns and, of course, consumer preferences. Of primary importance is the necessity of shifting these preferences from plantains and cassava to rice, beans and other higher nutritional value commodities. With a sufficient supply of calories, the protein that is available in the diet will be utilized as a tissue building source and not burned off as energy.

To the extent that 1980 production goals are met, incomes increased and better-distributed, and producers and consumers supplied with reliable nutritional information, the diet of the country will be more acceptable for more people and constraints imposed by poor nutrition less onerous. In ideal terms, however, the 1980 diet with its doubled availability of milk, rice, beans, poultry products and edible oils will still provide only one-third of total available protein from animal sources, may well be excessively high in bulk and will not necessarily provide adequate vegetables. These deficiencies are not inevitable, however, if informational programs are initiated early and pursued vigorously. Given the present starting point of current availabilities, consumer habits, income distribution, low educational levels and confused market patterns, the task is not small.

A combination of actions in production, marketing, credit, consumer information, and improved income

distribution, do not guaranty better nutrition and health. Other more immediate actions need to be considered.

Putting the overall nutritional picture in focus, considering the health implications involved and the beneficial effect of nutrition in helping to reduce the population growth rate, the agricultural sector should aim toward producing an acceptable food blend that can be distributed as a food supplement and weaning food to immediately attack existing malnutrition, especially among infants, so that the future population will not suffer the present severe consequences of malnutrition. It is necessary to identify the foods which might serve as carriers for fortification. These foodstuffs should be centrally processed and widely consumed in significant amounts. A national effort to fortify a few staple commodities while attempting to promote the production and utilization of a more balanced diet can result in improving the vitamin-mineral dietary intake so that national efforts can be concentrated on the protein-caloric problem. Several international agencies have experience in this field and assistance is available at little cost. Actual production can be undertaken by the private sector if found economically feasible. In this respect economic feasibility relates to market demand and only the Government can accelerate the process of increasing market demand through policies and programs calculated to influence consumer preferences.

A law requiring vitamin/mineral fortification could be applied along with the milling regulations suggested in Section VI on this assessment. Serious consideration should be given to using legumes as the vehicle for a food supplement for weaning infants. As mentioned briefly in privious sections of this paper, nutritional education should be an integral part of the radio outreach extension and market information network. SEA, the Secretariat of Health and the National Family Planning Council should coordinate this and other information programs.

2) Rural Income Distribution

A program such as described above, contains several elements which can contribute to a significant improvement in rural income distribution. Primary factors contributing to

greater equity are: (a) the more rational allocation of capital and investment resources; (b) greater equity in access to technological information and production inputs for hitherto neglected farm units with productive potential; (c) more efficient marketing processes and the leveling of large seasonal price fluctuations; (d) expanded employment opportunities; (e) the development of farm management and manual skills which are marketable; (f) potential net savings on interest rates as more farms use formal credit sources; and (g) the distributional aspects of taxation. In effect the strategy is canted toward increasing rural incomes, with few conflicts with other goals.

The major impediment to success of the strategy is that the productivity of the target group of small/medium farms has been low for an extended period due to the lack of technical knowledge, capital and modern production inputs. The farmers in this group, of which most have the prospect of a rising subsistence level, has always proved difficult to reach efficiently and economically for a variety of reasons, but principally because of this very underdevelopment and marginal to non-existent relation to the monetized sectors of the economy. Consequently, in assisting them, one has to start more or less at the initial phases of the development process. Thus, the capacity of this group to make use of modern technology and production inputs is limited, at least for the short-run. Nevertheless, with well-conceived policies and effective assistance which does indeed penetrate in timely fashion to the primary producer, this group's family incomes can be raised significantly in absolute terms. The prospects for achievement have improved dramatically in the past decade. For example, the experience of the Dominican Development Foundation (DDF) has demonstrated conclusively that large numbers of poor Dominican farmers can be reached efficiently and economically. In a broader sense, the greater mobility of rural families, their increasing exposure to the various media, particularly radio, and their observations of islands of modernization around them, mainly commercial agriculture in an array of crops, have raised somewhat aspirations and made those producers more willing agents of change.

This assessment targets significant gains in production over the period 1973-1980 for three crops that are

of particular importance to the small and medium sized farms (those about 10 hectares or less in area) which includes nearly all units. These crops are rice, beans and plantains which roughly account for 80% of the output on these farms today. Rice and beans are projected to increase at an annual rate of 10.1% over the period, compared to an annual rate of 2.9% over the period 1966/67 - 1971/72; plantains are projected to increase by 3.1% per annum for the period. The trend in plantains is difficult to delineate because of large fluctuations from year to year. Assuming about equal weight for plantains on the one hand and beans plus rice on the other, average output in the future should increase by about 6.6% per annum, or nearly equal to the average increase in other sectors. The result may be a roughly comparable increase in farm income, assuming no major change in cost-price relationships.

Moreover, the agricultural sector program provides for an increase in agricultural credit by $32.5 million to 80,000 borrowers or 44% of all farm units in the range of 0.5 hectares to 10 hectares. Most of these farmers have been dependent on non-institutional sources of credit which roughly costs them about 60% interest per annum. These borrowers would now pay perhaps only 15% with a savings of RD$121 on an average loan of RD$269. In effect this would increase rural family incomes (estimated value per worker of $500 in the target group) by about 16% per annum. Thus the target group of small and medium farmers would have their incomes increased by about 6% per year as a result of savings in interest, assuming the high percentage of such farmers have to borrow to finance production. Additional increases in income would be possible if price stability policies allowed the group to sell their products at a higher average price than in the past when many were forced to sell at seasonal low points in price fluctuations.

Consequently, it is possible, perhaps probable, that these farm family incomes (a large part of which is received in kind by small farmers) will increase more rapidly than income received by other sectors during the period under

consideration so that the urban-rural income gap will narrow, at least for those farmers benefiting from new program credits. It must be emphasized however, that success in general will depend not only on raising production and obtaining credit on favorable terms, but also on improving marketing facilities and effective price stabilization policies that will assure that the farmer receives a good return on the sale of his produce in the market.

In summary, the net effect of the strategy can be to raise the average income per farm worker from $500 to approximately $750 over the three year period for the target group.

3) Rural Employment

Problems of unemployment, underemployment and low incomes are inevitably closely interrelated; a sharp reduction in the volume of underemployment in rural areas (estimated by ILO to amount to over 40% of the working potential of the rural labor force) would clearly affect income distribution. Sixty percent of agricultural producers have plots under two hectares in size and have incomes well below the bare subsistence income level which, in rural areas, is estimated to be RD$420 per annum. Farmers with 10 hectares or less are occupied only half of a full working year. The productivity of this group is low because of the lack of technical knowledge, capital and modern agricultural inputs and because of the often dysfunctional aspects of the present marketing structure. Nevertheless, with appropriate policies and assistance, the majority of this group are potentially commercially viable and therefore capable of raising their family incomes significantly.

A survey on unemployment by UNDP/ILO, completed in December 1973, found that of the roughly 600,000 workers constituting the agricultural labor force, 100,000 were landless workers who were occupied 66% to 75% of the time, while 500,000 operated farms or helped relatives operate farms. From these figures, 425,000 workers on farms below 10 hectares in size are underemployed; 365,000 workers on farms below five hectares in size worked only half time, including work on the farm and outside work; 60,000 workers on farms of 5-10 hectares worked half-time devoting all that time to farm work. The remaining 75,000

on farms of over 10 hectares were fully occupied on farm labor except for a minor degree of underemployment in the category 10-20 hectares. Therefore, it is clear that underemployment becomes more serious as farm sizes are reduced. The foregoing translates into approximately 213,000 man-years of unemployment which will be reduced by the sector program in the following ways.

a. Production Increases

Production increases in basic food commodities (rice, beans, plantains) will rise at 6.6% per annum. It is assumed that this production increase will affect 80% (340,000) of the 425,000 workers employed on farms of less than 10 hectares. It is further assumed that employment will be generated at a rate equal to 70% of the rate of production growth, i.e., 4.6%. 1/ This will reduce unemployment from 213,000 man-years to 166,000 in three years (.046 x 340,000 = 15,600 per year x 3 years = 47,000. 213,000 - 47,000 = 166,000).

ILO places the net increase in the rural labor force at only 4,200 per year. If this is accurate the increase in the rural labor force during a three year period will be about 13,000. The net reduction in unemployment resulting from increased production would be:

Present unemployment.	213,000
+ Net 3 year increase in labor force.	13,000
	226,000
- Employment generated by increased production.	47,000
Unemployment remaining in 1977	179,000

1/ In the ILO study employment grew at 85% of the rate of production increases when such increases were attributed almost entirely to extension of the cultivated area.

b. Rural Public Works

It is unlikely that much more progress can be made in reducing the outstanding volume of rural unemployment/ underemployment without creating extensive employment through rural public works -- roads, land development and irrigation systems. It is estimated that $9.6 million in this three-year program will go into the construction of feeder roads which conceivably could employ an additional 5,760 workers during the period at the rate of RD$2.00 per day, 250 work days per year. This assumes that labor costs will be 90% of total costs. Such pick and shovel public works require virtually no expenditure of foreign exchange for imported equipment, have significant positive effect on long-term agricultural development and are highly employment intensive.

The net decline in unemployment may be summarized as follows:

Estimated unemployed (1974)	213,000
Net additions to rural labor force (1974-1977)	13,000
Sub-Total	226,000
Reductions in unemployment:	
Increase in production	47,000
Public works program	6,000
Sub-Total	53,000
Total Estimated Unemployed (1977)	173,000 man-years

This sector assessment is not intended to provide a comprehensive national prescription for eliminating rural unemployment. However, one aim is to encourage a set of policies and shifts in use of resources which can stimulate significant progress in reducing rural underemployment and minimizing rural/urban income disparities. The solution of what

is undoubtedly one of the country's major social problems will require a continuing and determined effort over many years in the context of a fully articulated and widely accepted national development plan.

ANNEX I

LAND CLASSIFICATION AND LIFE ZONES

For the purposes of this assessment, the lands of the Dominican Republic are classified into natural life zones. This classification permits identification of similar ecological zones where major climatic factors, i,e., mean annual biotemperature, total annual precipitation and humidity -- are sufficiently similar to allow successful production of similar agricultural crops wherever the zone is found.

Superimposed upon these life zones is a land capability classification. Thus, we are able to both list the crops best adapted to each zone and to predict maximum yields of these crops under differing agronomic treatments. Also, by crop, we can determine required inputs for differing levels of outputs. The system further allows delineation of priority areas for other major developmental programs such as irrigation systems, research needs, and transportation and marketing improvements.

There follows a brief description of each life zone:

a. Subtropical thorn woodland:

Map Symbol = S - tw

Location and Extent. Approximately 1,001 square kilometers of this life zone are present, representing about two percent of the total land area in four major areas: (1) A small area southwest of Baní, crossing Arroyo Hondo and extending westwards toward the Bahía de las Calderas. (2) The most extensive area starts near Puerto Viejo and extends northwestward as far as Lake Enriquillo. (3) A small area southeast of Pedernales province in the neighborhood of Cabo Rojo. (4) At the foot of the Loma de los Aguacates.

Climate Conditions. An average annual precipitation equals 455 mm, falling chiefly from August to October. Mean annual biotemperature is estimated at 22.0°C with average evapotranspiration at 130% higher than total annual rainfall. Runoff to rivers is rare.

Topography and Vegetation. Lands have flat to slightly broken relief. Elevation varies from sea level to 300 meters. Natural vegetation is chiefly shrubs and thorny plants.

Appropriate Land Use. Approximately 47% or 470 square kilometers of these lands fall in land capability Classes I to III and are suitable for irrigated agriculture only.

One valuable use of these lands would be managed livestock grazing. Carrying capacity is estimated at two animals per 24 ha.

Recommended crops are short cycle, drought resistant species such as sorghum or melons.

Existing land use has resulted in degeneration of the lands to thorny desert.. Over grazing and uncontrolled cutting have caused severe erosion.

b. Subtropical dry forest:

Map Symbol = S - df

Location and Extent. This zone covers a total of some 9,812 square kilometers or 20.42% of total land area of the country. It occurs in the following major areas: (1) From the town of Enriquillo westward along the slopes of the Cordillera de Bahoruco to the Haitian border. (2) In the northern part of the Barahona península from the Caribbean coast to Jimaní. (3) In the southern and eastern slopes of the Cordillera de Neiba to the vicinity of Pedro Larto. Also covers the southern slopes of the Cordillera Central. (4) In the extreme southeast from Cabo Engaño to San Rafael del Yuma. (5) In the extreme northwest from Santiago to Monte Cristi.

Climatic Conditions. Rainfall varies from 545 mm at Puerto Escondido to 980 mm at Santiago de los Caballeros. On an average, rain falls 51 days of the year.

The southern region has two well defined rainy seasons -- May to June and September to October. Other areas vary with rainy seasons occuring in either April through June or September-October.

Mean average biotemperature is close to 22.5°C with average potential evapotranspiration 60% higher than annual precipitation.

Topography and Vegetation. Elevation varies from sea level to 700 meters. Topography is level to broken.

Areas of near climax vegetation exist in the southeastern part of the life zone. These areas have a nearly closed cover of hardwood trees. Other areas have degenerated to a cover of various cactis, occasional trees and sparse perennial grass.

Appropriate Land Use (Capability Class)

Class		Area Square Kilometers
I	=	301
II	=	1,375
III	=	747
IV	=	855
V	=	41
VI	=	1,358
VII	=	4,890
VIII	=	245

The brevity of rainy seasons restricts rainfed farming to short growth-cycle species. Pests and diseases are not limiting factors and climatic factors are suitable for development of agriculture, especially with moisture conservation practices for rainfed or irrigated farming.

Land capability Classes I through III are suitable for sisal cultivation and some perennial species of fruit trees such as mangoes and certain citrus varieties under rainfed conditions. These classes of land under adequate irrigation are suitable for intensive cultivation of crops such as cotton, sugar-cane, rice, and beans, and under good cultural conditions and water management can give high yields.

Land Classes IV through VI are suitable for establishment of adapted grasses such as guinea grass. Under fertilization and good management these pastures should reach a carrying capacity of one animal unit yearly per 12 hectares.

Other lands unsuitable for farming or grazing because of soil or topography can support high value trees.

c. Subtropical moist forest:

Map Symbol = S - mf

Included in this life zone is the limited S - df to S - mf transition zone, covering only approximately 150 square kilometers.

Location and Extent. This life zone covers approximately 22,139 square kilometers or 46% of the land area and occurs country-wide. In the northern region it covers the valleys whose rivers empty into the Atlantic. In the western region, it covers the left banks of the valleys of the tributaries of the Artibonito River. In the southeast it extends along the southern foothills of the Sierra de Neiba. In the southern part it covers the valleys of the tributaries of the Yaque del Sur River basin and of the Ocoa, Nizao and Haina Rivers. In the southeastern region it covers almost the whole of the Caribbean coastal plain plus the southern slopes of the Cordillera Oriental and San Rafael del Yuma.

Elevation varies from sea level to 800 meters with the bulk falling between 400-800 meters.

Climatic Conditions. Rainfall is most frequent from April through December. January, February and March are dry season months.

During the nine months when rain occurs, the periods from April to July and September to December receive heaviest rainfall. All areas receive sufficient rainfall over the nine month season to allow for intensive agriculture. Average annual precipitation varies from 1,500 to 2,000 mm and shades to 1,000 mm westward in the transition to S - df zone.

The annual biotemperature varies from 21° to 24°C. Average potential evapotranspiration is estimated as 20% less than total annual precipitation.

Appropriate Land Use. This zone falls into the following capability classes.

Class		Area Square Kilometers
I	=	270
II	=	1,191
III	=	2,830
IV	=	1,816
V	=	-
VI	=	2,730
VII	=	12,746
VIII	=	556

From a climatic standpoint, lands in this zone are best suited to intensive farming and livestock operations. They are the most rewarding to the farmer of any lands in the country.

Capability Classes I and II are suited to intensive agriculture allowing multi-cropping systems for crops such as tobacco, string beans, potatoes, yucca, corn, peanuts, rice and various vegetables.

Single crops of rainfed rice with yields of five MT per Ha. are possible and with moisture conservation practices this can be followed with corn, sorghum, sweet potatoes, soybeans, and other crops. Multi-cropping with interplanting is possible with total yields up to 18 MT of food per hectare.

Capability Classes III, V and VI are suitable for tree crops such as coffee, bananas, coconut palms and fruit trees. They are also suitable for high intensity stock raising with managed tame pastures.

Classes VII and VIII are best suited to high value reforestation projects.

Included in the above life zone are the transition zones of S - mf to S - df and S - mf to S - wf. Together they comprise some 655 square kilometers or 1.36% of the land area. They are capable of the same treatment per capability class with certain restrictions at their extremes.

d. Subtropical wet forest:

Map Symbol = S - wf

Location and Extent. This zone covers about 6,808 square kilometers, equal to 14.2% of the total country area.

In the northern region it comprises chiefly the broken lands of the Cordillera Septentrional. In the northwest it occupies the Cabrera promontory and elevations above 200 meters of the Samaná península.

In the eastern region, it occupies the higher slopes of the Sierra de Yamasá and the Cordillera Oriental.

In the southern and eastern regions, it occupies lands bordering the Yuma, Nizao, Haina and Ozama Rivers. It also occurs along the tributaries of the Yaque del Norte, Dajabón and Artibonito Rivers.

Climatic Conditions. Rains in this zone follow the pattern of those for the S - mf zone. However, they are of longer duration and greater intensity. Average annual rainfall varies from 2,200 to 4,400 mm.

Temperature varies according to location. Mean annual biotemperature is 24°C near the coast and as low as 18°C on the slopes of the mountains.

Average potential evapotranspiration is estimated to be 60% less than total average precipitation. Some three-fifths of rainfall escapes as run-off, hence rivers run throughout the year.

e. Subtropical rain forest:

Map Symbol = S - rf

Subtropical wet forest to rain forest transition zone:

Map Symbol = S - wfd

These areas comprise only some 82 square kilometers or 0.18% of total land area. Due to excessive humidity, these lands are valueless for agriculture, stock raising or forestry and are not considered as a part of the agricultural resource.

f. Lower montane moist forest:

Map Symbol = LM - mf

Location and Extent. This life zone is located on the foothill spurs of the Cordillera Central. In the Sierra de Neiba and Sierra de Bahoruco, the sloping lands above 800 meters also belong to this group.

The life zone covers about 3,214 square kilometers or approximately 6.7% of total country area.

Climatic Conditions. Climatic conditions are favorable to human and animal life. Temperatures are moderate (similar to characteristics of a temperate climate).

Rainfall varies from 900 to 1,800 mm with heaviest fall from April through November, adequate to maintain plant growth during the growing season. Temperatures from December to April may fall to 1°C. Mean annual biotemperature is about equal to mean annual temperature.

Average evapotranspiration is equal to total annual rainfall so that streams rising in this zone run only during periods of highest rainfall.

Topography and Vegetation. Relief is largely broken. Areas of moderate gradient are small and dispersed, forming narrow valleys which lack communications. Elevation ranges from 800 to 2,200 meters.

Primary natural vegetation is chiefly pine. The volume of usable timber is low. However, natural regeneration is relatively easy.

Appropriate Land Use. Only Class I, II and III soils are suitable for agriculture or stock raising. Other capability classes are suitable only for forestry.

Land Capability Classes

Class		Area Square Kilometers
I	=	35
II	=	155
III	=	202
All Other	=	2,822

Principal crops adapted to the area and recommended for Class I and II lands are potatoes, corn, sorghum and various vegetables.

Tame pastures of alfalfa, clover and other forage legumes can occupy all three top capability classes as well as other moderately level to rolling classes. Considerable areas of this life zone have been cleared, farmed for a period and abandoned due to loss of fertility.

Forestry management with emphasis on adapted species of pine would be most rewarding.

g. Lower montane moist forest to dry forest transition zone:

Map Symbol = LM - mfa

Lower montane moist forest to wet forest transition zone:

Map Symbol = LM - mf

These zones occupy only 266 square kilometers or one percent of the country. Conditions in each zone and treatments recommended are the same as for the zones of lower rainfall into which the transition occurs, i.e., LM - mf = sdf and LM - mf = LM - mf.

h. Lower montane wet forest:

Map Symbol = LM - wf

Location and Extent. Zone occurs chiefly across the foothill spurs of the Cordillera Central, the source of the major rivers of the Dominican Republic.

Total area of the zone is 3,557 square kilometers or 7.4% of total area.

Climatic Conditions. Rainfall is approximately 2,000 mm. Temporary hoarfrosts occur.

About 50% of rainfall is used through evapotranspiration. The balance escapes to stream runoff.

Topography and Vegetation. Relief is generally broken, elevation ranges from 850 to 2,100 meters. Natural vegetation consists chiefly of trees. The zone contains the largest area of forests in the country. Pine, ebony and almond dominate the stands.

Appropriate Land Use. Little promise for agricultural activity exists in this zone. The primary recommended use is forestry and watershed.

Areas should be national forests under proper management.

i. Lower montane wet forest to rain forest transition zone:

Map Symbol = LM - wf

lower montane rain forest:

Map Symbol = LM - rf

Montane wet forest:

Map Symbol = M - wf

These three zones include some 359 square kilometers or 0.7% of country land area.

The lands have no agricultural and only limited forestry value. Their chief value is watershed and the zones should be managed as such.

Land Capability Classification, Summary and Description

The 1967 C.A.S. reconnaissance soil survey has been summarized according to land capability. This survey was competently executed so the summaries should give a good guide as to Dominican agricultural potentials. The following data, based on the O.A.S. survey are taken from the 1968 National Planning Office "Plataforma" report.

Class	Km^2	%	Production Capacity
I	537	1.1	Excellent for cultivation.
II	2,350	4.9	Very good for cultivation.
III	3,122	6.6	Good for cultivation.
IV	3,639	7.7	Limited or marginal for cultivation.
V	6,071	12.7	Pasture -- no erosion hazard.
VI	5,611	11.8	Pasture -- some erosion hazard.
VII	25,161	52.7	Forest.
VIII	1,202	2.5	Wildlife.

The productive capacity descriptions have been changed to facilitate a better understanding of potentials.

The above summary gives national totals. By superimposing capability classification on life zones, we are able to estimate the area of each capability class in each life zone. This further refines the suitability of crops and yield potentials for each life zone, as delineated in the life zone capability overlay and crop recommendation section.

Classes I, II and III are all well suited to cultivation to general crops. These have either increasing erosion hazard from Class I to Class III or decreasing yield potential.

Lands of Class IV normally are only marginally suited for general crops but may be occasionally farmed. Another group of soils normally placed in Class IV are those lands which may be poorly adapted to general crops but which may be suitable for a special crops such as rice. A great deal of the rice along the road from Bonao to San Francisco de Macorís and from Fantino to Las Matas is on Class IV land.

Class V land is usually flat to gently sloping and usually of heavy, poorly drained clays. Some of the flattest areas of these soils are successfully farmed in rice but in general these soils are best used for pasture. The Sabana de Guabatico near Santo Domingo is one of the largest single areas of such soils. Much of the better pasture land around Hato Mayor is in this classification.

Class VI lands are steeper lands, rocky lands, and shallow lands suitable for pasture but with much greater limiting factors than Class V. The steeper lands of La Cortina Ranch, Higuey, belong in this class. These lands are classed as suitable for forestry or grass but should be considered as chiefly pasture lands.

Class VII lands are the rough, steep mountain lands. These lands which make up over half the total area of the country are principally valuable as watersheds and, in general, suitable only for forestry. Farming and or grazing of these lands is often quite damaging to the vegetation protection which leads to severe erosion and damage to these vital watersheds.

Class VIII is a relatively small area of land, principally coastal saline swamps having limited commercial value. In usual terms these are classed as wildlife areas.

Life Zone Capability Overlay and Crop Recommendations

Land Class Square Kms.	S - tw	S - df	S - mf	S - wf	LM - mf
I		301	270	70	35
II	470	1,375	1,191	350	155
III		747	2,830	420	202
IV		855	1,816	480	
V		41	-	760	2,822
VI	531	1,358	2,730	880	
VII		4,890	12,746	3,002	
VIII		245	556	150	

- Life zones. S - rf and S - wfd comprise only some 82 square kilometers. They are valueless for agriculture except as watershed.

- LM - mf and LM - mf occupy some 266 square kilometers. They are transitional zones and have some recommended treatment as zones of lower rainfall into which transition occurs.

- ML - wf
  LM - rf
  M - wf

These transition zones occupy some 359 square kilometers. They have limited forestry value and primary value as watersheds.

- LM - wf

This life zone occupies approximately 3,557 square kilometers. Primary value is as forest and watershed.

- Life zone. S - tw

Capability Classes I through III suitable for agriculture only under irrigation.

Adapted crops under irrigation are short cycle crops such as melons, vegetables, sorghum, corn. High water use crops such as rice should be avoided due high evapotranspiration loss.

Capability Class IV - VII should not be farmed -- under managed grazing of nature vegetation have limited value during relatively short growing season.

- Life zone. S - df

Capability Classes I through III are suitable for rainfed farming to short cycle species such as sisal, sorghum, melons, and tomatoes. Suitable perennial crops are mangoes, guanábanas, some citrus.

These classes under irrigation are highly productive to intensive cultivated crops such as beans, cane, vegetables, rice.

Classes IV through VII are suitable only for managed pasture for low-density grazing and for forestry development.

- Life zone. S - mf

Climatically, this is the most favorable of life zones for farming and stock raising. Class I to III soils are suitable for intensive agricultural crops such as tobacco, beans, potatoes, yucca, corn, peanuts, rice and vegetables. Two crops a year are possible on all crops except rice without irrigation.

Class IV through VII are highly suited to livestock growing on improved managed tame pastures.

Specialized farming on problem soils such as Class V is possible for rice with drainage and water management.

- Life zone. S - wf

Intensive agriculture is limited due to excessive loss of fertility through leaching. Also, high humidity and rainfall encourage pests and disease.

Class I through III are suitable for high yield, intensive agricultural crops, especially root crops.

Other classes of soils are most suited to cacao and coffee, plantain, cassava and to managed tame pasture.

- Life zone. LM - mf

Crops sensitive to low temperatures are not recommended.

Intensive agriculture is possible on deep soils and adapted crops are potatoes, corr, onions, tomatoes and other high value vegetables. Shallower soils are suitable to both tropical and temperate fruit trees such as peach, pear, apple.

All soils on moderate slopes are suitable for tame pasture of legumes and grasses such as alfalfa, clover, etc.

ANNEX II

SURFACE WATER RESOURCES

There are 108 independent river systems in the Dominican Republic. Only five of these are classified as large river basins, i.e., those of the Artibonito, Yuma, Azua, Yaque del Norte, and Yaque del Sur Rivers.

The O.A.S. study previously mentioned has divided the country into 14 hydrographic subdivisions. For each of these subdivisions basic information has been collected. There follows a listing and limited description of these zones, their area, existing irrigation systems and limited steam flow data.

The following breakdown by river basins presents the picture as seen in 1965 - 1966. Since that time there have been limited additions, of land placed under irrigation. Table A-II-1 shows the 1972 - 1973 crop year irrigation listing by administrative areas and shows an increase of irrigated acreage of some 13,000 acres. Table A-II-2 shows irrigation projects under plan and consideration for implementation over the next two years.

1. Sierra de Bahoruco Zone

Area: 2,814 square kilometers.

Annual Rainfall: 750 to 2,000 mm annually.

Scream Flow: About 320 x 10/6[1/] cubic meters per annum.

1/ 10/6 equivalent to 10 raised to the sixth power.

Zone is bounded on the north by the Sierra de Bahoruco divide. Eastward flow to the sea is rapid. Southward flow does not reach the sea.

At present there is no irrigation development beyond small diversion works in the zone. A study for the development of the Pedernales River has been proposed but to date not carried out.

2. Azua, Baní and San Cristóbal Zone

Area: 4,460 square kilometers.

Annual Rainfall: 750 to 2,250 mm annually.

Stream Flow: 1,516 x 10/6 cubic meters per annum, irregularly distributed.

Irrigation Requirements: Southern portion of zone where irrigable soils exist is arid and crop production is dependent on a regular supply of irrigation water.

Irrigation Systems: A total of some 372,000 tareas are presently under irrigation in various areas. Major irrigated crops are cane, plantains, bananas, truck crops and rice.

Development Potential: At the present time, the discharge of the Nizao River is being entirely utilized. The Baní River is small and does not offer much potential for additional irrigation.

The Nizao River basin is the largest and has the highest rainfall in the very large region. It has been determined that there are four possible dam sites, including that of Valdesia, which offer considerable potential for development and expansion of the irrigation systems of the area. Valdesia is under construction at present.

3. Ozama River Basin

Area: 2,706 square kilometers.

Annual Rainfall: 1,400 to 2,250 mm annually.

Stream Flow: Approximately 1,586 x 10/6 cubic meters per annum.

Irrigation Requirements: Considered a humid area and only rice requires irrigation.

Irrigation Systems: None in the basin at present.

Development Potential: There are several extensive areas of irrigable lands in the Ozama basin that could be used for rice cultivation, for which the soils are suited. Relatively simple diversion structures and canals could provide the system.

Potential ground water yield is considered to be reliable and quite high, especially from deep wells. The ground water has considerable economic value for domestic and industrial use in the city of Santo Domingo.

4. San Pedro de Macorís and La Romana Zone

Area: 4,629 square kilometers.

Annual Rainfall: 1,000 to 2,250 mm annually.

Stream Flow: Approximately 2,444 x 10/6 cubic meters per annum.

The area belongs almost entirely to the Caribbean coastal plain. Major rivers are the Chavon, the Dulce, the Cumayasa, the Soco and the Macorís.

Irrigation Requirements: Northern portion of this zone is classified as humid, thus rice is considered the only crop requiring irrigation. In the southern part of the zone, supplemental irrigation is usually necessary for successful agriculture.

Irrigation Systems: The Central Romana at present irrigates about 26,000 tareas of sugar-cane.

Development Potential: In the southern portions of the zone, yields could be increased with the availability of supplemental irrigation water.

Though no figures are presently available, expansion of new lands for crops other than cane through irrigation are possible but of lower priority than some of the other areas.

5. Higuey Zone

Area: 2,207 square kilometers.

Annual Rainfall: 1,000 to 1,750 mm annually.

Stream Flow: 609 x 10/6 cubic meters per annum.

The Yuma is the only river in the area. The areas outside the Yuma River basin have virtually no surface streams and are considered arid.

Irrigation Requirements: Most of the irrigable lands in the zone require about 130 mm of supplemental irrigation water for production of short cycle crops. The lower Yuma River area is classified as arid and would require full crop requirement irrigation for successful agriculture.

Irrigation Systems: None at present.

Development Potential: There is considerable irrigable land in this zone which would require supplemental irrigation for successful short cycle crops. However, studies indicate that the Yuma River does not carry a dependable year round source of water for all the irrigable lands in the zone.

Because of this, rather expensive cross river diversions from such streams as the Chavon would have to be carried out or extensive ground water pumping developed. This places the development of supplemental irrigation water for the zone in a lower priority.

6. Miches and Sabana de la Mar Zone

Area: 2,265 square kilometers.

Annual Rainfall: 2,000 to 2,700 mm annually.

Stream Flow: Approximately 1,284 x 10/6 cubic meters per annum.

Irrigation Requirements: On arable lands, required only for rice and that as supplemental water.

Irrigation Systems: None.

Development Potential: None at this time.

7. Samaná Península Zone

This is a mountainous humid zone with limited agricultural land or potential. No information is available at this time.

8. Northern Coastal Zone

Area: 4,266 square kilometers.

Annual Rainfall: 1,000 to 2,300 mm annually.

Stream Flow: 3,870 x 10/6 cubic meters per annum.

This is a relatively narrow coastal plain bounded on the south by the Cordillera Septentrional with many perennial streams. These are the Boba, Nagua, San Juán, Yásica and Bajabonico Rivers.

Irrigation Requirements: This is a humid zone and requires supplemental irrigation only for rice.

Irrigation Systems: 24,800 tareas of land watered from the Nagua River. This area is mostly under rice cultivation and is located near the town of Madre Vieja.

Development Potential: The Nagua and Boba Rivers flood frequently causing considerable damage to crop lands. Primary development work should be toward flood control rather than irrigation. Supplemental irrigation would result from the flood control system.

9: Yuna River Basin

Area: 5,630 square kilometers.

Annual Rainfall: 1,170 to 2,250 mm annually.

Stream Flow: 2,375 x 10/6 cubic meters per annum.

Irrigation Requirements: The northeastern portion needs supplemental irrigation to improve crop yields and assure production. The remaining portion of the basin needs irrigation only for rice.

Irrigation Systems: A total of 473,000 tareas are under irrigation from various systems and diversions from the Yuna, Camú and Jima Rivers.

Development Potential: Two to three year cyclic flooding occurs in the delta of the Yuna and also along its course. This flooding is generally destructive to crops. Further, the flooding of the delta lands limits agricultural development for the area. Preliminary investigations for drainage and flood control for these lands indicate that the cost would probably be excessively high. Preliminary studies have also been made on the possibility of constructing a dam on the upper reaches of the Yuna between the towns of Hatillo and Bonao. This would not only furnish irrigation for additional lands but would assist in flood control and allow better utilization of the delta region.

10. Yaque del Norte River Basin

Area: 7,053 square kilometers.

Annual Rainfall: 500 to 2,000 mm annually.

Stream Flow: Approximately 2,017 x 10/6 cubic meters per annum.

Irrigation Requirements: All agricultural lands of the basin require irrigation for extensive or intensive agriculture. The intermediate eastern zone requires a minimum of 150 to 200 mm of supplemental water for short cycle crop growing. The arid western zone requires a full crop requirement of 450 to 600 mm.

Irrigation Systems: Total area under various irrigation systems is 645,900 tareas. Under present conditions, there is not sufficient water in the river system to adequately irrigate all the lands and as a result, frequent periods of water shortage occur with subsequent crop damage.

Development Potential: Most of the irrigable lands in the basin are already under delivery systems of one kind or another. The primary development needed is in water management. The shortage of water noted probably stems as much from lack of management as it does from an actual shortage of water. Overirrigation on the upper systems coupled with poorly maintained and poorly managed diversion and delivery systems account for much of the shortage of water in the lower portion of the basin. Any extensive investment of capital in large storage dams should definitely be connected to management of existing systems as a condition of funding.

11. Dajabón River Basin

Area: 858 square kilometers.

Annual Rainfall: 750 to 2,000 mm annually.

Stream Flow: Approximately 370 x 10/6 cubic meters per annum.

Irrigation Requirements: The lower half of the basin is a dry zone requiring irrigation for practically all crops. Here rice requires some 650 mm per growth season with other crops requiring approximately 300.

The rest of the basin requires none to supplemental for rice in the upper basin and supplemental for all crops in the transition zones.

Irrigation Systems: There are four separate areas in the basin now under irrigation covering a total of 33,000 tareas; 28,000 of this is in rice.

Development Potential: There are more lands in the area that could be irrigated if the water supply were sufficient. The very high consumption of water by rice in the lower zone restricts the area which the stream can support. Were it possible to shift from rice to less water-demanding crops, considerably more area could be brought under production.

12. Yaque del Sur River Basin

Area: 5,345 square kilometers.

Annual Rainfall: 700 to 1,500 mm annually.

Stream Flow: Approximately 1,181 x 10/6 cubic meters per annum.

Irrigation Requirements: The area south from about 10 kilometers downstream of San Juan de la Maguana is a dry zone requiring irrigation for intensive agriculture. The remainder of the basin benefits or could benefit from supplemental irrigation to increase yields and prevent the occasional crop loss from drouth.

Irrigation Systems: Over 25 separate irrigation areas cover a total of about 486,200 tareas.

Development Potential: The northwestern part of this basin contains rather extensive irrigable areas lacking surface water supply. Ground water supply is a possibility and should be investigated.

13. Lake Enriquillo Basin

Area: 3,048 square kilometers.

Annual Rainfall: 600 to 1,200 mm annually.

Stream Flow: 312 x 10/6 cubic meters per annum distributed among 10 different stream systems, none of which have a flow over one cubic meter per second during any month of the year.

Irrigation Requirements: All agricultural development in the region dependent on irrigation. Water requirements for all short cycle crops exceed 400 mm per crop.

Irrigation Systems: Total of 222,092 tareas is presently irrigated. This by means of springs and of water conducted from Yaque del Sur River.

Development Potential: Development of surface water in the area has probably reached a maximum and additional diversion from the Yaque del Sur is difficult to justify. However, there is an unknown ground water supply and investigation of ground water supplies should be a priority.

14. Artibonito River Basin

Area: 2,653 square kilometers.

Annual Rainfall: 1,200 to 2,000 mm annually.

Stream Flow: 1,190 x 10/6 cubic meters per annum.

Irrigation Requirements: The western San Juan valley requires supplemental irrigation for all short cycle crops. Rice requires 150 mm supplemental per crop and other crops approximately 100 mm.

Irrigation Systems: Present lands under irrigation are located along the Macasia River and its tributaries. These lands total 144,000 tareas.

Development Potential: The areas that remain with irrigable land potential are scattered and small, making expansion of the present system or development of new systems costly.

IRRIGATION DISTRICTS

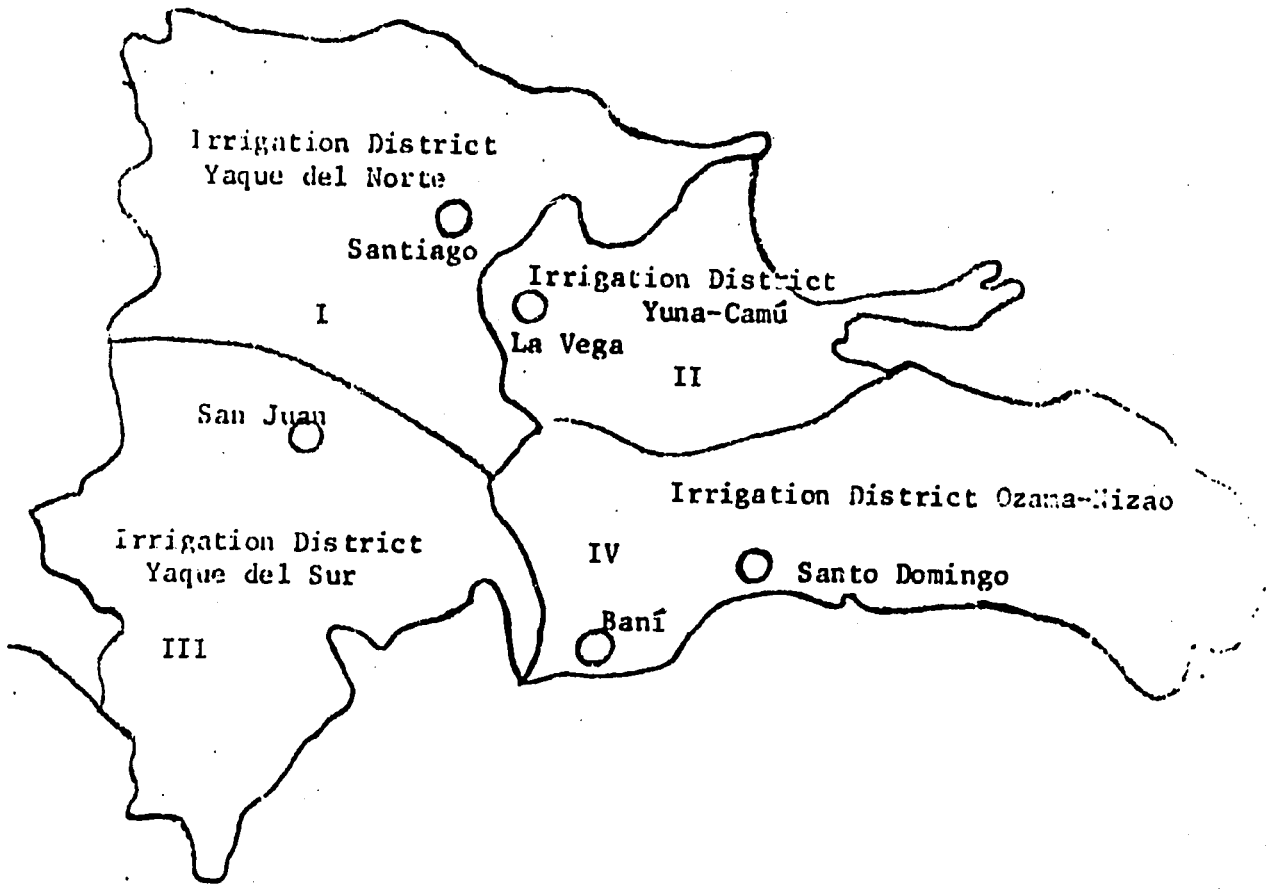


TABLE A-II-1

DISTRICTS OF IRRIGATION AND THREE MAIN PRODUCTS

PER AREA FOR PRODUCTION CYCLE 1972 - 1973 1/

A. Irrigation District Yaque del Norte

Area	Irrigated Area	Main Crop	Tareas Planted	Average Yield/Tarea cwt/Tarea 4/
Esperanza	120,980 Tareas	Rice	42,263	3.20
		Sugar-Cane	33,220	8.00
		Tobacco	14,329	1.75
Santiago	49,450 Tareas	Rice	23,869	2.36
		Sugar-Cane	8,580	8.00
		Tomatoes	3,920	15.00
Villa Vásquez	174,000 Tareas	Rice	135,992	3.19
		Plantain 2/	19,110	10,830
		Banana 3/	7,600	2,100

Continued

1/, 2/ and 3/ see continuation.
4/ 1 hectare = 15.9 tareas.

Continuation.

Area	Irrigated Area	Main Crop	Tareas Planted	Average Yield/Tarea cwt/Tarea
Dajabón	22,255	Rice	20,362	2.50
		Tobacco	1,371	2.00
		Yucca	207	5.00
Valverde	59,474	Rice	41,444	3.00
		Plantain 2/	10,575	10,830
		Tobacco	3,240	2.00
Total	426,159 Tareas			

1/ Statistics Report No. 1, August 1973 -- INDRHI.
2/ Plantain -- Unit of one plantain.
3/ Banana -- Stalks.

1/3

B. Irrigation District Yuna-Camú

Area	Irrigated Area	Main Crop	Tareas Planted	Average Yield/Tarea cwt/Tarea
La Vega	245,481	Rice	239,531	3.23
		Sweet Potatoes	75	5.00
		Minor Fruits	5,775	-
Cotuí	137,910	Rice	137,910	3.23
Nagua	42,677	Rice	42,677	3.23
Villa Riva	183,000	Rice	183,000	3.24
Constanza	17,808	Garlic	8,570	8.11
		Vegetables	2,984	-
		Onion	2,651	7.06
Total	626,876 Tareas			

C. Irrigation District Yaque del Sur

Area	Irrigated Area	Main Crop	Tareas Planted	Average Yield/Tarea cwt/Tarea
San Juan	175,045	Rice	131,630	3.50
		Beans	34,276	2.30
		Peanuts	8,260	2.10
Azua	50,733	Beans	14,520	2.50
		Tobacco	9,045	2.00
		Peanuts	6,385	2.00
Barahona	192,476	Plantain 1/	64,665	10,000
		Sugar-Cane	95,043	8.00
		Banana 2/	13,617	1,100
Neyba	121,808	Plantain 1/	53,734	10,000
		Banana 2/	31,933	900
		Beans	6,339	2.00
Las Matas de Farfán	54,408	Rice	25,592	2.09
		Beans	10,751	1.96
		Peanuts	9,070	2.00
Total	594,470 Tareas			

1/ Plantain -- Unit of one plantain.
2/ Bananas -- Stalks.

D. Irrigation District Ozama-Nizao

Area	Irrigated Area	Main Crop	Tareas Planted	Average Yield/Tarea cwt/Tarea
Baní	100,123	Sugar-Cane	32,860	8.00
		Plantain 1/	22,567	3,890
		Tomatoes	8,721	6.00
San Cristóbal	9,349	Sugar-Cane	4,310	8.00
		Yucca	1,066	8.00
		Peanuts	872	1.44
Total	109,472 Tareas			

1/ Plantain -- Unit of one plantain.

Difference may be noted between total acreage figures in the text and INDRHI's data which is based on actual acres under irrigation (production cycle 1972-1973) and OAS data is based on potential irrigable acres.

TABLE A-II-2

IRRIGATION PROJECTS UNDER PLAN AND CONSIDERATION FOR IMPLEMENTATION OVER THE NEXT TWO YEARS.

1975	
Canal Temporero José Joaquín Puello	15,900 Tareas
Yaque del Sur - Azua	47,700 "
Valdesia	31,800 "
1976	
Tavera (part of its irrigation capacity)	39,750 Tareas
Total	135,150 Tareas

ANNEX III

FARM MANAGEMENT DECISIONS

The kinds of management decisions that producers need to make, once they have a working knowledge of available technology and market conditions, are illustrated in Table 1.

TABLE 1

Yields, Cost of Production, Acquisition Prices at the Farm Level and Earnings in Some of the Crops Considered in the Zone. 1/

Crops	No. of Months of Cycle	Yield/ Tarea	Acquisition Cost/ Unit	Gross Earning/ Tarea	Prod. Cost/ Tarea	Net Total Earning/ Tarea	Net Monthly Earning/ Tarea
Ajonjolí	4	1.0/cwt	13.25/cwt	13.25	11.50	1.75	0.44
Cotton	5	2.5/cwt	11.00/cwt	27.50	20.00	7.50	1.50
Rice (dried)	3	4.5/cwt	9.00/cwt	40.50	24.00	15.50	5.17
Sweet Potatoes	5	12.0/cwt	4.00/cwt	48.00	11.00	37.00	7.40
Onion	4	15.0/cwt	20.00/cwt	300.00	60.00	240.00	60.00
Sun Flower	4	2.0/cwt	8.00/cwt	16.00	10.00	6.00	1.50
Pigeon Peas	5	5.0/cwt	6.50/cwt	32.50	15.00	17.50	3.50

1/ Source: FAO Cibao Project Preliminary Data.

(Continued)

TABLE 1 (Continuation)

Crops	No. of Months of Cycle	Yield/ Tarea	Acquisition Cost/ Unit	Gross Earning/ Tarea	Prod. Cost/ Tarea	Net Total Earning/ Tarea	Net Monthly Earning/ Tarea
Red Bean	3	2.0/cwt	16.00/cwt	32.00	13.00	19.00	6.33
Corn	4	3.5/cwt	4.50/cwt	15.75	13.50	2.25	0.56
Peanut (in shell)	3	2.5/cwt	11.50/cwt	28.75	13.00	15.75	5.25
Sorghum	3	5.0/cwt	4.25/cwt	21.25	12.75	8.50	2.83
Soybean	4	3.0/cwt	9.25/cwt	27.75	13.00	14.75	3.67
Tobacco (aromatic)	5	2.0/cwt	25.00/cwt	50.00	28.00	22.00	4.40
Tomatoes (table)	4	50.0/cwt	5.00/cwt	250.00	90.00	160.00	40.00
Tomatoes (industrial)	4	40.0/cwt	1.40/cwt	56.00	33.00	23.00	5.75
Yautía	6	15.0/cwt	2.50/cwt	37.50	28.00	9.50	1.58
Yucca	10	15.0/cwt	4.00/cwt	60.00	12.00	48.00	4.80
Plantain	12	7,000/unit	0.03/unit	210.00	22.00	188.00	15.67

This table is based on farm level research in the Cibao valley under the auspices of FAO and SEA and demonstrates the vast differences in profitability of various crops. The lowest net returns earned are from corn and yautía, both traditional crops planted widely throughout the country but which typically yield poor returns to the farmer. In the Cibao, 85% of farm units are under 80 tareas, a size comparable with the rest of the country. Such a farm family with all land in corn and growing one crop would realize a net annual income of RD$440.00, under optimum climatic and market conditions. With access to other crop technology and a market incentive, the family could realize, from intercropping soybeans, an additional net income of RD$293.60 for the year.

To learn more about the opportunities to make these kinds of advances nation-wide, SEA is planning to develop an office of farm management. Its task will be to do the necessary micro-economic research to learn the returns from different cropping patterns and then, through the extension service, to assist farmers to define and choose the optimum crop production patterns for themselves, given the prevailing microclimatic conditions and soils on their farms -- as is being done successfully in the Cibao. Lack of such management information and training on how to make management decisions with respect to organization of farms is a prime constraint on production, productivity and farm income at present.

ANNEX IV

IMPORT SUBSTITUTION

Achievement of the rice production targets will displace otherwise necessary imports of additional wheat and/or rice. GODR imports of rice and wheat in 1973 totalled 174,000 metric tons. Thus, it appears reasonable to assume that the displaced imports would be approximately equal to the increase in domesti rice production.

The rice production targets 1975 to 1980 and the estimate trade off value of this level of output are as follows:

Projected Rice Production Resulting from Improved Technology

Year	Rice Production Increase (000 MT)	Cost if Imported as Rice or Wheat Assume $180.00 per MT (Million $) 1/
1975	44.5	8.0
1976	60.3	10.9
1977	74.5	13.4
1978	90.2	16.2
1979	193.6	18.5
1980	118.2	21.3
1980	100.0 (Increase from new land)	

1/ GODR paid an average of $168.00 per MT for 1973 rice imports and December 1974 wheat futures at Chicago were $188.00 per ton on March 6, 1974.

The value of this import substitution relative to the import cost of fertilizer and plant protection material is as follows:

Year	Projected Import Cost of Fertilizer & Plant Protection Material (Million $)	Value of Imports Avoided by Expanded Rice Production (Million $)	Net Trade-Off Savings (Million $)
1975	1.1	8.0	6.9
1976	1.6	10.9	9.3
1977	1.9	13.4	11.5
1978	2.3	16.2	13.9
1979	2.6	18.5	15.9
1980	3.7	21.3	17.6
1980	*	18.0	18.0
			93.1

* (1980 + 100,000 MT rice from new land. Fertilizer and plant protection import cost for this already included in first 1980 figure).

The potential foreign exchange saving through import substitution is thus on the order of $93.0 million during the 1975-1980 period. This potential level of import substitution assumes that rice production targets will be achieved on schedule. Also, the actual level of the trade-off over the 6 year period will be influenced by relative changes in imported input costs versus world food grain prices.

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Relative changes in the input cost-grain price ratio during recent years clearly suggests that the potential trade-off advantage will range between $80.0 million and $100.0 million.

Soybean Import Costs

Soybean import projections were based on the following considerations:

1. The quantity of soybean oil required to supplement domestic oil production to achieve nutritional targets.

2. Soybean meal required to achieve targeted production of dairy and poultry products.

3. Full utilization of Dominican Republic soybean crushing facilities, i.e., double shift in all plants by 1980.

The distinct advantage of importing soybeans instead of soybean oil as long as there exists idle crushing plant capacity, becomes clear from the following data: 1/

1/ Assumes a soybean crushing yield of 18% oil and 78% meal. The soybean meal price applied to the meal tonnage is the Chicago December futures as reported March 6, 1974, $165.00 per ton. The soybean import prices applied was $168.00 per MT CIF, Dominican Republic. This is below the December future price, but the price of beans are expected to decline relative to oil meal price in the years ahead.

Year	Value of Oil Meal from Imported Soybeans (Million $)	Projected Import Cost of Soybeans (Million $)	Net Cost of Soybean Imports (Million $)
1974	8.1	10.6	2.5
1975	10.2	13.4	3.2
1976	12.6	16.5	3.9
1977	15.4	20.2	4.8
1978	19.0	24.7	5.7
1979	22.8	29.7	6.9
1980	22.8	29.7	6.9

At the relative prices of soybeans and oil meal assumed in the above table, the value of the meal would cover more than 75% of the cost of imported soybeans, and thus the annual cost of the resulting oil could be relatively nominal.

Even, if the bean/meal price ratio turned unfavorable to meal by as much as 30%, the value of the meal would equal almost 60% of the import cost of the soybeans and the part of the cost assigned to the soybean oil could thus continue to be very low.

In light of the advantages of importing soybeans in lieu of oil, studies should be undertaken to determine the economic feasibility of installing additional soybean crushing facilities later in the 1970's.

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