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RURAL TECHNOLOGY TRANSFER SYSTEM PROJECT

RTTS

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**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
AND
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES (IFAS)
UNIVERSITY OF FLORIDA
(TITLE XII)**

END OF PROJECT REPORT

**Office of International Programs
Institute of Food and Agricultural Sciences
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ACRONYMS USED

AGL	Asociación de Ganaderos del Litoral Cattle Producer Association of the Littoral
AGSO	Asociación de Ganaderos de la Sierra y Oriente Cattle Producer Association of the Highlands and Orient
ANCO	Asociación Nacional de Criadores de Ovejas National Association of Sheep Raisers
APROCICO	Asociación de Productores de Cultivos de Ciclo Corto Producer Association of Short Cycle Crops
CONACYT	Consejo Nacional de Ciencia y Tecnología National Council of Science and Technology
ESPOCH	Escuela Politécnica del Chimborazo Polytechnic School of Chimborazo
FUNDAGRO	Fundación de Desarrollo Agropecuario Agriculture and Livestock Development Foundation
INIAP	Instituto Nacional de Investigaciones Agropecuarias National Institute of Agriculture and Livestock Research
MAG	Ministerio de Agricultura y Ganadería Ministry of Agriculture and Livestock
MEGALIT	Mejoramiento de la Ganadería en el Litoral Cattle Improvement in the Littoral
POs	Producer Organizations
PL-480	Public Law 480
RTTS	Rural Technology Transfer System
USAID	United States Agency for International Development
USU	Utah State University

End of Project Report - Rural Technology Transfer System Project

1.0 Introduction

The Rural Technology Transfer System Project (RTTS) underwent several important implementation modifications during its life time. This was evidenced by the evolutionary path taken during project execution. With a public sector beginning in the infant national institution of CONACYT, followed by the relocation to the Ministry of Agriculture and Livestock and the subsequent redesign that directed the focus of the project to the private sector and gave implementation responsibilities to agricultural producer organizations, the Project has been one of experimentation and discovery. In fact, this concept of public-private cooperation was considered unique, a pioneering initiative in technology transfer development efforts. Given the ten year life of this Project, preparation of a detailed report covering all phases would require volumes. Since this information already exists in the offices of the United States Agency for International Development in Quito and the Ministry of Agriculture and Livestock, this report will be used to describe the project and then discuss important concepts and activities carried out to attain the programmed project goals.

2.0 Historical Summary

The Rural Technology Transfer System Project (RTTS) began in June 1981, with US\$ 5,300,000 in USAID grant funding. In 1982, USAID provided additional loan funding of US\$ 5,000,000. The Government of Ecuador (GOE) designated the Ecuadorean National Council on Science and Technology (CONACYT) as the implementing agency. The project was designed to be executed through sub-projects and institutional agreements with national and international institutions. From the beginning the Project has been conducted with technical assistance provided by Title XII universities from the United States. Seven United States universities participated in the original competitive bidding procedure. The Institute of Food and Agricultural Sciences (IFAS), University of Florida (UF) was selected as the lead Title XII institution and a contract was signed with USAID in 1981. The UF assumed responsibility for project coordination and management in the area of technical assistance, training and follow-up evaluation.

After three years, CONACYT had not demonstrated a capacity to implement the Project, only a minimum of funding was actually expended during this period. An external evaluation was conducted in May 1984, and a recommendation was made that project implementation responsibility be removed from CONACYT. The Government of Ecuador relocated the RTTS Project to the Ministry of Agriculture and Livestock

(MAG) at the end of August 1984, for the purpose of redesigning the implementation strategy and institutional organization of the Project.

Based on the policies and strategies of MAG, the project was redesigned to be implemented through agriculture producer organizations of priority commodities and located in selected geographic areas. As before, the implementing instrument was defined as the sub-project. The original objectives of the Project were maintained and the scope was expanded to include the strengthening of the capacity for self determination of technology development/transfer within the private sector. Self determination is the translation of auto-gestion in Spanish.

The final report of a redesign team was submitted in December 1984. During 1985, new sub-projects and budgets were submitted to USAID and MAG for approval. After revisions and editing, the redesign process ended in December 1985, with the signing of Amendment No. 11 to the original USAID/UF Contract.

While in CONACYT, 12 sub-projects were initiated within the public sector (GOE and universities). After relocation within MAG, seven of the original sub-projects were judged successful and continued, 5 new subprojects were incorporated (one dealing with Training and four to be executed by producer organizations in the country).

2.1 Sub-projects Continued from the CONACYT Implementation Period:

Project for Food Technology Research for Development of Appropriate Technologies for the Rural Sector - PITALPRO. Executed by the Technical University at Ambato. Short term technical assistance provided by the Universities of Georgia, Idaho, and Florida.

Project for Fishculture Production of Native and Exotic Species Research in the River Basin of the Guayas River. Executed by the Polytechnic University of Guayaquil (ESPOL) with technical assistance from Auburn University. Long term technical assistance ended in June 1987.

Evaluation, Conservation and Technology Development of Native Cultivars in El Oro Province. Executed by the Technical University at Machala. Short term technical assistance provided by the University of Florida.

Pest Inventory and Control in El Oro Province. Executed by the Technical University at Machala. Short term technical assistance provided by the University of Florida.

Determination of Prevalence Indices and Endemic Focus of Bovine Brucellosis and Generation of Norms for Its Control. Executed by the Technical University at Machala. Short term technical assistance provided by the University of Florida.

Soil and Water Conservation and Management - COMSA. Executed by the National Institute of Agriculture and Livestock Research (INIAP). Short term technical assistance provided by the University of Florida.

Research and Development Adapted to the Small Farmer - IDAPA. Executed by the National Institute of Agriculture and Livestock Research (INIAP). Short term technical assistance provided by the University of Florida.

The last five sub-projects were terminated in the second quarter of 1986 because the implementing institutions failed to present extension proposals.

2.2 Sub-projects Added During the MAG Implementation Period and Continued during the 23 months extension following the original PACD of 30 September 1988:

Training Sub-project - implemented by MAG with technical assistance from the University of Florida.

Dairy Production Improvement Project - implemented by the Association of Livestock Producers of the Sierra and Orient (AGSO) and the Holstein-Frisian Association (AHF) with technical assistance provided by Utah State University.

Sheep Production Improvement Project - implemented by the National Association of Sheep Raisers (ANCO), with technical assistance provided by Utah State University.

Short-cycle Crop Improvement Project in the Quevedo, El Empalme and Balzar Areas - implemented by the Association of Short-cycle Crop Producers (APROCICO) with technical assistance provided by the University of Florida.

Beef Cattle Production and Marketing Improvement Project in the Ecuadorean Littoral (MEGALIT) - implemented by the Association of Livestock Producers of the Littoral (AGL) and seven other producer organizations in the coastal area with technical assistance provided by the University of Florida.

Following the signing of a new contract amendment and the placement of long term technical assistance personnel, the new sub-projects were initiated in 1986. The Training Sub-project began in January, the Dairy and Sheep Sub-projects began in March, APROCICO began in April and MEGALIT began in June. During the initial stages of implementation, all sub-projects suffered setbacks in program execution caused by delays in the signing of the cooperative agreements (Convenios) between the

producer organizations and MAG and the subsequent preparation of implementation letters and delays in disbursements of PL-480 funding. Delays in the designation of counterpart support (technical and vehicles) also slowed initial project implementation.

After the relocation to MAG, USAID loan funding to the RTTS Project was reduced to US\$2,600,000 and PL-480 funding was substituted at an initial estimated level of S/ 150,000,000.

In September 1988, a no cost extension of the University of Florida Contract was approved by the USAID Regional Contract Officer to allow for the preparation of a new contract with the University of Florida to provide 23 additional contract months of technical assistance for the RTTS Project. A new contract was signed in January 1989, with the new PACD scheduled for 26 August 1990. This date was the absolute project end date based on the original signing of the Government to Government Agreement that created the RTTS Project on 27 August 1980. Funding for the final technical assistance effort was budgeted as US\$1.9 million. In addition, PL-480 funding was increased to allow for continued support to the producer organization implemented sub-projects.

At the end of the Project on 26 August 1990, the four major RTTS Sub-projects continued to be implemented through the producer organization mechanism. The original design documents proposed preliminary technical assistance and funding components of 24 months but with a forward planning horizon of 5 years. The project design teams considered the initial 2 year period to be only the first phase of a longer development effort required to achieve operational institutionalization of the concept of a public-private sector collaborative development mode. To a degree the extension awarded in 1988 allowed for an additional period to firmly establish the necessary sub-project organization and infrastructure. Whether or not self determination has been achieved will require a future evaluation that will appraise the RTTS Project effort.

3.0 THE PROJECT

3.1 EXECUTORS AND PHASES OF IMPLEMENTATION

The Project donor was the Government of the United States, through the United States Agency for International Development (USAID), which provided both grant and loan economic assistance. The grant and loan components were provided in dollars to provide resources for foreign technical assistance, major equipment purchases, and international short and long term training. PL-480 generated sucres were provided by the Government of Ecuador as a counterpart funding contribution and were used for local operating expenses.

Project administration and long and short term technical assistance were the responsibility of the University of Florida, through Contract No. 518-0032-C-00-1040

and, a follow-on Contract No. 518-0032-C-00-9025. The Administrative Unit for Project Implementation was staffed by faculty from the University of Florida and was located in the Project's institutional headquarters in Quito.

Although the Government to Government Agreement for the implementation of the Project was signed in mid-1980, the Project was initiated in mid-1981, following the selection of the University of Florida, Institute of Food and Agricultural Sciences (IFAS) as the source of required technical assistance.

During the initial period of Project implementation of August, 1981 to September, 1984, the Ecuadorean implementing institution was the National Council of Science and Technology (CONACYT), an advisory, coordinating, and planning agency assigned to the Vice-presidency of the Republic of Ecuador. Since its inception, the RTTS worked through the sub-project mechanism and during the first implementation phase, 12 sub-projects were implemented by seven different public sector research and development institutions. That is to say that during the first phase, the purpose of the Project was to be achieved through public sector efforts.

During the period of October, 1984 to September, 1990, implementation responsibility and the institutional home of the Project was transferred to the Ministry of Agriculture and Livestock (MAG). At the end of 1985, a redesign of the Project under the supervision of the MAG was completed. Later, in March, 1986 new sub-project designs were completed, based on recommendations incorporated into the new Project design. Four new major sub-projects were initiated, but contrary to the sub-projects initiated during the first phase, these new sub-projects were to be implemented by private producer organizations (POs) in selected priority commodity and geographic areas. When the development of work programs for each sub-project and the contracting of long term technical assistance are taken into consideration, the period of actual project implementation covers four years. The final PACD was August 26, 1990. This report covers the phase of Project implementation following the redesign of 1984.

3.2 PURPOSE AND OBJECTIVES

The purpose of the Rural Technology Transfer System Project (RTTS) was to promote agricultural development, emphasizing technology transfer aspects, to increase agricultural production and rural incomes. This was to be accomplished through improved yields of the specific priority commodities and also through improved organizational and marketing conditions within the sector.

To achieve this purpose, two primary objectives were set, one institutional and the other technical:

3.2.1 Institutional Objective.

Strengthen the National System of Technology Transfer, by way of encouraging the active and effective participation of agricultural producers in the technology development process, especially during the technology validation and diffusion stages.

Conceptually, this objective had two implications: 1) it would modify the traditional model of technological development by formally incorporating the new concept of producer participation into the technology transfer system. This concept removed the producer from the passive role of mere recipient of governmental sponsored technological development efforts, and allowed him or her to assume greater responsibility in the technological development process by taking an active participating role with both "voice and vote"; and 2) it would incorporate the "farming systems" or "bottom-up" approach into the technological development system, by allowing real and effective participation of the farmer as a crucial component of the methodology.

Programmatically, this objective implied the development and institutionalization of an irreversible capacity of auto-gestion, or "self-determination in technology development" at the producer organization level. This objective had strong implications for the definition of project strategy and goals.

The concept of auto-gestion was restricted to technical and the administrative operations within the POs and did not necessarily require that auto-financing of the technological development process be the sole responsibility of the producer organizations. However, a progressive increase in counterpart funding contribution through incoming generating activities was sought. Auto-gestion is defined as the development of the required capacity in the participating producer organizations so that they can participate as part of the agricultural technology development system.

3.2.2 Technological Objective.

Contribute to the agricultural technology development process in the areas of production and marketing, for high priority commodities and geographic areas of Ecuador.

Methodologically, this objective implied the development and/or testing of new field procedures during the technology validation and dissemination stages.

Operationally, since the technological objective was a function of the institutional objective, priority commodity and geographical zones were not reviewed nor changed during the implementation of the project. Identified problems and possible leverage opportunities, however, were changed in each commodity-zone with each work program.

3.3 PROJECT ACTIVITY COMPONENTS

With respect to external financial assistance, two components were considered important: (1) technical assistance, both long and short term, and (2) technical training, both formal and in-service. Following the redesign of the RTTS Project, almost all of the technical assistance and training activities were carried out by technicians from the University of Florida and the primary subcontractor, Utah State University.

The components of Work Program activities for each sub-project, were summarized in the following five categories: 1) organizational development, 2) selection and validation of technology, 3) technology dissemination, 4) marketing and 5) technical training.

3.4 IMPLEMENTATION STRATEGY

The institutional objective of the RTTS Project determined the implementation strategy. This required that the programs and activities be carried out by agricultural producer organizations, and that the POs be the primary recipients of the effort to institutionalize the capacity of auto-gestion. This strategy was to be implemented through a collaborative work effort between MAG and coordinated with other institutions participating in the technology transfer system.

The institutionalization of auto-gestion implies an irreversible change within producer organization structure (institutions), that is associated directly and specifically with the organizational factors dealing with stable resource management through time. A factor that influenced the achievement of the institutionalization objective, but which was not necessarily controlled by the project, was leadership capability. Besides being a scarce resource, it was subject to change each year with the annual election of the new PO administrations.

Self-determination in technological development, in the context of the project, signifies a capacity of the producer organizations to carry out technological programs under similar arrangements of institutional interactions and support that are characteristic of other technological development agencies or activities in the country.

As such, the producer organizations were introduced into the National System of Technology Transfer, by way of their participation in technology testing and dissemination programs, as they developed the capacity to: 1) identify problems of the producer sector and possible technological leverage opportunities (technological demand), 2) define priorities and formulate programs to test and disseminate technologies (technology supply), and 3) interact and coordinate activities with other institutional components of the technology development system i.e., with implementing institutions such as MAG and INIAP; with national coordinating and support institutions such as FUNDAGRO; and with international support organizations (via training, technical assistance and funding.)

In other words, the RTTS Project strategy proposed a collaborative development effort between the public agricultural sector (MAG, INIAP, etc.) and the agricultural producer sector (producer associations and cooperatives), with the former playing a facilitator and supporting role, and the latter playing an implementation role, as the institutional capacity towards self-determination was strengthened.

This concept supported a "systems" or "bottom-up" methodology, in which the beneficiary of the product participated in the design and execution of programs and activities, to resolve identified problems and achieve defined goals. The rationale behind this focus is that of agricultural research programs following a farming systems perspective.

In terms of the process of agricultural technology development, characterized by the following different stages: (1) generation, (2) validation (testing and fine tuning), (3) dissemination (technology transfer or technical assistance and training) and (4) adoption; this strategy actively incorporates the farmer into technology validation and dissemination. Thus, the passive role taken previously, that of a mere recipient or beneficiary of the State's effort, is changed to the active role of executor with its coinciding responsibility in the technology development process.

Because of the above, the RTTS Project was designed as a mechanism to change and institutionally strengthen the participating producer organizations, orienting agricultural technology development processes toward a collaborative effort between the public sector (facilitator) and the organized producer sector (executor).

3.5 IMPLEMENTING INSTITUTIONS AND GEOGRAPHICAL COVERAGE

The RTTS Project was executed under the authority of the MAG, the principal agricultural technology development institution in Ecuador and the backbone of the national rural technology transfer system, through a mechanism of producer organization implemented sub-projects.

At the discretion of each ministerial administration, the institutional home of the RTTS Project, for purposes of project coordination and decision making, was found in different departments within MAG at different times during the life of the project. These were the offices of: the Advisor on Education and Extension; the Advisor on Economics and International Matters; and the Agricultural Technology Development Project (PROTECA). The purpose of PROTECA was to reestablish an agricultural extension service within MAG. The head of each of these departments was designated as the Minister's representative to the Project. These ministerial departments were linked administratively to the RTTS Project via the office of the Project Administrative Unit. This Unit was located physically in the offices of the University of Florida Technical Mission and had the primary responsibility of providing

international technical assistance and training, along with conducting follow-up evaluations and supporting the POs in sub-project execution.

When the MAG representative was one of the Minister's Advisors, articulation between administration and the field, for the purpose of establishing channels of information and stable collaborative working relations, was achieved through the respective ministerial departments and programs. When the MAG representative was the Executive Director of PROTECA, collaborative work and program articulation was attempted at the field level with technicians located in the work "polygons" of PROTECA. Coordination of program follow-up evaluations and programming of joint technical training activities was attempted with PROTECA at the ministerial level.

During the last two years of the Project, the MAG representative to the RTTS Project was the Minister of Agriculture with some participation by the Director of PROTECA.

The sub-projects were implemented by participating producer organizations and based on individual cooperative agreements between the PO and MAG which granted complete administrative and technical independence to the Producer Organization. Under the cooperative agreements, the MAG assigned counterpart technicians and some operating funds for the technological programs of the sub-projects. The POs, for their part, supplied the basic institutional headquarters (offices, administrative and support personnel, and a certain amount of counterpart funding, according to the abilities of each case.) In order to obtain required resources to maintain and expand program coverage, the RTTS Project created criteria on both organization and procedures to follow during project implementation.

The agricultural producer organizations, who participated as sub-project implementation leaders, are listed below.

(i) **Dairy Production Improvement Sub-project.** This sub-project was implemented by the Cattle Producer Association of the Highlands and Orient (AGSO), with the Holstein-Frisian Association participating at a level consistent with its institutional objectives.

As presented in the Work Programs for the March, 1986 to August, 1988 period, the sub-project was implemented throughout the provinces of Carchi, Imbabura, Pichincha and Cotopaxi. During the period September, 1988 to August, 1990 the sub-project expanded coverage to the dairy producing areas of the Tungurahua province and also the zone around Baeza. The expansion to other areas was limited by resources, primarily those related to extension personnel and vehicle availability.

(ii) **Sheep Production Improvement Sub-project.** This sub-project was executed by the National Sheep Raisers Association (ANCO), in the sheep producing zones of

Ecuador but with emphasis in the highland paramo of the provinces of Carchi, Imbabura, Pichincha, Cotopaxi and Chimborazo. At the end of the first two years, coverage was expanded to include the provinces of the southern highlands with the help of eight Peace Corps Volunteers assigned to the sub-project. It is important to note that the PCVs did not have vehicles and therefore their areas of coverage were small. In spite of this assistance on the part of the Peace Corps, to adequately cover the southern portion of the country, ANCO would require additional staffing of qualified MAG technicians and vehicles.

The Polytechnic School of Chimborazo (ESPOCH) worked with ANCO, via a cooperative agreement, in technology development and validation of pastures during the final two years of the Project.

(iii) Short Cycle Crop Improvement Sub-project (Hard maize, soybeans and rice). This sub-project was executed by the Short Cycle Crop Producer Association (APROCICO) in the area around the cantons of Quevedo and El Empalme, Los Rios Province.

Initially geographic coverage included the canton of Balzar of the Guayas Province, but the zone was excluded due to organization difficulties with the collaborating producers of the local producer organization and assigned technician. Subsequently, an unsuccessful attempt was made to obtain two technicians from PROTECA to assist the sub-project expand geographic coverage and increase the volume of sub-project related activity. In the end, only one technician from the MAG/Rice Program was able to work effectively with APROCICO. All other technicians involved in sub-project implementation were directly hired by the producer organization.

During the 1988-1989 agricultural year, the program expanded its activities to include sorghum and white maize. The white maize initiative was carried out with assistance from Molinos Poulter, a national milling company. In addition, APROCICO began required administrative paperwork with the MAG to modify its statutes to permit the incorporation of perennial crops within its social mandate ie., coffee, african oil palm and banana.

(iv) Beef Cattle Production and Marketing Improvement Sub-project on the Littoral - MEGALIT. This sub-project was conducted in the geographic areas surrounding each of the following participating cattle producer organizations, located in the provinces of Guayas, El Oro, Manabi and Pichincha (lower part):

- Livestock Association of the Littoral - AGL (lead organization)
- Livestock Association "17 de Abril" in El Empalme
- Livestock Association of Arenillas
- Livestock Association of Los Bancos

Livestock Association of Pedro Vicente Maldonado
Livestock Association of Santo Domingo de los Colorados
Livestock Cooperative of Chone
Livestock Association of Los Rios in Quevedo

In mid-1989, the executive commission of the MEGALIT sub-project ratified the decision to exclude the Agricultural and Livestock Cooperative of Balzar from sub-project activities, basically because of the persistent lack of initiative on the part of the cooperative's implementation of the work program in its area of influence. It was subsequently resolved to carry out the earlier request of the Livestock Association of Los Rios, with its headquarters in Quevedo, to be admitted into MEGALIT. In this respect, various other livestock producer associations from Bahia, El Carmen, Quininde and Pichincha expressed interest in becoming part of the MEGALIT effort.

4.0 THE REDESIGNED RTTS

4.1 The RTTS Project in 1984

The National System of Rural Technology Transfer (Agriculture and Livestock) in Ecuador, as visualized in the National Development Plan of 1984-1988, could be defined as a set of component institutions, that had the MAG as their foundation and that interacted among themselves to achieve common objectives of technological development. This System would utilize financial and technical resources of the government to generate appropriate technologies for agricultural production and marketing.

By this definition, the institutional model implicitly involved the research and development organizations of the public sector and national universities. The private agricultural sector was seen as the beneficiary or recipient of the development efforts of the government. The government formally assumed the responsibility for providing technical assistance, training and other related services.

Nevertheless, the intervention of the private producer sector in the technology transfer system has been and is very visible, particularly in agro-industrial businesses and in the marketing of agricultural inputs. Part of this effort has been carried out by producer organizations on a non-profit basis with purely technical and social objectives. This technical effort had not been incorporated into the national "system" in an intentional and formal manner.

Based on the existing evidence that the organized producer sector could develop the institutional capacity for technological development, the MAG proposed that the RTTS Project be implemented for the purpose of developing these capabilities. This would be accomplished via a process of gradual institutional development, utilizing

technical assistance, training, and the provision of necessary equipment and operating funds to execute technology validation and transfer programs.

4.2 RTTS Headquarters in MAG

The redesign of the RTTS Project recommended that the initiative to incorporate the producer sector into the RTTS should be conducted under the authority of the MAG, the lead institution in the national technology transfer system. Under this project, each participating organization would be properly and firmly affiliated with the national system. The strategy of the RTTS Project would be to assist the MAG in the execution of the entire effort.

The MAG, playing the support role of facilitator, would be the institutional home for the Project's activities and it would secure the necessary institutional modifications required for smooth operational interaction with the producer sector participating in the technological programs. At the time of the redesign, no evidence existed that suggested that the existing organization might not be adequate for the task. As a matter of fact, not only was the PROTECA Project being initiated to reestablish a national extension service within the MAG, but there also existed the political desire, on the part of the administration, to facilitate the creation of the necessary information channels and the collaborative work mechanisms.

During the first period of RTTS Project execution with the private producer sector (defined by the cooperative agreements between the MAG and the POs, 1986-1988), the MAG conducted important organizational and operational changes. It began the PROTECA Project and eliminated the Product Technical Bureaus. The PROTECA Project would work in zones called polygons and have a multi-product focus, in contrast to the former technical bureaus that had executed programs for all production zones and had a single product focus. During the second period (1988-1990), also defined by signed cooperative agreements, the MAG had progressed somewhat in consolidating the extension focus in the polygons but continued to maintain, among others, the old programs of livestock, animal health, maize and oil seeds which were the programs directly related to the priority agricultural commodities of the RTTS Project.

In January, 1990, the MAG finally created the Division of Extension and Technology Transfer, but it wasn't until the RTTS Project ended and the furniture, equipment, and information of the RTTS became available, that the Division actually become operational. This MAG division was created to serve, in part, as the national counterpart to the technological programs being carried out by the producer organizations of the RTTS Project.

5.0 Technical Assistance

All technical assistance provided to the RTTS Project since 15 October 1985 is summarized in Annex (). Additional information can also be found in the Final Reports prepared by the subcontractor, Utah State University, for the Dairy and Sheep Improvement Sub-projects.

5.1 Long Term Technical Assistance

5.1.1 Administrative Unit

The Administrative Unit was responsible for ensuring the thorough and effective implementation of the RTTS Project in accordance with the overall objectives. University of Florida long term technical assistance personnel were responsible for arranging the timely provision of necessary long and short term technical assistance, project materials and equipment, and training. Participating in this role and administrative responsibility were:

Kamal Dow, Ph. D., Professor, Food and Resource Economics Department, Institute of Food and Agricultural Sciences, University of Florida, served as the RTTS Project's Chief of Party until 31 January 1987.

Lawrence J. Janicki, Ph. D., Associate Scientist, Agronomy Department, Institute of Food and Agricultural Sciences, University of Florida, served as the Project Chief of Party until the PACD of 26 August 1990.

Romulo Soliz, M. S., Assistant In, Food and Resource Economics Department, Institute of Food and Agricultural Sciences, University of Florida, served as the Project Specialist until the PACD and continued to assist the close out of the Project for an additional month, until 26 September 1990.

These three professionals provided 124 person months of technical assistance to the redesigned RTTS Projects. Their job descriptions and details of their accomplishments can be found in each end of tour report.

5.1.2 MEGALIT - Coastal Beef Cattle Sub-project

The long term technical assistance positions were not continued in this sub-project for the new contract that extended the RTTS Project past the original PACD of 30 September 1988. However, during the first phase of the MEGALIT Sub-project, the following technicians provided long term technical assistance.

Edward Golding, Ph. D., Assistant Scientist, Animal Science Department, Institute of Food and Agricultural Sciences, University of Florida, served as Livestock Production Specialist until March, 1988.

Hector Viscencio-Brambila, Ph. D., Assistant Scientist, Food and Resource Economics Department, Institute of Food and Agricultural Sciences, University of Florida, served as Livestock Marketing Specialist until September, 1988.

Together these two technicians provided a total of over 43 person months of long term technical assistance. Specific job descriptions are detailed in the Contract document.

Long term technical assistance was not funded during the project extension because of funding constraints and the assumption that the local counterpart technical staff were capable of implementing this sub-project. Unfortunately, soon after the new contract was initiated and the long term technical assistance had departed post, the local counterparts resigned their positions for more economically lucrative positions. This unanticipated resignation required the hiring of a new technical staff. The staffing change required the Administrative Unit to devote more time to this Sub-project to maintain the overall work program. Eight months of short term technical assistance was budgeted to provided technical assistance to assist the sub-project.

5.1.3 APROCICO - Short Cycle Crop Improvement Sub-project

This sub-project required the services of one long term technical assistance staff member. Following the 2 years of initial technical assistance, the Integrated Pest Management Specialist (IPM) was extended for an additional seven months, for a total of 32 person months of effort.

Philip Stansly, Ph. D., Assistant Professor, Entomology Department, Institute of Food and Agricultural Sciences, University of Florida was the technician assigned to work with the APROCICO growers association. Dr. Stansly's responsibilities and accomplishments are detailed in his end of tour report.

During this sub-project's implementation, a high level of technology transfer of IPM methods was achieved, particularly to small producers in the Quevedo area.

5.1.4 Dairy and Sheep Improvement Sub-projects

Long term technical assistance staffing, job descriptions and accomplishments for these two RTTS subcontracted sub-projects are available in the End of Sub-project Reports prepared by Utah State University and annexed to this End of Project Report. Over 173 person months of long term technical assistance were provided to the RTTS Project under these subcontracts.

5.2 Short Term Technical Assistance

To report on the short term technical assistance component of the Project, two areas have been selected to classify the technical assistance effort. These areas are technology transfer and organizational development. In addition, training activities related to the overall RTTS Project are discussed under the Training Sub-project.

5.2.1 MEGALIT - Coastal Beef Cattle Sub-project

Organizational Development - Because of its complexity, a need to address the organizational aspects of this geographically diverse sub-project was identified shortly after the arrival of the first long term technical assistance person.

Mr. Salvador Jimenez, an Organization Specialist, was contracted by the University of Florida for a six month period beginning on February 14, 1987. His assignment was to advise producer associations participating in the MEGALIT Sub-project on matters related to institutional strengthening, including organizational structure, finances, services to members, etc. This assignment was very instrumental in identifying the final working organizational structure that was followed by the participating POs during the implementation of the Sub-project.

In anticipation of the end of the RTTS Project, Dr. David Nelson, Project and Systems Design Specialist, was contracted by the UF in February, to provide two person months of technical assistance to develop specific recommendations related to improving the organizational structure and procedures of the MEGALIT Subproject and to prepare a management operations manual to assist the technical and administrative components in their efforts to coordinate respective institutional responsibilities and also provide for the required field level coordination with participating producer organizations. Two aspects were emphasized in this effort: Functional articulation among the participating producer organizations and between the administrative and technical groups (team approach), and development of income generating services to achieve the target of sustainability.

Finally, the issue of inter-institutional (national and international) linkages in subproject implementation, especially with regard to sources of appropriate technologies, was addressed.

Technology Transfer To provide specific technical expertise in the development of the general work plan for the MEGALIT Sub-project, Dr. Joseph H. Conrad, Cattle Nutrition; Dr. Roger L. West, Meat Sciences; Dr. Timothy A. Olson, Cattle Reproduction; and Dr. Scott H. Loeffler, Tropical Animal Diseases, University of Florida, worked closely with Dr. Ed Golding, long-term technical assistance expert, shortly after Dr. Golding arrived in country in June, 1986.

Mr. L. Van Crowder, Jr., University of Florida, traveled to the MEGALIT Sub-project in December, 1986, to evaluate local resources and to conduct a needs

assessment for technical training in extension communications for the po-linked technicians in the Sub-project. It was hoped that this study would pave the way for a comprehensive training program for the MEGALIT extension veterinarians. During the visit, Mr. Crowder presented an overview of the communications/technology transfer process, including the topics of audience assessment, message construction, barriers to effective communication, interpersonal versus mass media techniques, farmer participation, etc.

Following the preparation of the technical work plan, the MEGALIT entered a phase of organizational development that was described above under the heading of organizational development.

In July of 1987, several of the technicians, who participated in the development of the Sub-project work plan, returned to provide follow-up short term technical assistance in their respective specialization areas, and also, participate in a Biannual International Conference on Livestock in the Tropics held in Guayaquil. Each technician was required to conduct in-service training for PO-linked technicians.

Dr. Tim Olson conducted a one day training activity to discuss cattle breed improvement for both beef and dual-purpose enterprises in Ecuador. Dr. Joseph H. Conrad held an in-service training workshop to instruct cattle producers and MEGALIT PO-linked technicians on the basic concepts of mineral supplement use for cattle in the tropics. He also conducted field work concerned with the collection and analysis of samples of mineral supplements, forages, and other cattle feeds. Dr. Pablo Mendoza, a Forage Production Specialist from the University of Florida, came to Ecuador to provide inputs into the ongoing pasture improvement initiative of the sub-project in the production of King Grass and other species, hybrids, and cultivars of Elephant grass. Finally, Dr. Scott Loeffler, Tropical Disease Specialist, presented information on the prevention and control of cattle problems related to disease and parasites to cattle producers and MEGALIT technicians and he assisted the veterinary laboratory in Guayaquil in setting up various diagnostic procedures for tropical diseases.

Dr. H. H. Van Horn, Dairy Scientist, University of Florida visited the Sub-project during the period November 14, 1987 - November 21, 1987. He provided specific technical assistance regarding milk handling at the farm level for dual purpose herds.

In December, a team made up of Dr. Loy V. Crowder, Sr., Pasture Agronomist; Dr. James Simpson, Agricultural Economics and Marketing; and Dr. Marilyn Swisher, Women in Development Coordinator, University of Florida visited the sub-project to review progress to-date and provide guidance in sub-project implementation through September, 1988. In addition, a discussion of strategies to follow should an extension of the MEGALIT Sub-project become reality was held. This internal evaluation also

provided base line information and a summary of performance that was used by external evaluators and USAID Mission management in evaluating the sub-project's progress.

One result of the internal review conducted by the University of Florida was the decision to concentrate production efforts on the areas of cattle nutrition, especially during the dry season and also animal reproduction. These two areas were considered to be areas where technical intervention would have a high probability of succeeding.

Dr. Fedro Zazueta, Irrigation and Drainage Specialist, University of Florida, was brought to the MEGALIT Subproject in January, 1988 to study the water shortage situation in Arenillas prior to the beginning of the rainy season and to assist the technical assistance staff in designing a program to solve this serious constraint to cattle production in the semi-arid area around Arenillas.

Dr. Joseph H. Conrad returned in February and July, 1988, to respond to the MEGALIT action plan and supervise on-going technology validation activities in the area of animal nutrition. He also carried out follow-up activities related to the recommendations made by the UF internal evaluation team in December.

In June, 1989, Dr. Conrad again travelled to the sub-project to provide continuing technical assistance in the area of animal nutrition. Dr. Conrad was designated as the campus faculty member responsible for coordinating the overall backstop support to the MEGALIT Subproject and was directly responsible for providing technical support in the area of animal nutrition. During this visit, Dr. Conrad travelled with Dr. H. H. Van Horn, Dairy Extension Specialist, who provided additional inputs into the dual purpose cattle operations in the Los Bancos, Pedro Vicente Maldonado, and Santo Domingo areas. Dr. Van Horn was funded through UF Title XII, Program Support Grant.

A final visit was made by Dr. Conrad in July, 1990 to provide technical assistance in the area of animal nutrition and also to conduct a final appraisal of the technology validation and transfer activities related to livestock management in the MEGALIT Subproject. The objectives of Dr. Conrad final assignment were to (1) focus on the training of producer organization linked technicians in livestock feeding systems adaptable to the Ecuadorian coastal area, with emphasis on dual purpose systems and (2) assist the producer organizations to plan technical transfer activities to be conducted following the PACD of the RTTS Project.

Dr. Rolf Larsen, Reproduction Physiology, University of Florida, came to Guayaquil in April to initiate a training program for PO-Linked technicians in bull performance evaluation to improve the genetic characteristics of cattle herds in the Littoral and also provided an income generating activity for the MEGALIT Subproject.

In July, 1989, Dr. Larsen returned to Guayaquil to provide continuing technical assistance in the area of animal reproduction. As the designated campus faculty member responsible for providing backstop support to the MEGALIT Subproject in the area of animal reproduction, he provided follow-up technical assistance support in the area of bull performance evaluation and presented additional information on female bovine fertility topics, including artificial insemination and controlled mounting.

Short term technical assistance was also provided to the long term marketing specialist when Dr. Thomas Spreen, Food and Resource Economist, University of Florida, traveled to Guayaquil in May to review the on going economic analysis studies, related to meat and milk marketing for the coastal cattle industry, conducted by egresado students. He also attempted to identify and describe potential areas of policy that might improve the socio economic level of the livestock sector. Finally he assisted in the identification of short term training needs in livestock marketing for PO-linked technicians and national counterparts for the project extension.

Another area where short term technical assistance was provided to the MEGALIT marketing initiative was the assignments of Dr. Gonzalo Sierra, D.V.M., a Specialist in Cattle Slaughter and Cold Storage Meat Packing Houses, contracted by the UF to work on two different potential income generating activities related to meat processing. Dr. Sierra provided technical assistance on the installation and operation of cold storage and cattle slaughter houses for the Cattle Producer Association of Los Rios to assist the Municipality of Quevedo, owner of the slaughterhouse and equipment, to modernize the cattle butchering and, at the same time, when implemented, establish an income generating activity for the cattle producer association, which will administer the slaughterhouse as a mixed enterprise. Dr. Sierra studied the marketing conditions and evaluated existing facilities and equipment and advised the association with respect to the rehabilitation of the facilities and the creation and organization of the enterprise.

The period of the first short term technical assignment of Dr. Sierra was distributed into three stages, with intervals of time that permitted the Association and the Municipality to progressively execute the agreed upon recommendations.

The second assignment of Dr. Gonzalo Sierra provided technical assistance to the Association of Cattle Producers of Santo Domingo and the Meat Processing Center of the Polytechnic School of Chimborazo (ESPOCH) to develop a cooperative agreement to market quality meat cuts to specialized meat consumers i.e., hotels, restaurants, petroleum camps. Through the creation of a processing/marketing consortium, it is expected that both institutions will generate income that will assist their respective programs of technology generation/transfer. Income generation strengthening was a priority area of emphasis during the final months of the RTTS Project.

The last STTA provided to the MEGALIT Subproject was to contract Dr. Luis Cabrera, Specialist in Forage Preservation and Feed Alternatives for Beef Cattle, for eight weeks to assist the sub-project in the area of preservation of excess forage production grown in the wet season and other economically viable feed alternatives of high nutritional value for use by beef cattle during the pronounced dry season, with attention to the existing silage preparation study in Arenillas and the corn silage/ silo initiative in Chone.

Dr. Cabrera discussed, analyzed and proposed economic and technical support in areas such as the demonstration of up-to-date techniques for forage preservation currently practiced in the tropics, provision of training of MEGALIT technical personal in the application of these techniques and the instruction of technicians and cattle producers in the use of appropriate agro-industrial by products for cattle feed.

5.2.2 APROCICO - Short Cycle Crop Production Sub-project

Institutional Development

Short term technical assistance by an organizational specialist was identified as a priority activity in the APROCICO Project Document. Mr. Jose Oromi, was contracted to arrive prior to the long and short term technical assistance staff to lay the ground work for APROCICO Association's participation in the sub-project. He spent five months, at the project start up, assisting the president, manager, and Board of Directors of APROCICO in the preparation of a strategy for the implementation of the technology development project. Members, directors, and management were trained by INCAE, in general agribusiness skills thought to be required to successfully carry out the sub-project. The formation of advisory committees was recommended by Mr. Oromi to support forthcoming technical assistance personnel. Management's role was to assist in the analysis, budgeting and control of APROCICO's financial resources.

Consistent with the direction of the RTTS Sub-projects as of August, 1988, Mr. Giovanni de Choudens, Organizational Specialist, was contracted by the UF to study organizational factors and management strategies that would provide institutional capabilities to implement and administer income generating activities to achieve financial self sufficiency by the end of the RTTS Project.

Prior to the end of the RTTS Project and the expiration of the Cooperative Agreement between APROCICO and the MAG in August, 1990, Ing. Jorge Rovayo, a Specialist in Organization and Marketing Development, was contracted by the UF for two person months to examine the present institutional and technological development program for the purpose of defining the direction and goals of APROCICO for the future and developing a work program and financial proposal to continue the current technology transfer initiative. Emphasis was placed on defining

the functions and operational linkage between the technical team and the APROCICO Association's organizational structure.

Technology Transfer

Dr. James C. Jones, Social Anthropologist, University of Florida, was assigned to the sub-project to develop methods and a strategy for technology transfer to the different producer groups participating in the Short Cycle Sub-project. Unfortunately, Dr. Jones was not able to finish his tour and returned to the US prematurely. Follow-up work was conducted by Mr. Van Crowder, Jr. later in the sub-project implementation.

Following the experience of Dr. Jones and his expressed negative opinion with respect to the feasibility of including small-scale producers in the technology transfer scheme of the APROCICO Sub-project, Dr. Philip Stansly established contact with Dr. Michael E. Irwin, Entomologist from the University of Illinois, with extensive knowledge of transferring IPM methodology to small-scale producers. Since Dr. Irwin had experience with the design of this Sub-project and was travelling through the area, authorization was obtained to bring him to Quevedo in February, 1987. The RTTS only funded in-country travel costs, per diem, and salary during the STTA assignment.

Dr. Michael E. Irwin returned Ecuador during the period 16 - 20 September, 1987 to participate in a Regional Conference regarding Pest Problems in Soybeans. In addition to his presentation at the Conference, Dr. Irwin consulted with appropriate officials of APROCICO, MAG, and INIAP regarding the severe outbreak of a mosaic virus attacking soy plantings in the area. This virus problem became a high priority of the IPM program of the APROCICO Sub-project.

As per the Sub-project Document, other areas of technical expertise were to provide inputs into the APROCICO Sub-project. In March, 1987, Dr. Gerald Kidder, Soil Fertility Extension Specialist, IFAS, University of Florida, travelled to APROCICO to provide specific technical inputs regarding soil and plant tissue analysis. After studying the existing facilities to provide analysis services for producers in the sub-project's geographic area, he recommended that APROCICO consider the establishment of a soil and tissue sample preparation service to expedite the turn around time for such analyses. In addition, he suggested that the APROCICO Producer Organization develop a mechanism to provide reliable fertilizer recommendations to associates. Unfortunately, the leadership of APROCICO had decided that the solution to their analyses problems lay in the installation of a soils laboratory at the APROCICO headquarters. Dr. Kidder considered this alternative to be unjustified and would not support the plan. As a result, no effort was made by APROCICO to resolve the soil analysis/fertility problem.

Dr. Gary Simone, Plant Pathology Extension Specialist, IFAS, University of Florida, travelled to the Quevedo area during the period April 20 - May 1, 1987. The purpose of this STTA assignment was to provide specific technical inputs for the APROCICO Sub-project regarding maize and soybean diseases. Following a field study of prevalent diseases attacking maize and soybeans on producers' farms in the sub-project's geographic area, Dr. Simone recommended strategies to provide solutions for these production problems given the IPM thrust of the sub-project. In addition, he provided inputs into a plant disease extension service to assist the APROCICO Producer Organization in developing a mechanism to provide reliable disease control recommendations to associated producers.

Dr. Carl Barfield, IPM Entomologist, University of Florida, visited Quevedo during the period May 31, 1987 - June 5, 1987 to evaluate the on-farm integrated pest management research program, and suggest future direction for this activity. In addition to conversations with area producers, APROCICO members and directors, Dr. Barfield conducted a seminar on the implementation of integrated pest management by producers. Dr. Barfield had visited Ecuador and the APROCICO Sub-project on two earlier occasions with support of the MOU/Program Support Grant initiative. Dr. Barfield was the campus backstop person assisting Dr. Philip Stansly.

Dr. David Zimet, Agricultural Economics and Marketing Specialist, University of Florida, travelled to the APROCICO Sub-project during the period August 28, 1987 - September 12, 1987. The purpose of this assignment was to consult with the Board of Directors and general membership of APROCICO regarding problems and possible solutions for the marketing of agricultural products.

The final short term technical assistance activity for the 1987 year was conducted by Dr. Clifton Hiebsch, Soybean Extension Scientist, University of Florida during October 4, 1987- October 17, 1987. Dr. Hiebsch evaluated soybean varieties and cultural practices used in the APROCICO Sub-project area around Quevedo and Balzar. Given problems with mosaic virus, Dr. Hiebsch interacted closely with INIAP and Emsemillas personnel and also with APROCICO leadership to assist them in developing a strategy for quality seed multiplication.

The short term technical assistance activity to strengthen the technology base continued in 1988 with the assignment of Dr. Edwin C. French, Production Agronomist and Minimum Tillage Specialist, University of Florida, during the period January 17 - February 29, 1988. As described in the APROCICO Sub-project Document, the purpose of this STTA was to evaluate the field crop cultural practices, especially with regard to soil conservation measures. Following this evaluation, Dr. French made recommendations to develop technology packages that would encourage producers to adopt practices to conserve topsoil and also reduce tillage requirements in field crops.

Dr. Keith Andrews, Integrated Pest Management Specialist, from the University of Florida, but working with the IPM program at the Escuela Agricola Panamericana, Zamorano, Honduras visited Quevedo during the period May 8, 1988 - May 14, 1988. The purpose of this visit was to analyze the objectives, organization and operation of the APROCICO Sub-project, with regard to its components of research, extension, and the consulting service. Dr. Andrews prepared a report containing recommendations to coordinate the sub-project with the Honduran IPM program. Joint activities such as the preparation of extension materials were discussed. He delivered two presentations on the Honduran program, one to Sub-project technical staff including INIAP and the other to APROCICO membership. Following Dr. Andrews visit to Quevedo he also participated in a FUNDAGRO sponsored workshop where he presented audio-tutorial materials. Sets of these materials were purchased by FUNDAGRO.

To assist the APROCICO Sub-project achieve sustained transfer of appropriate technology to small and medium-scale farmers, Dr. Kamal Dow, Marketing Specialist, University of Florida and Ing. Alvaro Castillo Miño, an AGRIDEC consultant in Agricultural and Civil Engineering were brought to Ecuador as part of a two person team from 27 June, 1988 until 24 July, 1988. The responsibility of Dr. Dow was to assess the existing marketing system available to small and medium-size farmers and recommend an implementation strategy that APROCICO could utilize to assist farmers and also generate income. The responsibility of Ing. Castillo was to assist with the development of an income generating capability in small grain marketing with emphasis on required grain storage infrastructure.

Motivated by the serious outbreak of mosaic virus in soybean, Dr. William Zettler, Plant Pathologist/Virology, from the University of Florida travelled to Quevedo during the period September 6 - 16, 1988 with his laboratory technician, Mr. Mark Elliot (PSG funding). The purpose of the visit was to make a preliminary survey of virus problems in short cycle row crops in the sub-project area. Dr. Zettler conducted a 5 day short course on virus diagnosis techniques for APROCICO and INIAP technicians and also MAG extension agents involved in the implementation of the IPM program.

Dr. W. Zettler and Mr. M. Elliot returned to the APROCICO Subproject in July, 1989 to follow-up on the field work associated with identification of bean pod mottle virus in soybeans and the newly identified insect vector.

In October, 1988, Mr. L. Van Crowder, Jr., Communications Specialist (Extension Sociologist), University of Florida, conducted a needs assessment and technical training in communications for producer organization linked technicians. He provided inputs into the area of extension programming and assisted APROCICO technicians in the evaluation of technology validation. This effort was supported with the help of Mr. Marshall Breeze, UF Editorial Department, using MOU/PSG funding.

Mr. Breeze provided technical assistance in the preparation of extension audio visual materials. As a result of this visit, the IPM program progress was evaluated by identifying impact indicators, recommendations were prepared to improve the technology diffusion program, and emphasis was placed on those aspects of methodology directed to improve the program's efficiency. Appropriate communication materials were designed for both training and technology transfer.

At the recommendation of Mr. L. Van Crowder, Jr, Mr. William Andrews, Communications Specialist, University of Florida, was brought to Ecuador with PSG funding for a five month period beginning in February, 1989. The purpose of this travel was to provide assistance to the RTTS APROCICO Sub-project in the area of communication technology. Although the costs of this technical assistance activity were covered under the MOU/PSG, certain local costs were anticipated and Mission approval was requested and obtained to cover in-country travel.

Mr. L. Van Crowder returned briefly in February to assist APROCICO and Mr. Andrews prepare a work plan for the preparation of specific publications related to the information obtained in the Short Cycle Crop Improvement Sub-project.

5.1.4 Dairy and Sheep Improvement Sub-projects

For details regarding short term technical assistance in these sub-projects, please see attached End of Sub-project Reports prepared by Utah State University.

5.1.5 TRAINING Sub-project

As mentioned previously, the redesign of the RTTS Project in 1985, removed all formal training activities from the individual sub-projects and placed them under the responsibility of the newly created Training Sub-project. Although originally budgeted at approximately US\$750,000, this funding level was reduced by 50 percent to provide the dollar funding required to support foreign technical assistance activities after it was determined in appropriate to use PL-480 currency for technical assistance support. In spite of these cut backs, a comprehensive training program was maintained by the Project.

The Training Sub-project Work Plan employed different methods to achieve defined goals. These methods included sub-project related technical and administrative training both in Ecuador and abroad. In addition to specific training identified at the sub-project level, certain other non sub-project related training events were sponsored.

The first major sub-project related training initiative was conducted between 27 July and 30 November, 1986 for the Short Cycle Crop Improvement Sub-project. A program on Small Enterprise Organization and Management was conducted under a

sub-contract with the Instituto Centroamericano de Administración de Empresas (INCAE), Costa Rica.

A series of four workshop-seminars dedicated to small business organization and management was presented to directors and interested members of the APROCICO Producer Association and also to directors and members of producer associations from El Empalme and Balzar. Mr. Jose Oromi, Short term Organization Specialist, supervised this effort during his assignment.

The second major training effort, not initially sub-project related, occurred following a request by the Instituto Nacional de Capacitación de Campesinos (INCCA) to support a series of training workshops on programming, planning and presenting non-formal educational training events to 35 MAG extension agents working with the Institute to train small-scale farmers in the Carchi Province. The Training Sub-project sponsored two workshops during the period 7 - 10 October, 1986 and 26 - 30 January, 1987. These workshops provided the RTTS Project with the opportunity to introduce the goals and concepts of the Project to both INCCA and field extension technicians, and also, to consider the feasibility of working with INCCA in future training efforts.

Based on this training event, a need was identified to strengthen the capacity of the local INCCA professionals in non-formal education methods and also develop specific skills related to the training of trainers (extension agents). This was considered to be an effective way to train the PO-linked technicians working as extension agents in the RTTS Sub-projects. A formal Training of Trainers program began with the arrival of Mr. James Kelly, USDA/OICD Contractor, on March 31, 1987. The program was implemented in three phases:

Phase I. A one week needs assessment and planning trip to Ecuador during the period 31 March to 9 April, 1987 by Mr. James Kelly, USDA/OICD Contractor. Mr. Kelly met with local institution staff and the RTTS Administrative Unit to develop the detailed program for a two week training of trainers workshop that was conducted in May.

Phase II. Mr. James Kelly and Mr. Michael Wilburn, USDA/OICD Contractors conducted a two week workshop for INCCA staff, communication art staff from INIAP, and PO-linked extension representatives from each of the four major RTTS producer organization implemented sub-projects. A third workshop for MAG extension agents in the Carchi Province was conducted by the trained INCCA staff as a practical experience and training evaluation activity under the supervision of Mr. James Kelly. Course preparation, presentation and evaluation for Phase II occurred between 6 April and 11 June, 1987.

Phase III. A training workshop for PO-linked extension agents of the MEGALIT and Dairy Improvement Sub-projects was conducted during September,

1987. Mr. James Kelly, USDA/OICD Contractor and Dr. L. Van Crowder, Jr., University of Florida, visited Ecuador during the period 30 August to 4 October, 1987, to assist the INCCA Training Team in the preparation and presentation of the two week workshop. This training effort demonstrated the successful development of local talents to provide quality training in the area of technology transfer.

Part of the scope of work of the Training Coordinator position included the training of a local counterpart to carry out the training initiative following the advisor's departure from post. To accomplish this, Ing. Luis Rosero, Training Coordinator Counterpart, made a fact finding visit in September, 1986, to key training institutions to discuss potential training activities with staff located at International Agricultural Research Centers (IARCs) and other prestigious international training institutions serving Latin America. This travel prepared Ing. Rosero to assume responsibility for management of the RTTS Training Sub-project in February, 1987, by acquainting him with the training programs and staff at the visited institutions and providing a mechanism for establishing long lasting cooperative linkages between the RTTS Project, the IARCs and other training institutions. Institutions and locations visited included CIAT, Cali, Colombia; CATIE, Turrialba, Costa Rica; INCAE, San Jose, Costa Rica; EAP, Zamorano, Honduras; Chapingo, Texcoco, Mexico; CIMMYT, El Batan, Mexico; and finally, the University of Florida, Gainesville, FL.

To improve supervisory, communications, and extension skills of the participating Producer Organizations, six association affiliates were selected to attend a short course on Agricultural Association Management and Extension, held at Land O'Lakes, Incorporated, Minneapolis, Minnesota during the period 30 November to 18 December, 1986. Attending this training activity were the following participants. Manuel Jesus Olivo Castillo and Luis Oswaldo Pozo Quirox, ANCO; Jorge Marino Beltran Rodriguez, AGSO; and Ariosto Antonio Morales Rizzo and Jose Wilfrido Macias Zambrano, APROCICO. No representative from the MEGALIT Sub-project was identified to attend.

The participants received practical training through lectures, discussions, and visits with professionals working in the Land O' Lakes Cooperative System and the Minnesota State Cooperative Organization. In addition, professional staff from the Minnesota Cooperative Extension Service demonstrated the collaborative participation between agricultural cooperatives and extension agencies.

To strengthen the managerial capacity of Ing. Anibal Saltos, Universidad Técnica de Ambato, PITALPRO Sub-project and Ing. Jenny Valencia, University of Florida, Administration Unit, RTTS staff members responsible for sub-project and project implementation, funding was provided for them to attend a six week short course at the Graduate School of International and Public Affairs, University of Pittsburgh, during 7 May - 27 June, 1987 on Policy, Program, and Project Management: Design, Evaluation and Implementation. Given the political, economic and social

problems of Latin America, this course prepared the participants to identify and implement solutions to problems encountered in technical assistance programming in Ecuador.

Another attempt to bring the concept of the RTTS Project to a broader audience was made during a seminar, in October, 1986, on sales promotion and technology transfer for members of the National Federation of Retail Merchants of Ecuador, FENACOMI, in the Province of Manabí. The Central Office staff of the Commercialization Section, Commercialization Under secretariat, Ministry of Agriculture and Livestock conducted this event with RTTS sponsorship to improve operations and increase the level of involvement of retail merchants marketing agricultural products and basic foods. The goal of this training was to change attitudes of commercial intermediaries towards consumers and transfer appropriate marketing techniques to retailers that stressed quality goods at reasonable and logical prices and profit margins given the prevailing marketing circumstances.

Training events directed to the specific sub-projects are detailed next. A final training opportunity for the ESPOL Aquaculture Sub-project was made available to Ing. Luis Campodónico, to study at Auburn University to obtain "hands-on" experience in Farm Pond Management. This occurred during the period 17 July - 31 August, 1986.

As the PITALPRO Sub-project entered its final two years, Ing. Hector Anibal Saltos received training in Post-harvest physiology and handling of vegetables at the Institute of Food Technologists (Annual Meeting), in Dallas, TX and also at a follow-on short course at the University of California, Davis between June 14 - July 4, 1986. In addition, six technical staff from the Food Science Faculty were trained as trainers of the MSTAT Microcomputer Statistical Analysis Program, as part of the continuing effort to develop national capabilities to train local technical staff in new technologies. This short course was held during the period 20 October - 1 November, 1986.

The Short Cycle Crop Improvement Sub-project (APROCICO) continued to develop a strong training component following the INCAE workshop series. Lcdo. Rigoberto Lara, APROCICO Manager, attended a one-month formal course on high-level management offered by the Central American Institute of Business Training (INCAE) at their central office in San Jose, Costa Rica. The purpose of this training was to strengthen the APROCICO Association to better manage the sub-project. Mr. Alfonso Mosquera, ANCO manager, was to attend this event but had to cancel his participation at the last minute.

In August, 1986, following the first INCAE seminar, Mr. Jose Oromi, Organization Specialist, recommended an observation visit to the United States for producers participating in the sub-project. A group of 15 producers of short cycle agronomic crops and associated with APROCICO and other producer organizations

in the Quevedo area participated in the study visit to farms and universities in the southeastern US. Follow-up evaluation of this observation trip showed that the participants used information obtained to design future sub-project technical assistance and training activities. August 4 - 16, 1986

Although initial training in the APROCICO Sub-project concentrated on organizational matters and encouraging member producers to participate actively in the sub-project, upon arrival of the long term entomologist, a more technically oriented training program was developed.

Ing. Agr. Leonor Guerrero M., laboratory technician, attended the First Entomology Congress, held by the Entomology Society of Colombia in Bogota, 14 - 23 July, 1987. During this visit, she also visited laboratories working on biological control of plant pests in Cali, Colombia.

In September, 1987, Ing. Agr. Jorge Mendoza, Chief of Entomology, Pichilingue Experiment Station, INIAP, and sub-project collaborator, attended a seminar in Chiclayo, Peru, sponsored by USAID and the Peruvian Government and conducted by a panel of crop protection experts from the USA and Peru, to develop short and medium term solutions to priority crop protection problems from selected agro-ecological zones in Peru. These zones were very similar to areas in the Quevedo area and information obtained by the APROCICO participants (Dr. Stansly also attended) benefitted the integrated crop protection program being implemented by the RTTS Project.

As part of APROCICO's effort to develop appropriate technology transfer methods, Mr. Marcos Tobar, Technical Counterpart to the IPM Specialist, APROCICO, and Dr. Stansly traveled to CIAT, Cali, Colombia and the Panamerican School for Agriculture, Zamorano, Honduras, in April, 1988, to observe methodologies and procedures in the area of communications and technology transfer in short cycle row crops. The technicians also procured audiovisual materials and publications related to their activities in IPM technology dissemination.

The Coastal Beef Cattle Production and Marketing Improvement Sub-project devoted a considerable amount of effort to both production and marketing oriented training once the long term technical assistance advisors were on-board.

In an attempt to establish strong working relations with the Faculty of Veterinary Medicine, University of Guayaquil, travel support was provided to Dr. William Lopez Vasquez, in October, 1986, to attend the VI International Course on Diagnosis of Respiratory and Enteric Bovine Virus, Instituto Nacional de Investigaciones Agrarias de España, Madrid. Dr. Lopez was conducting research on the Serology and Isolation of Causal Agents of Bovine Viral Diseases in the Ecuadorian Littoral. Results from this study would help to increase livestock production in the MEGALIT Sub-project geographic area.

In October - November, 1986, similar support was extended to Dr. Francisco Erazo Parrales, Instituto de Investigaciones Pecuarias, Universidad de Guayaquil, to attend the X International Course on Animal Production, Instituto Nacional de Investigaciones Agrarias de España, Madrid. Dr. Erazo was conducting research on the prevalence and epidemiological pursuit of tapeworm and cystercosis (Human - Animal - Human). Results of this study would help to increase livestock production and benefit human health in the Littoral Zone, the area of emphasis of the MEGALIT Sub-project.

Soon after arrival of the long term marketing specialist, an observation visit to study beef cattle production and marketing at the Antioquia Federation of Cattle Producers' Cattle Fair and Auction, in Medellin, Colombia was scheduled. Sixteen producer organization linked technicians and nineteen producers from MEGALIT Producer Organizations participated in this observation visit in December, 1986.

Also in December, 1986, Dr. Carlos Romero R., MAG, Commercialization Section, Quito and Dr. Franklin Alarcon E., MAG Director of Livestock Programs on the Coast, Guayaquil, attended an international meeting, sponsored by the Inter - American Institute for Cooperation on Agriculture, IICA, in Montevideo, Uruguay, on the economic and technical implications of using growth hormones in livestock animals. IICA sponsored this event in response to the decision by the European Economic Community to prohibit the importation of animal products treated with hormonal substances, effective January 1, 1987. It was deemed important that the Ministry of Agriculture and also technical counterpart personnel from the MEGALIT Sub-project be knowledgeable regarding this matter because of possible future constraints on beef export marketing for Ecuador.

In addition, Dr. Franklin Alarcon E. was provided with airfare to attend the I Course in Latin America on Pork Production Technology in Maracay, Venezuela, during 9 - 11 June, 1987. This course was sponsored by the American Association of Soybeans and covered the swine management and processing of pork meat with emphasis on animal nutrition.

The MEGALIT Sub-project hosted a five day workshop on artificial insemination for 20 beef cattle producers from area around Arenillas and, conducted by the National Semen Company (ENDES), during the period 23 - 27 February, 1987. The purpose of this workshop was to provide theoretical and practical hands-on training and experience on artificial insemination for cattle producers cooperating with the MEGALIT Sub-project. This training provided the producers with the capability to improve the genetic quality and composition of their herds.

Ing. Carlos Rolando, MEGALIT Livestock Production Counterpart and Ing. Luis Maldonado, Livestock Marketing Counterpart attended the I Curso Sub-regional Andino sobre Producción y Tecnología de Carne Bovina conducted by the Junta del

Acuerdo de Cartagena, Maracay, Venezuela, May 3 - 17, 1987. Given the sub-project's emphasis on livestock production and marketing, it was considered beneficial for the two counterpart technicians to attend this regional course. Technical areas covered were: livestock production technology, hygiene procedures and sanitation inspection of slaughterhouses, promotion of livestock production and beef agro industries, technology transfer and utilization in the Andean Sub-region, and standardization of operating methodologies in the beef industry.

A workshop to train technicians, working with the MEGALIT Sub-project and other technical assistance projects, in methods to obtain beef cattle price information and to establish a unified procedure for the National Price Information and Marketing News System was conducted by the Commercialization Under secretariat, MAG and the RTTS Project between 30 June and 1 July, 1987.

In January, 1988, Dr. Franklin Alarcon, newly hired MEGALIT Marketing Counterpart, MEGALIT, Dr. Enrique Falcones, AGL, and Economist Jacinto Pincay, AGL attended a two week course on cattle breed registries. Following the course, Dr. Alarcon provided technical assistance and the other two participants implemented a herd registry program for the MEGALIT Sub-project. The herd registry program was to provide income generation potential for the sub-project. The course was conducted by the Asociación CEBU de Colombia during the period 24 January - 8 February, 1988.

In April, 1988, Dr. Franklin Alarcon, Architect Guillermo Castro, UDRI, and Dr. Hector Viscencio, UF Marketing advisor, traveled to Gainesville, Florida and also central cattle marketing installations in Medellin and Pereira, Colombia. The purpose of this travel was to allow the two national technicians the opportunity to obtain designs and construction specifications for the proposed central cattle marketing operation in the Santo Domingo area. In addition, this travel strengthened technical linkages with the University of Florida and provided an opportunity to see efficient and healthful cattle marketing operations.

With the elimination of long term technical assistance in the MEGALIT Sub-project during the Sub-project extension, Ing. Carlos Rolando, the national counterpart for livestock production assumed total responsibility for implementation of this sub-project component. To better prepare him for this responsibility, the Training Sub-project proposed that he travel to the University of Florida campus to meet with the Technical Advisory Committee appointed to oversee the technical program and action plan of the MEGALIT Sub-project. In addition, he attended the 18th Annual Latin American Short course, sponsored by the University of Florida. This training activity provided Ing. Rolando with the opportunity to familiarize himself with current work being carried out in Latin America with regard to livestock production and occurred at the University of Florida, Gainesville, Florida, during the period 12 - 26 June, 1988.

Due to an oversight in the preparation of the PL-480 funded budgets for the Dairy and Sheep Production Improvement Projects, University egresado activities were budgeted under the RTTS Training Sub-project. The rationale for this training activity was to provide adequate research facilities, qualified thesis/research direction, and financial resources for quality training of the egresado students of university or other agricultural faculties, to insure quality trained technical personnel for future activities of the RTTS Sub-projects. In addition, the work performed by these students assisted USU technical assistance staff in solving problems identified as constraining agricultural production in the areas of their sub-projects. The estimated distribution of student years and specialty were as follows:

Sheep Management	4	Dairy Extension	4
Sheep Extension	4	Dairy Health	2
Sheep Economics	1	Dairy Management	4
		Dairy Economics	1

To strengthen the Dairy Sub-project and assist the USU long term advisor in herd health, Dr. Galo Izurieta, Technical Manager of the Sierra Livestock Association, was sent to the Western States Veterinary Conference in Las Vegas, Nevada in February, 1988. Given the actual and potential severity of viral diseases identified in dairy herds in the Sierra, attendance at this meeting provided useful professional interaction with main-stream research/extension activities being conducted in the US. Additionally, a request was submitted and approved that allowed Dr. Izurieta to travel to the Federal Laboratory in Plum Island, New York and to visit the dairy research facilities at USU, and the National DHIA Center and Brigham Young University in Provo, Utah.

The only long term post graduate training for the RTTS Project was allocated to the Sheep Improvement Sub-project. Dr. Marco Rodriquez, ANCO, was selected to attend English language training and continue on with long term training to the MS level at USU in Sheep Reproduction Physiology. Dr. Rodriquez worked under the egresado program for the ANCO implemented project and conducted a thesis on the effects of day length on ovulation in sheep. He continued this study in Logan, Utah, and returned to Ecuador in April, 1990.

To strengthen working relations with MAG professionals, periodically requests for travel support to international meetings directly or indirectly related to the RTTS Project were submitted to USAID and MAG for approval. In one such case, Dr. Enrique Balda, National Director, Livestock, MAG was provided travel support to visit the World Center for Water Buffalo Reproduction, Sao Paulo, Brazil. As the National Director for Livestock in the Ministry of Agriculture and Livestock, Dr. Balda's participation in this Conference was considered to strengthen the RTTS Project in two ways: (1) Provide him with the opportunity to establish international contacts with animal scientists from around the world which directly benefitted the Dairy, Sheep, and

MEGALIT Subprojects and (2) Introduce Dr. Balda to a world wide organization working with water buffalos, a potential livestock species appropriate for the coastal area and orient area of Ecuador. Only the plane fare was funded under this training activity during February 21 - 27, 1988.

Training during the Project extension period began strongly with the placement of Agr. Diego Arias, ANCO technician, into a Wool Classification Course and a Wool Production and Wool bearing Animal Management Course, in Montevideo, Uruguay, from 13 February until 27 July, 1989. This training was considered critical to developing a functioning wool classification and marketing initiative within the Sheep Production Improvement Sub-project.

In March, 1989, Dr. Miguel Angel Arevalo, National Director of Livestock, MAG, visited the Panamerican Center of Hoof and Mouth Disease, in Cartagena, Colombia, to attend the International Seminar on Hoof and Mouth Disease in Endemic Areas of South America. This participant training was considered to be pertinent to the MEGALIT and Dairy Improvement Sub-projects.

Following the resignation of the counterpart technical assistance staff from the MEGALIT Technical Unit in late 1988 and early 1989, an immediate need was identified to orient the replacement technicians, Dr. Jose Alvarez, MEGALIT Manager, and Ing. Francisco Oliva, Livestock Production Specialist, to the MEGALIT Sub-project and the role of the University of Florida in Sub-project implementation. Authorization was obtained for the participants to attend the International Conference on Livestock in the Tropics and Orientation at the University of Florida, Institute of Food and Agricultural Sciences during the period 7 - 11 May 1989. In addition, it meetings were scheduled with UF technicians who had played important short term technical assistance roles during the first two years of sub-project implementation.

K. Dow, Chief of Party, USAID/Private Agricultural Organization Project in Bolivia, visited Ecuador during the period 14 - 19 August 1989 to investigate interest and feasibility of a collaborative working relationship between the two USAID sister projects. Ing. R. Soliz visited Bolivia and the PAO Project during the period 7 - 10 November 1989 by invitation of the Bolivian Project. In April, 1990, authorization was obtained to send Ing. Guillermo Ortega (AGL), Sr. Mario Quiñones (AGL), Sr. Adolfo Giler (AGL), Sr. Andres Borja (AGSO), on an observation visit to the USAID/PAO Project to visit cattle producers and organizations in the cattle producing area of the Beni Province. The overall objective of this visit was to provide first hand experience on income generating strategies being practiced by the Bolivians cattle producers for eventual consideration of the participating POs in the RTTS Dairy and Beef Cattle Sub-projects in Ecuador.

Ing. Nelson Villacis, Dairy Extension Agronomist, and Dr. Asthon Chonlong, Dairy Extension Veterinarian, attended special extension training at USU on how to gather demonstration research information to solve specific problems confronting the dairy industry. In addition, the participants received an overview of the Land Grant University, Cooperative Extension Service at the University of Florida in Gainesville, Florida. The dates for this training were 12 August - 3 September, 1989 in Utah and 4 September - 11 September, 1989 at the UF.

Dr. Jorge Beltran, Dairy Extension Veterinarian, attended the First International Course on Agricultural Extension Specialization, at the Escuela Central de Capacitación Agraria, in Madrid, Spain, during the period 15 October - 15 December, 1989. Participation at this event was partially funded by the Government of Spain.

Following the successful visit to USU by the two Dairy Sub-project technicians in August, 1989, a similar visit by Dr. Augusto Duran, Dairy Extension Veterinarian, Dr. Miquel Bolaños, Dairy Extension Veterinarian, and Dr. Luis Alava, Dairy Extension Veterinarian, was scheduled for the period 7 - 29 July, 1990. Again, special extension training on how to gather demonstration research information to solve specific problems confronting the dairy industry was the objective.

Because of the successful working relationship that developed with the National Semen Company during the four years of the Project, it was considered important to provide additional training to Ing. Patricio Vargas A., Animal Scientist, ENDES. To technically strengthen Ing. Vargas, support was provided to him to attend the 12th Meeting of the Latin American Association of Animal Production (ALPA), held in Campinas, Brasil during 21 -28 July, 1990.

The successful visit by the MEGALIT and Dairy Producer Association members to the USAID/PAO Project in Bolivia prompted a similar visit by Lcdo. Rigoberto Lara, APROCICO Sub-project Coordinator between 6 - 11 August, 1990. Although Ing. Jorge Ponce, Sub-project Technical Director, was scheduled to participate in this observation travel, he resigned prior to the trip. In the case of the APROCICO Coordinator, a visit to short cycle crop producers and organizations in the Santa Cruz and Cochabamba areas of Bolivia was programmed.

6.0 Conclusions

Specific sub-project accomplishments are documented in the Annexes to this report and also other documents prepared during the implementation of the RTTS Project. This level of detail will not be repeated in these concluding remarks.

To draw reliable conclusions regarding the impact of the RTTS Project on governmental efforts to diffuse technology to producers or to assess the achievement of programmed project goals would be impossible so soon after Project completion.

However, the end of project status of the sub-projects did provide indicators that institutional development had occurred to varying degrees, both within the POs and MAG. The question that must be answered is whether or not the private organized producer sector has been functionally incorporated into the National Technology Transfer System in Ecuador.

During the first two years of the redesigned RTTS Project, resources were channeled primarily to activities related to the validation of appropriate technologies that would relieve production and marketing constraints experienced by producers of the priority commodities. The last two years of the Project were devoted to strengthening the institutional capabilities of the participating producer organizations in their effort to achieve self-determination in the technological development process and also to explore avenues of income generation through the provision of services to member and non-member producers. The organizational functionality of the producer organizations was emphasized when it became apparent that institutional development by way of technological development was more complex and required a longer time frame than originally thought. Increased efforts were directed to the operational and programmatic linkages with the MAG during the project extension in an attempt to firmly establish the methodological concepts proposed by the RTTS Project within the day to day routines of the MAG.

During the life of the Project, all participating POs had the opportunity to receive direct technical assistance from international and national specialists. Training in areas related to organizational management, operations, and marketing was provided to strengthen the capability of the POs to provide technical services to member and non member producers. By the Project end all leader POs were demonstrating some income generating capacity. With this beginning of an ability to generate counterpart funding by the POs, long term technology transfer sustainability was considered feasible if continued external economic support, from national or international donors, could be obtained for the near future.

Any evaluation of the RTTS Project should carefully consider the pioneering role it played in developing a new conceptual basis for technology development and transfer. As such, this Project was not an example of classic institutional development but rather an experiment, that constantly manipulated organizational and social variables within the private organized producer sector and important organizational and technical variables within the MAG and other public sector institutions, to explore new working relationships between the sectors. The experimental hypothesis was that technology recipients, in this case producer organizations, could actively participate in the national technology development and transfer process. This would be accomplished by developing a sustained effort, within the POs, to identify problems that constrain production, prioritize these problems, and then seek both local and distant limited resources to help solve these problems.

To successfully implant this concept into Ecuador's National Technology Transfer System, important attitude changes had to be effected not only at policy and decision making levels within the MAG, but also simultaneously, within the leadership and membership of participating Producer Organization. Under this strategy, MAG would have to listen to the technical needs identified by the producer organizations and the organizations would have to expand their organizational mandate to include technical responsibility to membership, in addition to, the traditional social and political activities of the past.

Given the complexity of such an institutional development effort, the time provided for Project implementation was very short. In addition, a lack of clear conceptual definitions and guidelines for individual and shared responsibilities of the Project participants, following the Project redesign in 1985, hindered the expected rapid start-up. The issues of sustainability and social equity were a constant concern of Project executors and donors. Serious debate of these issues continued until the PACD.

Perhaps the most important question raised by the Project, was that related to the social responsibilities of both private and public sectors. This may have been the result of an expectation that the inefficient technology transfer system in the public sector could be by-passed by working directly through producer organizations in the private sector. The final analysis showed that technological and social development was possible only through mutual and responsive effort by both sectors. Whether each will accept this responsibility in a continuing matter will only be known if the RTTS concept can be found to have been incorporated into the National Technology Transfer System after the Project's end.

In general, the principal producer organizations of the four major Sub-projects and the MAG demonstrated, in varying degrees, a willingness to participate in the technological development process. A continued investment in this process on the part of the producers will depend on the returns received from their efforts.

Annex A

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RURAL TECHNOLOGY TRANSFER SYSTEM PROJECT

RTTS

CONTRACT NO. 518-0032-C-00-9025

**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
AND
THE UNIVERSITY OF FLORIDA
(TITLE XII)**

END OF TOUR REPORT

LAWRENCE J. JANICKI, CHIEF OF PARTY

**Office of International Programs
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, Florida 32611**

August, 1990

**End of Tour Report - Lawrence J. Janicki, Chief of Party
Rural Technology Transfer System Project - RTTS**

I. Introduction

I was initially assigned to the Ecuador RTTS Project as Training Coordinator. This was budgeted for a one-year period and the assignment began on 28 January 1986. Under the redesigned RTTS Project, all training activities were removed from the individual subprojects and grouped under a separate Training Sub-project. Originally, approximately \$750,000 was budgeted to cover long and short term training activities. However, due to funding constraints and the need to provide additional dollar funding to support long term technical assistance, the training budget was substantially reduced by the end of 1986 (See Project Financial Report). During the year as Training Coordinator I developed the overall training program and local resources working with a designated national counterpart who was to carry on the training effort after my departure. The following October the Contract's Chief of Party was sent back to the United States by order of the Minister of Agriculture and Livestock. I was requested to remain in Ecuador and assume the responsibilities of Chief of Party until the PACD of 30 September 1988. I assumed responsibility of the Chief of Party on 1 February 1987.

This end of tour report will detail and discuss specific accomplishments, with emphasis placed on the Chief of Party Scope of Work. Effort and accomplishments of the Training Coordinator Scope of Work are discussed in the RTTS Project End of Project Report submitted by the University of Florida.

Both the Training Coordinator and the Chief of Party Scopes of Work, along with Project Objective and Mission Responsibilities are provided as attachments to this report. These documents are extracted from the two contracts that were in force during my long term technical assistance assignment on the RTTS Project.

It is important to mention that the RTTS Project was successfully extended for an additional 23 month period and the revised PACD became 26 August 1990. A new contract was signed between the United States Agency for International Development and the University of Florida to update certain contractual items and provide approximately 1.9 million dollars of additional funds to cover project implementation during the extension period. It is also important to note that the new contract was carried out with a reduced level of resources, when compared to the original redesigned RTTS Project effort of 1985.

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II. Responsibilities and Accomplishments

1. Guide and coordinate all RTTS project activities, including the subprojects. As such, the Chief of Party will be responsible for the timely and effective delivery of all inputs under this Contract.

Inputs under this contract consisted of long and short term technical assistance, equipment purchases, and oversight of PL-480 local currency funding. This activities were conducted through the RTTS Administrative Unit's headquarters in the Ministry of Agriculture and Livestock located in Quito, Ecuador.

Technical assistance and most major equipment purchases were provided to the Project with the support of the Office of International Programs, Institute of Food and Agricultural Sciences, University of Florida. In addition to overall Project administration, the University of Florida had primary responsibility to manage the Short Cycle Crop Improvement and Coastal Beef Cattle Production and Marketing Subprojects. Two subcontracts with Utah State University were prepared to provide technical and some logistical support to the Dairy Production Improvement and Sheep Production Improvement Subprojects carried out in the Ecuadorean Sierra.

2. Establish and maintain working relationships at the highest policy levels with MAG, producer organizations and other participating Ecuadorean institutions and subcontractors.

This included providing timely information to MAG leadership regarding the RTTS Project initiative and working concept. Due to frequent changes in administration, this basic project orientation effort was on-going and continuous during the last two years of the Project.

A significant effort was required to assist the participating producer organizations establish working relationships with the public sector entities i.e. MAG and INIAP and also other development efforts such as PROTECA, FUNDAGRO, and the UDRI Projects.

3. Arrange and coordinate all long term and short term technical assistance under the RTTS.

As a matter of procedure, all long and short term technical assistance arrangements were channeled through the RTTS Administrative Headquarters. This required the preparation of detailed terms of reference, assurance of proper and adequate communication among the various producer organizations, subcontractor personnel and other cooperating projects, and oversight of required follow-up activities. In short, terms of reference and requests for travel and salary level

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authorization were prepared, with participation of long term technical assistance and participating producer organization administration when required, and submitted to USAID and MAG for approval.

During my tenure as Chief of Party approximately 350 person months of long term technical assistance were provided to the Project. An additional 52 person months were brought into the Project as short term technical assistance. Periodic visits by non-project funded technical assistance, primarily sponsored by the Title XII MOU/PSG initiative of UF and USU, were also coordinated.

4. Ensure the substantive and formal quality and completeness of all sub-project work plans which are presented by producer organizations to MAG and AID for review and approval.

The Administrative Unit, under the supervision of the Chief of Party, played an important role in the preparation of sub-project work plan documents and also carried out any necessary follow-up to assure the timely presentation of the final versions to USAID and MAG. Additional follow-up was required to assist USAID and MAG in responding to the work plans.

5. Supervise and help coordinate all training activities that will take place under the project.

As mention in the introduction, I was assigned originally to the RTTS Project as Training Coordinator. Responsibilities during the last two years of the Project required that I devote a portion of my time to overseeing the training component of the Project. Funding limitations reduced the training effort considerably when compared to the original design document for the revised RTTS Project of 1985.

All training requests for short term training, both locally and internationally, where channeled through the Administrative Unit. Appropriate requests for authorization were made to USAID and MAG. The one long term post graduate effort of the Project was also administered by the University of Florida with invaluable assistance by the Office of International Programs and its Training Coordinator.

Local training and most short term training efforts were directed at strengthening producer organization linked technicians in extension and technology transfer methodology and producer organizations directors in basic management methodologies.

It is appropriate to mention the successful effort made to develop local resources to train PO-linked technicians as extension agents. This program was begun during in 1986, the first year of the redesigned RTTS through a working agreement

with USDA/OICD in Washington. The effort was conducted in Ecuador with CHP International, a consulting firm, contracted to provide training of trainer instruction to the National Institute of Farmer Training (INCCA). The Office of Training at the University of Florida coordinated all inter-institutional logistics for this activity. Developing this local resource has provided long term in-country capability required for training extension agents, both participating in the RTTS Project as well as other national technology transfer efforts.

6. Supervise and coordinate follow-up activities for the main project, as well as, the subprojects under the RTTS.

This responsibility was addressed by quarterly progress evaluations of all on-going subprojects. The quarterly progress was measured through written reports of long term technical assistance staff and also reports prepared by producer organization representatives. The Project Specialist was assigned primary responsibility for this activity at the Sub-project level. Details on his procedures can be found in his End of Tour Report.

7. Plan, participate in and supervise periodic evaluations of the different subprojects and the overall RTTS Project.

In addition to the quarterly sub-project progress evaluations mentioned in No. 6 above, more substantive evaluations were coordinated with PL-480, USAID and MAG supervisory personnel participating. In addition, most subprojects benefitted from internal evaluations conducted by the implementing universities.

A strong project evaluation effort was conducted in December, 1987 to assess the feasibility of extending the RTTS Project past the PACD of 30 September 1988. Equity issues at the sub-project level were evaluated by USAID sponsored evaluators and the MEGALIT Sub-project was evaluated internally by University of Florida faculty. Following recommendations made by both evaluations teams and developing a strong action plan for the MEGALIT Sub-project impacted positively on the request to extend all four major RTTS Subprojects for an additional 23 months.

8. Serve as an effective link between USAID/Ecuador and all other Ecuadorean and Title XII institutions that participate in the implementation of the Projects.

As Chief of Party, I interacted directly with the USAID mission in Ecuador. This entailed weekly staff meetings in the Agriculture and Natural Resource Office. Additional meetings were held with other offices of the Mission i.e. contracts, controller, legal advisor, and executive office.

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Within MAG, I met frequently with the minister's representative designate to obtain required approvals on travel and training. Policy matters were discussed and problems critical to project implementation were also discussed.

A major accomplishment was the extension of the RTTS Project and the signing of a new US \$1.9 million contract with USAID. This effort required a tremendous effort beginning early in 1988.

III. Closing Comments.

Any future evaluation of the RTTS Project should carefully consider the pioneering role it played in developing a new conceptual basis for technology development and transfer. As such, this Project was not an example of classic institutional development but rather an experiment, that constantly manipulated organizational and social variables within the private organized producer sector and important organizational and technical variables within the MAG and other public sector institutions, to explore new kinds of working relationships between the sectors. The experimental hypothesis was that technology recipients, in this case producer organizations, could actively participate in the national technology development and transfer process. This would be accomplished by developing a sustained effort, within the PO, to identify problems that constrain production, prioritize these problems, and seek local and distant resources to help solve these problems.

To successfully implant this concept into Ecuador's National Technology Transfer System, important attitude changes had to be effected not only at policy and decision making levels within the MAG, but also simultaneously, within the leadership and membership of participating Producer Organization. Under this strategy, MAG would have to listen to the technical needs identified by the producer organizations and the organizations would have to expand their organizational mandate to include technical responsibility to membership, in addition to, the traditional social and political activities of the past.

Given the complexity of such an institutional development effort, the time provided for Project implementation was very short. In addition, a lack of clear conceptual definitions and guidelines for individual and shared responsibilities of the Project participants, following the Project redesign in 1985, hindered the expected rapid start-up. The issues of sustainability and social equity were a constant concern of Project executors and donors. Serious debate of these issues continued until the PACD.

Perhaps the most important question raised by the Project, was that related to the social responsibilities of both private and public sectors. This may have been the result of an expectation that the inefficient technology transfer system in the public

sector could be by-passed by working directly through producer organizations in the private sector. The final analysis showed that technological and social development was possible only through mutual and responsive effort by both sectors. Whether each will accept this responsibility in a continuing matter will only be known if the RTTS concept can be found to have been incorporated into the National Technology Transfer System after the Project's end.

In general, the principal producer organizations of the four major Sub-projects and the MAG demonstrated, in varying degrees, a willingness to participate in the technological development process. A continued investment in this process on the part of the producers will depend on the returns received from their efforts.

ATTACHMENT I

Project Objective and Mission Responsibilities

The main objective of this project is to assist the Government of Ecuador (GOE) in establishing a Rural Technology Transfer System (RTTS), that will address the need to generate and diffuse technologies appropriate for the agricultural sector in general.

The Administrative Unit, composed of a Chief of Party and a Project Specialist, will be responsible for ensuring thorough and effective project implementation in accordance with the overall objectives of the RTTS project.

Specifically, the Administrative Unit will have the following responsibilities:

1. Coordinate all project activities to ensure inputs and outputs are supplied on a timely basis.
2. Assure that candidates for TA positions are suitably qualified.
3. Assure that the work of the TA is satisfying the requirements specified in the work plans approved by the MAG, Producer Organizations and AID.
4. Procure materials and supplies for the Administrative Unit, and assist the subprojects in procurement when necessary.
5. Arrange for adequate training activities when appropriate and funding is available.
6. Handle the administrative and logistical aspects of having a TA team in Ecuador, except for those aspects provided in the sub-contractual agreements between the lead institution and the subcontracting institution.
7. Administer all contract dollar finances and PL-480 Funding for the support of the TA team.
8. Provide direct support to participating producer associations enabling them to administer all non-TA related PL-480 funding.

9. Provide administrative and technical clearance and pass on to the PL-480 Advisory Committee, for approval, all PL-480 funding requests from the participating RTTS producer organizations.
10. Prepare and submit quarterly and annual reports to MAG and AID.
11. Serve as liaison between the TA, sub-project organizations, AID, MAG, FUNDAGRO, INIAP, DRI, Centros Agrícolas, etc. and foster good working relations among all.
12. Continue to institutionalize the concept of public/producer participation in research and extension within the MAG.
13. Provide direct technical assistance (by administrative unit) to subprojects in institution building, income generation, business management, agricultural economics, etc. (The extent of this technical assistance by the Administrative Unit long term technical assistance staff will depend on the amount and quality of MAG administrative support personnel resources supplied to the UF Administrative Unit.)
14. Closely monitor TA performance and project implementation and recommend adjustments to project participants, as necessary, to assure effective implementation.
15. Submit work plans to MAG and AID for the project extension.
16. Perform on-going informal evaluation of p[^]R2
*t, paying particular attention to the establishment of self-sustained technology validation and transfer systems within the private associations. Specific attention must also be paid to assure that small men and women farmers are benefiting from the project. (Evaluations of this nature will depend on Short Term Technical Assistance funding levels and Administrative Unit support by MAG.)
17. Identify implementation problems and recommend possible strategies to solve the problems.
18. Specifically coordinate short term TA for the MEGALIT sub-project which will have no long term TA assigned.

ATTACHMENT II

Training Officer Position Description

Working under the supervision of the Chief of Party, plan, organize and administer the training activities that will take place under the General RTTS Project as well as under the different subprojects. This will be accomplished through the following activities:

1. Identify training needs in both the private and the public agricultural sector, in those areas that have been determined as priority under the RTTS.
2. Design a comprehensive and balanced training program that will include both degree training and short courses, seminars and visits in Ecuador, the U.S. and other countries as well as in international agricultural research centers.
3. Arrange with participating local institutions and individuals as well as with Title XII and other institutions for the timely and adequate provision of this training.
4. Arrange and coordinate the necessary activities of both instructors and participants, so that the programs are carried out smoothly.
5. Keep track of and support participants (especially long term) to ensure that their training experience is beneficial.
6. When necessary, help in the selection of possible candidates for training.
7. If necessary, arrange for an adequate language training program, to improve the capability of local candidates to obtain training at Title XII institutions.
8. Follow through to help ensure useful placement of participants upon conclusion of their training.
9. Supervise and train an Ecuadorean counterpart so that the counterpart will be able to assume the full responsibilities of the training officer.

ATTACHMENT III

Chief of Party Position Description:

Chief of Party. This individual shall:

1. Guide and coordinate all RTTS project activities, including the subprojects. As such, the Chief of Party will be responsible for the timely and effective delivery of all inputs under this Contract.
2. Establish and maintain working relationships at the highest policy levels with MAG, producer organizations and other participating Ecuadorean institutions and subcontractors.
3. Arrange and coordinate all long term and short term technical assistance under the RTTS.
4. Ensure the substantive and formal quality and completeness of all sub-project work plans which are presented by producer organizations to MAG and AID for review and approval.
5. Supervise and help coordinate all training activities that will take place under the project.
6. Supervise and coordinate follow-up activities for the main project, as well as, the subprojects under the RTTS.
7. Plan, participate in and supervise periodic evaluations of the different subprojects and the overall RTTS Project.
8. Serve as an effective link between USAID/Ecuador and all other Ecuadorean and Title XII institutions that participate in the implementation of the Projects.

Annex B

ECUADOR

RURAL TECHNOLOGY TRANSFER SYSTEM-RTTS PROJECT

USAID PROJECT No. 518-0032

END OF TOUR REPORT

ROMULO SOLIZ, PROJECT SPECIALIST

**Office of International Programs
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, Florida**

December, 1990

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ACRONYMS USED

AGL	Asociación de Ganaderos del Litoral Cattle Producer Association of the Littoral
AGSO	Asociación de Ganaderos de la Sierra y Oriente Cattle Producer Association of the Highlands and Orient
ANCO	Asociación Nacional de Criadores de Ovejas National Association of Sheep Raisers
APROCICO	Asociación de Productores de Cultivos de Ciclo Corto Producer Association of Short Cycle Crops
CONACYT	Consejo Nacional de Ciencia y Tecnología National Council of Science and Technology
ESPOCH	Escuela Politécnica del Chimborazo Polytechnic School of Chimborazo
FUNDAGRO	Fundación de Desarrollo Agropecuario Agriculture and Livestock Development Foundation
INIAP	Instituto Nacional de Investigaciones Agropecuarias National Institute of Agriculture and Livestock Research
MAG	Ministerio de Agricultura y Ganadería Ministry of Agriculture and Livestock
MEGALIT	Mejoramiento de la Ganadería en el Litoral Cattle Improvement in the Littoral
POs	Producer Organizations
PL-480	Public Law 480
RTTS	Rural Technology Transfer System
USAID	United States Agency for International Development
USU	Utah State University

ECUADOR

RURAL TECHNOLOGY TRANSFER SYSTEM-RTTS PROJECT

USAID PROJECT No. 518-0032

END OF TOUR REPORT

ROMULO SOLIZ, PROJECT SPECIALIST

1.0 INTRODUCTION

This report summarizes the activities and accomplishments of the Project Specialist of the RTTS Project with respect to his terms of reference for the period 1985 to 1990. The results obtained for the Rural Technology Transfer System Project (RTTS) in general, with respect to its objectives and goals, are summarized in the Final Report of the RTTS Project.

According to the RTTS Project Document and the USAID/University of Florida Contract, the Terms of Reference of the position of Project Specialist were as follows:

- a) Work closely with the staff of MAG, the producer organizations and Title XII institutions in the development of subproject work plans. In this regard, USAID will provide guidance, as needed, to ensure the quality and acceptability to USAID of the work plans.
- b) Carry out follow-up monitoring activities in the different subprojects to determine progress, help define problems and identify solutions.
- c) Participate actively in subproject evaluation activities, and report to the Chief of Party the results and recommendations of such evaluations.
- d) Assist the subprojects in the analysis and reporting of the level of adoption of technology by the members of producer organizations, particularly small and medium size producers under the different subprojects.

e) Assist the MAG with the development of procedures and channels of information to institutionalize the RTTS concept of working with producer organizations within the MAG organization.

f) Provide training and assistance in the area of agricultural economics to the subprojects when feasible and primary job responsibilities are not adversely affected. (This professional activity will depend on the amount of administrative support provided to the Administrative Unit by MAG.)

The Project Specialist will allocate most of his time to the activities listed above. However, due to the nature of the RTTS Project, considerable administrative support and training is required while the producer organizations develop self management skills. The position of Project Specialist is under the supervision of the Chief of Party.

2.0 THE PROJECT

2.1 EXECUTORS AND PHASES OF IMPLEMENTATION

The Project donor was the Government of the United States, through the United States Agency for International Development (USAID), with both grant and loan economic assistance allocated for use by the Project (the amounts are reported in the Project Report). The grant and loan components were dollar funded, primarily to provide foreign technical assistance, major equipment purchases, and international short and long term training. PL-480 generated sucres were provided by the Government of Ecuador as counterpart funding and were primarily used for local operating expenses.

Project administration and long and short term technical assistance were the responsibility of the University of Florida, through Contract No. 518-0032-C-00-9025-00. The Administrative Unit for Project Implementation was staffed by faculty from the University of Florida and was located in the Project's institutional headquarters in Quito.

Although the Government to Government Agreement for the implementation of the Project was signed in mid-1980, the Project was initiated in mid-1981, following the selection of the University of Florida, Institute of Food and Agricultural Sciences (IFAS) as the source of required technical assistance.

During the initial period of Project implementation, August, 1981 to September, 1984, the Ecuadorean implementing institution was the National Council of Science and Technology (CONACYT), an advisory, coordinating, and planning agency assigned to the Vice-presidency of the Republic of Ecuador. Since its inception, the RTTS worked through the subproject mechanism and during the first

implementation phase, 12 subprojects were implemented by seven different public sector research and development institutions. That is to say that during the first phase, the purpose of the Project was to be achieved through public sector efforts.

During the period of October, 1984 to September, 1990, implementation responsibility and the institutional home of the Project was transferred to the Ministry of Agriculture and Livestock (MAG). At the end of 1985, a redesign of the Project under the supervision of the MAG was completed. Later, in March, 1986 new subproject designs were completed, based on recommendations incorporated into the new Project design. Four new major subprojects were initiated, but contrary to subprojects initiated during the first phase, these new subprojects were to be implemented by private producer organizations (POs) in selected priority commodity and geographic areas. When the development of work programs for each subproject and the contracting of long term technical assistance are taken into consideration, the period of actual project implementation in the field covers four years. The PACD was August 26, 1990. This report covers the phase of Project implementation following the redesign of 1984.

2.2 PURPOSE AND OBJECTIVES

The purpose of the Rural Technology Transfer System Project (RTTS) was to promote agricultural development, emphasizing technological aspects, for the purpose of increasing production and rural agricultural incomes. This was to be accomplished through improved yields of the specific priority commodities and also through improved organizational and marketing conditions within the sector.

The purpose was realized through the following two primary objectives:

Institutional Objectives: Strengthen the National System of Technology Transfer, by way of encouraging the active and effective participation of agricultural producers in the technology development process, especially during the technology validation and diffusion stages.

Conceptually, this objective had two implications:

- a) Modify the traditional model of technological development, by formally incorporating a new concept of producer participation into the technology transfer system. This concept removed the producer from the passive role of mere recipient of governmental technological development efforts, and allowed him or her to assume greater responsibility in the technological development process by taking an active participating role with both "voice and vote".

b) Incorporate the "farming systems" or "bottom-up" approach into the technological development system, by allowing real and effective participation of the farmer as a crucial component of the methodology.

Programmatically, the goal of this objective implied the development and institutionalization of an irreversible capacity of "auto-gestion", or "self-determination in technology development" at the producer level. This objective had strong implications at the strategy level, which is discussed later, and also directly in the definition of Project goals.

The goal of **auto-gestion** was restricted to the technical and the administrative areas and did not necessarily include the auto-financing of the technological development process. However, a progressive increase in counterpart funding participation through incoming generating activities was sought. "Auto-gestion" is defined in terms of the capacity needed to be developed in the participating organizations so that they made up part of the agricultural technology development system.

Technological Objective: Contribute to the agricultural technology development process in the areas of production and marketing, for high priority commodities and geographic areas of Ecuador.

This objective had the following implications:

a) **Methodologically**, it contributed to the development and/or testing of new field procedures during the technology validation and dissemination stages.

b) **Operationally**, since the technological objective was a function of the institutional objective, priority commodity and geographical zones were not reviewed nor changed during the implementation of the project. Identified problems and possible leverage opportunities, however, were changed in each commodity-zone with each work program.

2.3 PROJECT ACTIVITY COMPONENTS

Regarding external financial support, two components were considered important: **technical assistance**, both long and short term, and **technical training**, both formal and in-service. The Final Project Report details the levels and type of effort conducted under these two activities, most of which were conducted by technicians from the University of Florida and the subcontractor Utah State University.

With respect to the Work Program activities for each subproject, the components are summarized in the following five categories: Organizational

development, selection and validation of technology, technology dissemination, marketing and technical training.

The terms of reference for the Project Specialist concerned all of these established components, especially the areas of support and coordination of subproject implementation, follow-up and evaluation.

2.4 IMPLEMENTATION STRATEGY

The project's institutional objective determined the primary element of the implementation strategy. This was that the project's programs and activities be carried out by **agricultural producer organizations, POs**, and that the POs be the recipients of the effort to institutionalize the capacity of self-determination. This strategy was to be implemented through a collaborative work effort between MAG and coordinated with other institutions participating in the technology transfer system.

The term **institutionalization** implies a process of irreversible change of producer organizations (institutions), associated directly with the organizational factors dealing with resource management, that assure a stable capacity through time. A factor that influenced the achievement of the institutionalization object, but not necessarily controllable by the activities of the project, was leadership capability. Besides being a scarce resource, it was liable to change each year with the election of a new administration at the PO.

The term **self-determination**, in the context of the project, signifies a capacity of the producer organizations to carry out technological programs under similar arrangements of institutional interactions and support that were characteristic of other technological development agencies or activities in the country.

As such, the producer organizations are injected into the National System of Technology Transfer, by way of their participation in technology testing and dissemination programs, as they developed the capacity to:

- identify problems of the producer sector and possible technological leverage opportunities (technological demand)
- define priorities and formulate programs to test and disseminate technologies (technology supply)
- interact and coordinate activities with other institutional components of the technology development system: (i) with implementing institutions such as MAG and INIAP, (ii) with national coordinating and support institutions such as FUNDAGRO,

and (iii) with international support organizations (via training, technical assistance and funding.)

Putting it another way, this strategy element proposed a collaborative effort between the public agricultural sector (MAG, INIAP, etc.) and the agricultural producer sector (producer associations and cooperatives), with the former playing a facilitator and supporting role, and the latter playing an implementation role, as an institutional capacity towards self-determination was strengthened.

This strategy element supported a "systems" or "bottom-up" methodology, in which the beneficiary of the product had to participate in the design and execution of programs and activities, to effectively resolve identified problems and achieve defined goals. The rationale behind this focus has been well documented in different agricultural research experiments.

In terms of the process of agricultural technology development, which is characterized by the following different stages: i) generation, ii) validation (testing and fine tuning), iii) dissemination (technology transfer or technical assistance and training) and iv) adoption; this strategy actively incorporates the farmer into technology validation and dissemination. Thus, the passive role taken previously, that of a mere recipient or beneficiary of the State's effort, is changed to the active role of executor with its coinciding responsibility in the technology development process.

Because of the above, the RTTS Project was designed as a mechanism to change and strengthen the producers' institutional sector, orienting agricultural technology development process toward a collaborative effort between the public sector (facilitator) and the organized producer sector (executor).

2.5 IMPLEMENTING INSTITUTIONS AND GEOGRAPHICAL COVERAGE

The RTTS Project was executed under the authority of the MAG, the principal agricultural technology development institution in Ecuador and the backbone of the national rural technology transfer system, through a mechanism of producer organization implemented subprojects.

By decision of the each ministerial administration, the institutional home of the RTTS Project, for purposes of project coordination and decision making, was found in different departments within MAG at different times during the life of the project. These were the offices of: the Advisor on Education and Extension; the Advisor on Economics and International Matters; and the Agricultural Technology Development Project (PROTECA). The purpose of PROTECA was to reestablish an agricultural extension service within MAG. The head of each of these departments was designated as the Minister's representative to the Project. These

ministerial departments were linked administratively to the RTTS Project Administrative Unit. The Administrative Unit was located physically in the offices of the University of Florida Technical Cooperation Mission and had the primary responsibility of providing international technical assistance and training, along with conducting follow-up evaluations and supporting the POs in subproject execution.

During the last two years of the Project, the MAG representative to the RTTS Project was the Minister of Agriculture with some participation by the Director of PROTECA.

When the MAG representative was one of the Minister's Advisors, articulation between administration and the field, to establish appropriate channels of information and stable collaborative working relations, was achieved through the respective ministerial departments and programs. When the MAG representative was the Executive Director of PROTECA, collaborative work and program articulation was attempted at the field level with technicians located in the work "polygons" of PROTECA. Coordination of program follow-up evaluations and programming of joint technical training activities was attempted with PROTECA at the ministerial level.

The subprojects were implemented by participating producer organizations and based on individual cooperative agreements between the PO and MAG which granted complete administrative and technical independence to the Producer Organization. Under the cooperative agreements, the MAG assigned counterpart technicians and some operating funds for the technological programs of the subprojects. The POs, for their part, supplied the basic institutional headquarters (offices, administrative and support personnel, and a certain amount of counterpart funding, according to the abilities of each case.) In order to obtain required resources to maintain and expand program coverage, the RTTS Project created criteria on both organization and procedures to follow during project implementation.

The agricultural producer organizations, participating as subproject implementation leaders, are listed below.

(i) **Dairy Production Improvement Subproject.** This subproject was implemented by the Cattle Producer Association of the Highlands and Orient (AGSO), with the Holstein-Frisian Association participating at a level consistent with its institutional objectives.

As presented in the Work Programs for the March, 1986 to August, 1988 period, the subproject was implemented throughout the provinces of Carchi, Imbabura, Pichincha and Cotopaxi. During the period September, 1988 to August, 1990 the subproject expanded coverage to the dairy producing areas of the Tungurahua province and also the zone around Baeza. The expansion to other areas

was limited by resources, primarily those related to extension personnel and vehicle availability.

(ii) **Sheep Production Improvement Subproject.** This subproject was executed by the National Sheep Raisers Association (ANCO), in the sheep producing zones of Ecuador but with emphasis in the highland paramo of the provinces of Carchi, Imbabura, Pichincha, Cotopaxi and Chimborazo. At the end of the first two years, coverage was expanded to include the provinces of the southern highlands with the help of eight Peace Corps Volunteers assigned to the subproject. It is important to note that the PCVs did not have vehicles and therefore their areas of coverage were small. In spite of this assistance on the part of the Peace Corps, to adequately cover the southern portion of the country, ANCO would require additional staffing of qualified MAG technicians and vehicles.

The Polytechnic School of Chimborazo (ESPOCH) was worked with ANCO, via a cooperative agreement, in technology development and validation of pastures during the final two years of the Project.

(iii) **Short Cycle Crop Improvement Subproject (Hard maize, soybeans and rice).** This subproject was executed by the Short Cycle Crop Producer Association (APROCICO) in the area around the cantons of Quevedo and El Empalme, Los Rios Province.

Initially geographic coverage included the canton of Balzar of the Guayas Province, but the zone was excluded due to organization difficulties with the collaborating producers of the local producer organization and assigned technician. Subsequently, an unsuccessful attempt was made to obtain two technicians from PROTECA to assist the subproject expand geographic coverage and increase the volume of subproject related activity. In the end, only one technician from the MAG/Rice Program was able to work effectively with APROCICO. All other technicians involved in subproject implementation were directly hired by the producer organization.

During the 1988-1989 agricultural year, the program expanded its activities to include sorghum and white maize. The white maize initiative was carried out with assistance from Molinos Poulter, a national milling company. In addition, APROCICO began required administrative paperwork with the MAG to modify its statutes to permit the incorporation of perennial crops within its social mandate i.e., coffee, african oil palm and banana.

(iv) **Beef Cattle Production and Marketing Improvement Subproject on the Littoral - MEGALIT.** This subproject was conducted in the geographic areas surrounding each of the following participating cattle producer organizations, located in the provinces of Guayas, El Oro, Manabi and Pichincha (lower part):

Livestock Association of the Littoral - AGL (lead organization)
Livestock Association "17 de Abril" in El Empalme
Livestock Association of Arenillas
Livestock Association of Los Bancos
Livestock Association of Pedro Vicente Maldonado
Livestock Association of Santo Domingo de los Colorados
Livestock Cooperative of Chone
Livestock Association of Los Rios in Quevedo

In mid-1989, the executive commission of the MEGALIT subproject ratified the decision to exclude the Agricultural and Livestock Cooperative of Balzar from subproject activities, basically because of the persistent lack of initiative on the part of the cooperative's implementation of the work program in its area of influence. It was subsequently resolved to carry out the earlier request of the Livestock Association of Los Rios, with its headquarters in Quevedo, to be admitted into MEGALIT. In this respect, various other livestock producer associations from Bahia, El Carmen, Quinde and Pichincha expressed interest in becoming part of the MEGALIT effort.

3.0 THE REDESIGNED RTTS

3.1 The RTTS Project in 1984

The National System of Rural Technology Transfer (Agriculture and Livestock) in Ecuador, as visualized in the National Development Plan of 1984-1988, could be defined as a set of system component institutions, that had the MAG as their foundation and that interacted among themselves to obtain higher common objectives of technological development, utilizing financial and technical resources of the government to produce appropriate technologies for agricultural production and marketing.

By this definition, the institutional model implicitly involved the research and development organizations of the public sector and universities. The private agricultural sector was seen as the beneficiary or recipient of the development efforts of the government. The government formally assumed the responsibility for providing technical assistance, training and other related services.

Nevertheless, the intervention of the private producer sector has been and is very visible, particularly in agro-industrial businesses and in the marketing of agricultural inputs. Part of this not for profit effort has been carried out by producer associations with purely technical and social objectives. This technical effort was never incorporated into the national "system" in a deliberate and formal manner.

Based on the evidence that the organized producer sector could develop the organizational capacity for technological development, the MAG proposed that the RTTS Project be implemented to develop these capabilities. This would be accomplished via a process of gradual institutional development, utilizing technical assistance, training, equipment and operating funds, to execute technology validation and transfer programs.

3.2 RTTS Headquarters in MAG

The redesign of the RTTS Project recommended that the effort to incorporate the producer sector into the RTTS should be conducted from the MAG, the systems leading institution, in order that each participating organization be appropriately and securely affiliated. The RTTS Project should function as a strategy to assist the MAG in the execution of the entire effort.

The MAG, playing the support role of facilitator, should be the institutional home for the Project's activities and it should obtain the necessary institutional modifications required for smooth operation with the producer sector participating in the technological programs. At the time of the redesign, no evidence existed that suggested that the existing organization might not be adequate for the task. As a matter of fact, not only was the PROTECA Project being initiated to reestablish a national extension service within the MAG, but there also existed the political desire on the part of the administration to facilitate the creation of the necessary information channels and the collaborative work mechanisms.

During the first period of execution of the RTTS Project with the private producer sector (defined by the cooperative agreements between the MAG and the POs, 1986-1988), the MAG conducted important organizational and operational changes: It began the PROTECA Project and eliminated the Product Technical Bureaus. The PROTECA Project would work in zones called Polygons and have a multi-product focus, while the former technical bureaus had executed programs for all production zones, and had a single product focus. During the second period (1988-1990), also defined by signed cooperative agreements, the MAG had progressed somewhat in consolidating the extension focus in the polygons but continued to maintain, among others, the old programs of livestock, animal health, maize and oil seeds that are those programs related to the priority commodities of the RTTS Project.

In January, 1990, the Division of Extension and Technology Transfer was created but it wasn't until the end of the RTTS Project, when the furniture, equipment, and information of the RTTS became available, the Division become operational. This MAG division was created to serve as counterpart to the technological programs being carried out by the producer organizations of the RTTS Project.

4.0 PROJECT SPECIALIST - ACTIVITIES/ACCOMPLISHMENTS

4.1 Approach and Procedures

The major effort of the Project Specialist was to support activities directed toward the programming and the follow-up evaluation of the technological programs and institutional development of the participating producer organizations. In this effort, the focus of work was that of **support follow-up** which was problem-solving oriented; that is to say that during the his visits to the POs, not only were observations made with respect to the completion of activities related to the work program and anticipated goals, but also an attempt was made to examine opportunities and existing difficulties, with the view to make constructive recommendations and arrange solutions. For any given problem, the follow-up activity was not only to observe and record the fact, but also to make an effort to assist the POs in finding a viable solution. Although conceptually different, Project follow-up and administration have a tendency to unite when a problem or critical management opportunity presents itself.

This type of focus proved to be quite acceptable and useful. The possible use of more time in the follow-up activity was more than compensated for by the greater credibility and acceptance of the opinions and suggestions made by the Project Specialist.

This focus of the follow-up activities is quite different from the type of supervision that is generally practiced in the public sector, and usually not compatible with the circumstances of the producer sector. In technological programs administered by the producers, methodological rigor is not as crucial and a portion of the precision is sacrificed for the gains in the quantity of information and time.

4.2 Bench Mark Studies - Baseline Information

At the beginning of the RTTS Project, in order to assist MAG define priority commodities and geographic zones that would be covered by the RTTS Project, the Project Specialist conducted a brief study of priorities. Likewise, to sustain the participation of the organized producer sector as executor of the technological programs of the Project, the Specialist, together with the Chief of Party at that time, wrote a Project Strategy Document.

During the design phase of the subprojects, the Specialist conducted several base line studies on the technical and institutional situation for the commodities, where sufficient information did not exist, that had been selected for technological development through the Project. These commodities were: soybean, maize, coastal livestock and tropical fruits. All but the tropical fruit commodity group were eventually financed under the project.

4.3 Design of the Subprojects

The Project Specialist participated as a member of the design teams for the three subprojects designed by the University of Florida i.e. the Short Cycle Crop Improvement, Improvement of Production and Marketing of Coastal Beef Cattle, and finally, a Post Harvest Development Subproject for Vegetables (not financed and; therefore, not implemented.)

In the subprojects designed by Utah State University, the Project Specialist participated in the review and editing of the project documents, likewise in the analysis of expected social impact and the preparation of the terms of reference for the financial analysis of the documents.

4.4 Preparation of Work Programs

For the purpose of discussing the operational strategy and the global objectives and goals of each subproject, the Project Specialist designed and led a series of seminars for the benefit of subproject administrators and technical advisors, with the participation of delegates from MAG and USAID/Ecuador.

Prior to the preparation of the initial specific work programs of each subproject, the Project Specialist conducted meetings with the POs to discuss objectives/activities and presentation formats. Later he supported the long term advisors from the University of Florida in the preparation of work programs for the MEGALIT and Short Cycle Improvement Subprojects.

For the initiation of the second part of the Project Implementation in mid-1988, the Project Specialist conducted a seminar-workshop on the preparation of technological development programs, directed to administrative leaders and subproject linked technicians working with participating producer organizations. Each administrator/technician team of each PO prepared their own work program, with a little input from the international advisors. These programs were fine tuned and/or completed in later visits by the Project Specialist to each PO.

The bi-annual approval process for the subproject work programs at the MAG and USAID level, both technical and financial (PL-480 funding), were supported by the Project Specialist. This was accomplished by providing complementary information during review meetings.

4.5 Technology Validation and Dissemination

The activities of the Project Specialist in this management component supported program design, training, and program implementation follow-up. Details

of these activities are reported in Sections 4.4, 4.6, and 4.9. Nevertheless, this section has been inserted to highlight and summarize a methodological difficulty encountered in field work.

Of the different sequential phases of the technological development process, selection/validation and the dissemination of technologies were emphasized by the Project. Both phases are conducted in producer fields. Methodologically, the design of the technology verification trials and demonstration plots should systematically take into consideration two basic design elements: the climatologic and socioeconomic circumstances of the producer and farm, and the level at which the sites represent the recommendation domain (that group of producers to whom the technology is directed.)

Without exception, and in some more than others, the subprojects did not achieve the effective utilization of these design elements. The Project Specialist conducted a seemly endless chain of discussions, communications, and made reading recommendations for the technicians, without ever completely achieving success.

4.6 Training

The formal training activities were, for the most part, the responsibility of the Training Subproject. Nevertheless, the Project Specialist conducted several formal training activities (as mentioned previously in Section 4.4) and also informal and in-service training. This last type of training was very time consuming.

At the PO level, the Project Specialist used his visits to address topics of programming, administration of scarce resources, design of field trials or technology dissemination. In the institutional development component (organization, operation, income generation), an important effort was assigned to both formal and informal meetings to transmit basic elements that helped the decision making process within the POs. At the MAG level and RTTS in general, the overall focus of the RTTS Project was constantly emphasized. With each change of administration, of which there were many, significant time was allocated to familiarize new participants with the focus and basic concepts of the Project.

4.7 Institution Building

In the first part of Project implementation, the effort of the Project Specialist was concentrated on supporting the development of the capacity of the POs to design and execute technological programs, with informal strengthening of the PO's institutional base. This was how it was anticipated in the design of the subprojects: an implicit supposition that institutional development should come about as a consequence of the execution of the technological development program, in other words, an organizational and operational development process should occur in the

POs in order for the technological programs to occur. As such, institutional development should be seen to occur as the project progressed and a specific program for this activity component was not viewed as necessary. The Project Specialist participated in numerous meetings and work discussions, not only at the PO level but also at the level of MAG/USAID, and took the role of promotor of the recommendations.

During the second part of Project execution, the objective of institutional development received priority attention from the USAID Mission. Firstly, because the technological objective had been the focus during the initial part of the life of the Project and secondly, because experience had shown that the first supposition or assumption had been entirely correct. Each PO had achieved a different degree of development, and the programming factor had influenced this without a doubt. It is evident that there were other factors that impacted negatively on the institutional development component and that these were not necessarily under the control of the Project. For example, the leadership factor was a determining factor in the success of the execution of the technological programs. If a determined level of leadership was not present in the PO directorate and administration, the program did not achieve expected levels of success (this was the case in the program of APROCICO since with the change in manager, an unanticipated weakening occurred.)

The principal barrier that confronted the Specialist and the Project was the small amount or lack of knowledge of institutional processes existing within the technological sphere. The institutional development process that was looked for, and for which two and then four years were given, turned out to be both a complex and a long process, in which there can not be substitutions of time for capital and during which steps or stages cannot be skipped.

During the phase to establish the organization of the Project, the Project Specialist had to help the long term technical advisors and the PO administrative team for each subproject, in organizational and operational planning, in the distribution of responsibilities and in the determination of appropriate operating procedures. To accomplish this, the Project Specialist conducted working meetings and a seminar.

Another area of institutional development, which was a priority during the second part of project implementation, was the strengthening and creation of the so-called income generation services, conceived as a mechanism that the POs should develop to promote the use of the introduced technologies by way of services paid for by the producers. A parallel objective of these services was the generation of income, with any surplus after expenses being used to increase the financial counterpart contribution of the PO. This concept was extended to the marketing services, not only agricultural inputs (PO operated input stores) but also commodity

production marketing. All of the subprojects tried to develop the capacity of income generation, particularly the Sheep Improvement and MEGALIT Subprojects.

The Project Specialist collaborated in assisting the POs develop income generation efforts by helping them in the identification and preparation of income generating services at the concept level; by editing proposal documents to procure additional funding; and by editing terms of reference for specialists that were contracted to prepared study-proposals for different services for the POs and, ultimately, were used to create PO operated enterprises.

4.8 Coordination and Linkages

The Project Specialist dedicated a tremendous effort to the development of project coordination and the establishment of appropriate institutional linkages. Very good results were obtained with respect to the objective of technological development and with varying degrees of success in terms of the objective of institutionalization.

In the first instance, the subprojects achieved an acceptable and progressive degree of communication and articulation with INIAP (with the exception of the Sheep Subproject, since INIAP does not work with this item). In the case of the APROCICO Subproject, the signing of a collaborative agreement was achieved for research and field trials, including technical training. Final results were collected and reported in the form of joint extension publications. The Dairy Improvement and MEGALIT Subprojects established some collaborative bonds, also. FUNDAGRO played a supporting role in the case of the Dairy Improvement Subproject.

In the same technological area, effort was made to articulate the subprojects with PROTECA. This effort was addressed with both the original governmental administration and also the new elected administration that came to power in 1988. Results obtained depended more on the response of individual technicians than on the institution.

In the institutional area, criteria and procedures were discussed with PROTECA to coordinate and develop formal linkages between the two Projects. The Project Specialist prepared a linkage document that was approved, but due to administrative changes within PROTECA, was never implemented.

With MAG in general, the effort to coordinate was constant. It began with the designation of counterpart contributions of MAG (technicians and vehicles) and continued with the establishment of information flows and collaborative follow-up evaluation and support work. In the latter, the results in terms of institutionalization were not satisfactory. During the Project execution period, the "representation" of MAG or the institutional home of the RTTS Project changed hands four times and at the same time, five administrations (four Minister of Agriculture) and two

restructurings of MAG, with its resulting change in technical assistance focus, occurred. All of this impeded the establishment of stability and continuity in the effort to achieve articulation between the public and private sectors. Fortunately, at the end of the Project, based on the availability of equipment and furniture that the Project left, MAG organized and put into operation the Division of Agricultural Extension and Technology Transfer, created in January, 1990 to serve as counterpart of the RTTS Project and other projects that operate with external funding and that are related to technology transfer.

An important barrier to the coordination and creation of linkages between the public sector and the private producer sector was the chronic lack of counterpart technicians from MAG. All of the subproject suffered personnel attrition that was not replaced by MAG. Obviously, it was not possible to achieve the anticipated expansion in geographic coverage by the programs after developing technologies and dissemination procedures during the first two years of project execution. With regard to this, the Project Specialist made numerous requests to the Offices of Livestock and Animal Health in the MAG, and to PROTECA, with little success. In the last instance, a system to share technicians was agreed to, which in the end, gave PROTECA access to the available technologies in the RTTS Project. The lack of vehicles made this arrangement non-functional.

4.9 Project Implementation Follow-up

Two areas were emphasized in this activity: a) insure that information on subproject progress, problems and opportunities was collected, analyzed, and reported to the Project's sponsoring and administrative institutions; b) support project execution by way of the identification of opportunities and problems, discuss courses of action and procure the implementation of these courses.

Follow-up activity utilized the following inquiry and information gathering mechanisms:

- . Field visits to observe execution of project activities (technology validation trials and field days.)
- . Meetings with technical teams and with administrators to review program execution.
- . consultation with technicians and administrators of related institutions (ie., MAG, INIAP).
- . Regular review of subproject related documents (collaborative agreements, work programs, activity reports and financial reports).

These follow-up activities were carried out in a regular manner, requiring that each subproject be visited at least once each quarter. The Project Specialist reported

each quarter through the RTTS Project Quarterly Report, which was sent by the Chief of Party to MAG, USAID/Ecuador and the University of Florida.

The quarterly report, in a succinct manner, described and analyzed the progress achieved in each subproject, with relation to the work program and established goals. The problems that impeded expected progress and actions taken or which should have been taken to reach an adequate solution were carefully reported. When pertinent, any follow-up and support actions that should be taken by the sponsoring institutions during the next quarter were indicated. When possible, the report emphasized important technological and institutional achievements.

The regular information on subproject progress with regard to implementation and results was useful to catalyze the disbursements of PL-480 funds, improve compliance with statutory procedures with the POs and achieve more agile response and with a greater knowledge of cause, to the requests and requirements of the administrating institutions. The principal bottle necks of the subprojects were identified and resolved for the greatest part, via this follow-up (technical difficulties, delays in acquisitions, lack of personnel, etc.).

4.10 Information Dissemination

The principal method of information dissemination for the Project was the preparation of quarterly reports. As was indicated earlier, the Project Specialist's follow-up activities culminated with a quarterly progress and situation report on implementation of the various subprojects, which was also written by the Chief of Party, in the part referred to as administration.

To support the dissemination of the technical information of the subprojects, 2,000 copies of a Publications Catalog of the RTTS Project was prepared. This was distributed to libraries, universities, development institutions, communication media and the technical and agricultural producer communities.

For a similar purpose, the subproject technicians were helped in the creation and editing of extension publication on the various technologies relevant to the subprojects and also press released on subproject activities and important results were encouraged.

4.11 Other Activities (Support of Work Plans)

Financial Management: (i) Support the Project Administrative Unit and the administrative and accounting offices of the participating POs. (ii) Support special examinations of project funds, sponsored by USAID/Ecuador and the external financial audit of the PL-480 funds, carried out at the request of MAG by the Comptroller General of Ecuador.

Administration: Several times left in charge of the University of Florida Technical Mission, during periods of travel and vacation of the Chief of Party. Supervised the management of inventory of the property of the Administrative Unit and of the subprojects.

Close-out of the RTTS Project: Left in-charge of the formal close-out of the RTTS Project after the departure of the Chief of Party on 10 August 1990.

4.12 Important Problems

Particularly during the first half of project implementation in the MAG, there existed a chronic problem of delays in disbursement of PL-480 funds. This event impeded the implementation of programmed field activities. The Project Specialist constantly served as liaison between the POs and the PL-480 Council and also did follow-up evaluations on the disbursements.

The lack of compliance on the part of MAG on the counterpart contribution, above all the assignment of technicians and vehicles, was continuous. A part from impacting on the volume of work in the existing work areas, it hindered the projected expansion of geographic coverage during the second phase of Project implementation.

Lack of stability in the institutional structure and above all the administration of the MAG.

The livestock and animal health programs, that should have been the principal counterpart of the three livestock oriented subprojects, transferred human resources to PROTECA, without attending to the contractual obligations of MAG with regard to staffing the POs.

Because of the above, the goal of articulating the MAG to the participating POs was not properly achieved. MAG confined itself to approving work programs, the contracting of technical assistance, training activities and purchases. In the end, the RTTS Project succeeded in getting the MAG to initiate steps to solved the problem of not providing an effective counterpart, when in January, 1990, the Division of Agricultural Extension and Technology Transfer was created.

5.0 RELEVANT EXPERIENCES

- Regarding the Project Design:

i) The period of implementation and the anticipated times to achieve the objectives and goals were very short given the process of evolution, change and growth of the participating organizations.

The institutional development as a function of technological development turned out to be a complex and long process, in which there was no substituting time for capital, and in which steps or stages could be bypassed.

ii) The factors most incidental to the institutional development process should have been incorporated in the objective function of the project. For example, if the institutional development function is:

Institutional
Development = f (organization, procedures, financial resources, human resources, program, leadership, ...)

The leadership factor should be manipulated or should exist at the beginning at a minimum stable level, that guarantees that the other factors can demonstrate their impact. On the contrary, the limiting factor can act as the shortest stave of Liebig's barrel, in which the levels of effort through the other factors do not increase the level of product, in this case institutional development.

- **Regarding the Self-sustainability of Management**

i) Consistent with the definition in Section 2.2, the realistic goal planned for the process of institutional development, is technical-administrative self-determination, with an adequate level of financial counterpart.

This aspiration is consistent with the fact that all of the public sector agencies and members of the non producer private sector, conducting technological development activities, receive financial support from both the Government and from external donors.

If the POs accomplish the development of management capabilities that allows them to become formally attached to the RTTS, without profit motivation and with social objectives (ie, attention to the small producer), they merit consideration as members of the development community and consideration as viable economic assistance recipients.

ii) Self determination should not be construed as a self financing capacity. To do so signifies to solicit a transfer of resources between producers, by way of a subsidy of the large producers to the small producers. In an economy such as that in Ecuador, this presumption is not realistic.

- **Regarding the Work Plan**

The focus of "bottom up" that was tried to be applied, by which the producer assumes a total decision power regarding the technological program, proved to be very acceptable by the POs and above all, efficient. It is clear that those who suffer the problem and assume the risks of investment in the technological solutions, are those that are most qualified to intervene in the analyses and decisions.

- **Regarding the Relation between the Public and Private Sectors**

A higher objective of the RTTS Project was to institutionalize a work relation between the public agricultural sector and the private producer sector, that would allow the existence of effective channels of information and efficient mechanisms of collaborative work, both at the political and planning level and also at operational levels, especially the field.

The establishment of these articulation activities between the sectors confronted the rigidity of existing institutional operations, in which each institution looked for its own objectives, with little programmatic flexibility to incorporate the concept of activities of shared responsibility.

The experience showed that this rigidity was greater in the public sector and is well summarized in the following:

- i) The technocratic focus that functions in relations with farmers puts a barrier in front of communication flows with POs. The technician tends to tell the farmer what to do, without testing the consensus, necessary for things to happen.
- ii) Management within institutions usually is conducted by areas of discipline, resources or problem, through programs or departments. In their turn in these instances, management is conducted by persons responsible for the activity.

In several cases in MAG, individuals weakened the notion of institutional objective and even program objective and substituted this with personal professional objective. For this reason, the programs of the Project encountered difficulties in articulation with MAG programs, up to the point that several requests made by the POs to obtain action from MAG to facilitate a course of action or activity of the PO, were delayed or not attended to.

iii) The differences of perception between both sectors hindered collaborative work and stable and established communications: a) The aversion to risk (in technical investment in agriculture) is greater or only exists in the private sector, in that it is the farmer that makes incurs the expense. b) The opportunity cost of the farmers' time seems greater than in the time of the technicians, since the public sector takes more time for similar activities such as programming for example, which is perhaps explained by a closer following of methodological rigor. The private producer sector, on the other hand, is concerned more for the execution and results, demonstrating a disposition to sacrifice precision in exchange for quantity of information for making decisions.

Annex C

ECUADOR

PROYECTO DE SISTEMA DE TRANSFERENCIA DE TECNOLOGIA

PROYECTO DE USAID No. 518-0032

INFORME DE FIN DEL TRABAJO

ROMULO SOLIZ, ESPECIALISTA DE PROYECTOS

**Office of International Programs
Instituto de Ciencias Agricolas y Alimenticias
Universidad de Florida
Gainesville, Florida 32611**

Diciembre, 1990

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SIGLAS UTILIZADAS

AGL	Asociación de Ganaderos del Litoral
AGSO	Asociación de Ganaderos de la Sierra y oriente
ANCO	Asociación Nacional de Criadores de Ovejas
APROCICO	Asociación de Productores de Cultivos de Ciclo Corto
CONACYT	Consejo Nacional de Ciencia y Tecnología
ESPOCH	Escuela Politécnica del Chimborazo
FUNDAGRO	Fundación de desarrollo Agropecuario
INIAP	Instituto Nacional de Investigaciones Agropecuarias
MAG	Ministerio de Agricultura y Ganadería
MEGALIT	Mejoramiento de la Ganadería en el Litoral
OPs	Organizaciones de Productores
PL-480	Ley Pública 480
STTR	Sistema de Transferencia de Tecnología Rural
USAID	Agencia para el Desarrollo Internacional de EUA
USU	Universidad del Estado de Utah

ECUADOR

PROYECTO DE SISTEMA DE TRANSFERENCIA DE TECNOLOGIA - STTR

PROYECTO DE USAID No. 518-0032

INFORME DE FIN DEL TRABAJO

ROMULO SOLIZ, ESPECIALISTA DE PROYECTOS

1.0 INTRODUCCION

Este reporte resume las actividades realizadas y los resultados obtenidos por el Especialista del Proyecto en relación con sus términos de referencia (período 1985 a 1990). Los resultados obtenidos por el Proyecto Sistema de Transferencia de Tecnología Rural (STTR) en relación con sus objetivos y metas se resumen en el Reporte Final del Proyecto STTR.

Según el Documento del Proyecto STTR, los Términos de Referencia del Especialista del Proyecto fueron:

- a) Trabajar estrechamente con el personal del Ministerio de Agricultura y Ganadería (MAG), las organizaciones de productores y las instituciones Título XII, en el desarrollo de los subproyectos. En este aspecto, la USAID proporcionará guías, conforme se requieran, para asegurar la calidad y aceptabilidad de la USAID a los programas de trabajo.
- b) Conducir actividades de seguimiento en cada uno de los diferentes subproyectos, para determinar el progreso, ayudar a definir problemas e identificar soluciones.
- c) Participar activamente en las actividades de evaluación de los subproyectos y reportar al Jefe de Equipo sobre los resultados y recomendaciones de tales evaluaciones.
- d) Asistir a los subproyectos en el análisis y reporte del nivel de adopción de tecnología por parte de los miembros de las organizaciones de productores, particularmente de los pequeños y medianos productores.

e) Asistir al MAG en el desarrollo de los procedimientos y canales de información para institucionalizar el concepto del STTR, de trabajar con las organizaciones de productores dentro de la organización del MAG.

f) Proporcionar adiestramiento y apoyo a los subproyectos en el área de economía agrícola, siempre que sea posible y cuando las responsabilidades primarias no sean afectadas adversamente. (Esta actividad profesional dependerá de la cantidad de apoyo administrativo que sea proporcionado por el MAG a la Unidad Administrativa del Proyecto).

"El Especialista del Proyecto asignará la mayor parte de su tiempo a las actividades listadas. Sin embargo, debido a la naturaleza del proyecto STTR, **se requiere considerable apoyo administrativo y adiestramiento** mientras las organizaciones participantes desarrollan conocimientos para automanejarse. La posición del Especialista del Proyecto está bajo la supervisión del Jefe de Equipo."

2.0 EL PROYECTO

2.1 EJECUTORES Y FASES DE IMPLEMENTACION

El auspicio financiero del Proyecto fue del Gobierno de los Estados Unidos, a través de la USAID, con fondos de donación y de préstamo (las cifras se reportan en el Reporte del Proyecto). La donación incluyó dólares, mayormente para asistencia técnica y entrenamiento internacionales, y sucres PL-480 para gastos de operación.

La asistencia técnica y administración para la ejecución del Proyecto estuvo a cargo de la Universidad de Florida, a través del Contrato 518-0032-C-00-9025-00. La Unidad Administrativa para la ejecución del Proyecto fue responsabilidad de la Misión de Cooperación Técnica de la Universidad de Florida, ubicada en la sede de la institución nacional ejecutora del Proyecto.

Si bien el Convenio de Gobierno a Gobierno para la ejecución del Proyecto se firmó a mediados de 1980, la ejecución del mismo se inició a mediados de 1981, con la selección de la Universidad de Florida como fuente de la asistencia técnica requerida.

Durante el período agosto de 1981 a septiembre de 1984, la institución nacional ejecutora del Proyecto fue el Consejo Nacional de Ciencia y Tecnología (CONACYT), un organismo asesor, coordinador y planificador, adscrito a la Vice- Presidencia de la República. En esta fase, el Proyecto STTR operó con doce subproyectos, ejecutados por siete instituciones de investigación y desarrollo del sector público. En esa fase, el propósito del Proyecto se procuró a través del esfuerzo del sector público.

Durante el período de octubre de 1984 a septiembre de 1990, el Proyecto pasó a ejecutarse en el Ministerio de Agricultura y Ganadería (MAG). Hasta fines de 1985

se cubrió una fase de rediseño del Proyecto. Hasta marzo de 1986 se cubrió la etapa de diseño de los subproyectos nuevos. Considerando la etapa de formulación de los programas de trabajo de cada subproyecto y zona y la contratación de la asistencia técnica de largo plazo requerida, el período de ejecución de las actividades de campo cubre cuatro años, hasta agosto de 1990. Es sobre esta segunda fase a la que se refiere el reporte que sigue.

2.2 PROPOSITO Y OBJETIVOS

El propósito del Proyecto "Sistema de Transferencia de Tecnología Rural" - STTR, fue promover el desarrollo agropecuario principalmente en el área tecnológica, con el fin de aumentar la producción e ingresos agrícolas, a través de mejoras tanto en los rendimientos de los productos como en las condiciones de organización y de comercialización del sector.

Este propósito se procuró a través de dos objetivos superiores, a saber:

- **Objetivo Institucional:** Fortalecer el Sistema Nacional de Transferencia de Tecnología Rural, a través de la participación activa y efectiva de los productores agropecuarios en el proceso de desarrollo tecnológico, en las fases de validación y difusión tecnológicas.

En lo conceptual, este objetivo tuvo dos implicaciones:

a) Procuró la modificación del modelo tradicional de desarrollo tecnológico, por el cual se intentó incorporar al Sistema, de manera formal, un nuevo brazo ejecutor de los programas y proyectos tecnológicos. Así, el agricultor pasa de jugar un papel pasivo, de recipiente del esfuerzo gubernamental, a uno de participación activa, con "voz y voto", asumiendo mayor responsabilidad sobre el destino del agro.

b) Procuró instrumentar el "enfoque de sistemas agrícolas", o enfoque de desarrollo de "abajo hacia arriba", en el que la participación real y efectiva del agricultor es un componente crucial del rigor metodológico.

En lo programático, el logro de este objetivo implicó desarrollar e institucionalizar una capacidad irreversible de "autogestión para el desarrollo tecnológico" a nivel de los agricultores, lo cual contiene implicaciones a nivel de la estrategia, que se discuten más adelante, y en la definición de metas.

La meta de autogestión se circunscribió al ámbito técnico/administrativo y no al financiero, aunque en éste se procuró un progresivo incremento de la contraparte presupuestaria (actividades generadoras de ingresos). La autogestión se definió en términos de la capacidad que se requiere desarrollar en las organizaciones

participantes para que constituyan organismos del sistema de desarrollo tecnológico agropecuario.

- **Objetivo Tecnológico:** Contribuir con el proceso de desarrollo tecnológico agrícola y pecuario del país, en las fases de producción y de comercialización, en productos y zonas de alta prioridad del país.

Este objetivo tuvo las siguientes implicaciones:

a) En lo metodológico, contribuyó a desarrollar y/o a probar procedimientos nuevos de trabajo de campo, en las fases de validación y difusión tecnológicas.

b) En lo operativo, en virtud de que el objetivo tecnológico estuvo en función del objetivo institucional, las prioridades de productos y de zonas no se revisaron durante la ejecución del proyecto (no así las referidas a los problemas u oportunidades de desarrollo tecnológico en cada producto-zona, que fueron cambiadas con cada programa de trabajo).

2.3 COMPONENTES DE ACTIVIDAD DEL PROYECTO

Por el lado del aporte externo, dos fueron los componentes de actividad más importantes: **asistencia técnica** de largo y corto plazos, y **capacitación técnica** tanto formal como en servicio. El Reporte Final del Proyecto detalla los niveles y tipos de esfuerzo realizados en estas actividades, las que fueron conducidas primariamente por técnicos de las Universidades de Florida y del Estado de Utah (subcontratista).

Por el lado de los Programas de Trabajo de cada subproyecto, los componentes de actividad se resumen en cinco categorías: Desarrollo organizacional y equipamiento, selección y validación de tecnologías, difusión de tecnologías, comercialización y capacitación técnica.

Los términos de referencia del Especialista del Proyecto tienen que ver con todos los componentes de actividad establecidos, en las áreas de apoyo y coordinación para la implementación y de seguimiento y evaluación de la ejecución y resultados.

2.4 ESTRATEGIA DE EJECUCION

El objetivo de tipo institucional del proyecto determinó el principal elemento de estrategia: Que los programas y actividades del proyecto se ejecuten a través de **organizaciones de productores agropecuarios, OPs**, que constituyeron el sujeto de la institucionalización de la capacidad de autogestión, mediante un enfoque de trabajo colaborativo con el MAG y articulado a varias instituciones del sistema.

El término **institucionalización** implica un proceso de cambio irreversible en las organizaciones de productores (instituciones), asociado principalmente a los factores de organización y de manejo y dotación de recursos, que asegure una capacidad de gestión estable en el tiempo. Un factor que influyó en la institucionalización, pero que fue exógeno (no controlable) a las acciones del proyecto, fue el liderazgo, que aparte de ser un recurso escaso se cambia cada año con los Directorios de las instituciones.

El término **autogestión**, en el contexto del proyecto, significa una capacidad de las organizaciones de productores para ejecutar los programas tecnológicos bajo similar arreglo de interacciones institucionales y flujos de apoyo que los que caracterizan a otras organizaciones de desarrollo tecnológico en el país.

Así, las organizaciones de productores se insertan en el Sistema Nacional de Transferencia de Tecnología, mediante la ejecución de programas de prueba y difusión tecnológicas, a través de una capacidad propia para:

- identificar problemas y oportunidades tecnológicas de su sector de producción (demanda tecnológica)
- definir prioridades y formular programas de prueba y difusión tecnológicas (oferta tecnológica)
- interactuar e interrelacionar sus actividades con otros componentes institucionales del sistema de desarrollo tecnológico: (i) con instituciones ejecutoras como el MAG y el INIAP, (ii) con coordinadoras y de apoyo como FUNDAGRO, y (iii) con organismos internacionales de apoyo (vía capacitación, asistencia técnica y financiamiento).

Puesto de otra forma, este elemento de estrategia propuso un trabajo conjunto del sector público agropecuario (MAG, INIAP, etc.) con el sector productor agropecuario (asociaciones y cooperativas de productores), con el primero jugando un papel facilitador y de apoyo, y con el segundo desempeñando un papel ejecutor, dentro de un proceso de fortalecimiento de la capacidad institucional hacia la autogestión.

Este elemento de estrategia del proyecto se sustentó en el enfoque metodológico denominado de "sistemas" o de "abajo hacia arriba", en el cual la parte beneficiaria del producto del funcionamiento del sistema tiene que participar en el diseño y ejecución de los programas y actividades, para resolver de manera efectiva sus problemas y lograr sus metas (La racional de este enfoque está ampliamente documentado en diversas experiencias en el campo de la investigación agrícola).

En términos del proceso de desarrollo tecnológico agropecuario, caracterizado por las fases de i) generación, ii) validación (prueba y ajuste), iii) difusión (transferencia de tecnología o asistencia técnica y capacitación) y iv) adopción, la estrategia incorpora al agricultor a las fases de validación y de difusión tecnológicas, cambiando de su papel

pasivo previo, de mero recipiente o beneficiario del esfuerzo del Estado, y otorgándole un papel activo de responsabilidad ejecutora en el proceso tecnológico.

Por todo lo anterior, el Proyecto STTR se definió como un mecanismo de cambio y fortalecimiento del sector institucional de los productores, orientado al desarrollo tecnológico agropecuario, bajo el diseño de una nueva forma de trabajo articulado entre el sector público (papel facilitador) y el sector productor organizado (papel ejecutor).

2.5 INSTITUCIONES EJECUTORAS Y COBERTURA GEOGRAFICA

El Proyecto STTR lo ejecutó el MAG, como entidad rectora del desarrollo tecnológico agropecuario del país y columna vertebral del Sistema Nacional de Transferencia de Tecnología Rural, mediante el mecanismo de subproyectos que ejecutaron varias organizaciones de productores.

Por decisión de las administraciones de turno, el espacio institucional del Proyecto STTR en el MAG, desde el que se coordina y canaliza la toma de decisiones y la ejecución del Proyecto, se ubicó en varias dependencias sucesivamente, así: en la Asesoría de Educación y Extensión, la que al renunciar su titular prácticamente dejó de existir; en la Asesoría Económica y de Asuntos Internacionales; en el Proyecto de Desarrollo Tecnológico Agropecuario (PROTECA), que es un proyecto cuyo propósito es reinstalar en el MAG el servicio de extensión. Cada una de estas dependencias fue de alguna manera articulada a la Unidad Administrativa del Proyecto STTR, ubicada en las oficinas de la Misión de Cooperación Técnica de la Universidad de Florida, cuyas funciones centrales fueron canalizar la asistencia técnica internacional y la capacitación requeridas y realizar el seguimiento y apoyo a la ejecución de los subproyectos.

Durante los dos últimos años, la Representación del MAG ante el Proyecto STTR fue ejercida directamente por el Ministro, con alguna injerencia al final del Director Ejecutivo del PROTECA.

En los casos en que el poder de decisión del MAG respecto al STTR se encontró en una instancia asesora, la articulación a nivel ejecutor/campo se procuró a través de las direcciones y programas ejecutores, a fin de establecer flujos de información y relaciones de trabajo colaborativo estables. Cuando el nivel de decisión estuvo en el PROTECA, se intentó el trabajo colaborativo y articulación de programas a nivel de campo con los técnicos de los "polígonos" de trabajo del PROTECA; a nivel central se intentó coordinar el seguimiento de las actividades y la programación conjunta de actividades de capacitación técnica.

En cuanto a los subproyectos, estos fueron ejecutados por los propios productores a través de las organizaciones participantes, mediante convenios individuales con el

MAG, bajo un esquema de absoluta independencia administrativa y responsabilidad técnica. Mediante estos convenios, el MAG asignó técnicos de contraparte y fondos para la operación de los programas tecnológicos de los subproyectos. Las OPs, por su lado, asignaron la base institucional requerida (oficinas, personal administrativo ejecutivo y de apoyo y fondos de contraparte, en diferentes proporciones, según el caso). Con el fin de obtener los recursos requeridos para mantener y expandir la cobertura de los programas, el Proyecto STTR formuló un conjunto de criterios sobre organización y procedimientos a seguirse durante la ejecución.

Las organizaciones de agricultores participantes, ejecutoras de los subproyectos, fueron las siguientes:

(i) **Subproyecto de Fomento Lechero.** Fue ejecutado casi exclusivamente por la Asociación de Ganaderos de la Sierra y el Oriente - AGSO, pues la Asociación Holstein Frisian, según lo previsto, participó de manera muy reducida y puntual, en actividades que corresponden a su objetivo institucional.

Según se previó en los Programas de Trabajo, en el período marzo 1986 - agosto 1988 el subproyecto cubrió las provincias de Carchi, Imbabura, Pichincha y Cotopaxi; en el período octubre 1988 - agosto 1990, el subproyecto se expandió a otras zonas lecheras en la provincia de Tungurahua y en la zona de Baeza. La expansión a otras zonas fue limitada por la disponibilidad de recursos, principalmente de técnicos extensionistas y vehículos.

(ii) **Subproyecto de Mejoramiento Ovino.** Fue ejecutado por la Asociación Nacional de Criadores de Ovejas - ANCO, en varias zonas, principalmente de páramo, de las provincias de Carchi, Imbabura, Pichincha, Cotopaxi y Chimborazo. Al final de los primeros dos años expandió la cobertura a las provincias del sur de la Sierra, gracias a que contó con ocho técnicos voluntarios del Cuerpo de Paz (sin vehículo). Sin embargo, para cubrir adecuadamente el sur del país, ANCO requerirá de técnicos calificados y vehículos del MAG.

Mediante convenio de ANCO con la Escuela Politécnica del Chimborazo (ESPOCH), esta última institución durante los dos últimos años se incorporó a la ejecución del componente de desarrollo y validación de tecnología, particularmente en el áreas de la nutrición con pastos.

(iii) **Subproyecto de Mejoramiento de Cultivos de Ciclo Corto (Maíz duro, soya y arroz).** Fue ejecutado por la Asociación de Productores de Cultivos de Ciclo Corto - APROCICO, en la zona de influencia de los cantones Quevedo y El Empalme, de la Provincia de Los Ríos.

Inicialmente la cobertura geográfica incluyó el cantón Balzar de la provincia del Guayas, zona que fue excluida por dificultades organizativas de los productores colaboradores de la asociación local de productores y del técnico asignado.

Posteriormente se solicitó sin éxito la designación de dos técnicos del PROTECA, con el fin de expandir la cobertura geográfica e incrementar el volumen de actividades. Al final, solo un técnico del MAG/Programa del Arroz trabajó con APROCICO; los demás técnicos fueron contratados por APROCICO.

En cuanto a la cobertura de cultivos, en el año agrícola 1988-1989 el programa ejecutó algunas actividades en sorgo y en maíz blanco, éste último bajo auspicio de Molinos Poultier. Además, APROCICO tramitó ante el MAG modificaciones a sus estatutos que le permitan incorporar a su mandato social cultivos perennes de la zona, como café, palma africana y banano.

(iv) **Subproyecto de Mejoramiento de la Producción y Comercialización de Ganado Bovino en el Litoral - MEGALIT.** Se ejecutó en las zonas de influencia geográfica de cada una de las organizaciones de ganaderos participantes, ubicadas en las provincias del Guayas, El Oro, Manabí y Pichincha (parte baja), que son las siguientes:

Asociación de Ganaderos del Litoral - AGL (líder)
Asociación de Ganaderos "17 de Abril" de El Empalme
Asociación de Ganaderos de Arenillas
Asociación de Ganaderos de Los Bancos
Asociación de Ganaderos de Pedro Vicente Maldonado
Asociación de Ganaderos de Sto. Domingo de los Colorados
Cooperativa Pecuaria de Chone
Asociación de Ganaderos de Los Ríos (En Quevedo)

A mediados de 1989, la Comisión Ejecutiva del MEGALIT ratificó la decisión de excluir del subproyecto a la Cooperativa Agrícola y Pecuaria Balzareña, debido básicamente a la persistencia de falta de gestión en la ejecución del programa de trabajo de su zona de influencia. Se resolvió dar trámite a una solicitud de la Asociación de Ganaderos de Los Ríos, con sede en Quevedo, que con anterioridad había expresado su interés por ingresar al MEGALIT. Al respecto, varias otras asociaciones de ganaderos (de Bahía, de El Carmen, de Quinindé, de Pichincha) expresaron su interés por ser parte del MEGALIT.

3.0 SITUACION INICIAL DEL SISTEMA

3.1 Situación inicial del STTR

El Sistema Nacional de Transferencia de Tecnología Rural (agropecuaria) en el país, conforme se visualiza en el Plan Nacional de Desarrollo de 1984-1988, podría definirse como un conjunto de instituciones componentes del sistema, que tienen como columna vertebral al MAG y que interactúan entre sí en procura de objetivos superiores comunes de desarrollo tecnológico, que utilizan recursos financieros y técnicos del

Estado y que producen tecnologías para la producción y comercialización agropecuarias.

En esta definición, el modelo institucional implícito involucra a los organismos de investigación y desarrollo del sector público y a las universidades. El sector privado agropecuario es visto como un beneficiario, recipiente de los esfuerzos de desarrollo del Estado. De manera formal, el Estado asume la responsabilidad de la provisión de la asistencia técnica y capacitación y demás servicios conexos.

No obstante, en varios rubros agrícolas la intervención del sector privado productor era y es muy visible, particularmente en las empresas agroindustriales y en las comercializadoras de insumos agrícolas. Parte de este esfuerzo era de asociaciones de productores, sin fines de lucro, con objetivos de tipo tecnológico y social. Al esfuerzo de este sector, el "sistema" no lo incorporaba de manera deliberada y formal.

Con base de la evidencia de que el sector productor organizado si puede desarrollar capacidades de organismo de desarrollo tecnológico, el MAG propuso que el proyecto STTR se ejecute para desarrollar esas capacidades, a través de un proceso de desarrollo institucional gradual, que utilizando asistencia técnica, capacitación, equipamiento y fondos de operación, ejecute programas de validación y transferencia de tecnología.

3.2 Organización de base del ejecutor

El rediseño del Proyecto STTR recomendó que el esfuerzo de incorporar al sector productor al STTR debía conducirse desde el MAG, como organismo rector del sistema, para que cada organización participante se incorpore debidamente y de manera estable. El Proyecto STTR debía funcionar como una forma de trabajo para ayudar al MAG en la ejecución de todo el esfuerzo.

El MAG debía ofrecer el espacio institucional (dependencia de contraparte y representación) para las actividades del Proyecto y procurar la adecuación institucional necesaria para un funcionamiento articulado con el sector productor ejecutor de los programas tecnológicos, jugando un papel facilitador y de apoyo. Entonces, no existía evidencia de que la organización existente no fuera la adecuada; se estaba iniciando el PROTECA (para reinstalar el servicio de extensión en el MAG) y existía la voluntad política de la administración por facilitar la creación de los flujos de información y mecanismos de trabajo colaborativo que fueran necesarios.

En el primer período de ejecución del Proyecto STTR con el sector productor privado (fijado por los convenios del MAG con las OPs, 1986-1988), el MAG condujo importantes cambios en su estructura y funcionamiento: Inició la ejecución del PROTECA y eliminó las Direcciones Técnicas. El primero trabaja en zonas ("polígonos"), con un enfoque de multiproducto; las segundas ejecutaban programas

para todas las zonas de producción, con un enfoque por producto. En el segundo período (1988-1990), igualmente fijado por los convenios suscritos, el MAG progresó un poco en la consolidación del enfoque de extensión en "polígonos", pero mantuvo entre otros a los antiguos programas de ganadería, de sanidad animal, de maíz y oleaginosas, que son los que tienen que ver con los productos que trabajó el Proyecto STTR.

En enero de 1990, se crea la División de Extensión y Transferencia Tecnológica, pero no es sino con la terminación del Proyecto STTR que se logra su organización y funcionamiento, lo cual fue posible utilizando los muebles, equipos e información del mismo Proyecto. Esta dependencia se creó para servir de contraparte de los programas tecnológicos que ejecutan los productores del STTR.

4.0 ACTIVIDADES Y RESULTADOS DEL ESPECIALISTA

4.1 Enfoque de trabajo del especialista

La mayor proporción del esfuerzo del Especialista del Proyecto correspondió a las actividades de apoyo a la programación y al seguimiento de la ejecución de los programas tecnológicos y de las actividades de desarrollo institucional en las organizaciones de productores participantes. En este esfuerzo, el enfoque de trabajo del Especialista fue de **seguimiento de apoyo**, orientado a resolver problemas; es decir que en las visitas a las OPs no solo se observó la realización de las actividades con relación al programa de trabajo y metas previstas, sino que se procuró examinar las oportunidades y dificultades existentes, con miras a recomendar mejoras e inclusive a instrumentar soluciones. Ante un problema, el seguimiento no solo observó y registró el hecho, sino que realizó esfuerzos para asistir a las OPs en la solución. Aunque conceptualmente diferentes, el seguimiento y la ejecución del Proyecto tendieron a unir sus acciones cuando un problema u oportunidad de gestión importante se presentó.

Este enfoque probó ser muy aceptado y útil. La posible utilización de mayor tiempo en la actividad de seguimiento, fue compensada con la mayor credibilidad y aceptación que adquirieron las opiniones y sugerencias del Especialista.

Este enfoque de seguimiento se diferencia del de tipo supervisión, que se aplica por lo general en el sector público, y que no resulta compatible con las circunstancias del sector productor. En los programas tecnológicos administrados por los productores, el rigor metodológico no es crucial: se sacrifica una medida de precisión a cambio de ganancias en la cantidad de información y tiempo.

4.2 Información de base (estudios)

Al inicio del Proyecto STTR, para apoyar la decisión del MAG sobre los productos y zonas que debía cubrir el Proyecto STTR, el Especialista del Proyecto condujo un

estudio breve de prioridades. Asimismo, para sustentar la participación del sector productor organizado como ejecutor de los programas tecnológicos del Proyecto, el Especialista del Proyecto, conjuntamente con el Jefe de Misión, escribió un documento de estrategia del Proyecto.

En la fase de diseño de los subproyectos, el Especialista del Proyecto condujo varios estudios de base sobre la situación tecnológica e institucional de varios productos que fueron seleccionados para el desarrollo tecnológico a través del Proyecto, para los que no existió suficiente información disponible. Estos productos fueron: Soya, maíz, ganadería en el litoral y frutas tropicales - sobre este último rubro no se logró financiar un programa.

4.3 Diseño de documentos de subproyectos

El Especialista del Proyecto participó como miembro de los equipos de diseño de tres subproyectos diseñados por la Universidad de Florida: El de Mejoramiento de Cultivos de Ciclo Corto, el de Mejoramiento de la Ganadería en el Litoral/MEGALIT, y el de Desarrollo Pos-cosecha de Hortalizas, que no se llegó a financiar y ejecutar.

En los subproyectos diseñados por la USU, el Especialista del Proyecto participó en la revisión y edición de los documentos de los subproyectos, así como en el análisis de impacto social esperado y en la formulación de los términos de referencia para su análisis financiero.

4.4 Formulación de programas de trabajo

Con el fin de acordar sobre la estrategia de funcionamiento de los subproyectos y sobre los objetivos y metas de tipo global en cada subproyecto, al inicio del Proyecto el Especialista diseñó y lideró la realización de un seminario para los administradores y técnicos asesores de los subproyectos, con la asistencia de delegados del MAG y de la USAID/Ecuador.

Previo a la formulación de los programas de trabajo iniciales y específicos de cada subproyecto, el Especialista del Proyecto mantuvo reuniones con las OPs para discutir objetivos/actividades y formatos de presentación. Posteriormente apoyó a los asesores de largo plazo de la Universidad de Florida en la formulación de los programas de trabajo de los subproyectos MEGALIT y de Cultivos de Ciclo Corto.

Para el inicio de la segunda parte de ejecución de Proyecto, a mediados de 1988, el Especialista del Proyecto condujo un seminario-taller sobre formulación de programas de desarrollo tecnológico, dirigido a los administradores líderes y a los técnicos de los subproyectos en las OPs participantes. Cada equipo administrador-técnico de cada OP formuló su propio programa de trabajo, con poco insumo de los asesores

internacionales. Estos programas fueron afinados y/o completados en visitas sucesivas del Especialista del Proyecto a cada OP.

El proceso de aprobación bi-anual de los programas de trabajo a nivel del MAG y de la USAID, tanto en la parte técnica como en la financiera (fondos PL-480), debió ser apoyado por el Especialista del proyecto, tanto proveyendo información complementaria como participando en reuniones de revisión.

4.5 Validación y difusión de tecnologías

Las actividades del Especialista del Proyecto en este ámbito de gestión se clasifican en tres áreas: apoyo al diseño, capacitación y seguimiento a la ejecución. Sobre las actividades en estas tres áreas se reporta principalmente en las secciones 4.4, 4.6 y 4.9. No obstante, se inserta esta sección para señalar en síntesis una dificultad metodológica que sufrió el trabajo de campo.

De las varias fases secuenciales del proceso de desarrollo tecnológico, la selección/validación y la difusión tecnológicas fueron las que el Proyecto cubrió. Ambas fases se ejecutan en los campos de agricultores. Metodológicamente, para que el trabajo redunde en éxito (tecnologías adoptadas de manera estable), el diseño de los ensayos de verificación de las tecnologías y las parcelas demostrativas, debía tomar en cuenta de manera sistemática, entre otros, dos elementos básicos del diseño: las circunstancias agroclimáticas y socioeconómicas del agricultor y su finca, y la representatividad de los sitios con respecto al dominio de recomendación (aquel grupo de agricultores a quienes va dirigida la tecnología).

Sin excepción, unos más que otros, los subproyectos no lograron el suficiente rigor en la utilización de estos elementos de diseño. El Especialista del Proyecto abundó en discusiones, comunicaciones y recomendación de lecturas a los técnicos, sin éxito completo en los resultados.

4.6 Capacitación

La actividad de capacitación formal estuvo mayormente a cargo de subproyecto de capacitación del Proyecto. Sin embargo, el Especialista del Proyecto realizó varias actividades de capacitación formal, como las ya indicadas en 4.4., y capacitación informal o en servicio.

Este último tipo de capacitación fue el que consumió más tiempo del Especialista del Proyecto. A nivel de las OPs se aprovechó las visitas para abordar temas de programación, administración de recursos escasos, diseño de ensayos de campo o de difusión tecnológica. En el ámbito del desarrollo institucional (organización, funcionamiento, generación de ingresos), se asignó un importante esfuerzo a reuniones formales e informales para transmitir elementos básicos que coadyuven con el proceso

de toma de decisiones en las OPs. A nivel del MAG y del STTR en general, se insistió bastante en la diseminación del enfoque del Proyecto STTR. Con cada cambio de administradores, que los hubo varios, se asignó tiempo importante a la familiarización de los técnicos con el enfoque y conceptos básicos del Proyecto.

4.7 Desarrollo institucional

En la primera parte de la ejecución del Proyecto, el esfuerzo del Especialista se concentró en apoyar el desarrollo de las capacidades de las OPs para diseñar y ejecutar los programas tecnológicos, con la base institucional en proceso de adecuación sin un programa específico. Así estaba previsto por el diseño de los subproyectos: un supuesto implícito de que el desarrollo institucional debía darse como consecuencia de la ejecución del programa de desarrollo tecnológico; en otras palabras, en las OPs debía darse un proceso de adecuación organizacional y funcional para que la ejecución de los programas tecnológicos ocurra. Así, las actividades de desarrollo institucional se debían ir detectando sobre la marcha y no se creyó necesario un programa específico para este componente de actividad. El Especialista del Proyecto participó en numerosas reuniones y discusiones de trabajo, tanto a nivel de las OPs como del MAG/USAID, y sirvió de agente impulsor de las recomendaciones.

Durante la segunda parte de la ejecución de Proyecto, el objetivo de desarrollo institucional recibió atención prioritaria de la Misión. Primero, porque durante la parte inicial de la ejecución del Proyecto se trabajó mayormente hacia el objetivo tecnológico. Segundo, porque la experiencia mostró que el aludido supuesto no fue del todo correcto. Cada OP realizó un grado diferente de desarrollo, en el que el factor programación a no dudarlo debió tener cierta influencia. Pero es evidente que hubo otros factores que incidieron en el desarrollo institucional y que no fueron controlados por el Proyecto. Así, por ejemplo, el factor liderazgo resultó determinante en el éxito de la ejecución de los programas tecnológicos. Si un nivel determinado de liderazgo no estaba presente en el Directorio y administración de las OPs, el programa no tenía éxito (fue el caso del programa de APROCICO, que con el cambio de gerente se debilitó a niveles insospechables).

La principal barrera que enfrentó el Especialista y el Proyecto mismo fue el poco conocimiento previo que se tuvo de los procesos institucionales en el ámbito tecnológico. El proceso de desarrollo institucional que se buscaba, y para el que se puso inicialmente un plazo de dos años que luego fueron ampliados a cuatro, resultó ser un proceso complejo y largo, en el que no hay sustituciones de tiempo por capital, y en el que no se pueden saltar pasos o etapas.

Durante la fase de establecimiento de la organización del Proyecto, el Especialista del Proyecto tuvo que asistir a los asesores de largo plazo y al equipo ejecutor en las OPs, en la planificación de la organización y funcionamiento de los subproyectos, en la

distribución de las responsabilidades y en la determinación de los procedimientos operativos. Para este fin, el Especialista condujo reuniones de trabajo y un seminario.

Otro campo del desarrollo institucional, que fue prioritario durante la segunda parte de la ejecución del proyecto, fue el fortalecimiento y creación de los llamados servicios generadores de ingresos, concebidos como un mecanismo que las OPs debían desarrollar para promover el uso de las tecnologías por medio de servicios pagados por los productores. Un objetivo paralelo de estos servicios, entonces, fue la generación de ingresos, cuyos excedentes debían servir para que las OPs incrementen su aporte financiero de contraparte. Este concepto se extendió a los servicios de comercialización, tanto de insumos (almacenes en las OPs) como de productos. Todos los subproyectos incursionaron en el desarrollo de esta capacidad generadora de ingresos, particularmente el de Mejoramiento Ovino y el MEGALIT.

En este quehacer, el Especialista del Proyecto colaboró en varios frentes: asistiendo a las OPs en la identificación y formulación a nivel de idea de algunos servicios generadores de ingresos; redactando documentos de propuesta de servicios en procura de financiamiento; y redactando los términos de referencia para los especialistas que formularon varias estudios-propuestas de servicios en las OPs y últimamente de empresas para las OPs.

4.8 Coordinación y enlaces

El Especialista del Proyecto asignó abundante esfuerzo a este campo de actividad, con muy buenos resultados en cuanto al objetivo de desarrollo tecnológico y con diverso grado de éxito en términos del objetivo de institucionalización.

En el primer caso, los subproyectos lograron un aceptable y progresivo grado de comunicación y articulación con el INIAP (con excepción del ovino, pues INIAP no trabaja en este rubro). En el caso del subproyecto de APROCICO, se logró la firma de un convenio colaborativo para la investigación y pruebas de campo, incluída la capacitación técnica. Los resultados terminaron inclusive con publicaciones divulgativas conjuntas. El subproyecto de Fomento Lechero y el MEGALIT establecieron algunos vínculos de colaboración, en el primer caso apoyados por FUNDAGRO.

En el mismo campo tecnológico, se realizó esfuerzos por articular los subproyectos con el PROTECA. Se trabajó con las dos administraciones de turno y los resultados obtenidos más se debieron a las respuestas individuales de los técnicos que a las de la institución.

En el campo institucional, con el PROTECA se discutieron y aprobaron criterios y procedimientos para la coordinación y enlace formal de los esfuerzos de los dos proyectos. El Especialista del Proyecto preparó un documento que fue aprobado, pero que por cambios administrativos en el PROTECA no llegó a instrumentarse.

Con el MAG en general, el esfuerzo de coordinación fue permanente. Se inició con la designación de la contraparte del MAG (técnicos y vehículos) y se continuó con el establecimiento de flujos de información y trabajo colaborativo de seguimiento y apoyo. En esto último, los resultados en términos de institucionalización no fueron satisfactorios. En el período de ejecución del Proyecto, la "representación del MAG" o el espacio institucional responsable del proyecto STTR cambió de dependencia cuatro veces; al mismo tiempo se interactuó con cinco administraciones (cuatro cambios de ministro) y dos reestructuraciones del MAG, con cambio de enfoque en la actividad de asistencia técnica. Todo esto impidió mantener estabilidad y continuidad en el esfuerzo de articular el sector público con el privado. Afortunadamente, al término del Proyecto, con base en la disponibilidad de equipos y muebles que dejó el Proyecto, se logró que el MAG organicara y haga funcionar la División de Extensión Agropecuaria y Transferencia de Tecnología, que fue creada en enero de 1990 para servir de contraparte del Proyecto STTR y de otros proyectos que operan con aporte externo y que tienen que ver con transferencia tecnológica.

Una barrera importante a la coordinación y creación de enlaces entre el sector público y el privado de los productores, fue la crónica insuficiencia de técnicos de contraparte del MAG. Todos los subproyectos sufrieron bajas que no fueron restituidas por el MAG. Obviamente, tampoco se pudo lograr la expansión prevista en la cobertura geográfica de los programas, luego de haber desarrollado tecnologías y procedimientos de difusión durante los dos primeros años de ejecución. Al respecto, el Especialista del Proyecto realizó innúmeras gestiones ante las Direcciones de Ganadería y de Sanidad Animal, y ante el PROTECA, con reducido éxito. Con esta última instancia se acordó un sistema de trabajo compartido de sus técnicos, que a la postre lo que procuraba era que el PROTECA tenga acceso a las tecnologías disponibles en el Proyecto STTR. La falta de vehículos hizo que este arreglo no funcione.

4.9 Seguimiento de la ejecución

Con esta actividad se cumplió básicamente dos funciones: a) asegurar que la información sobre el progreso del subproyecto, problemas y oportunidades, sea colectada, analizada y reportada a las instancias auspiciadoras y administrativas del proyecto; b) apoyar la ejecución mediante la identificación de oportunidades y problemas, discutir cursos de acción y procurar su instrumentación.

La actividad de seguimiento utilizó los siguientes mecanismos de consulta e información:

- Visitas de campo para observar la ejecución de las actividades (ensayos de validación tecnológica y días de campo).
- Reuniones con los equipos técnicos y con los administradores para revisar la ejecución de los programas.

- Consultas a técnicos y administradores de instituciones relacionadas (e.i. MAG e INIAP).
- Revisión regular de los documentos de los subproyectos (convenios, programas de trabajo, reportes de actividades y reportes financieros).

Estas actividades de seguimiento se cumplieron de manera regular, procurando visitar cada subproyecto por lo menos una vez cada trimestre. El Especialista del Proyecto reportó cada trimestre a través del Reporte Trimestral del Proyecto STTR, el mismo que fue enviado por el Jefe de Misión con la misma frecuencia al MAG, a la USAID/Ecuador y a la Universidad de Florida.

De manera sucinta, el reporte trimestral describió y analizó el progreso logrado en cada subproyecto con relación a los programas de trabajo y metas establecidos, y los problemas que dificultaron la ejecución esperada y las acciones que se tomaron o debían tomar para su adecuada solución. En lo pertinente, también se indicó las acciones de seguimiento y apoyo que las instituciones auspiciantes debían asumir en el próximo período de ejecución. Cuando posible, el reporte relievó los logros importantes de tipo tecnológico e institucional.

La información regular sobre el progreso de la ejecución y resultados de los subproyectos fue útil para catalizar los desembolsos de los fondos PL-480, mejorar en las OPs el cumplimiento de los procedimientos estatuidos y lograr respuestas más ágiles y con mayor conocimiento de causa, a las solicitudes y requerimientos de las instituciones ejecutoras. Los principales cuellos de botella de los subproyectos fueron identificados y solucionados en su mayoría a través del seguimiento (dificultades técnicas, retrasos en adquisiciones, falta de personal, etc.).

4.10 Diseminación de información

El principal medio de diseminación de la información del Proyecto fueron los reportes trimestrales. Como quedó indicado, las actividades de seguimiento del Especialista del Proyecto culminaron con un reporte trimestral de progreso y situación de la ejecución de los diversos subproyectos, que era también escrito por el Jefe de Misión, en la parte referida a la administración.

Para apoyar la difusión de la información tecnológica de los subproyectos, se preparó un Catálogo de Publicaciones del Proyecto STTR, que en tiraje de 2.000 fue distribuido en bibliotecas, universidades, instituciones de desarrollo, medios de comunicación y comunidad técnica y de productores agropecuarios.

Con fin similar, se asistió a los técnicos en la concepción y edición de publicaciones divulgativas sobre las tecnologías de los subproyectos y de artículos de prensa informativos sobre actividades y resultados importantes.

4.11 Otras actividades de apoyo al proyecto

Manejo financiero: (i) Apoyo a la Unidad Administrativa del Proyecto y a las oficinas de administración y contabilidad de las OPs.

(ii) Apoyo a los procesos de exámenes especiales de fondos del proyecto, auspiciados por la AID/Ecuador y de la auditoría financiera externa de los fondos PL-480, realizada a pedido del MAG por la Contraloría General del Estado.

Administración: Varias veces encargado de la Jefatura de la Misión de Florida, en períodos de viajes de trabajo y vacaciones del titular. Apoyo al manejo de los inventarios de bienes de la Unidad Administrativa y de los subproyectos.

Cierre del Proyecto STTR: Encargado del cierre del Proyecto luego de la partida del Jefe de Misión el 10 de agosto de 1990.

4.12 Problemas importantes

- Particularmente durante la primera mitad del período de ejecución del Proyecto en el MAG, existió un problema crónico de retrasos en los desembolsos de los fondos PL-480. Este hecho dificultó la ejecución de las actividades de campo programadas. El Especialista del Proyecto permanente sirvió de nexo entre las OPs y el PL-480, y realizó el seguimiento de los desembolsos.

- La falta del cumplimiento por parte del MAG de los compromisos de contraparte, sobretodo de la asignación de técnicos y vehículos, fue permanente. Aparte de afectar los volúmenes de trabajo en las zonas existentes, impidió la expansión prevista de la cobertura geográfica en la segunda parte de la ejecución.

- Falta de estabilidad en la estructura institucional y sobretodo en la administración del MAG.

- Los programas de ganadería y sanidad animal, que debían ser la principal contraparte de los tres subproyectos pecuarios del Proyecto STTR, transfirieron recursos humanos al PROTECA, sin poder atender los compromisos contractuales del MAG con las OPs.

- Por lo anterior, la meta de articular al MAG con las OPs participantes no se logró debidamente. El MAG se limitó a la aprobación de los programas de trabajo, de las contrataciones de asistencia técnica, de las actividades de capacitación y de las adquisiciones. Al final, el Proyecto STTR logra que el MAG inicie la solución al problema de una contraparte efectiva: en enero de 1990 se crea la División de Extensión Agropecuaria y Transferencia Tecnológica.

5.0 EXPERIENCIAS RELEVANTES

- En el diseño del proyecto:

i) El período de ejecución y los plazos previstos para el logro de los objetivos y metas fue muy corto frente al proceso de evolución, de cambio y crecimiento de las organizaciones participantes.

El desarrollo institucional en función del desarrollo tecnológico resultó ser un proceso complejo y largo, en el que no hay sustituciones de tiempo por capital, y en el que no se pueden saltar pasos o etapas.

ii) Los factores más incidentes en el proceso de desarrollo institucional deben ser incorporados en la función objetivo del proyecto. Por ejemplo, si la función de desarrollo institucional es:

Desarr. Inst. = f (organización, procedimientos,
recursos financieros, recursos humanos,
programa, liderazgo,....)

El factor liderazgo debe ser manipulado o debe existir al inicio en un nivel mínimo estable, que garantice que los otros factores puedan hacer visible su impacto. De lo contrario, el factor deficitario puede actuar como la duela baja del barril de Liebig, en que las cantidades de esfuerzo a través de los otros factores no elevan el nivel de producto, en este caso de desarrollo institucional.

- Sobre la autosuficiencia de gestión

i. Conforme se define en la sección 2.2, la meta realísticamente planteada para el proceso de desarrollo institucional, es la de la autogestión técnico-administrativa, con un adecuado nivel de contraparte financiera.

Esta aspiración es consistente con el hecho de que todo organismo del sector público y del privado no productor, que realizan actividades de desarrollo tecnológico, reciben apoyo financiero, tanto del Estado como externo.

Si las OPs logran el desarrollo de capacidades de gestión que les permita insertarse de manera formal en el STTR, sin fines de lucro y con objetivos sociales (e.i. atención al pequeño productor), ameritan ser consideradas organismos de desarrollo y ser tomadas en cuenta en los programas de financiamiento.

ii. Autogestión no debe entenderse como una capacidad de autofinanciamiento. Hacerlo significa pretender una transferencia de recursos entre productores, mediante

un subsidio de los grandes a los pequeños. En una economía como la del Ecuador, esta pretensión no es realista.

- **Sobre el enfoque de trabajo**

El enfoque de "abajo hacia arriba" que se procuró aplicar, por el cual el productor asume un poder decisión total sobre el programa tecnológico, probó ser muy aceptado por las OPs y sobretodo eficiente. Es claro que quien "sufre" el problema y cubre lo riesgos de invertir en las soluciones tecnológicas, es quien está más calificado para intervenir en los análisis y decisiones.

- **En la relación sectores público y privado**

Un objetivo superior del Proyecto STTR fue institucionalizar una relación de trabajo entre los sectores público agropecuario y privado de los productores, que permita la existencia de canales efectivos de información y de mecanismos eficientes de trabajo colaborativo, tanto en los niveles de la política y planificación tecnológicas, como en los niveles operativos, sobretodo de campo.

El establecimiento de estas actividades de articulación entre estos sectores enfrentó las rigideces propias del funcionamiento institucional existente, en el que cada institución busca sus objetivos propios, con poca flexibilidad programática para incorporar el concepto de actividades de responsabilidad compartida.

La experiencia mostró que estas rigideces fueron mayores en el sector público y se resumen bien en lo siguiente:

i. El enfoque tecnocrático que funciona en las relaciones con el agricultor pone una barrera a los flujos de comunicación con las OPs. El técnico tiende a decirle al agricultor lo que tiene que hacer, sin verificar el consenso necesario para que las cosas ocurran.

ii. La gestión en la instituciones usualmente se realiza por áreas de disciplinas, recursos o problemática, a través de programas o departamentos. A su vez en estas instancias la gestión la realizan las personas responsables de las actividades.

En varios casos en el MAG, las personas diluyeron la noción del objetivo institucional y hasta del programa y lo substituyeron por el objetivo profesional personal. Por este hecho, los programas del Proyecto encontraron dificultad de articulación con los programas del MAG, pues varias solicitudes de las OPs en procura de acción del MAG, para facilitar el curso de acción o actividades de las OPs, fueron demoradas o no atendidas.

iii. Las diferencias de percepción entre ambos sectores dificultaron el trabajo colaborativo y las comunicaciones estables e instituidas: a) La aversión al riesgo (en las inversiones tecnológicas en la agricultura) es mayor o solo existe en el sector privado, pues son los agricultores los que realizan el gasto. b) El costo de oportunidad del tiempo de los agricultores parece mayor que el de los técnicos, pues el sector público toma más tiempo en actividades similares, como la programación por ejemplo, lo cual quizá se explica por el mayor apego al rigor metodológico. El sector privado productor, en cambio, se preocupa más por la ejecución y resultados, mostrando una disposición a sacrificar precisión a cambio de cantidad en la información para la toma de decisiones.

Annex D



UTAH STATE UNIVERSITY

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DEPARTMENT OF ANIMAL, DAIRY AND VETERINARY SCIENCES
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January 29, 1991

Dr. Lawrence J. Janicki
Office of International Programs
University of Florida
Gainesville, Florida 32611

Dear Larry:

Enclosed are the required 7 copies of the final technical report for the dairy and sheep sub-projects we had with UF. I believe you already have the final financial reports from our contracts and grants office. I apologize for these technical reports being so slow getting to you. Dave James did the major writing, but he had a lot of other assignments when he returned to campus, so wrote them mostly on his own time. When they finally came to me I had to do some major rewriting to remove some biases and negativisms that I felt would do no good in a report such as this. I am proud of the job our technical team did in Ecuador. I feel this report now reflects the effort and accomplishments achieved there, even though we were not able to do all everyone hoped we would when the project started. I do not feel we need to apologize, make excuses, or try to put blame on anyone else.

I appreciate the opportunity we had to work with the University of Florida. I also appreciate the help you provided us personally as the RTTS Chief of Party in Quito. I recognize that you were often in an awkward position between AID, the USU team, and the MAG. I wish you the best in your future endeavors.

Sincerely,

Robert C. Lamb
Department Head
Animal, Dairy and Veterinary Sciences

RCL:ij
Enclosures

UTAH STATE UNIVERSITY DAIRY SUB-PROJECT

UNIVERSITY OF FLORIDA RTTS PROJECT

FINAL REPORT

DECEMBER 31, 1990



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UTAH STATE UNIVERSITY DAIRY SUB-PROJECT
 UNIVERSITY OF FLORIDA RTTS PROJECT
 FINAL REPORT
 DECEMBER 31, 1990

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UTAH STATE UNIVERSITY DAIRY SUB-PROJECT
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1.0 EXECUTIVE SUMMARY

In November 1984, a US presidential commission to Ecuador determined that the Sierra dairy industry was very susceptible to technological improvements and Utah State University (USU) was invited to evaluate the potential for technical improvements in this area. In 1985, a team of Ecuadorian public and private sector dairymen toured the US and ultimately selected USU as the implementing agency for the recommended dairy improvement program. Coincidentally, USU had been selected to implement a sheep improvement program in Ecuador. The Rural Technology Transfer System (RTTS) under the leadership of the University of Florida was already in place and USU was given a sub-contract to field a team of experts working in both sheep and dairy improvement. It is estimated that 85% of the RTTS program resources was allocated to the sheep and dairy sub-projects between 1986 and 1990.

The first long term Utah State University faculty arrived in Quito in March, 1986. There were two phases marked by differences in USU Team composition and program operational objectives and methods. The last USU faculty departed Quito in July, 1990.

The Sierra Livestock Association (AGSO), together with the Holstein-Friesian Association (HFA), were selected as the implementors of the dairy improvement program. Since the two sub-projects (dairy and sheep) were so completely interwoven in terms of USU management and technician division of labor, this RTTS Dairy final report should be read in conjunction with the RTTS Sheep final report to obtain a complete picture of the overall USU input to the Ecuadorian Sierra livestock industry.

The Livestock Association (AGSO) celebrated its 25th anniversary in 1989; its membership includes about 10% of all dairymen in the Sierra. AGSO's main function over the years has been in lobbying government on issues related to establishing and enforcing dairy policy. It also maintains supply outlets where dairymen can buy production inputs such as feed concentrates, veterinary medicines, fertilizers and improved forage-pasture seeds. In 1984 the MAG secured several animal health specialists to the AGSO in support of the then current dairy improvement program.

The HFA was a major player in the early phases of the Dairy RTTS but its role faded and during Phase II it was equivalent to "other" interested agencies.

The goal of the dairy program was to further the socio-economic development of the Ecuadorian agricultural sector in milk production so as to increase the production and income of the rural population of Ecuador. The purpose of the Dairy sub-project was to generate and transfer appropriate technology to the producers. This was to be accomplished through classical applied research and agricultural extension systems. Human resource development and institution building were included as program goals.

Utah State University fielded a team of senior faculty with extensive experience in developmental agriculture. During the period March 1986-July 1990 USU expended approximately 10.8 man-years in dairy improvement. The Utah State University Team Leader served the dairy and sheep programs in terms of both administration and technological inputs relative to their areas of expertise.

Utah State University also provided 15 man-months to dairy under the Short Term Technical Assistance contract. In addition, Utah State provided two man-months of short term TA at no cost to the sub-contracts (Title XII Program). All short term TA was integrated into the on-going programs. It provided for highly significant inputs, extending the range of disciplines and topics provided by the long termers. In addition, 21 USU faculty members contributed to a three-week USU-FUNDAGRO electronic conferencing program which emanated from Logan and was received in Quito by closed circuit satellite transmission.

Project Papers provided for five faculty in the two sub-projects during the first two years and six faculty during the last two years. The last phase was to have given added emphasis to extension. But the extension thrust was severely reduced when AID reduced program funding; there were just three USU faculty among the two sub-contracts during the second phase.

The RTTS program purposes remained the same during the two phases but the objectives and methods were different. USU technology development and transfer activities during the two program phases are summarized in the following table. Program budgets provided very little for field demonstration but these were greatly facilitated by land owners who carried up to 80% of the demonstration costs. During Phase II the cost of printing and publishing was covered by a special allocation from the PL-480 fund.

Program funding did not allow for any long term training for Ecuadorian dairy technicians. There were no full time counterparts for technical program administration. A limited number of counterparts were provided by MAG to the private sector as USU technical counterparts. The potential for manpower development was much greater than that actually achieved.

Collaboration with MAG dependencies (INERHI, INIAP, PROTECA and ENDES) was essentially uni-directional since these agencies could not reciprocate with technical program inputs. MAG funding levels maintain these agencies at rudimentary levels of science and technology.

The Centros Agrícolas (Agricultural Centers in the provinces) were designed to be major collaborators with the private sector implementors of the RTTS Dairy program. But CA involvement was sporadic.

ITEM	PHASE		TOTAL
	I	II	
Direct management assistance to producers			
Number of farms	196	422	618
Farm demonstrations (number)	61	13	74
Conferences and formal instructional activities for producers and University students			
Number held	33	85	118
Attendance	1,122	4,990	6,112
Training of extensionists			
Number of events	58	79	137
Number person/days	277	220	497
Publications	15	58	72
Field days and workshops			
Number of events	34	9	43
Number of participants	976	270	1,246
Student training			
Number	17	12	29
Number person/months	135	53	188
Short term consultants			
Number of experts	8	17	25
Number person/weeks	16	45	61

Universities in Quito and Riobamba were informally involved in dairy technology development, mostly through the senior student thesis programs. These work-study programs were of significant benefit to the RTTS and to the students, but were of limited benefit to the universities. This was attributed to the fact that the universities fundamentally are not research oriented institutions and their contact with the world scientific community is practically no-existent because of the lack of language capabilities. The status of scientific training and research in Ecuador is estimated to be 15 to 20 years behind other developing countries such as Egypt and India, mostly because of the limited trained human resource base.

Recommendations are given on a dairy research agenda.

2.0 RTTS DAIRY SUB-PROJECT DEVELOPMENT

The RTTS Dairy Project was closely associated with the RTTS Sheep Project from its inception and the final report for the RTTS Sheep sub-project should be read in connection with the RTTS Dairy sub-project to obtain all details.

In October and November, 1984, the new government of Ecuador was visited by a presidentially appointed commission from the United States. The commission was to identify and review potential areas of mutual interest and recommend cooperative activities that would be beneficial as well. The commission identified the low level of fluid milk production in Ecuador as a solvable problem for which the U.S. could provide assistance. Veterinarians and producers agreed that low fertility in dairy cows was a major factor in the low milk production.

The Sierra Livestock Association (AGSO) and the Ecuador Holstein Friesien Association (HFA) requested that USU provide a dairy production specialist and a diagnostic veterinarian to survey selected dairy herds and make recommendations on an appropriate dairy health improvement program. This activity came under the USAID/USU Technical Support to Mission (TSM) Contract. Drs. R. Dean Plowman and Jay W. Call from the USU faculty did the survey and recommended that an Ecuador Dairy Production Improvement Project be initiated under the RTTS.

A review team of Ecuadorian experts was asked to identify a university with appropriate capability to provide the technical assistance. The team consisted of Dr. Galo Izurieta, Director, Sierra Livestock Division of MAG; Mr. Alfonso Moscoso, President of the HFA, Mr. Ignacio Perez, and Mr. Ramiro Lopez from the AGSO. They visited Florida, Utah, Minnesota, and Maryland and finally selected Utah State University.

Dr. James Thomas wrote the project paper, assisted by Drs. Ronald Boman, Jay Call and Boyd Wennergren.

The sheep project was being initiated at the same time as the dairy project, and USAID/E and the University of Florida agreed that the projects should be combined administratively. As a result, the projects were delayed somewhat in implementation. However, in March of 1986 the first three experts arrived in Ecuador. The team was completed in June of 1986.

Accordingly, the RTTS Sheep and Dairy Sub-projects had much in common, not the least of which was the overlapping assignments of the USU technicians on the two sub-projects. In addition, on-campus and in-country administration treated the two sub-projects essentially as one, especially during Phase I when both were reported together under the title "Sierra Livestock Project".

2.1 The Sierra Livestock Association and The Holstein Friesien Association

The Asociación de Ganaderos de la Sierra y Oriente (AGSO) celebrated its 25th anniversary on October 27, 1989. Ing. Rubén Espinosa was a charter member of the AGSO and has served as its manager for 24 years.

Among the AGSO'S principle activities is the maintenance of stores of dairy production inputs such as fertilizers, pasture and forage seeds, dairy feed supplements, minerals, including iodized salt, vitamins, vaccines, and other veterinary medicines. In addition to the main store located in Quito the AGSO manages six other outlets distributed in the provinces of Pichincha, Cotopaxi and Carchi. This includes a small store in Baeza. The "Y Oriente" in the AGSO title is justified mainly by its membership and commodity sales activities in Baeza.

The specific selection of production inputs made available to members in the sales outlets evidently is dictated by member demand. The AGSO also has occasionally participated in importation of purebred dairy stock from North America.

The other main AGSO activity has been as a lobbying agency, attempting to influence national government legislation for development and enforcement of animal industry regulations. During recent months this activity has been focused mainly on government pricing policy for fluid milk.

Dairy farmer membership in the AGSO requires payment of a yearly fee. In addition a milk check-off system is maintained wherein about 10 centavos on each liter of milk sold through the Quito milk pasteurizers is turned over to the AGSO. The AGSO membership consists of dairy farmers of all sizes. In 1990 there are about 2500 members of record, approximately 1500 of whom are active dues paying members. This represents about 10% of all dairy farmers in the Sierra and eastern slopes of the Sierra, or about 5% if dues-paying members is the basis of comparison.

The AGSO maintains a permanent staff of 30 secretaries, accountants, store keepers and laborers.

The AGSO had a somewhat active dairy improvement program (Plan Fomento Lechero) in place when the Dairy RTTS was initiated in 1986. This was supported by the MAG which had initially seconded three of its animal health technicians to the AGSO to work in dairy technology diffusion. There is little evidence that the original "Plan Fomento Lechero" had specific plans of work devoted to technology generation or adaptation. The technicians relied principally on testing of animal and farm production resources (soils and pastures) to make recommendations from a variety of standard practices. One of the technicians had an MS degree from a US university.

The Holstein Friesien Association of Ecuador (HFA) is an association of dairymen dedicated to importation and production of pedigreed breeding stock. They also assist members in dairy record keeping and analysis for bull proving and for increasing the genetic potential of cows for yield and quality of milk. The HFA sponsors an annual dairy exposition in Quito. HFA membership is limited, but the benefits of the improved breeding stock is reflected region-wide.

The HFA members are nearly all members of the AGSO also. Initially the HFA was very helpful in lobbying with the AGSO to help get the cooperation and collaboration the dairy project needed from MAG administrators. HFA members were also among the first to offer their farms as demonstration units and they were the best advocates for adoption of improved animal management practices.

3.0 PROJECT GOALS AND OBJECTIVES

The Plan of Work of the Dairy Improvement Sub-project was approved by the Government of Ecuador, the Ministry of Agriculture and the United States Agency for International Development. The sub-project was included within the broader Rural Technology Transfer System Project managed by the University of Florida. Implementation of the project was the responsibility of the Livestock Association of the Sierra and Oriente (AGSO) and the Holstein Friesian Association. Utah State University was responsible for providing technical inputs to the project.

The goal of the project was to further the socio-economic development of the Ecuadorian agricultural sector in milk production so as to increase the production and income of the rural population of Ecuador.

The purpose of the project was to develop a system that would increase the production of milk and milk by-products by generating and transferring appropriate technology to the dairy producers at all social and economic levels. The project was to address the following limiting factors:

— Technology extension and research in Ecuador in dairy production was limited in scope and activity.

— There were few trained personnel working at the production, extension, or research level on dairy production.

— There was a lack of confidence in the current activities of the MAG extension agents in dairy production.

Types of technology: The Dairy sub-project was designed to combat animal diseases and improve the nutrition and management of milk cows in the Sierra region.

General areas of emphasis: The requirements of the project were based on four general activities as the bases for accomplishing the intended objectives. These were:

Outreach: The project called for a major focus on activities designed to introduce new production technologies to individual farmers. The activities were to include those traditionally performed by agricultural extension, such as field demonstrations, information pamphlets, and farm visits. Establishing a private sector system of information transfer to producers was to be the highest priority of the livestock projects.

Applied research: Obtaining information for technology adaptation and transfer to Ecuadorian conditions was a project objective. The outreach component was to be practical and conducted entirely on producer farms.

Training: The training activities of the project were to focus on both technical and outreach personnel. USU was to provide the technical advisors in the subject matter specialties. Selected Ecuadorian personnel were to be assigned from the MAG to the producer organizations for the purpose of training to eventually serve the associations' technical and outreach program needs.

Institution building: The research, outreach, and training activities were to be carried out primarily to strengthen selected producer organizations. The dairy activities were to be centered in the Livestock Association of the Sierra and Oriente and the Holstein Friesien Association. The USU technical assistance personnel were to be assigned primarily to these two producer organizations. The primary end result of the project was to help establish within these organizations the capacity to extend new technology to all size levels of dairy producers in Ecuador, whether or not they were members of the respective associations. This implied a close working relationship with public research organizations and an institutional structure within the associations capable of preparing technical information and effectively transmitting it by various techniques to farm-level producers. Furthermore, it implied that the organization would have the capability to secure technology (improved pastures, supplemental feeds, pharmaceuticals, etc.) needed to assist the dairy producers.

Special attention was to be given to small farm needs in the Dairy Improvement Project to assure that small farmers benefit from the improved technologies. However, the project paper clearly recognized the need to assist farms of all sizes.

4.0 RTTS DAIRY PROGRAM PERSONNEL

The RTTS Dairy Program report is segregated into Phases I (1986-88) and II (1988-90) because of changes in expatriate and local personnel. Also, the Plans of Work were distinctly different between the two phases.

4.1 Phase I

4.11 Utah State University Ecuador Dairy Team

E. Boyd Wennergren, Ph. D., Professor Agricultural Economics, Utah State University; Quito Chief of Party and Agricultural Economist, March 1986 to June 1988.

Ronald L. Boman, Ph. D., Extension Dairy Nutrition and Management Specialist, Utah State University; Quito Animal Nutrition and Management Specialist, June 1986 to August 1988.

Keith H. Hoopes, DVM, Professor of Veterinary Medicine, Brigham Young University; Quito Animal Health Specialist. March 1986 to July 1988.

Dr. Wennergren's time was split between the Dairy Program and the Sheep Program both as Chief of Party and Agricultural Economist. Mr. James Stevens (detailed under Sheep Program) had a fraction of his time in the Dairy Program. A total of 6.83 contract man-years is included in the three dairy positions described here.

Sra. Doris de Jarrin was the USU team secretary throughout Phase I and Eduardo Martinez was the driver.

4.12 Ecuadorian Dairy Team

Individuals, affiliation and assignment are included in the following roster of dairy team counterparts.

Arturo Gangotena, AGSO President
Rubén Espinosa, AGSO Manager
Galo Izurieta, DMV, MS, AGSO Technical Director 1987-90.
Telmo Hervas, DMV, MAG, Quito
Hector Ballesteros, DMV, MAG, Quito
Jorge Beltran, DMV, MAG, Quito
Nelson Villacis, Ing. Agron., MAG, Quito
Bolivar Carrera, DMV, MAG, Extension in Machachi
Miguel Bolaños, DMV, MAG, Extension in Tulcan
Agusto Duran, DMV, MAG, Extension in Latacunga
Asthon Chonlong, DMV, MAG, Extension in Cayambe

Dr. Izurieta joined the program on a part time basis in 1987 as AGSO Technical Director. Dr. Beltran, whose salary came from both MAG and AGSO, later served as Assistant Technical Director. Thus, no single AGSO person worked full time on the dairy improvement program.

Drs. Beltran, Hervas and Mosquera were seconded to AGSO by MAG in 1984 as also was Dr. Ballesteros in early 1987. As indicated, some of these actions occurred before the RTTS Dairy Program was initiated. Drs. Ballesteros and Hervas resigned from the RTTS Dairy Team in 1987. Dr. Ballesteros was associated with the project, but as FUNDAGRO's dairy specialist.

At the beginning of the USU Dairy Program, Drs. Carrera (Machachi), Bolaños (Tulcan), and Duran (Latacunga) were seconded by MAG to the Utah Team to work as animal health and extension specialists. Dr. Carrera died in 1988 and was not replaced. Dr. Chonlong (Cayambe), an extension specialist, and Ing. Villacis (Quito), a nutritionist, were also seconded by MAG directly to the Utah Dairy Team.

As indicated above, Dr. Beltran received part of his salary from AGSO and part from MAG. All other MAG personnel continued to receive their salaries from the MAG. Accordingly, the direct AGSO inputs to personnel costs are estimated at one full time equivalent (FTE) (e.g. the part time Technical Director and the partial salary of the Assistant Technical Director). The MAG put about 7.0 FTE/year salaries into the dairy improvement program during Phase I. Peace Corps Volunteers made a significant contribution, representing about another 2.0 FTE/year.

4.2 Phase II

4.21 Utah State University Ecuador Team

David W. James, Ph. D., Professor, Department of Plants, Soils and Biometeorology, Utah State University; Quito Chief of Party and Soils-Pasture Specialist, August 1988 to July 1990.

Jay W. Call, DVM, MS, Professor, Animal Dairy and Veterinary Sciences Department, Utah State University; Quito Animal Health Specialist, August 1988 to July 1990.

In the USU Phase II Contract Team Dr. James' time was divided between the Dairy and Sheep programs both as Chief of Party and Soils-Pasture Specialist. Also Dr. Call was assigned fractional time to the Sheep Program and Mr. James Stevens was assigned a limited amount of time to the Dairy Extension Program. Total time accounted for in the foregoing manpower distribution is four contract man-years.

Sra. Doris de Jarrin resigned as USU team secretary early in 1989. She was replaced by Sra. Genoveva de Benitez who continued to within one month of the end of the Dairy RTTS contract. Sr. Eduardo Martinez provided team support, primarily as a driver, through the end of the program.

4.22 Phase II Ecuadorian Dairy Team

The following individuals continued on the Dairy Team throughout Phase II: Drs. Izurieta (part time Technical Director), Beltran, Bolaños, Chonlong, Duran, and Ing. Villacis. It was determined that since it was not legal to assign MAG personnel directly to the Utah Team they were re-assigned to AGSO (although this

was not formalized by the end of the Dairy RTTS). Ing. Rubén Espinosa continued as Manager of AGSO. AGSO presidents during this phase include Alberto Moncayo (1988-89), Andres Borja (1989-90), and Simon Bustamante (1990-).

Counterpart team members varied, because of both FUNDAGRO and MAG inputs to the Dairy Program, as indicated in the following:

José Espinosa, Ph. D., Soil Fertility Specialist, Quito.
Carmen Agila, DMV, MAG-AGSO Animal Health Laboratory, Quito
Hipatia Nogales, DMV, AGSO Animal Health Laboratory, FUNDAGRO, Quito
Luis Alava, DMV, FUNDAGRO-AGSO, Quito and Machachi
Diana Yocum, Peace Corps Volunteer, Baeza
Ruben Freire, DMV, FUNDAGRO, Baeza
Fernando Sanchez, DMV, FUNDAGRO-AGSO, Baeza
Ramiro Granda, AgroZ., FUNDAGRO-AGSO, Quito

Dr. José Espinosa, former director of the INIAP Soils Laboratory, joined the AGSO Dairy Team beginning November 1, 1988 under FUNDAGRO auspices. He resigned after one year for a more permanent position elsewhere.

Drs. Agila (MAG) and Alava (FUNDAGRO) joined the Dairy Team in 1989. Dr. Nogales and AgroZ. Granda (both FUNDAGRO) joined the dairy team in 1990.

Dr. Jorge Barba, Ambato MAG Extension Veterinarian was tentatively transferred to the RTTS Dairy team in late 1989. He participated in several Dairy Team activities including farmer seminars presented in Ambato and Riobamba. He received orientation from Dr. Ronald Boman during a short term TA trip on the RTTS Dairy program. He expressed a good deal of enthusiasm with the prospects of being integrated into the team, but unfortunately the transfer process was never finalized by MAG, and further contact with Dr. Barba did not occur.

Ms. Diana Yocum, PCV, spent her two-year volunteer service in Baeza, mainly in the AGSO laboratory located there. She represented the principle communication link between the Baeza Dairy Team members and the AGSO Quito office.

Agro. Ramiro Granda joined the Dairy Improvement Team in March 1990.

In Phase II the direct AGSO professional salary inputs amounted to about 1.0 FTE per year. Combined MAG, FUNDAGRO and Peace Corps inputs provided about 8.0 FTE per year.

5.0 RTTS DAIRY PROGRAMS ADMINISTRATION

Administration of the RTTS was very complex as indicated by the hierarchy of agencies involved. Administration was further complicated by the separation of authority on fund management from the responsibility of program implementation.

5.1 Utah State University

5.11 On Campus

The Dairy RTTS Program was under the leadership of the Department of Animal, Dairy and Veterinary Sciences at Utah State University. Initially, the Department Head was Dr. R. Dean Plowman. He was succeeded for the final two years of the RTTS program by Dr. Robert C. Lamb. On-campus coordination was supplied at various times by Dr. James Thomas, who also served as Director of International Programs. Dr. Guy Denton (Campus Coordinator) for about one year and Ms. Jo Egelund (Project Accountant) were also contributors to Project Management.

In addition to administrators mentioned above, other USU administrative units represented by short visits to Ecuador during the course of the RTTS Programs included: Dr. Doyle J. Matthews, Dean, College of Agriculture; Dr. Weldon S. Sleight, Associate Dean of Resident Instruction, College of Agriculture; Dr. Gerald R. Olson, Assistant Vice President for Extension; Dr. Evan N. Stevenson, Vice President for Administrative Affairs; Dr. Bartell Jensen, Vice President for Research; Dr. R. Paul Larsen, Vice President for Extension; and Dr. Morris Whitaker, Director of International Programs.

University Administration also committed a significant amount of resources in the form of short term technical assistance for which there was no specific contractual obligation (Title XII Program). These included two main inputs. First, faculty members in selected disciplines who traveled to Ecuador and made valuable contributions in identifying significant restraints to Sierra dairy production efficiency. These professors also participated in technology diffusion through the presentation of conferences and seminars and in writing extension-type bulletins and folders. These publications were integrated into the routine publication series of the Dairy Program. The names of Utah State University faculty who participated in these activities are included in Section 9.0. Their seminar/conference presentations and publications are included in Section 7.3.

The second contribution made by USU, in collaboration with FUNDAGRO, was in demonstrating the concept of international technology transfer through electronic media. This utilized an on-campus master computer, a slave computer in Quito and international telephone satellite communications. Through these media, professors in various disciplines in Utah presented seminars to an audience of selected professionals in Quito. Administrators from AID/E, MAG and FUNDAGRO also participated. Details on the personnel, the topics covered and the seminar schedule are given in Section 9.4.

The Utah State University administration, both at the departmental and higher levels, was more involved in the Ecuador Dairy and Sheep Improvement Programs than any other overseas agricultural development program it has fielded. This technical and administrative assistance and support was reflected in the attitude, enthusiasm and dedication of each of the long-term faculty assigned to the field programs.

5.12 Utah State University Ecuador Contract Team Administration

Dr. E. Boyd Wennergren (Agricultural Economist) was USU Quito Chief of Party during the first contract phase and Dr. David W. James (Soil Scientist) was Chief of Party during the second phase. In both phases, the Chief of Party time was divided between field program administration and technology development and diffusion within their own areas of expertise. Dr. Wennergren and Dr. James did not have bona-fide full time counterparts in their role as program administrators. This counterpart role was partially satisfied when Dr. Galo Izurieta became part-time Technical Director for the AGSO in 1987 (See Section 5.5). Terms of Reference or Job Descriptions were not developed to establish the working relationships between Dr. Izurieta and Drs. Wennergren or James.

In technology development and diffusion Dr. Wennergren had no counterpart in Agricultural Economics. He had the assistance of two local students plus short term inputs from two north American students. Dr. Beltran was counterpart for Dr. Hoopes in animal health, Ing. Nelson Villacis was counterpart to Dr. Boman in dairy management in Phase I and to Dr. James in the pasture/forage component in Phase II. In addition Dr. José Espinosa was counterpart to Dr. James for one year as a soil scientist.

5.2 University of Florida

The University of Florida was the prime contractor for the AID-GOE-MAG Rural Technology Transfer System (RTTS) program which was initiated in 1980. As already indicated, when the Dairy and Sheep sub-projects were added to the RTTS in 1985 Utah State University was selected as program implementor. Accordingly, Utah State University was a sub-contractor under the Florida RTTS.

Under this arrangement the UF was responsible for managing contract funds, including loan, grant and PL-480 funds. The UF also had prime responsibility for contract reports, and for providing liaison between the RTTS sub-projects and the MAG and AID. It is estimated that 80-85% of RTTS resources were committed to the USU Dairy and Sheep Sub-contracts.

The USU Quito team had a petty cash fund, amounting to about \$US250 which was replenished periodically upon submission of cash receipts. Operational costs were mostly associated with vehicle maintenance and operation and office supplies.

In Phase II, the PL-480 project operating funds were shared by UF with the AGSO as part of the Institutionalization thrust. This required that petty cash accounting and replenishment was also split. USU had no direct control over operating funds during this period.

5.3 AID/Ecuador

AID/E provided funds for the RTTS program implementation. At the beginning of Phase II, the contracted long term USU technician positions were reduced as a result of reduction in resource allocation to the sub-project. Nevertheless, USU was held responsible for the contracted goals and objectives. AID/E administrative relations with the USU/Quito team were difficult because there was no direct contract between USU and AID/E, therefore there were no direct lines of communication.

5.4 The Ministry of Agriculture (MAG)

The AGSO, representing the dairy private sector in the Ecuador Sierra, was selected as the main implementor of the RTTS Dairy sub-project. Nevertheless, the official channel of communications between USAID and program implementors (AGSO) was via the MAG because the basic legal agreements were between USAID and the MAG. Therefore, the MAG had the authority to approve or disapprove all AID funding pass-through to the private sector. The MAG, therefore, had the authority to approve or disapprove pieces of the Plan of Work through their authority to approve or disapprove budget line items.

During Phase I most concerned MAG offices were merely casual toward the RTTS. One exception was the close working relationship established with Mr. Diego Gandra (MAG Sub-secretary for the Sierra) who took a close interest in the project. His inputs were especially valuable in getting MAG personnel assigned to the project. The attitude of the Mag changed in the second program phase when Sub-secretary Gandra left and the MAG became more actively involved in program management through its role in PL-480 funding, both in budget approval and disbursements.

5.5 The Sierra Livestock Association (AGSO)

Initially, the AGSO did not involve itself directly in field program administration. It did, however, assert itself in program policy, especially in regard to selection of target audiences. The AGSO was critical of any technical assistance given to dairymen who were not members of the association. In 1987, Dr. Galo Izurieta was hired by the AGSO as part time Technical Director. This buffered the Dairy Team from AGSO administration and resolved the most serious problems.

6.0 TECHNOLOGY VALIDATION AND DIFFUSION: METHODOLOGY

6.1 Phase I

The Dairy RTTS sub-project goals and objectives were stated in very broad terms in the Project Papers. This gave the USU Contract Team considerable license in establishing detailed Plans of Work and specific methods. During a brief initial period of orientation, the USU technicians became aware of several important deficiencies in dairy management practices in the Sierra which strongly influenced their work. These included:

1) A high calf mortality rate resulting from the customary closed-barn system of calf rearing in the Sierra. Pneumonia and diarrhea were causing death rates of 35% and higher on many farms. Many calves that did survive were severely debilitated by the residual effects of these diseases.

2) Age at first calving ranged from 36 to 48 months.

3) Abortion rates were excessively high despite national legislation which provided for control and prevention of Brucellosis.

4) Farmers did not associate cause and effect in terms of dairy management input costs and benefits. They were basically illiterate in regard to accurate accounting of production costs and methods of evaluating new technology.

Based on these observations the USU Team began an applied research and demonstration program to evaluate how and what changes could be made in raising calves, calf nutrition to age of calving, nutrition of lactating cows, herd sampling to establish the extent of Brucellosis and viral diseases, and economic evaluation of the technologies being demonstrated. In addition, attempts were made to establish a farm management service at the Centros Agrícolas using computer capability. This attempt developed slowly because of limited TA under the short term contract and was eliminated entirely by the cancellation of the economics work in Phase II.

Institutionalization, as a prime project objective, was approached in Phase I mainly in terms of counterpart training. As indicated in Section 5.12, a counterpart relationship at the technical administrative level was not well defined and was not achieved in realistic terms.

The USU Phase I Dairy Team discovered that farmers placed very little confidence in MAG research and extension personnel. Therefore, the thrust of the Dairy RTTS was placed in establishing communications with the dairymen on a one-to-one basis and working with the Centros Agrícolas and other smaller farmer groups within the AGSO and HFA in order to secure needed demonstration sites and inputs. The USU contract budget did not provide for any inputs to demonstration costs.

Within a relatively short time both the USU technicians and their counterparts were welcomed on many collaborating farms as farmers gained respect and confidence in program workers.

6.2 Phase II

The second RTTS Dairy phase brought several changes in methods although the original goals and objectives did not alter.

First and foremost, Phase II started with a reduction in expatriate technicians, rather than an increase as originally envisioned in project documents. This reduction in force was occasioned by a reduction in project funding. Accordingly, the anticipated expansion in purely extension activities had to be drastically curtailed.

Secondly, Phase II changes in team composition brought about changes such as:

- 1) Loss of the economics position shifted the dependence on socio-economic evaluations of dairy technologies on to the short term TA contract.

- 2) Animal nutrition and management emphasis was shifted more completely to the extensionists who were now better trained on this topic. In addition, periodic return visits by Dr. Ronald Boman under the short term TA contract provided for backstopping in this area of the project.

- 3) The focus on animal health was shifted from viral diseases to mastitis and metritis.

- 4) The new pasture-soils specialist position began evaluating soil fertility and soil moisture management factors as limiters to improved yield and quality of pastures and forages.

- 5) The short term TA contract, including also short term TA provided at no cost to the contract from USU Title XII (AID) backing, was specifically focused through the Terms of Reference to back stop central project themes as well as expand into agricultural scientific disciplines and areas that were not covered in the full time Dairy Team Plan of Work.

The increased emphasis on Institutionalization resulted in the UF sharing budgeting and fund disbursement with the AGSO.

The broad acceptance of RTTS Dairy technicians (both expatriate and nationals), in all areas of the Sierra where they were known, justified a change in outreach methods in Phase II. The person-to-person contact was reduced (though not eliminated) and greater emphasis was placed on group contacts. This was accomplished through farmer conferences, spaced on six-month intervals, which were presented at collaborating Agriculture Centers and local livestock associations between Tulcan on the north and Cuenca on the south. Up to five themes were presented in each of three series of conferences. These were presented in a total of 12 localities, including a side trip to Baeza, and on one occasion Tena and Puyo. Specific themes were based on results of the research-demonstration activities and also upon discussions with farmers, individually and in groups, which reflected producer concerns. Published extension articles were dispersed freely to attendees of these conferences.

7.0 TECHNOLOGY VALIDATION AND DIFFUSION: RESULTS

Although the Dairy RTTS was designed principally as a "technology transfer" system the Dairy Team had to concentrate initially on technology generation and validation. This was because of the early recognition of the essential lack of site-specific information ready for the extension function of the project. This subtle but important shift in team emphasis was not fully accepted throughout the project lifetime by AGSO, MAG, AID and UF administrators. This was caused by a general lack of comprehension of the depth and breadth of the agricultural sciences information vacuum in Ecuador.

Bona fide applied research was conducted under the euphemism "demonstration". Results of this applied research were published widely in oral and written form as is shown in the following sections.

7.1 Phase I Results

Applied research-demonstrations that were installed early in Phase I resulted in recommendations that called for basic changes in many dairy farmer management habits. These recommendations were highly justified as may be seen in the following:

1) The mortality rate from pneumonia and diarrhea in calves that were raised in separate hutches, spaced so as to avoid contact between animals, dropped essentially to zero on collaborating farms. This compared to 35% and greater mortality rates in the customary enclosed calf housing.

2) It was demonstrated that with proper nutrition using feed concentrate supplements or calf starters, the age of heifers at first calving could be reduced to about 25 months from the previous range of 36 to 48 months of age at first calving. This resulted in savings from feeding less milk before weaning, plus the obviously shorter period of time to bring heifers to the productive stage.

3) Dairy feed supplements (grains and protein feeds) were found to be high in crude fiber and ash and low in protein and energy. Balanced concentrate diets higher in energy and protein were provided by using available feed ingredients in Ecuador, including whole cottonseed. This significantly improved animal performance at all ages.

4) Ring tests on bulk milk deliveries and blood analysis for diagnosis of Brucellosis at the start of the dairy project helped make everyone aware of the prevalence of the disease. Control measures were recommended to reduce the prevalence of the disease and thus reduce the economic losses and the human health hazard.

5) New abortion-related virus diseases were identified, including IBR, PI-3 and BVD. Effective immunization procedures were demonstrated.

6) The introduced technologies had exceptionally high internal rates of return based on cost/benefit analyses.¹

Although there were several changes among the MAG-AGSO extension staff, those who remained with the program throughout Phase I grew remarkably. Increase in self confidence was one of the more obvious changes in these new-found professionals. In the context of Institutionalization, human resource development was significant.

However, overall progress towards Institutionalization, i.e. the acceptance by AGSO of its programmed role to become a leader in dairy technology development and diffusion in the Sierra of Ecuador, was very slow.

Other evidence of the Phase I RTTS Dairy Team activity is given in succeeding sections on training and publications.

7.2 Phase II Results

Accomplishments during Phase II of the Dairy RTTS included:

1) Economic analyses of calf rearing and cow nutrition technologies by a short term TA contractor showed that farmer investments in feed concentrates and improved pastures are under funded and far short of their economic potential.

2) Animal nutrition outreach, as a result of greater efficiency among the extensionists (with help from the periodic visits of short term TA) received increased emphasis in conferences, seminars and field days. The economic survey done at the end of the Dairy RTTS showed that many farms were adopting the concepts. It was demonstrated that improved animal nutrition, based simply on increased energy intake, improved both reproduction and production in the herds.

3) Mastitis was found in 100% of the herds tested. Eighty percent was found to be caused by Staphylococcus and the balance mainly by Streptococcus. It was demonstrated that

— Sanitation and hygiene are the principal management practices needed to control or eliminate mastitis. This amounts simply to a change of habits on the part of those managing and milking the herds.

¹ The following is taken from the End of Tour Report of Dr. Boyd Wennergren. "The technologies demonstrated in the dairy sub-project have provided results that are not just marginally feasible but that have resulted in unusually high rates of return... One is left to wonder why technologies with such high returns have not been demonstrated by Ecuadorian research and extension institutions before the RTTS Dairy Program. The technologies demonstrated by the Utah Technicians are known in professional and trade journals world-wide. Either Ecuadorian scientists are not adequately in touch with the world scientific community, or they face extreme institutional or professional constraints. Whatever the cause, it is creating a terrible information loss to the nation."

—Metritis is a frequent problem, causing delayed pregnancy at best and loss of the cow at worst. Again, management of sanitation and hygiene in the cow's environment during and immediately after calving was the main recommendation for control of metritis.

—Poorly monitored estrus and poorly managed insemination together with metritis frequently causes extended open periods and serious loss of milk production efficiency.

4) Results of fertilizer trials at several sites, together with diagnostic soil fertility tests done at INIAP, lead to the following conclusions:

—Phosphorus is rarely deficient in fields where pasturing (automatic manuring) and regular fertilizer applications occur. This is because of the pronounced long-term residual effect of phosphorus fertilizers that were liberally applied in the past by some farmers.

—Potassium deficiency was never encountered. Likewise minor element deficiencies were never detected. The RTTS Dairy Team could find no support for many of the soil additives being purchased by dairymen.

—Nitrogen fertility management depends critically on soil moisture conditions. There is no logical nitrogen fertilizer recommendation if there is no understanding of soil moisture relations, both in terms of rainfall (amount and seasonal distribution) and irrigation (method, amount and frequency).

—Excess soil moisture in the root zone is a frequent limiting factor to pasture and forage production. A thorough understanding of Cangahua, the natural semi-pervious cemented layer in the volcanic ash soils of the Sierra must be obtained before cost-effective soil drainage can be designed. Where drainage is economically feasible there would be one set of recommendations for improved pastures (kind of improved pasture, seeding rates, and fertilizer practices). Where drainage is not feasible another set of recommendations would be called for based principally on managing Kikuyo and native grass pastures.

—In general, farmers are making excessive investments in fertilizers as well as other amendments such as lime for non-acid soils.

5. The short term contract provided help in detecting alfalfa stem nematode and leaf spot diseases as principal limiting factors to alfalfa production in the Sierra. Also, non-dormant alfalfa types seem logical for the Sierra because alfalfa can grow year-round there if soil moisture is available (rain and/or irrigation) and if soil drainage is not a problem.

It should be noted that, other than the outreach efforts done in full collaboration with Ing. Nelson Villacis, there was very little concentrated extension training on soils-pastures work. This was because the MAG-AGSO-FUNDAGRO extensionists (all veterinarians) were going through a rapid growth process in animal health (their professional focus), and animal nutrition and management extension.

Several valuable extension publications were a direct result of the short term TA. These publications, together with help given in conferences and seminars, are included in the overall RTTS Dairy effort in succeeding sections.

7.3 Phase I Publications

Paper and ink were budgeted in the RTTS program. Printing was done in the MAG printshop. During Phase I, 1000 copies of each publication were printed with semi-hard cover (cartelina).

1-86 Importancia de la calidad de la leche y su precio. (The importance of milk quality and pricing). E. B. Wennergren and Thelmo Hervas.

2-86 Guia para calcular el costo de producción de leche. (A guide to calculate the cost of milk production). Thelmo Hervas and E. B. Wennergren.

3-86 Una guia para determinar la facilidad económica de mejoras tecnológicas en la producción de leche. (A guide to determining the economic feasibility of improved technology in dairy production). E. B. Wennergren and Thelmo Hervas.

4-86 Selección, cuidado y manejo del ganado importado. (Management, selection and care of imported herds). R. L. Boman and K. Hoopes.

1-87 Mejoras en el manejo de terneras lecheras en el ecuador (Improved management of dairy calves in Ecuador: A case study). R. L. Boman, N. Villacis, and E. B. Wennergren.

2-87 Costo de producción de leche en el ecuador. (Cost of milk production in Ecuador). K. Schultheis, E. B. Wennergren and G. Izurieta.

3-87 Guia para determinar la perdida economica de abortos en ganados lecheros (A guide for determining the economic loss of an abortion in dairy cattle). K. Hoopes, R. L. Boman, E. B. Wennergren and G. Izurieta.

4-87 Utilizacion de cassetas individuals para mejorar de ganado lechero (Utilization of individual calf hutches in improving dairy management). R. L. Boman, I. Hidalgo, N. Villacis, E. B. Wennergren and J. Stevens.

5-87 Diarrea viral bovina (Bovine viral diarrhea). K. Hoopes, G. Izurieta and H. Ballesteros.

1-88 Enfermedades uterinas postparto y su manejo (Postpartum uterus diseases and their management). K. Hoopes and G. Izurieta.

2-88 Use of milk replacer and high energy feed for calf raising. R. L. Boman.

3-88 Control de enfermedades virales del ganado lechero en el ecuador (Control of dairy diseases by vaccination in Ecuador). K. Hoopes, G. Izurieta and E. B. Wennergren.

OTHER PUBLICATIONS

Brucellosis: Infectious disease that affects economic losses in dairy cattle. In Surco No. 54. May 1986. K. Hoopes.

Management and nutrition are indispensable in improving dairy production. In Holstein Journal. No. 10. Jan. 1987. R. L. Boman.

Management, selection and care of imported breeding stock. In Holstein Journal No. 12. R. L. Boman and K. Hoopes.

Diarrea Bovina (BVD), Rhinotraqueitis Bovina Infecciosa (IBR), and Parainfluenza III (PI3) viruses in Ecuador. In Holstein Journal No. 14. September 1987. K. Hoopes and G. Izurieta.

A guide for determining the economic loss of an abortion in dairy cattle. In Holstein Journal No. 15. January, 1988. K. Hoopes, R. L. Boman, and E. B. Wennergren.

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3-88 Determinacion del consumo de materia seca de pastos en ganado lechero. 1988. Milton Fernando Cisneros Paznaino. Tesis de Grado, Medico Veterinario y Zootecnia, Facultad de Medicina Veterinaria y Zootecnia.

4-88 Evaluacion de nuevas variedades de gramineas y leguminosas forajeras en dos zonas de las Sierra. 1988. Duval Garcia. Tesis de Grado, Ingeniero Agronomo, Facultad de Ciencias Agricolas.

5-88 Crianza de terneras hasta los tres meses de edad con sustituto de leche y balanceado iniciador. 1988. Martha Pacheco Venegas y Rafael Matute Villacicencio. Tesis de Grado, Medico Veterinario y Zootecnia, Facultad de Medicina Veterinaria y Zootecnia.

7-88 Evaluacion de cuatro niveles de suplementacion energetica en la alimentacion de vacas en produccion bajo pastoreo. 1988. Margoth Hipatia Nogales Paredes. Tesis de Grado, Medico Veterinario y Zootecnia, Facultad de Medicina Veterinaria y Zootecnia.

7.4 Phase II Publications

The budget for Phase II publications was provided by a special allocation from PL-480. To reduce costs, Phase II publications were printed in 400 copies without firm cover. Several of these were reprinted.

4-88 Mastitis Bovina (Bovine Mastitis). K. Hoopes, G. Izurieta, and J. Call.

1-89 Crianza de Terneras (Raising heifers). A. Chonlong and R. Boman.

2-89 Fertilizantes comerciales en la Sierra ecuatoriana: Costos y otras bases para selección. (Commercial Fertilizers in the Sierra: Costs and other bases for selection). D. James, J. Espinosa, and N. Villacis.

3-89 Analisis de suelos para recomendaciones de fertilización. (Analysis of soils for fertilizer recommendations). J. Espinosa, D. James, and N. Villacis.

4-89 Control de Mastitis Bovina (Mastitis control in dairy cattle). J. Call, A. Chonlong, M. Bolaños, J. Beltrán, A. Durán, and C. Agila.

5-89 Fiebre de Leche (Milk Fever). J. Call and R. Boman.

6-89 Detección del Celo en Vacas Lecheras. (Heat detection in the Dairy Cow). J. Call, G. Izurieta, and C. Agila.

7-89 Enfermedades de Animales Causadas por Clostridios. (Diseases caused by Clostridial organisms). R. Smart and J. Call.

8-89 Examen Bacteriológico de Leche para la Detección de Agentes Infecciosos que Causan Mastitis. (Bacterial examination of milk). R. Smart and J. Call.

9-89 Guia para el Mejoramiento Genético en el Ganado Lechero. (Guidelines for genetic improvement of dairy cattle). R. Lamb.

10-89 Cómo Utilizar los Registros en la Producción Lechera. (How to use dairy production records). R. Lamb.

11-89 El Descarte de animales lecheros: una manera de mejorar el manejo. (Culling dairy cows to improve production). J. Call and R. Boman.

12-89 Perdida de Nitrogeno de los Fertilizantes de Urea: Causas y Controles (Ammonia loss from urea fertilizers and its control). D. James and N. Villacis.

13-89 Cada agricultor un Investigador (Every farmer an experimenter). D. James, J. Espinosa, and N. Villacis.

14-89 Hay Qué Drenar? (Why Drain?). L. Willardson.

15-89 El Riego y Manjo en los Potreros (Irrigation management in pastures). K. Stutler.

16-89 Malezas de Alfalfa y pastos en la Sierra Ecuatoriana (Weeds of Alfalfa and Pastures in the Sierra of Ecuador). S. Dewey.

17-89 Control de Nematodo de Tallo de Alfalfa en la Sierra (Alfalfa Stem Nematode Control in the Sierra). S. Thomson.

1-90 Manejo sanitario de Vacas Lecheras. (Health management of dairy cows). J. Call, J. Stevens, R. Boman, and G. Izurieta.

2-90 Case studies of economic benefits of improved calf raising methods and improved nutrition of lactating cows on ecuadorian dairy farms. K. Schultheis.

3-90 Experiencias sobre manejo de ganado lechero en la Sierra ecuatoriana. (Experiences on management of dairy cattle in the Ecuatorian Sierra). R. Boman.

4-90 Guia para controlar los parasitos en ganado bovino. (Guide for controlling parasites in cattle). J. Stevens and J. Call.

5-90 Guia para el manejo nutricional de las vacas lecheras lactantes en la Sierra ecuatoriana. (Guide for managing nutrition of lactating cows en the Ecuatorian Sierra). R. Boman.

6-90 Diseño y construccion de un sencillo nivelador de tierra. (Design and construction of a simple land plane). D. James and N. Villacis.

7-90 Prediciendo la fertilidad del nitrogeno en el suelo. (Predicting nitrogen fertility of soils). D. James, N. Villacis, and R. Granda.

8-90 Un nuevo sistema de seguridad para puertas de acceso o salida al potrero. (A new style of farm gate). D. James and N. Villacis.

9-90 Metritis y su tratamiento (Treatment of mastitis). J. Call and A. Duran.

10-90 Formulando dietas para el ganado lechero. (Formulating diets for dairy cattle). J. Stevens, J. Butcher, and J. Call.

11-90 Programacion de riego. (Programming irrigation). R. K. Stutler.

12-90 Causa y control de suelos saturados en la Sierra (Cause and control of saturated soils in the Sierra). D. James and K. Stutler.

13-90 Economic feasibility of feeding concentrates to dairy cows in the Sierra. K. Schultheis.

14-90 Short term economic effects of improved calf raising technology. K. Schultheis.

Translated to Spanish

1. Manejo epidemiologico de PI3, IBR y DVB en el ecuador. K. Hoopes, G. Romo, J. Call, and G. Izurieta.

In Process

1. N. Villacis and D. James. Pasture variety adaptation trials: Site by variety interactions.

2. N. Villacis and D. James. Fertilization of established pastures: results of field trials.

3. N. Villacis and D. James. Fertilization of native pastures: results of field trials.

4. N. Villacis and D. James. Fodderbeet as an alternative source of feed during the dry season.

5. J. Call, G. Izurieta, L. Alava, A. Chonlong, M. Bolaños, C. Agila, and A. Durán. Subclinical mastitis in dairy cattle of Ecuador.

6. J. Call, G. Izurieta, L. Alava, A. Durán, A. Conlong, and M. Bolaños. Reproductive performance of dairy cows in Ecuador.

Other Publications

1. Schultheis, B. Kris. 1989. Identifying production potentials and farm size efficiency relationships among Ecuadorian dairy farms. Master of Arts Thesis. Utah State University, Logan, Utah, USA.

2. Bailey, D., B. Biswas, S. C. Kumbhakar, and B. K. Schulthies. 1989. An analysis of technical, allocative, and scale inefficiency: The case of Ecuadorian dairy farms. *Western J. Ag. Econ.* 14:30-37.

3. Powel, R. L., and G. R. Wiggins. 1989. Interpretación de la evaluación de toros en el Ecuador. (Traducido por: Ing. Fernando Mora). *Holstein Ecuatoriano.* 8(24):36-41.

4. Hoopes, K., G. Izurieta, B. Wennergren, J. Call, L. Alava, and F. Sánchez. Enfermedades Viruales en el Ecuador BVD, IBR, PI3. (The presence of viral diseases in Ecuador BVD, IBR, PI3). (Special report of AGSO to the MAG.)

5. Hoopes, K. 1990. Manejo epidemiológico de DBV, IBR, PI3 en Ecuador. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.

6. Boman, R. 1990. Experiencias sobre manejo de ganado lechero en la Sierra ecuatoriana. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.

7. Call, J. 1990. Programa de control de mastitis subclínica. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.

8. Chonlong, A. and A. Durán. 1990. Manejo del medio ambiente en la crianza de terneros. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.

9. James, D., N. Villacis, and R. Boman. 1990. Tecnología mejorada de pastos y forrajes: Resultados de pruebas en el campo. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.

10. Villacis, N. and D. James. 1990. Manejo de fertilidad del suelo en la Sierra ecuatoriana: Pastos y forrajes. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.
11. James, D. 1990. Manejo de humedad en el suelo como un factor de producción de forraje en la Sierra. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.
12. Beltran, Jorge. 1990. Futuro de la transferencia de tecnología en el proyecto de Fomento Lechero. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.
13. Izurieta, Galo. 1990a. Experiencias sobre uso de subdosis vacunal para la prevención y control de brucelosis. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.
14. Izurieta, Galo. 1990b. Panorama de la producción lechera en el Ecuador. II Seminario de Producción Lechera en la Sierra Ecuatoriana. Quito, March 14, 15, 16, 1990.
15. Boman, R. L., and E. B. Wennergren. Dairy extension successes in a developing country--Ecuador. Presented at the annual meeting of the American Dairy Science Association, Raleigh, N.C. June, 1990.
16. Boman, R., K. Hoopes, and G. Izurieta. USAID technical assistance model project in Ecuador. Presented at the 23rd International Dairy Congress, Ottawa Canada, October 1990.
17. Hoopes, K., J. Call, and G. Izurieta. 1990. Incrementar la inmunidad pasiva en los terneros. Hoja Divulgativa--Serie Manejo de Ganado 012.001.90.
18. Espinosa, J. and D. James. 1990. Suelos acidos en la Sierra (Soil acidity and liming in the Sierra). (Joint bulletin INIAP & AGSO).
19. Powell, R. L., G. R. Wiggans, and R. D. Plowman. 1990. Evaluations of Holstein Bulls and Cows in Ecuador. J. Dairy Sci. 73:3330-3335.

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Finalizado

1-89 Introduccion y adaptacion de especies forrajeras en dos zonas de altura (3350-3400 msnm). 1989. Milton Leonel Yanez Garcia, Tesis de Grado, Ingeniero Agonomo. Universidad Central Del Ecuador, Facultad de Ciencias Agricolas.

2-89 Evaluacion de niveles y frecuencias de fertilizacion nitrogenadas en mezclas forrajeras. 1989. Joe Ribadeniera (Ing. Agron. Tesis de Grado). Facultad de Agronomia.

1-90 Efecto de Nitrógeno y Fósforo en el Rendimiento y la Relación Gramínea Leguminosa en Pastos Establecidos en Lloa, Pichincha. Fabián Guzmán. (Ing. Agron. Tesis de Grado). Facultad de Agronomía.

2-90 Respuesta de Cuatro Variadades de Remolacha Forrajera a la Fertilización Nitrogenada y a Dos Epocas de Cosecha en Cayambe Pichincha. Edison Nuñez. (Ing. Agron. Tesis de Grado). Facultad de Agronomía.

3-90 Introducción y Adaptación de Quince Variadades de Alfalfa en Machachi, Pichincha. Carlos Perrazo. (Ing. Agron. Tesis de Grado). Facultad de Agronomía.

4-90 Evaluación de quince variedades de alfalfa en dos localidades de la Sierra ecuatoriana, Cayambe y El Quinche, Pichincha. Romulo Alban. (Ing. Agron. Tesis de Grado). Facultad de Agronomía.

5-90 Evaluación de Tres Fuentes de Nitrogeno, Dos Metodos y Dos Frecuencias de Aplicación en Kikuyo, Lloa y Cariacu, Pichincha. Pablo Cevallos. (Ing. Agron. Tesis de Grado). Facultad de Agronomía.

6-90 Efectos de la fertilización fosfórico y potásico en praderas establecidas en dos localidades del callejón interandino. Edgar Arroba. Ing. Agron. Tesis de Grado. Facultad de Agronomía.

8.0 TRAINING ACTIVITIES

8.1 Phase I Student Training

Student collaborators were exclusively from the Central University, Quito. They developed their senior thesis while assisting the RTTS Dairy Team. This represented an especially effective manpower training effort.

<u>Student Name</u>	<u>Advisor</u>
Julio Escudero	Dr. Wennergren
Hipatia Nogales	Dr. Boman
Milton Cisneros	Dr. Boman
Martha Pacheco	Dr. Boman
Duval Garcia	Dr. Boman
Ivan Hidalgo	Dr. Boman (thesis not completed)
Marcelo Tipan	Drs. Hoopes and Izurieta
Armando Ramirez	Drs. Hoopes and Izurieta
Nelson Echeverria	Drs. Hoopes and Izurieta
Luis Pozo	Drs. Hoopes and Izurieta
Gabriel Trueba	Drs. Hoopes and Izurieta
German Romo	Dr. Hervas
Silvano Velasco	Dr. Hervas
Maria E. Nolivos	Dr. Hervas

8.2 Phase II Student Training

Juan Carlos Ceron	Dr. Izurieta
José Viracucha	Dr. Izurieta
Nerevo Ramirez	Dr. Izurieta
Luis Tipan	Dr. Izurieta
Vicente Goa	Dr. Izurieta
Amador Luna	Dr. Izurieta
Fernando Sanchez	Dr. Izurieta
Luis Alava	Dr. Izurieta
Miltón Yanez	Dr. James and Ing. Villacis
Romulo Alban	Dr. James and Ing. Villacis
Edgar Arroba	Dr. James and Ing. Villacis
Carlos Perrazo	Dr. James and Ing. Villacis
Joe Ribadeneira	Dr. Espinosa and Ing. Villacis
Edisón Nuñez	Dr. James and Ing. Villacis
Fabian Gúzman	Dr. James and Ing. Villacis
Pablo Cevallos	Dr. James and Ing. Villacis
Jorge Flores	Ing. Villacis (initiated near end of long term USU team)
Ivan Larrea	Ing. Villacis (Initiated near end of long term USU team)

8.3 Other Dairy Training

The following individuals were supported by the RTTS and by FUNDAGRO in Utah based training programs.

Germán A. Roma. August, 1988. Travel support to Brigham Young University in Provo, Utah to accept assistantship in Veterinary Medicine to work on his masters degree. Partial support by RTTS and USU.

Asthor Chonlong and Nelson Villacis. August 14-September 9, 1989. To Utah State University and University of Florida for training in animal health, nutrition, and pastures-forages extension procedures. Training costs paid by FUNDAGRO, RTTS and USU.¹

Agusto Duran, Miquel Bolaños, Luis Alava. July 7-28, 1990. To Utah State University for training in animal health and nutrition extension procedures. Training costs paid by RTTS.

¹ The USU contributions were in terms of faculty time dedicated to on-campus training of short term visitors.

9.0 SHORT TERM TECHNICAL ASSISTANCE

The Short Term Contract gave very important support to the Dairy RTTS program, having a significant role in program implementation. In Phase II, short term TA workers were especially focused on the on-going Plan of Work. They made several valuable contributions, helping to identify important constraints across the whole gamut of dairy-related technologies. The terms of reference for Phase II helpers were also written in terms of farmer and student seminars and preparation of extension bulletins. These numerous and valuable contributions are detailed in the following sections.

The contributions which were supported, both in country and on-campus, under the USU Title XII program (i.e. done at no cost to the Dairy RTTS program) are integrated here with the work provided under the short term contract. Individuals, dates of visits and program inputs are included in the following sections.

In addition, USU, with FUNDAGRO financial assistance, developed and presented a demonstration on electronically transmitted training programs with numerous inputs by a range of USU faculty. This is also included here.

9.1 Phase I Short Term TA

Ronald L. Boman. April 1-15, 1986. Prepare advance plan of work for long term assignment.

R. Dean Plowman. April 10-20, 1986. Review progress on plan of work and program development for first year.

Ross A. Smart. July 7-31, 1986. Evaluate Sierra veterinary diagnostic laboratories and help develop a laboratory certification program.

R. Dean Plowman. July 10-25, 1986. Help HFA Association prepare efficient herd record program and develop a program for bull proving.

Roy E. Blaser. October 15-30, 1986. Examine forage production systems in the Sierra, including grass-legume mixtures in improved pastures and soil fertility management practices.

William F. Farnsworth. March 1-8, 1987. Present a training course in extension methods to the dairy extension agents.

David W. James. April 15-22, 1987; May 15-20, 1988. Evaluate soil and irrigation management practices with focus on forage production efficiency and assist with design of some field demonstrations on fertilization of established pastures.

Larry K. Bond. June 1-21, 1987. Bring computer software programs used in evaluating costs and returns on dairy herd management; train technicians in the Machachi and Cayambe Centros Agrícolas in the application of these programs.

Hector Ballesteros. June 1-2, 1987. Transport blood samples to Cali laboratory for diagnostic tests.

Hector Ballesteros. October 25-November 5, 1987. Visit to Logan, Utah and attend the American Veterinary Practitioner Meetings.

R. Dean Plowman. November 1-15, 1987. Consult with Holstein-Friesian Association and review herd records and bull proving programs.

Keith Hoopes and Galo Izurieta. February 13-20, 1988. To attend Western Veterinary Conference. Logan, Utah.

Other Technical Assistance

Kris Schultheis. June 20-September 15, 1986. Collect data for MS thesis at Utah State; subject economics of milk production in the Sierra.

9.2 Phase II Short Term TA

Dr. Keith Hoopes. November 7-18, 1988. To review plan of work being developed for second phase USU/Quito dairy team. Also March 12-24, 1989. To review program of vaccination of cattle for IBR, BVD, PI3 virus diseases and to introduce new programs for syncytial virus; to write extension article.

Dr. Ronald Boman. Feb 6-Mar 4, 1989; also September 10-Oct 10 1989; also Mar 12-April 7, 1990. To review and expand extension dairy nutrition and herd management programs; to write extension bulletins. (Also planned and coordinated on-campus training for two Ecuadorian counterparts during August 1989 and three Ecuadorian Counterparts during July 1990 on the short term contract).

Dr. Robert Lamb. August 13-26, 1989. To review HFA herd records system and evaluate bull proving program; wrote an extension bulletin on record keeping and bull proving.

Dr. Clell Bagley. April 22-May 6, 1989. Helped co-author a publication on control of foot rot in cattle. See also Title XII Program and Sheep Sub-project.

Dr. Ross Smart. April 29-May 12, 1989. Helped standardize AGSO animal health laboratory procedures for mastitis. Helped write two extension articles on Clostridia in cattle and sheep and on culturing milk samples for mastitis.

Dr. Lyman Willardson. June 13-27, 1989. To evaluate soil drainage needs for improved pasture and forage production; wrote an extension bulletin on drainage needs.

Mr. R. Kern Stutler. June 25-July 8, 1989; also June 18-29, 1990. Assist the dairy team and INERHI technicians in evaluating irrigation practices and giving recommendations on improved irrigation efficiency for forage and pasture production. Wrote two extension bulletins and co-authored another.

Mr. Kris Schultheis. Nov-Dec, 1989; also May 21-July 7, 1990. Prepare questionnaires and help implement data collection to evaluate economics of improved dairy and sheep technologies, calf rearing and feed supplements to lactating cows. Wrote three extension bulletins on findings.

Dr. David Nelson. November 1989 to March 1990. Performed an organizational and resource study of the AGSO; provided recommendations on public sector-private sector collaboration in a continuation of the dairy improvement program.

9.3 USU Title XII Program Short Term TA

Mr. Steve Cox, USU Extension Area Supervisor. October 15-30, 1988. Evaluate dairy and sheep extension programs.

Sherman Thompson, Ph. D., USU Extension Plant Pathologist. March 4-18, 1989. Wrote an article on disease control in alfalfa through selection of resistant varieties. Emphasis was placed on the extent and intensity of alfalfa stem nematode in the Sierra.

Steve Dewey, Ph. D., USU Extension Weed Control Specialist. April 16-29, 1989. Wrote an extension article on weed control practices in pasture and forage crops. Emphasis was placed on two-stage control of Kikuyo.

Rex Powell, Ph. D., USDA-ARS, Animal Geneticist, Beltsville, Maryland. May 15-20, 1989. Worked with the Holstein Association on dairy herd genetic improvement. He had previously analyzed herd sire data sent to Beltsville from Quito.

Clell Bagley, DVM, USU Extension Veterinarian. April 22-May 7, 1989. Worked with mastitis evaluation, machine milking preventive measures; assisted with diagnosing cattle diseases; co-authored extension articles.

9.4 USU/FUNDAGRO/AGSO/ANCO Electronic Conferences

The electronic conferences utilized two international telephone lines simultaneously. One provided two-way person to person or person to group audio communication. The other provided visual communication from the USU campus computer to the Quito slave computer in which data and graphics were transmitted.

The electronic conferencing was rated a 85% success in terms of the programmed air time versus the accomplished air time. Less than perfect conditions existed at all times, mostly related to the data line. The electronic conferencing was rated a 100% success in terms of the number of USU faculty involved and the quality of the information they presented. There were a total of 19 faculty members representing three departments (Animal, Dairy and Veterinary Sciences Department; Plant, Soil and Biometereorology Department; and Agricultural and Irrigation Engineering Department) in two colleges (College of Agriculture and College of Engineering) making direct presentations in one or more subject areas. This does not count the support staff who programmed and produced the seminars in Logan. Dr. Weldon Sleight, Dr. James Thomas and Mr. Roger McEvoy were in Quito during different parts of the electronic conference to assist with productions on that end.

The following table summarizes the faculty participants and subjects they treated during the conferences. A total of 197 persons attended the ten electronic conferences representing FUNDAGRO, MAG, INIAP, INERHI, ANCO, AGSO, ENDES, HFA, and farmers. There was some participant duplication among

conferences because certain persons attended as many as two or three different seminars. A video copy was made of most of the conferences and copy left for the FUNDAGRO library.

ELECTRONIC CONFERENCES

Date	Topic	Professors	No. of Quito Participants#
Feb. 6	Ruminant nutrition	Randy Wiedmeier* John Butcher*	28
Feb. 7	Dairy nutrition	Mike Arambel* Ronald Boman**	15
Feb. 8	On-farm water management	Kern Stutler**	18
Feb. 13	Forage production	Ralph Whitesides* Steven Dewey** Gerald Griffen*	25
Feb. 14	Reproduction problems in ruminants	David Marcinkowski* Robert Callan* Clell Bagley*	27
Feb. 15	Parasites of ruminants	Mark Healey* Clell Bagley* Ross Smart*	17
Feb. 19	Dairy management	John Swain* Stan Henderson* Clell Bagley*	20
Feb. 20	Dairy genetics	Robert Lamb* Wallace Taylor*	20
Feb. 21	Milk processing and products	Paul Savello**	18
Feb. 22	Economics of milk production	Kris Schultheis**	9

Count is approximate because attendees did not all arrive or leave at the same time.

* Discussion presented with translation assistance.

** Discussion presented directly in Spanish.

The USU/Quito team dedicated considerable time to the program planning and local logistics. Also, among the ten electronic conferences, six were continued locally in the afternoons for additional discussion on the practical implications of the subjects presented during the morning. These discussions generated considerable interest and were judged to be a valuable adjunct to the information emanating from the campus in Logan.

10.0 COLLABORATION WITH OTHER ECUADORIAN AGENCIES

10.1 Holstein Friesien Association

In the beginning of the Dairy RTTS the HFA, a sister private sector agency to the AGSO, was a major player in program development and implementation. The HFA president was among the team of four that visited Logan and selected USU as the Dairy RTTS implementor. However, the HFA in its traditional role as a record keeping agency for Purebred breeders did not lend itself to technology transfer and consequently its activity began to fade early in the program and by Phase II the HFA was essentially limited to "other" agency status. But they were always willing to publish information and to provide cooperators.

Section 9.0 shows direct HFA inputs through short term TA. These helps, which were given by Dr. R. Dean Plowman and Dr. Robert C. Lamb (USU) and Dr. Rex Powell (ARS-USDA Beltsville, MD), were directed at dairy herd record keeping and bull proving. Section 7.3 lists the technical reports and bulletins created by this activity.

10.2 The Ministry of Agriculture

Commentary on MAG administrative inputs into the RTTS Dairy program are given in Section 5.4. It was evident from the brief contacts with MAG personnel that the MAG had very little experience in technology development and diffusion. Consequently, the terms of reference and the review report for the MAG program review of August 1989 were written by UF. In this context the UF was acting as a surrogate MAG. Without this important input by the UF the MAG would have remained essentially unaware of the contributions of the RTTS programs.

In July 1990 another MAG review was done. This team, made up of other MAG personnel, was much more serious at the outset in pursuing the terms of reference and a more valid analysis could be anticipated. This review was not complete by the departure date of the USU technical personnel. Again, the terms of reference were prepared by the UF and not by the MAG itself.

Several MAG agencies were involved to some degree in the RTTS dairy program as described in the following.

10.21 ENDES (The Empresa Nacional de Semen):

The national agency for semen collection and distribution was directly involved in Dairy Team activities on three occasions. The first occurred in late 1986 when USU donated three pedigreed Holstein bulls to ENDES. This donation early in the Dairy RTTS helped USU gain visibility among the dairymen and many farmer cooperators were recruited as a result. The semen was distributed to an estimated 20,000 cows in the Sierra, many of whom were owned by small dairymen.

The second joint USU-ENDES effort occurred in February-March 1988 when a dairy herdsman short course was presented by USU personnel. Mr. John Swain and Mr. Stan Henderson came from Logan and Drs. Hoopes, Boman and Wennergren assisted. About 54 people were involved, including dairy farm mayordomos (farm foremen) and owners. The short course was rated highly. In 1989 the Quito

Pasteurizers Company offered to help fund a repeat of the program, but this did not materialize.

In mid-1989 the ENDES director requested USU help in acquiring three new bulls. They asked USU to donate one Holstein bull and to locate a commercially available red and white Holstein bull and a Jersey bull. The ADVS conducted a search for and located bulls with the needed specifications. The ADVS then initiated procedures for the purchase and transport of the selected animals. However, in the meantime the ENDES director was changed and the new director asked USU to suspend all action on new bull acquisition until their re-organization could be completed. What began as a very enthusiastic effort on the part of USU was aborted and no further action took place.

10.22 PROTECA (Programa Transferencia Tecnologica y Capa citación Agropecuaria):

This agency funded a major thrust in agricultural extension in and for the MAG, aimed at establishing a viable agricultural extension program. Personnel from this agency, beginning with the director's office, were invited on several occasions to attend and/or participate in the several farmer training programs conducted by the RTTS Dairy Team, but there was very little participation.

This PROTECA response is probably explained by the fact that donor agencies such as BID and AID have historically concentrated their agricultural developmental resources on basic food crops such as cereals and potatoes. Little, if any, effort has been focused on animal agriculture. Thus, agencies like PROTECA do not have personnel with formal training and experience in research or extension on animal health and nutrition, or for that matter in pastures and forages. Thus, they did not have the personnel to work with the Dairy Team.

10.23 INERHI:

The national water resource agency became involved during Phase II when the soils-pasture specialist on the RTTS Dairy Team sought their inputs in irrigation and drainage issues. Several field trips were made with INERHI personnel and three seminars were conducted by the RTTS Dairy Team, with major inputs from short term TA. Evidence of this may be seen in Section 9.0 "Short Term TA" and Section 7.3 "Publications".

INERHI invited closer ties to the USU on-farm water management expertise, for which USU has gained world-wide notoriety. However, for lack of financial resources, only informal collaboration by INERHI on soil moisture-related issues could be developed under the Dairy RTTS. This is unfortunate because it has been shown that the lack of improved on-farm water management (both irrigation and drainage) is a major limiting factor to improved crop (including pasture and forages) production in the Sierra. A soil moisture-soil fertility interaction demonstration was included in the December 1988 Dairy RTTS Plan of Work, but this did not occur because the funds were eliminated from the budget.

10.24 INIAP:

The national agricultural research institute can be characterized as severely lacking in their ability to respond to research information needs

related to soils, pastures-forages, animal nutrition and animal health. Leadership in all these sections, as well as at the director's level, changed at least once during the RTTS project. INIAP annual reports and plans of work were vague in all areas related to dairy technology. Formally published reports were not included in their work plans, and there did not appear to be a budget for printing publications. Furthermore, there appeared to be a serious lack of funding for INIAP, resulting in a deficiency in scientific capability. This is unfortunate because INIAP had a potential for significant support to and cooperation with the RTTS Dairy Team.

10.3 FUNDAGRO:

The Foundation for Agricultural Development (FUNDAGRO) was created by AID through an endowment. FUNDAGRO was intended to operate as an autonomous agency, but it remains dependent on AID in large measure for program approvals and fund disbursements. In an important sense FUNDAGRO is a surrogate AID.

FUNDAGRO's intended function was to serve as a catalyst, i.e. induce developmental activities in areas of special need. However, FUNDAGRO moved from the catalytic role to that of an implementor of agriculture extension programs, at least insofar as dairy technology was concerned. They hired and fielded dairy extension teams. In this respect, FUNDAGRO represented a special problem in terms of Dairy RTTS program activities and future dairy improvement work. On one hand, FUNDAGRO funded several technicians in the Dairy RTTS Team (see Section 4.0, Personnel). On the other hand, FUNDAGRO established parallel dairy extension programs with their own teams in areas where the Dairy RTTS already was actively extending dairy technology.

10.4 CENTROS AGRICOLAS:

The Ecuadorian Centro Agrícola (CA) is a farmer association authorized by national law in each canton. The CA was intended to help bring improved agricultural technology to the canton and was originally supported financially by the national government. However, during the RTTS programs none of this funding appeared to reach the cantons. The CA objectives are fulfilled in part by the management of an agricultural supply store at some of the CA headquarters. In some cases the CA provides technical assistance through owning and operating diagnostic soils laboratories (e.g. Ambato) and veterinary medicine laboratories (e.g. Baeza).

The CA was originally designed into the Dairy RTTS as a major player. Special agreements were signed which provided for a close collaboration between the AGSO and the CA's in Cayambe, Machachi and Latacunga. Under these agreements the CA was to provide office facilities for the AGSO extension person, plus transport facilities, and some financial support for field programs. A three-fold plan of activities for the CA's included: technical assistance to the members, development of laboratory diagnostic capability, and farm management service using computers.

The level of collaboration between the CA's and the Dairy RTTS ranged from excellent to poor. A well managed CA required considerable personal sacrifice on the part of the presidents (who rotated annually) and other officers; in some cases the altruism didn't reach a level sufficient to maintain good

relationships. Most dairy extension activities proceeded with only minimal material support. In some cases the CA was very critical of programs being implemented but failed to become closely enough involved to understand the needs and procedures for science-based technology development and diffusion.

If the model proposed for dairy improvement beyond 1990 is implemented (see Dr. D. Nelson, Section 9.0, Short Term TA) the CA's will become more intimately involved in the professional lives of the extension personnel, even to the extent of dictating program needs. Considerable risk is anticipated if this is implemented as outlined because many farmers were simply expecting continuous personalized service on the part of extension agents. Also, many farmers anticipated that the research-extension activities will merely justify many of their ingrained habits. The basic issue is that scientific discipline is needed in both technology development-diffusion and in program direction. This professional discipline does not exist at the farm level and the CA could become a hindrance to progressive action.

10.5 Universities and Technical Institutes:

The dairy improvement program was more or less continuously associated with the Central University (UC) in Quito. This collaboration was completely informal and was based mostly on the student thesis work-study programs. There was much less contact with the Technical University (UT) in Ambato and the Technical Institute (ESPOSCH) in Riobamba. The latter two sought the RTTS Dairy team participation, which occurred essentially as seminars given to students and faculty (See Section 8.0, Training).

The UC represented a special opportunity for collaboration because of the many students who became involved through the RTTS becas, "año rural" and "tesis de grado" programs. But at the same time the UC represented a peculiar challenge. Work-study programs would be outlined for the student but the UC faculty had veto power on the objectives and designs of the studies insofar as the thesis was concerned. Many student work plans proceeded without comment from the faculty but some were sharply modified or rejected. Some of the mis-understanding was based on an insistence that expensive laboratory analyses be included in the thesis when the financing simply was not available. In some cases the analyses would have been useful but in other cases they would have been worthless in terms of the study objectives.

11.0 SUMMARY OF RTTS SUB-PROJECT ACTIVITIES

ACTIVITY	PHASE		TOTAL
	I	II	
DIRECT MANAGEMENT ASSISTANCE TO PRODUCERS			
Number of farms	196	422	618
Number of animals	13,643	---	---
Office visits by dairymen	---	93	---
FARM DEMONSTRATIONS			
Number of farms	61	13	74
Number of demonstrations			
Initiated	118	15	133
Completed	33	12	45
CONFERENCES AND FORMAL INSTRUCTIONAL ACTIVITIES FOR PRODUCERS AND UNIVERSITY STUDENTS			
Number held	33	85	118
Number attendance	1,122	4,990	6,112
NUMBER OF COWS BROUGHT UNDER NEW PRODUCTION TECHNOLOGY			
Imported animals	3,000		3,000
Disease control	6,817		6,817
Mastitis		5,553	5,553
Milk replacer use	3,547	a	3,547
Feed concentrates	5,750	a	5,750
Calf starter	5,110	a	5,110
Calf hutches No.	868	a	868
Installed at farms No.	120	a	120
Artificial insemination	6	a	6
TRAINING OF EXTENSIONISTS			
Number of events	58	79	137
Person/days	277	220	497
PUBLICATION ACTIVITY			
Published	15	58	72
In preparation		6	6
TECHNICAL STUDIES AND REPORTS			
	2	2	4

ACTIVITY	PHASE		TOTAL
	I	II	
FIELD DAYS AND WORKSHOPS			
Number	34	9	43
Participants	976	270	1,246
STUDENT TRAINING			
Number	17	12	29
Person/months	135	53	188
Thesis finalized	3	7	10
SHORT TERM CONSULTANTS (Individual visits. Includes four visits in Phase II at no cost to contract)			
Number	8	17	25
Person/weeks	16	45	61
PERSONNEL ASSIGNED TO PROJECT (full time equivalent)			
MAG	4	6	10
FUNDAGRO		5	5
AGSO	1	1	2

a These activities were maintained in Phase II by the AGSO-MAG technicians and were included in the AGSO report. These data are not included here because this report emphasizes direct USU inputs.

12.0 RECOMMENDATIONS

From the beginning of the Dairy RTTS program, the USU technicians and counterparts confronted a severe shortage of proven Sierra-specific technology. When the lack of an adequate information base became obvious, the USU/Ecuador team designed and established field trials to satisfy, at least in a preliminary way, some of the informational needs. This applied research effort was severely constrained because program budgeting did not anticipate this need.

Developmental aid has historically de-emphasized animal agriculture. This is based on the premise that production of crops for direct human consumption (e.g. wheat, maize, rice, potato) is a more efficient use of natural resources for the benefit of small farmers, and also for society as a whole. This philosophy ignores the fact that animal industry is the only feasible way of exploiting many land and water resources (i.e. animal harvesting of pasture grown on terrain not suited for any other kind of agriculture). Furthermore, sale of animals and animal products is a principle source of cash income for even the smallest farmers. The status of sheep and dairy production in Ecuador reflects this policy. The recommendations given here deal with the fundamental deficiencies of the system.

The investigations recommended here do not include an economic component. This would be a vital input if irrelevant research objectives and results are to be avoided. Also, a general management program would be important because most producers don't have estimates or know how to calculate the costs of producing milk. INIAP does not have an economic research unit¹ and special organizational and manpower needs would need to be provided to bring both macro- and micro-agricultural economics to the desired level of performance. A degree program in Agricultural Economics at a University would be a good start.

Socio-economic objectives are commonly at the center of agricultural development programs but the recommendations for research given here do not specifically focus on sociology and anthropology. It is assumed that the "appropriate" technologies would be economically valid and that they would, accordingly, contain natural built-in adoption incentives for the farming community. It is apparent that a market-driven economy would be a pre-requisite for this assumption to be valid.

If the USU recommendations were accepted, the small farm focus could be replaced by a broad thrust with expansion of agricultural production as its base.

12.1 Research Direction

It is strongly recommended that qualified research directorship be developed during the early phases of upgrading country capacity for agricultural research. Effective directorship distinguishes between research program strategy

¹ Neither do the universities in Ecuador have departments of agricultural economics. Attempts were made by USU to initiate some economics courses in the Catholic University in Quito but nothing materialized from this effort.

and tactics. The latter refers to guiding, approving and funding technicians' plans of work. Tactics also includes the application of management tools commonly utilized in modern scientific institutions for monitoring, evaluating, and promoting research technicians, to assist the researchers in expanding their professional competence. Research strategy is set by the funding or controlling agency. The research tactics are based on politically and economically based strategies.¹

The number of topics may appear to be prohibitive, and it might be said that Ecuador cannot afford the start up costs of an up-to-date and broadbased experimental program. It is believed, however, that in the long run the overall costs will be far less than if it were attacked only piece meal.

Much of the infrastructure is in place to implement the suggested research program. The single most important deficiency is trained manpower. It will probably require two to three years to establish the human resource base, depending on whether or not INIAP-FUNDAGRO can re-recruit some of those 14 Ph. D. Ecuadorians who abandoned the system for want of professional encouragement and support.

12.2 Research Objectives

12.21 Animal Health, Nutrition and Management

Animal Health: A more complete characterization of dairy cattle diseases in the Sierra would include:

- a) The virus pneumonia and abortions complex (especially syncytial virus).
- b) Pasteurella pneumonia, with focus on new modified live vaccines and new killed bacterins.
- c) Leptospirosis, its importance and appropriate controls based on year-round exposure. This should include evaluation of new vaccines and preventive measures.
- d) Clostridial diseases, extent and intensity in the Sierra.
- e) Staphylococcus mastitis as related to improved milk production.

¹ The lack of coordination between strategy and tactics in INIAP direction is exemplified by the very large resource base being dedicated to wheat variety development (in which the tactics appear to be very appropriate, due to the inputs from CIMMYT). Ecuador at one time exported wheat. But for 20 years wheat has been imported by Ecuador because it has not been economically feasible to produce this grain here. Loss of wheat productivity in Ecuador has been ascribed to government subsidies to the consumer. It may actually be more closely related to the fact that massive soil erosion has eliminated much of the original wheat land. The USU has suggested that erosion has removed dozens of cubic kilometers of soil per province from the Sierra, leaving behind the non-arable Cangahua layer as the new terrain surface.

f) A parasite control program for the Sierra where lack of freeze-thaw action and persistent humid soil conditions favor parasite survival in the soil and on plant foliage.

g) Right heart failure or high altitude sickness. This disease is sometimes associated with the heart parasite Sarcosporida. Other stress factors are also involved. All of these factors should be evaluated and the relative contribution of each understood in terms of altitude sickness causes and effects.

h) Veterinary Medicine: An on-going evaluation of new veterinary medicine products in concert with the rapidly changing veterinary medicine picture should be an integral part of animal health investigations. This would help Sierra livestock industries keep abreast of world progress in preventive medicine.

i) A regional focus on animal health should be developed for increased efficiency in research on disease control. This would include endemic diseases like Brucellosis and Aftosa.

j) A well monitored animal quarantine system is needed to eradicate certain diseases and prevent the importation of diseases in new breeding stock.

k) Veterinary Diagnostic Laboratory: A veterinary laboratory diagnostic service is badly needed to support sound veterinary practices. This would provide for rapid and accurate identification of diseases in support of efficient health management programs.

Dairy Cattle Nutrition: Evaluate the cost-benefit relationships of locally available feed grains and by-product feed stuffs to adequately supplement cattle that are given large amounts of forage. The focus should be on feed supplements that have the lowest cost per unit of digestible energy. Protein content would be secondary to energy. Computer programs would be adapted to help select the appropriate combination of feed supplements for all required nutrients. Emphasis should be placed on maximizing forage intake at all stages of growth (birth to calving) and also during lactation in order to obtain optimum economic rates of growth and performance. Alternate sources of concentrate energy need to be explored, such as fats and oils, in order to improve animal productivity. There also needs to be an improvement in quality of forages offered to dairy cattle.

Dairy Cattle Management: Many dairy animals of all ages, both lactating and non-lactating, are poorly managed in the Sierra. Emphasis needs to be placed on proven methods of managing dairy cattle of all ages to counter the deeply entrenched traditional but counterproductive habits of producers. Examples of improved technology such as calf hutches, and managing adequately to breed for first calvings at 25-30 months of age need to be continued. Bovine Somatotropin needs to be evaluated under the conditions of the Sierra.

Animal genetics: Much progress can still be made in Ecuador in traditional genetics and selection of superior milk producing animals as parents of future generations. Also there is a need to evaluate genetic resistance in animals to selected diseases (for example, neoplasms and parasites) as probably the most economic approach to disease control.

Marketing: Develop quality controls for marketing animal products (meat and milk). Such controls could be based on price premiums for quality products in order to encourage good health and management practices at the farm level.

12.22 Pasture and Forage Production Management

Alfalfa: Before alfalfa production can be greatly improved an alfalfa stem nematode and alfalfa leaf spot fungus disease control program needs to be developed. This would emphasize genetic resistance and non-dormant alfalfa types.

The feasibility of producing alfalfa for use as dry hay under the humid conditions of the Sierra needs thorough evaluation. Presently some farmers are making significant investments in hay production without any assurance the cost/benefit picture is positive.

Pasture management: Grazing management studies, including pasture rotation, on different pasture mixtures are needed in order to determine the most profitable pasture-animal management system. Pasture adaptation trials should focus on the species/variety by site interactions. These trials should be done under conditions of well managed animal grazing.

A definitive test of grass-legume pasture mixtures with focus on the ability of legumes to supply nitrogen to grasses is needed. These studies should include the cost effectiveness of nitrogen and phosphorus fertilization of mixed pastures together with the role of animal manures in pasture soil fertility management. These evaluations should be done under conditions of well managed animal grazing and would be applicable to both dairy and sheep production management and would include:

- a) optimum carrying capacities for natural pastures.
- b) preference, palatability and resistance of grazing studies with different pasture species.
- c) animal productivity and net income as influenced by different stocking rates.
- d) economics of converting native pastures to improved (seeded) pastures.

Natural Pastures: Kikuyo is an important natural resource and is important to soil conservation on less intensively managed pastures. Kikuyo should be studied to extract its full potential in relation to:

- a) direct utilization of Kikuyo as forage through appropriate fertilization and management.
- b) reducing Kikuyo competition with improved species using selective herbicides in conjunction with control of saturated soils where needed.

12.3 Soil Management

Cangahua: The naturally cemented hardpan, and its influence on soil-plant-water relations, needs thorough characterization as a basis for soil and crop management. This is especially true in respect to control of saturated soils.

Nitrogen: The fate of fertilizer nitrogen (both organic and inorganic) under Sierra conditions needs a complete evaluation in order to increase the efficiency of the fertilizer investment and at the same time decrease or eliminate risk of stream and ground water pollution. The conditions that favor ammonia loss to the air from urea fertilizers would be included. Also the denitrification potential of different Sierra soils as related to water table conditions is needed as an adjunct to improved plant use efficiency of soil nitrogen.

Diagnostic Soils Laboratory: An early effort should be made to update the INIAP diagnostic soil test calibrations for phosphorus and potassium. In the process the longevity of phosphorus and potassium fertilizer treatments would be determined.

The secondary and micro plant nutrient elements, and associated soil test calibration and plant analysis procedures, need to be evaluated in order to determine the potential for suppressed crop yields from nutrient element deficiencies. The initial focus should be on sulfur, zinc, and boron.

Soil Acidity: The extent and intensity of acid soils in the Sierra needs to be determined, together with the influence of nitrogen fertilizer management practices on artificial acidification of soils.

On-farm Water Management: The absence of irrigated crop production research in the Sierra is an irony. Although irrigation is vital here, essentially no research has been done which would lead to an understanding of the profound interactions involving soil moisture, soil fertility and crop variety. This is especially true in regard to forage and pasture management. Technicians and farmers alike fail to recognize that there is no logical basis of soil fertility management in the absence of soil moisture management. Soil moisture and fertility interactions should be the core of any soil and crop production management studies.

Annex E



UTAH STATE UNIVERSITY

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January 29, 1991

Dr. Lawrence J. Janicki
Office of International Programs
University of Florida
Gainesville, Florida 32611

Dear Larry:

Enclosed are the required 7 copies of the final technical report for the dairy and sheep sub-projects we had with UF. I believe you already have the final financial reports from our contracts and grants office. I apologize for these technical reports being so slow getting to you. Dave James did the major writing, but he had a lot of other assignments when he returned to campus, so wrote them mostly on his own time. When they finally came to me I had to do some major rewriting to remove some biases and negativisms that I felt would do no good in a report such as this. I am proud of the job our technical team did in Ecuador. I feel this report now reflects the effort and accomplishments achieved there, even though we were not able to do all everyone hoped we would when the project started. I do not feel we need to apologize, make excuses, or try to put blame on anyone else.

I appreciate the opportunity we had to work with the University of Florida. I also appreciate the help you provided us personally as the RTTS Chief of Party in Quito. I recognize that you were often in an awkward position between AID, the USU team, and the MAG. I wish you the best in your future endeavors.

Sincerely,

Robert C. Lamb
Department Head
Animal, Dairy and Veterinary Sciences

RCL:ij
Enclosures

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UTAH STATE UNIVERSITY SHEEP SUB-PROJECT

UNIVERSITY OF FLORIDA RTTS PROJECT

FINAL REPORT

NOVEMBER 30, 1990

UTAH STATE UNIVERSITY SHEEP SUB-PROJECT
UNIVERSITY OF FLORIDA RTTS PROJECT
FINAL REPORT
NOVEMBER 30, 1990

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UTAH STATE UNIVERSITY SHEEP SUB-PROJECT
UNIVERSITY OF FLORIDA RTTS PROJECT
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1.0 EXECUTIVE SUMMARY

In early 1984 the Ecuadorian Ministry of Agriculture invited Utah State University to evaluate the sheep industry in the Ecuadorian Sierra and to determine the potential for improvements through technology development and diffusion. In 1985 a team of Ecuadorian public and private sector dairymen toured the United States and ultimately selected USU as the implementing agency for a recommended dairy improvement program. The Rural Technology Transfer System (RTTS) under the leadership of the University of Florida was already in place and USU was given a sub-contract to field a team of experts working in both sheep and dairy improvement.

The first long term Utah State University faculty arrived in Quito in March, 1986. There were two phases marked by differences in USU Team composition and program operational objectives and methods. The last USU faculty departed Quito in July, 1990.

The National Sheep Producers Association (ANCO) was selected to help implement the program. ANCO was first organized in 1957. Its mission was to produce improved sheep breeding stock for sale at cost to the Sierra sheep farmers. ANCO also fielded a team of extension specialists who worked with sheep producers to give impetus to higher efficiency of meat and wool production. In 1990, ANCO membership includes about 30,000 sheep farmers, 98% of whom are classified as small farmers.

The goal of the RTTS Sheep Sub-project was to further the socio-economic development of the Ecuadorian agricultural sector in meat and wool production so as to increase the production and income of the rural population of Ecuador. The purpose of the sub-project was to generate and transfer appropriate technology to the sheep producers. This was to be accomplished through classical applied research and agricultural extension systems. Direct assistance to ANCO in management of their sheep breeding stock stations was also included. Human resource development and institution building were included as program goals.

Utah State University fielded a team of senior faculty with extensive experience in developmental agriculture. During the period March 1986-July 1990 USU expended approximately 6.4 man-years in sheep improvement. The Utah State University Team Leader served the dairy and sheep programs in terms of both administration and technological inputs relative to their areas of expertise.

Utah State also provided 6.5 man-months to the sheep program under the Short Term Technical Assistance (TA) contract. In addition, Utah State provided short term TA at no cost to the sub-contracts (Title XII Program). All short term TA was integrated into the on-going programs. It provided for highly significant inputs, extending the range of disciplines and topics provided by the long termers. In addition, 21 USU faculty members contributed to a three-week USU-

FUNDAGRO electronic conferencing program which emanated from Logan and was received in Quito by closed circuit satellite transmission.

Project Papers provided for five faculty in the two sub-projects during the first two years and six faculty during the last two years. The last phase was to have given added emphasis to extension. But the extension thrust was severely reduced when AID reduced program funding; there were just three USU faculty among the two sub-contracts during the second phase.

The RTTS program purposes remained the same during the two phases but the objectives and methods were different. USU technology development and transfer activities during the two program phases are summarized in the following table.

ITEM	PHASE		TOTAL
	I	II	
Direct management assistance to private flocks			
Number of farms	313	216	539
ANCO sale of improved sheep			
From ANCO farms	1,996	5,056	7,052
From private farms	631	753	1,384
Community and membership training			
Number of courses	29	110	139
Participants (individuals)	1,289	4,649	5,938
Field instruction, persons	4,599	28,848	33,447
Introductory community visits			
Number	203	43	246
Participants	5,163	1,629	6,792
Field days			
Number	7	53	60
Participants	152	1,372	1,524
Extension training			
Participants	17	368	385
Person days	78	510	588
Publications	8	20	28
Short term technical assistance			
Number of experts	2	9	11
Person weeks	4	24	28

In regard to manpower development, Program funding allowed for one long term training scholarship; an ANCO technician received his MS in animal science at Utah State University. There were no full time counterparts for technical program

administration. A limited number of technicians were provided by MAG to the private sector as USU technical counterparts. The potential for manpower development was much greater than that actually achieved.

Collaboration with MAG dependencies (INERHI, INIAP, PROTECA) was essentially non-existent in the sheep program because these entities historically had dedicated very little to sheep production technology.

Universities in Ambato and Riobamba were informally involved in sheep technology development, mostly through the senior student thesis programs. These work-study programs were of significant benefit to the RTTS and to the students, but were of limited benefit to the universities. This was attributed to the fact that the universities fundamentally are not research oriented institutions and their contact with the world scientific community is practically non-existent because of the lack of language capabilities.

Emphasis on small-farm oriented technology was high in the RTTS Sheep Program because 98% of Ecuadorian Sierra sheep producers are defined as small farmers.

Recommendations are given on sheep research agenda.

2.0 RTTS SHEEP SUB-PROJECT DEVELOPMENT

The Ecuador Sheep Production Improvement Project was initiated under the auspices of the Rural Technology Transfer System (RTTS) Contract implemented by the University of Florida. The RTTS started in 1980 with a broad mandate to identify suitable activities which would impact the Ecuadorian agriculture sector and assist smaller producers.

In May of 1984, the Director of the Livestock Division for the Sierra, of the Ecuadorian Ministry of Agriculture (MAG), contacted Dr. Warren Foote, Director of the International Sheep and Goat Institute (ISGI) at Utah State University (USU) in an effort to obtain assistance with sheep production on three government-owned sheep farms. The request for assistance was accepted, and in September, 1984, after the August national elections, Drs. James Thomas and Simón Riera of the ISGI traveled to Ecuador to meet with the new government officials regarding this program. Under the direction of Dr. Galo Izurieta, the new director of the Sierra Livestock Division, the MAG decided to place any sheep activities under the RTTS which had recently moved from CONACYT to MAG.

During the next six months Drs. Thomas and Riera traveled to Ecuador several times to write the project paper under the USAID "collaborative assistance" process, and USAID and the ISGI (through USU and the University of Florida) agreed to a two-year effort to assist the farmers. The contract contained provisions for technical assistance, research and extension, and training. The RTTS provided administrative and logistic support and USU was given a subcontract from the University of Florida.

In October and November, 1984, the new government of Ecuador was visited by a presidentially appointed commission from the United States. The commission was to identify and review potential areas of mutual interest and recommend cooperative activities that would be beneficial as well. The commission identified the low level of fluid milk production in Ecuador as a solvable problem for which the U.S. could provide assistance. Veterinarians and producers agreed that low fertility in dairy cows was a major factor in the low milk production.

The Sierra Livestock Association (AGSO) and the Ecuador Holstein Friesian Association (HFA) requested that USU provide a dairy production specialist and a diagnostic veterinarian to survey selected dairy herds and make recommendations on an appropriate dairy health improvement program. This activity came under the USAID/USU Technical Support to Mission (TSM) Contract. Drs. Dean Plowman and Jay Call from the USU faculty did the survey and recommended that an Ecuador Dairy Production Improvement Project be initiated under the RTTS.

Dr. James Thomas wrote the project paper, assisted by Drs. Ronald Boman, Jay Call and Boyd Wennergren.

The sheep project was being finalized at the same time as the dairy project, and USAID/E and the University of Florida agreed that the projects should be combined administratively. As a result the projects were delayed somewhat in implementation. However, in March of 1986 the first three experts arrived in Ecuador. The team was completed in June of 1986.

Accordingly, the RTTS Sheep and Dairy Sub-projects have much in common, not the least of which was the overlapping assignments of the USU technicians on the two projects. In addition, on-campus and in-country administration of all contract parties treated the two sub-projects as one, especially during Phase I when both were reported together under the title "Sierra Livestock Project".

2.1 The Ecuador Sheep Producers Association (ANCO)

During the colonial period there were approximately five million sheep in the Ecuador. After independence in 1822, the wool market in Spain was eliminated resulting in a decline of the sheep industry.

A more recent major event that influenced the sheep industry in Ecuador was the Agrarian Reform of 1963. Prior to reform, the owners of the haciendas managed the sheep of the farm workers together with those of the hacienda. The workers did not make any management decisions with respect to their animals, therefore, they had very little experience or understanding of management. After the agrarian reform, the campesinos owned the property and were left to their own devices to manage the land as well as the animals. But because of the lack of management abilities and training, sheep productivity declined and death losses increased.

The national sheep producers association (ANCO) was organized in 1957. At that time there were approximately one million sheep in the country. The objectives of the organization were to organize a functional extension service to train the campesinos in sheep management skills and to improve the quality of sheep in Ecuador. ANCO received technical and financial assistance from FAO, BID, Banco de Fomento and MAG. Improved breeds of sheep were imported from Australia and the United States.

ANCO functioned from 1957 to 1972. During the latter part of this period, ANCO operated three farms with a total of 11,000 head of improved sheep. These farms were Concepcion de Monjas, Tablon (Pichincha), and Pachamama (Chimborazo). Lambs from these sheep were sold to upgrade the Criollo sheep that had decreased in quality and size due to inbreeding and poor management. ANCO also had eleven fully trained extension agents, two veterinarians and a wool grader that worked with producers throughout the Sierra.

In 1972 there were about 1.34 million sheep in the country and the industry was expanding and improving. However, there was a change of government in 1972 which led to expropriation of the ANCO farms and livestock. At the same time the extension services and educational programs were terminated. From 1972 to 1986 the numbers of improved sheep in the Government of Ecuador (GOE) (formerly ANCO) farms decreased rapidly with only a few offspring being sold to producers. The Sierra sheep industry declined sharply over this 14 year period.

In 1986, the GOE signed an agreement with ANCO to manage the three sheep farms but property ownership was retained by the state. At that time there were about 3,700 Corriedale and Rambouillet sheep on these farms. ANCO re-established their sheep extension service aiming it specifically at the campesinos who represented 98% of the sheep industry in the country at this time.

3.0 PROJECT GOALS AND OBJECTIVES

Specific sheep improvement goals were to improve the quality and quantity of domestic wool and to reduce Ecuadorian imports of fine wool; to increase the quality and number of sheep in the country to satisfy the local demand for meat and wool.

The project objectives were: 1) to initiate a training program for producers which would enable them to manage their herds for greater production of wool and meat; 2) to provide improved rams to upgrade the genetic quality of Criollo sheep in order to produce more and higher quality wool; and 3) provide technical assistance to the management of ANCO farms.

4.0 RTTS PROGRAM PERSONNEL

4.1 Phase I Utah State University Ecuador Contract Team

E. Boyd Wennergren, Ph.D., Professor Agricultural Economics, Utah State University; Quito Chief of Party and Agricultural Economist, March 1986 to June 1988. Dr. Wennergren's time was split between the Dairy Program and the Sheep Program, both as Chief of Party and Agricultural Economist.

Sra. Doris de Jarrin was the USU team secretary and Pablo Guamingo was the driver.

USU technicians with a majority obligation to the Sheep program were:

James Stevens, M.S., Extension Agent Utah State University, Sheep Specialist. June 1986 to July 1988.

Darrell Matthews, M.S., Extension Animal Specialist, Utah State University, Sheep Station Management Specialist. March 1986 to August 1988.

In Phase I Mr. Stevens focused primarily on extension training of the ANCO technicians. Mr. Matthews focused exclusively on management of the ANCO sheep stations located at Concepción de Monjas, Tablon (both in Pichincha) and Pachamama (located in Chimborazo). These two full-time sheep technicians account for 4.42 contract man years during this phase.

4.2 Phase I ANCO Personnel

Julio Escudero, President, ANCO
Alfonso Mosquera, Managing Director ANCO
Raul Montalvo, Ing., MAG Quito, Extension Agent and Supervisor
Manuel Olivo, Ing., MAG Cotopaxi, Extension Agent
Hernan Torres, Ing., ANCO Chimborazo, Extension Agent
Javier Cisneros, DVM, ANCO, Extension Quito
Richard Salazar, DVM, ANCO, Extension Quito
Noel Madrid, MAG, Manager Sheep Station Monjas and Tablon
Manuel Cueva, DVM, Manager Sheep Station Monjas 1989
Marco Leon, MAG, Manager Sheep Station Pachamama
Luis Castillo, MAG, Manager Sheep Station Tablon.

Ings. Mosquera and Escudero were in the indicated leadership positions before the Sheep RTTS Program was initiated. The overall sheep technician inputs were distributed approximately 4 FTE/year from ANCO and 6 FTE/year from MAG.

4.3 Phase II Utah State University Contract Team

David W. James, Ph.D., Professor, Department of Plants, Soils and Biometeorology, Utah State University; Quito Chief of Party and Soils-Pasture Specialist, August 1988 to July 1990.

Jay W. Call, DVM, MS, Professor, Animal, Dairy and Veterinary Sciences Department, Utah State University, Quito Animal Health Specialist, August 1988 to July 1990.

Drs. D. W. James and J. W. Call gave a lesser part of their time to the Sheep Program than the Dairy Program. Mr. Stevens carried over from Phase I. His work was essentially full-time in the Sheep Program although his job description had him doing some dairy extension training work as well. Mr. Stevens was called upon to assist in sheep station management as partial substitute for the help that Mr. Matthews had previously given. Two USU contract man-years are ascribed to this activity.

Sra. Doris de Jarrin resigned as USU team secretary early in 1989. She was replaced by Sra. Genoveva de Benitez, who continued to June, 1990. Sr. Eduardo Martinez provided team support, primarily as a driver, to the end of the program.

4.4 Phase II ANCO Personnel

Essentially all ANCO personnel from Phase I continued into Phase II. Luis Castillo, MAG, Manager Sheep Station Tablon resigned in 1989. Two full-time sheep technicians were added as follows:

Christian Wohlermann, Assistant Manager ANCO
Marco Rodriguez, DMV, MS, ANCO.

5.0 RTTS SHEEP PROGRAM ADMINISTRATION

5.1 Utah State University

5.11 On Campus

The RTTS Sheep Program was under the leadership of the Department of Animal, Dairy and Veterinary Sciences at Utah State University. Initially, the Department Head was Dr. R. Dean Plowman. He was succeeded for the final two years of the RTTS program by Dr. Robert C. Lamb. On-campus coordination was supplied at various times by Dr. James Thomas, who also served as Director of International Programs. Dr. Guy Denton (Campus Coordinator for about one year) and Ms. Jo Egelund (Project Accountant) were also contributors to Project Management.

In addition to administrators mentioned above, other USU administrative units represented by short visits to Ecuador during the course of the RTTS Programs included: Dr. Doyle J. Matthews, Dean, College of Agriculture; Dr. Weldon S. Sleight, Associate Dean for Resident Instruction, College of Agriculture; Dr. Gerald R. Olson, Assistant Vice President for Extension; Dr. Evan N. Stevenson, Vice President for Administrative Affairs.

University Administration also committed a significant amount of resources in the form of short term technical assistance for which there was no specific contractual obligation. These included two main inputs: First, faculty members in selected disciplines who made valuable contributions in identifying significant restraints to sheep production efficiency. These professors also participated in technology diffusion through the presentation of conferences and seminars and in writing extension-type bulletins and folders. These publications were integrated into the routine publication series of the Sheep Program. The names of Utah State University faculty who participated in these activities are included in Section 9.0. Their seminar/conference presentations and publications are included in Section 7.3.

The second contribution made by USU, in collaboration with FUNDAGRO, was in demonstrating the concept of international technology transfer through electronic media. This utilized an on-campus master computer, a slave computer in Quito and international telephone satellite communications. Through these media professors in various disciplines presented seminars from Utah to an audience of selected professionals in Quito. Administrators from AID/E, MAG and FUNDAGRO also participated. Details on the personnel, the topics covered and the seminar schedule are given in Section 9.4.

The Utah State University administration, both at the departmental and higher levels, was more involved in the two Ecuador livestock programs than any other overseas agricultural development program it has fielded. This technical and administrative assistance and support was reflected in the attitude, enthusiasm and dedication of each of the longterm faculty assigned to the field programs.

5.12 Utah State University Ecuador Contract Team Administration

Dr. E. Boyd Wennergren (Agricultural Economist) was USU Chief of Party during the first Contract phase and Dr. David W. James (Soil Scientist) was Chief of Party during the second phase. In both Program phases the Chief of Party time was divided between field program administration and technology development and diffusion within their own areas of expertise.

In technology development and diffusion, Dr. Wennergren had no counterpart in Agricultural Economics. He had the assistance of two local students plus short term inputs from two North American graduate students. Ing. Nelson Villacis was counterpart to Dr. James in the pasture/forage component.

5.2 University of Florida

The University of Florida (UF) was the prime contractor for the AID-GOE-MAG Rural Technology Transfer System (RTTS) program. This program began in 1980. As already indicated, when the Dairy and Sheep sub-projects were added to the RTTS in 1985 Utah State University was selected as program implementor. Accordingly, Utah State University was a sub-contractor under the Florida RTTS.

Under this arrangement, the UF was responsible for managing contract funds, including loan, grant and PL-480 funds. The UF also had prime responsibility for contract reports, and for providing liaison between the RTTS sub-projects and the MAG and AID. The USU Quito Team had a petty cash fund, amounting to about \$US250 which was replenished periodically upon submission of cash receipts. Operational costs thus involved were mostly associated with vehicle maintenance and operation and office supplies.

In Phase II, the PL-480 project operating funds were shared by UF with the ANCO as part of the Institutionalization thrust. This required that petty cash accounting and replenishment was also split. USU had no direct control over operating funds during this period.

5.3 AID/Ecuador

AID/E provided funds for the RTTS program implementation. The ANCO, representing the Ecuador sierra sheep private sector was selected as the main implementor of the RTTS Sheep sub-project. The official channel of communications between USAID and program implementors (ANCO) was via the MAG because the basic legal agreements were between USAID and the MAG. The MAG therefore had the authority to approve or disapprove pieces of the Plan of Work through their authority to approve or disapprove budget line items. During phase II USU was held responsible for the contracted goals and objectives even though there was a reduction in long term TA.

5.4 The Sheep Producers Association (ANCO)

ANCO management policy and procedure was aggressive from the outset, giving support to all program facets. At project inception ANCO quickly moved to take charge of the three sheep stations and invested their own funds for such things as seed for improved pastures, even before the official property release by the

MAG. The property release was delayed until late 1986 due to MAG reluctance to support the sheep program. Mr. Matthews worked on the Sheep Stations, but without any authority until the transfer. ANCO tried to move the program forward during this early period, but there was considerable conflict with the MAG. As soon as project funds became available for vehicles the ANCO extension program was able to move ahead rapidly.

The largest and most far reaching management decision by ANCO management and board of directors was the importation of improved sheep breeding stock from New Zealand. This was initiated and put into operating during Phase I. Improved ram distribution to growers began as soon as stock became available for this purpose. This activity continued regularly to the end of Phase II.

In Phase II a fulltime assistant manager was hired by ANCO. This greatly facilitated program monitoring and evaluation of field activities. A regular schedule of monthly planning and reporting meetings was one result of this increased commitment to management.

6.0 TECHNOLOGY VALIDATION AND DIFFUSION: METHODOLOGY

6.1 Phase I

Following the expropriation of 1972 the lamb crop on the MAG farms ranged from 35 to 60 percent. This was the result of: (1) Lack of funds for purchase of medicines and parasite control. Under MAG procedures such materials could not be purchased for months after requisitions were submitted and many animals died before control measures could be implemented. (2) The managers on two farms thought that sheep did not need drinking water, even during lactation. This contributed to the high lamb mortality rate for lack of milk production for the nursing lambs. (3) There was only one lambing per year. Many ewes only lambed once in two years.

Production information obtained by the renewed ANCO extension program indicated that campesinos were encountering numerous problems such as adult mortality rates of 20 percent; 47 percent lamb crop; 60 percent lamb mortality; requirement of 30 rams per 100 ewes; average weight of adult sheep of 45 pounds.

Specific practices were initiated to demonstrate the effect of improved flock management on these parameters.

6.2 Phase II

Body condition scoring was initiated during this period by the farm managers and technicians. The sheep were separated into groups and poor animals given supplemental feed. In addition, portable chutes were constructed which resulted in less stress on the animals and workers during shearing, medicine application and other management activities.

Newborn lambs were marked to identify them with their mothers. This enabled the managers to identify poor mothers or ewes that were sick or had other problems.

Records were kept so that more accurate management decisions could be made for selection, culling or identifying reproductive problems.

During the breeding season the rams' chests were painted to mark the ewes in heat. After one heat cycle the paint color was changed allowing the sheep to be divided into a herd that lambed early and one that lambed 18 days later.

A wool marketing and grading program was established. ANCO purchased wool in three of the major sheep producing areas. Producers were charged a percentage of the price for wool handling by ANCO.

Educational programs were developed and conducted in the Indian communities. Practices taught and demonstrated were: Culling of nonproductive ewes and rams; increased care of the ewe before and during lambing; shearing of udders to assure more efficient nursing by the newborn lamb; disinfection of the navels soon after birth; assuring that the lambs nursed soon after birth; control of internal and external parasites.

7.0 TECHNOLOGY VALIDATION AND DIFFUSION: RESULTS

7.1 Phase I

Implementation of improved management practices resulted in timely and effective application of medicines and parasite control practices. Water was provided to the sheep, especially during lactation. Two breeding periods were initiated so that ewes lambed at least once a year. These practices initiated on the ANCO sheep stations resulted in an average crop of 80 lambs per 100 ewes. The wool purchase and grading program resulted in an average price increase of 20% to the growers with 233% increased price for quality wool.

7.2 Phase II

The benefits of improved technology given to farmers resulted in reducing adult mortality from 20 to 12 percent; increasing lamb crop from 47 to 73 lambs per 100 ewes; reducing lamb mortality rate from 60 to 33 percent; decreasing ram requirement from 30 to 15 rams per 100 ewes; and increasing average adult weight of ewes from 45 to 57 pounds.

The economic benefit resulting from the improved management and wool prices has an annual rate of return of 118 percent. When improved rams were introduced into the Criollo flocks with the foregoing management practices, the annual rate of return was 130 percent.

7.3 RTTS Sheep Sub-project Publications

Paper and ink were budgeted in the RTTS program. Printing was done in the MAG printshop. During Phase I, 1000 copies of each publication were printed with semi-hard covers (cartelina).

7.31 Phase I

1. Descole y castración (Docking and castration). D. Matthews and J. Stevens.
2. Edad de ovejas (Determining age of sheep). D. Matthews and J. Stevens.
3. Selección y desecho (Selection and culling). D. Matthews and J. Stevens.
4. Práctica de genética y crianza en ovejas (Genetic practices and raising sheep). D. Matthews and J. Stevens.
5. Esquila a mano (Shearing sheep by hand). D. Matthews and J. Stevens.
6. Esquila a máquina (Machine shearing). D. Matthews and J. Stevens.
7. Preparing wool fleeces for market. D. Matthews and J. Stevens.

8. Sharpening hand shears. D. Matthews and J. Stevens.
9. Laparoscopia de ovejas en ecuador: investigación de la presentación de celo. (Laprascopy of Ecuadorian sheep; investigation of the presence of heat). Manuel Cueva.
10. Potencial económico de las ovejas mejoradas en el ecuador (Economic potential of improved sheep in Ecuador). E. B. Wennergren, J. Stevens and D. Matthews.
11. Una guía para calcular los costos en la producción ovina (A guide for calculating the costs of production of sheep). J. Escudero and E. B. Wennergren.

7.32 Phase II

The budget for Phase II publications was provided by a special allocation from PL-480. To reduce costs, Phase II publications were printed in 400 copies without firm cover. Several of these were reprinted.

12. Determinación de la Condición del Cuerpo con Relación a la Nutrición de los Ovinos. (Body condition evaluation as it relates to sheep nutrition) J. Butcher, J. Stevens, J. Call, W. Foote.
13. Procedimiento para Regular la Producción en Ovejas. (Procedures for regulating reproduction in sheep). W. Foote, J. Call, J. Stevens, J. Butcher.
14. Manejo Reproductivo en Ovejas en la Sierra del Ecuador. (Sheep reproduction management in the sierra of Ecuador). W. Foote, J. Stevens, J. Call, J. Butcher.
15. Programa Reproductivo Utilizando el Semen Importado para Ovejas Rambouillet. (Reproductive program using imported semen for Rambouillet sheep). W. Foote, J. Call, J. Stevens, J. Butcher.
16. Inventario de Control de Ovejas. (Inventory control of sheep). J. Butcher, J. Stevens, J. Call, W. Foote.
17. (Optimizing available feed resources for sheep). W. Foote, J. Butcher, J. Stevens, J. Call.
18. Manejo y Mecanismo de Pastoreo para Ovinas. (Pasture monitoring and management for sheep). J. Butcher, J. Stevens, J. Call, W. Foote.
19. Procedimiento para Evaluar las Razas de Ovejas en el Ecuador (Procedures for evaluating breeds of sheep in Ecuador). W. Foote, J. Call, J. Stevens, J. Butcher.
20. Clasificación: Una Práctica Primaria de Manejo para Aumentar la Producción de Ovejas. (Culling a primary practice to increase sheep production). W. Foote, J. Butcher, J. Stevens, J. Call.

21. Panadizo en Ovejas. (Foot rot in sheep). J. Call, C. Bagley, J. Stevens.
22. Epididymitis en Carneros (Ram Epidiymitis). C. Bagley, J. Stevens, J. Call.
23. Neumonía en Ovejas. (Pneumonia in sheep). C. Bagley, J. Call.
24. Guia de Productos para Control de Parásitos en Ovejas. (Product guide for control of parasites in sheep). J. Stevens, J. Call.
25. Economics of improved sheep raising methods in Ecuador. (Kris Schultheis)
26. Managing communally owned range and pasture lands. C. W. Gay, M. Rodriquez.
27. Manual tecnico de esquila. (Technical shearing manual). Raul Manzini.
28. Necrobacilosis in newborn lambs. J. Call and J. Stevens.

Other Publications

Sheep management wheel. ANCO Technicians.

Reference should be made to the RTTS Dairy Report for additional publications in the Pasture and Forage program. Much of the information presented there is equally applicable to the Sheep Program. A total of five field trials were implemented on the ANCO Sheep stations, the information for which is included under Dairy.

8.0 TRAINING ACTIVITIES

Student collaborators were exclusively from the Central University, Quito. They developed their senior thesis while assisting the RTTS Sheep Team. This represented an especially effective manpower training effort.

8.1 Phase I

<u>Student Name</u>	<u>Advisor</u>
Hernan Torres	Mr. Stevens
Marco Rodriguez	Mr. Matthews
Manuel Cueva	Mr. Matthews
Gilbert Paredes	Mr. Matthews
Elmo Gutierrez	Mr. Matthews
Javier Cisneros	Mr. Matthews
Richard Salazar	Mr. Matthews

8.2 Phase II

Maria Rosa Curillo	Mr. Stevens
Carmen Castillo	Mr. Stevens
Paulina Nuñez	Mr. Stevens
Johnny Barreno	Mr. Stevens

9.0 SHORT TERM TECHNICAL ASSISTANCE

The Short Term Contract gave very important support to the RTTS Sheep program, having a significant role in program development and implementation. In Phase II, short term TA workers were especially focused on the on-going Plan of Work. They made several valuable contributions, helping to identify important constraints across the whole gamut of sheep-related technologies. The terms of reference for Phase II helpers were also written in terms of farmer and student seminars and preparation of extension bulletins.

The contributions, which were supported both in country and on-campus under the USU Title XII program (i.e. done at no cost to the Sheep RTTS program), are integrated here with the work provided under the short term contract.

In addition, USU, with FUNDAGRO financial assistance, developed and presented a demonstration on electronically transmitted training programs with numerous inputs by a range of USU faculty. This is also included here.

9.1 Phase I Short Term TA

Mr. James Stevens. April 1-15, 1986. Prepare plan of work for long term assignment.

Dr. Warren C. Foote. July 10-20, 1986. Study ovulation characteristics of sheep in the sierra to coordinate breeding program for best season of year for lambing.

Mr. Darrell Matthews. July 6-20, 1987. Visit to New Zealand to help select sheep to be purchased and imported by ANCO.

9.2 Phase II Short Term TA

Sr. Diego Arias Galeas. February 13-April 21, 1989. To Uruguay to attend wool processing and grading short course.

Dr. John Butcher. June 13-26, 1989; also August 8-24, 1989. Evaluate range management and sheep nutrition. Co-authored extension bulletins on problems observed.

Dr. Warren Foote. September 9-24, 1989. Evaluate ANCO sheep breeding practices and quality of available breeding stock. Co-authored extension bulletins.

Mr. Darrell Matthews. January 23-March 6, 1989. Assisted in the second USU artificial insemination campaign; rams were selected, semen collected and shipped to Ecuador.

Mr. Kris Schulthies. Nov-Dec, 1989; also May 21-July 7, 1990. Prepare questionnaires and help implement data collection to evaluate economics of improved dairy and sheep technologies; calf rearing and feed supplements to lactating cows. Wrote three extension bulletins on findings.

Dr. Clell Bagley. December 2-17, 1989. Worked with local health experts in evaluating footrot and other disease problems of sheep. Co-authored extension bulletins on recommendations for improvement.

Dr. Charles Gay. June 16-30, 1990. Studied sierra ranges with focus on ANCO stations; emphasized need for grazing intensity management. Authored an extension bulletin on management recommendations.

Sr. Armand Votto. Forty five days between May 28 and July 27, 1990. Evaluated ANCO planning, budgeting and cost control system.

Sr. Raul Manzini. June 15-July 15, 1990. Conducted wool shearing, grading and marketing workshop at each of the ANCO stations. Wrote two bulletins on management practices.

9.3 USU Title XII Program

Mr. Steve Cox, USU Extension Area Supervisor. October 15-30, 1988. Evaluate dairy and sheep extension programs.

Dr. Sherman Thompson, USU Extension Plant Pathologist. March 4-18, 1989. Wrote an article on disease control in alfalfa through selection of resistant varieties. Emphasis was placed on the extent and intensity of alfalfa stem nematode in the sierra.

Dr. Steve Dewey, USU Extension Weed Control Specialist. April 16-29, 1989. Wrote an extension article on weed control practices in pasture and forage crops. Emphasis was placed on two-stage control of Kikuyo.

9.4 USU/FUNDAGRO/AGSO/ANCO Electronic Conferences

The electronic conferences, which occurred in February, 1990, utilized two international telephone lines simultaneously. One provided two-way person to person or person to group audio communication. The other provided visual communication from the USU campus computer to the Quito slave computer in which data and graphics were transmitted.

The electronic conferencing was rated an 85% success in terms of the programmed air time versus the accomplished air time. Less than perfect conditions existed at all times, mostly related to the data line. The electronic conferencing was rated a 100% success in terms of the number of USU faculty involved and the quality of the information they presented. There were a total of 19 faculty members representing three departments (Animal, Dairy and Veterinary Sciences Department; Plant, Soil and Biometeorology Department; and Agricultural and Irrigation Engineering Department) in two colleges (College of Agriculture and College of Engineering) making direct presentations in one or more subject areas. This does not count the support staff who programmed and produced the seminars in Logan. Dr. Weldon Sleight, Dr. James Thomas and Mr. Roger McEvoy were in Quito during different parts of the electronic conference to assist with productions on that end.

The following table summarizes the faculty participants and subjects they treated during the conferences. A total of 197 persons attended the ten electronic conferences representing FUNDAGRO, MAG, INIAP, INERHI, ANCO, AGSO, ENDES, HFA, and farmers. There was some participant duplication among conferences because certain persons attended as many as two or three different seminars. A video copy was made of most of the conferences and a copy left for the FUNDAGRO library.

ELECTRONIC CONFERENCES

Date	Topic	Professors	No. of Quito Participants#
Feb. 6	Ruminant nutrition	Randy Wiedmeier* John Butcher*	28
Feb. 7	Dairy nutrition	Mike Arambel* Ronald Boman**	15
Feb. 8	On-farm water management	Kern Stutler**	18
Feb. 13	Forage production	Ralph Whitesides* Steven Dewey** Gerald Griffen*	25
Feb. 14	Reproduction problems in ruminants	David Marcinkowski* Robert Callan* Clell Bagley*	27
Feb. 15	Parasites of ruminants	Mark Healey* Clell Bagley* Ross Smart*	17
Feb. 19	Dairy management	John Swain* Stan Henderson* Clell Bagley*	20
Feb. 20	Dairy genetics	Robert Lamb* Wallace Taylor*	20
Feb. 21	Milk processing and products	Paul Savello**	18
Feb. 22	Economics of milk production	Kris Schultheis**	9

Count is approximate because attendees did not all arrive or leave at the same time.

* Discussion presented with translation assistance.

** Discussion presented directly in Spanish.

The USU/Quito team dedicated considerable time to the program planning and local logistics. Also, among the ten electronic conferences, six were continued locally in the afternoons for additional discussion on the practical implications of the subjects presented during the morning. These discussions generated considerable interest and were judged to be a valuable adjunct to the information emanating from the campus in Logan, Utah.

10.0 COLLABORATION WITH OTHER ECUADORIAN AGENCIES

10.1 The Ministry of Agriculture

Commentary on MAG administrative inputs to the RTTS Dairy program are given above in Section 5. It will be noted that all the land and water resources utilized by ANCO at their sheep breeding stations, together with a large percent of the live stock, were property of MAG and were leased to ANCO.

There was essentially no collaboration with MAG dependencies, such as INIAP and PROTECA, in the Sheep Sub-project.

10.2 ESPOSCH

The Polytechnic Institute in Riobamba was a close collaborator in the ANCO sheep improvement program, especially during Phase II. Several senior thesis projects were developed at Pachamama. In addition seminars and workshops were presented to students at ESPOSCH and area farmers as listed in Section 11.0.

10.3 Ambato University

Seminars and workshops were presented in Ambato analogous to those in Riobamba.

10.4 Central University, Quito

Seminars were presented by ANCO technicians and by Project short term animal health and nutrition consultants.

11.0 SUMMARY OF RTTS SHEEP SUB-PROJECT ACTIVITIES

ITEM	PHASE		TOTAL
	I	II	
ANCO MEMBERSHIP			
Individuals	290	16	306
Communities	47	41	88
Community members	7,558	7,157	14,715
DIRECT MANAGEMENT			
Assistance to private flocks (No. farms)	313	226	539
ANCO SALE OF IMPROVED SHEEP			
ANCO farms	1,996	5,056	7,052
Private farms	631	753	1,384
IMPROVED SHEEP SELECTED BY ANCO FOR SALE FROM PRIVATE FLOCKS			
	958	438	1,396
COMMUNITY AND MEMBERSHIP TRAINING			
Number of courses	29	110	139
Participants (individuals)	1,289	4,649	5,938
Field instruction, persons	4,599	28,848	33,447
INTRODUCTORY COMMUNITY VISITS			
Number	203	43	246
Participants	5,163	1,629	6,792
FIELD DAYS			
Number	7	53	60
Participants	152	1,372	1,524
EXTENSION TRAINING			
Participants	17	368	385
Person days	78	510	588
PUBLICATIONS			
	8	20	28
SHORT TERM TECHNICAL ASSISTANCE			
Number of experts	2	9	11
Person weeks	4	24	28

12.0 RECOMMENDATIONS FOR A RESEARCH AGENDA: SHEEP

From the beginning of the Sheep RTTS program, USU technicians and counterparts confronted a severe shortage of proven Sierra-specific technology. When the lack of an adequate information base became obvious, the USU/Ecuador team designed and established field trials to satisfy, at least in a preliminary way, some of the informational needs. This applied research effort was severely constrained because program budgeting did not anticipate this need. More details on the status quo of Ecuadorian animal agricultural research are given in the RTTS Dairy Sub-project final report.

The investigations recommended here for sheep production improvement do not include an economic component. This would be a vital input if irrelevant research objectives and results are to be avoided. It is assumed that "appropriate" technologies would be economically valid and that they would, accordingly, contain natural built-in adoption incentives for the farming community. It is apparent that a market-driven economy would be a pre-requisite for this assumption to be completely valid.

12.1 Research Direction

It is strongly recommended that qualified research directorship be developed during the early phases of upgrading country capacity for agricultural research.

The infrastructure is not in place to implement the suggested sheep research program. This is because INIAP has never had a clear focus to assist the sheep industry. The single most important deficiency is trained research manpower.

12.2 Research Objectives

12.21 Animal Health, Nutrition and Management

There is a need to focus on a parasite control program for the Sierra where lack of freeze-thaw action and persistent humid soil conditions favor parasite survival in the soil and on plant foliage.

A veterinary diagnostic laboratory service is badly needed to support sound veterinary practices. This would provide for rapid and accurate identification of diseases in support of efficient health management programs.

The cost-benefit relationships of locally available feed grains and by-product feedstuffs should be evaluated with a focus on feed supplements that have the lowest cost per unit.

Genetic resistance in animals to selected diseases (for example, parasites) is probably the most economic approach to disease control.

Quality controls for marketing wool and meat need to be implemented. Such controls could be based on price premiums for quality products in order to encourage good health and management practices at the farm level.

An important question in the sheep industry is why sheep do not have twins even though imported breeds normally give birth to twins in countries of origin. Is the low lamb crop related to nutrition or other environmental factors? The solution to these problems would have far-reaching effects in terms of sheep production and re-production efficiency.

12.22 Pasture and Forage Production Management

Grazing management studies, including pasture rotation, on different pasture mixtures or types are needed in order to determine the most profitable pasture-animal management system. Pasture adaptation trials should focus on the species/variety by site interactions. These trials should be done under conditions of well managed animal grazing.

A definitive test of grass-legume pasture mixtures with focus on the ability of legumes to supply nitrogen to grasses is needed. These studies should include the cost effectiveness of nitrogen and phosphorus fertilization of mixed pastures together with the role of animal manures in pasture soil fertility management. These evaluations should be done under conditions of well managed animal grazing and would be applicable to both dairy and sheep production management and would include:

- a) optimum carrying capacities for natural pastures.
- b) preference, palatability and resistance of grazing studies with different pasture species.
- c) animal productivity and net income as influenced by different stocking rates.
- d) economics of converting native pastures to improved (seeded) pastures.

Natural Pastures: Kikuyo is an important natural resource and is important to soil conservation on less intensively managed pastures. Kikuyo should be studied to extract its full potential in relation to:

- a) direct utilization of Kikuyo as forage through appropriate fertilization and management.
- b) reducing Kikuyo competition with improved species using selective herbicides in conjunction with control of saturated soils where needed.

The fate of nitrogen fertilizer (both organic and inorganic) under Sierra conditions needs a complete evaluation in order to increase the efficiency of the fertilizer investment and at the same time decrease or eliminate risk of stream and ground water pollution. The conditions that favor ammonia loss to the air from urea fertilizers would be included.

An effort should be made to update the INIAP diagnostic soil test calibrations for phosphorus and potassium. In the process the longevity of phosphorus and potassium fertilizer treatments would be determined.

Annex F

Annex F

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS)

Professional Long-term					
Subproject/Unit	Advisor	Tour	"1040"	"9025"	Speciality
University of Florida			152.20	47.00	
Admin Unit	Kamal Dow	10/15/85-02/28/87	16.50		Chief of Party
Admin Unit	Romulo Soliz	10/15/85-08/24/90	35.50	20.00	Project Officer
Admin Unit	Lawrence Janicki	01/28/86-08/24/90	32.00	20.00	Training Officer
MEGALIT	Edward Golding	06/23/86-03/01/88	19.20		Chief of Party
MEGALIT	Hector Vicencio	09/03/85-09/02/88	24.00		Cattle Production
APROCICO	Philip Stansly	08/28/85-07/15/89	25.00	7.00	Cattle Marketing
					Entomologist
Utah State University					
Advisor	Tour		191.00	57.00	Speciality
Dairy	Boyd Wennergren	03/02/86-07/03/88	29.50		Ag. Economist
					Team Leader
Dairy	Keith Hoopes	03/06/86-07/01/88	29.50		Animal Health
Dairy	Ronald Boman	06/09/86-08/22/88	26.50		Dairy Production
Sheep	Darrell Matthews	02/28/86-08/16/88	31.00		Sheep Management
Sheep	James Stevens	06/06/86-07/29/90	26.50	19.00	Livestock Ext.
Dairy	David James	07/28/88-07/24/90		19.00	Soil Fertility
					Team Leader
Dairy	Jay Call	07/28/88-07/07/90		19.00	Animal Health

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COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Professional Short-term					
Subproject/Unit	Advisor	Tour	50.73	18.45	Speciality
University of Florida			42.14	3.41	
Admin	Lawrence Janicki	11/10/85-11/22/85	.45		Administrative
Admin	Hugh Popenoe	10/21/86-10/24/86	.18		Administrative
Admin	Hugh Popenoe	09/27/87-10/02/86	.23		Administrative
Admin	Sue Springsteen	03/06/88-03/19/88	.45		Administrative
Admin	Sherman F. Pasley	05/22/88-05/27/88	.23		Administrative
Admin	Hugh Popenoe	07/09/88-07/12/88	.18		Administrative
Admin	Hugh Popenoe	09/02/89-09/06/89		.18	Administrative
APROCICO	Jose Oromi	04/08/86-09/08/86	5.00		Organizations
APROCICO	James Jones	05/24/86-10/24/88	5.00		Sociologist
APROCICO	Michael Irwin	02/07/87-02/10/87	.14		Entomologist
APROCICO	Gerald Kidder	03/29/87-04/11/87	.45		Soil Fertility
APROCICO	Gary Simone	04/20/87-05/02/87	.45		Plant Pathology
APROCICO	Carl Barfield	05/31/87-06/05/87	.23		Entomologist
APROCICO	David Zimet	08/28/87-09/12/87	.45		Marketing
APROCICO	Michael Irwin	09/16/87-09/20/87	.23		Entomologist
APROCICO	Clifton Hiebsch	10/04/87-10/17/87	.45		Soybean Extension
APROCICO	Edwin C. French, III	01/17/88-02/29/88	1.14		Agronomy
APROCICO	Keith Andrews	05/08/88-05/14/88	.23		Entomologist
APROCICO	Alvaro Castillo	07/03/88-07/24/88	.68		Ag. Engineering
APROCICO	Kamal Dow	06/27/87-07/24/87	.91		Marketing
APROCICO	Giovanni de Choudens	08/14/88-09/10/88	.91		Organizations
APROCICO	William Zettler	09/06/88-09/16/88	.45		Plant Pathologist
APROCICO	L. Van Crowder	10/16/88-10/28/88	.45		Extension
ARPOCICO	L. Van Crowder	02/14/89-02/21/89		.23	Extension
ARPOCICO	William Zettler	04/16/89-04/30/89	.45	.45	Plant Pathology
ARPOCICO	Mark Elliot	04/16/89-04/30/89		.45	Plant Pathology
MEGALIT	Roger West	08/30/86-09/05/86	.23		Heat Science
MEGALIT	Joseph Conrad	08/30/86-09/05/86	.23		Animal Nutrition
MEGALIT	Timothy Olson	08/30/86-09/05/86	.23		Cattle Breeding
MEGALIT	Scott Loeffler	08/30/86-09/05/86	.23		Animal Diseases
MEGALIT	Van Crowder	12/04/86-12/20/86	.50		Extension
MEGALIT	Salvador Jimenez	02/14/87-08/13/87	6.00		Organizations
MEGALIT	Joseph Conrad	07/12/87-07/25/87	.45		Animal Nutrition
MEGALIT	Scott Loeffler	07/03/87-07/23/87	.68		Animal Diseases
MEGALIT	Pablo Mendoza	07/19/87-07/25/87	.23		Tropical Pastures
MEGALIT	Timothy Olson	07/12/87-07/25/87	.45		Animal Breeding
MEGALIT	H. H. Van Horn	11/14/87-11/21/87	.23		Dairy Extension
MEGALIT	Loy V. Crowder, Sr	12/06/87-12/12/87	.23		Tropical Pastures
MEGALIT	James Simpson	12/06/87-12/12/87	.23		Ag. Economics
MEGALIT	Marilyn Swisher	12/06/87-12/12/87	.23		Women's Issues
MEGALIT	Fedro Zazueta	01/24/88-01/30/88	.23		Water Management
MEGALIT	Joseph Conrad	02/14/88-03/02/88	.55		Animal Nutrition
MEGALIT	Rolf Larsen	04/10/88-04/23/88	.45		Animal Reproduct
MEGALIT	Thomas Spreen	05/29/88-06/06/88	.27		Marketing
MEGALIT	Joseph Conrad	07/05/88-07/25/88	.68		Animal Nutrition
MEGALIT	Rolf Larsen	07/09/89-07/28/89		.68	Animal Reproduct
MEGALIT	Joseph Conrad	06/20/89-07/18/89		.91	Animal Nutrition
MEGALIT	Joseph Conrad	07/08/90-07/22/90		.50	Animal Nutrition

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Professional Short-term				
Subproject/Unit	Advisor	Tour		Specialty
University of Florida				
PITALPRO	Robert Bates	04/03/86-04/20/86	.59	Post Harvest
PITALPRO	Richard Matthews	04/03/86-04/20/86	.59	Post Harvest
PITALPRO	Romeo Toledo	08/23/86-09/06/86	.45	Food Processing
PITALPRO	William Shane	10/22/86-11/03/86	.45	Data Processing
PITALPRO	William Shane	03/15/87-04/04/87	.68	Data Processing
ESPOL	Thomas Popma	11/06/87-11/25/87	.68	Aquaculture
ESPOL	Thomas Popma	07/16/88-08/15/88	1.00	Aquaculture
TRAINING	James Kelly	03/31/87-04/09/87	.23	Training Trainers
TRAINING	James Kelly	05/10/87-06/11/87	2.05	Training Trainers
TRAINING	Michael Wilburn	05/10/87-06/08/87	1.32	Training Trainers
TRAINING	James Kelly	08/30/87-10/04/87	1.59	Training Trainers
TRAINING	Van Crowder	08/31/87-09/11/87	.55	Training Trainers
Non-Subproject	Dwaine Gull	05/04/86-05/17/86	.45	Vegetables
Non-Subproject	William French	05/08/86-05/16/86	.27	Plant Pathology

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Professional Short-term				
Subproject/Unit	Advisor	Tour		
Utah State University			8.59	15.05
Admin	James Thomas	05/03/87-05/15/87	.45	Administrative
Admin	James Thomas	11/10/87-11/20/87	.32	Administrative
Admin	Dean Plowman	04/23/88-04/30/88	.23	Administrative
Admin	James Thomas	07/05/88-07/12/88	.23	Administrative
Admin	Jo Egelund	08/29/88-09/03/88	.23	Administrative
Admin	Guy Denton	12/10/88-12/18/88	.23	Administrative
Admin	Robert Lamb	08/13/89-08/26/89		.45 Administrative
Admin	Robert Lamb	08/21/89-08/26/89		.23 Administrative
Dairy	Ronald Boman	04/14/86-04/29/86	.45	Dairy Extension
Dairy	Dean Plowman	04/21/86-04/29/86	.23	Herd Records
Dairy	Ross Smart	07/07/86-07/31/86	.82	Laboratories
Dairy	Roy Blaser	10/15/86-10/30/86	.45	Tropical Pastures
Dairy	Dean Plowman	01/10/87-01/25/87	.45	Herd Records
Dairy	William Farnsworth	03/01/87-03/08/87	.14	Dairy Extension
Dairy	David James	04/15/87-04/22/87	.23	Soil Fertility
Dairy	Larry Bond	06/01/87-06/21/87	.68	Dairy Extension
Dairy	Dean Plowman	11/01/87-11/15/87	.45	Herd Records
Dairy	Larry Bond	01/10/88-01/24/88	.68	Dairy Extension
Dairy	Jay Call	01/10/88-01/24/88	.45	Animal Health
Dairy	Donald Thomas	03/15/88-03/30/88	.45	Milk Sanitation
Dairy	Keith Hoopes	11/07/88-11/19/88	.45	Animal Health
Dairy	Ronald Boman	02/06/89-03/04/89		1.00 Dairy Extension
Dairy	Ross Smart	04/30/89-04/06/89	.27	Disease Diagnosis
Dairy	John Butcher	05/14/89-05/21/89	.27	Animal Nutrition
Dairy	Lyman Willardson	06/11/89-06/27/89	.55	Drainage
Dairy	Kern Stutler	06/25/89-07/08/89	.55	Irrigation
Dairy	Robert Lamb	08/13/89-08/20/89	.27	Animal Reproduct
Dairy	Ronald Boman	09/10/89-10/07/89	.91	Dairy Extension
Dairy	Kris Schulthies	11/11/89-12/03/89	.68	Ag. Economics
Dairy	Keith Hoopes	03/10/90-03/24/90	.45	Animal Health
Dairy	Ronald Boman	03/10/90-04/07/90	.95	Dairy Extension
Dairy	Kris Schulthies	05/21/90-07/09/90	1.59	Ag. Economics
Dairy	Kern Stutler	06/17/90-06/30/90	.55	Irrigation
Sheep	William Farnsworth	03/01/87-03/08/87	.14	Extension
Sheep	James Stevens	04/14/86-04/29/86	.45	Extension
Sheep	Warren Foote	07/10/86-07/20/86	.36	Sheep Reproduct
Sheep	Darrell Matthews	01/23/89-03/05/89		1.36 Sheep Management
Sheep	Ross Smart	05/07/89-04/12/89	.27	Disease Diagnosis
Sheep	John Butcher	05/22/89-05/27/89	.27	Nutritionist
Sheep	Warren C. Foote	09/09/89-09/25/89	.64	Sheep Reproduct
Sheep	John Butcher	09/09/89-09/25/89	.64	Nutritionist
Sheep	Kris Schulthies	12/03/89-12/22/89	.68	Ag. Economics
Sheep	Clell Bagley	12/02/89-12/16/89	.55	Extension Vet.
Sheep	Charles Gay	06/17/90-06/30/90	.55	Range Management
Sheep	Raul Manzini	06/04/90-07/13/90	1.36	Wool Management

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Local Hire Professional					
Subproject/Unit	Person	Tour	46.50	20.00	Speciality
University of Florida			46.50	20.00	
Admin	Luis Rosero	02/01/86-01/31/88	24.00	0.00	Training
APROCICO	Leonor Guerrero	02/17/87-08/24/90	22.50	20.00	Lab Technician
Utah State University			0.00	0.00	
Admin			0.00	0.00	
DAIRY			0.00	0.00	
SHEEP			0.00	0.00	

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Local Hire Technical Assistance					
Subproject/Unit	Advisor	Tour	0.00	13.86	
University of Florida			0.00	10.23	Speciality
Admin			0.00	0.00	
APROCICO	Jorge Rovayo	05/21/90-07/31/90		2.00	Organizations
MEGALIT	David Nelson	02/19/90-06/30/90		2.05	Organizations
	Gonzalo Sierra	03/01/90-06/30/90		2.00	
	Luis Cabrera	04/01/90-05/30/90		1.82	
	Gonzalo Sierra	07/09/90-08/15/90		1.36	
	Luis Cabrera	07/24/90-08/23/90		1.00	
Utah State University			0.00	3.64	Speciality
Admin			0.00	0.00	
DAIRY	David Nelson	11/15/89-07/07/90		1.59	Organizations
SHEEP	Armando Votto	05/01/90-07/20/89		2.05	Organizations

COMPOSITION AND QUANTITY OF IN-COUNTRY STAFFING (WORK MONTHS) Continued

Local Hire					
Administrative	Advisor	Tour	93.50	20.00	
Subproject/Unit					
University of Florida			93.50	20.00	Speciality
Admin Unit	Jenny Valencia	10/15/85-04/30/88	30.50	0.00	Administrative
	Pedro Borja	10/15/85-03/15/88	29.00	0.00	Accountant
	Fabian Paz	03/01/86-04/30/88	26.00	0.00	Accountant
	Miguel Angelo Soto	00/00/88-00/00/88	5.00	0.00	Accountant
	Carmen Villafuerte	10/01/88-08/24/90	3.00	20.00	Accountant
Utah State University			0.00	0.00	Speciality
Admin			0.00	0.00	
DAIRY			0.00	0.00	
SHEEP			0.00	0.00	
Local Hire					
Support	Advisor	Tour	328.00	155.50	
Subproject/Unit					
University of Florida			216.50	94.00	Speciality
Admin	Elizabeth Salazar	10/15/85-08/24/90	38.50	20.00	Bilingual Sec.
	Judith Romo leroux	10/15/85-08/24/90	38.50	20.00	Secretary
	Patricio Landeta	02/12/86-02/08/87	12.00		Driver/Admin
	Enrique Gless	02/24/87-02/30/88	12.00		Driver/Admin
	Nery Romero	03/01/88-06/25/89	16.00		Driver/Admin
	Marco Soliz	07/01/89-08/30/86	0.00	1.00	Driver/Admin
	Jose Castillo	08/25/89-09/30/89	0.00	1.00	Driver/Admin
	Jorge Abad	10/05/89-08/24/90	0.00	11.00	Driver/Admin
APROCICO	Ligia Marcillo	06/16/88-08/24/90	5.50	20.00	Secretary
	Edmundo Cervantes	01/09/88-08/24/90	12.00	20.00	Driver
MEGALIT	Mariana Gambarotti	07/07/86-04/04/87	9.00		Secretary
	Cecilia Zambrano	02/01/87-01/30/89	23.00	1.00	Secretary
	Sergio Silva	07/07/86-07/30/88	24.00		Driver
	Mario Cevallos	07/02/86-09/30/88	26.00		Driver
Utah State University			111.50	61.50	Speciality
DAIRY	Sandra Littuma	04/15/86-08/15/86	4.00		Secretary
	Doris Grijalba	08/25/86-07/18/89	28.00	6.50	Secretary
	Genoveva Esquetini	04/10/89-07/30/90		15.00	Secretary
	Eduardo Martinez	03/12/86-08/24/90	33.00	20.00	Driver/Mechanic
SHEEP	Ana Moncayo	06/08/86-08/30/87	15.00		Secretary
	Pablo Guaminga	05/15/86-08/24/90	31.50	20.00	Driver/Ext.

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