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TRIP REPORT

J. K. McLermott

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Project: Small Farmer Technology Development 514-0203

Purpose of this trip was to help the Mission evaluate a loan project with the Instituto Colombiano de Agropecuaria (ICA) in Small Farmer Technology. This was one of the last loans approved for Colombia before Mission phaseout began. It was finalized under forced draft and was designed largely by the Mission in collaboration with the Office of Planning more than with that of ICA.

Observations

Project Description
Project Organization
Program and Concepts
Research
Paper work, Data Processing, Publications
Communication, Organization, and Diffusion
ICA Operations
Technology Transfer Audience
Linkages
Technical Assistance
International Technical Interchange

Analysis, Discussion, Interpretations

General
Conceptualization
Design
Quantification, Objectification, Paper
Plants and People
Farm Management
Perfection or Experimentation
International Technical Interchange

Recommendations

Management
Design
Farmer Involvement
Experimentation
Other Experience
Project Extension

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Observations

Project Description

The project was designed in a systems format and emphasized five sub-systems:

1. One to describe and analyze the small farmer, his strengths, weaknesses, technology, and problems;
2. One to do adaptive research directed toward development of appropriate small farm technology;
3. One for devising methods of delivery of critical services including agricultural technology and risk aversion schemes to small farmers;
4. One for encouraging local small farmer organization to assist in the functioning of "2" and "3" above; and
5. One for evaluating and monitoring all project activities.

The first sub-system would consist of a desk analysis of secondary data and a field analysis utilizing primary data and would result in a knowledge of the production process used by farmers, establishment of economic baselines, definition of market areas, and a description of economic and social systems.

The second sub-system included discovery of the best farmer-used technology, on-farm experimentation, technology architecture base on improved knowledge of the farmer, and consultation with farmers.

The third sub-system included delivery of the best farmer technology, use of farmers as part-time extension agents, training of agents, insurance against risk and delivery of other inputs.

Sub-system four included group purchase of inputs, demonstrations using existing organizations, assembly of farm products, credit unions, and reimbursed technical services by the farm organizations on a commercial basis to small farmers.

The final sub-system would consist of a Project Monitoring and Evaluation Unit which would work with verbal feedback, trouble shooting studies, farm records, and area economic and social indicators.

Project funds can be used for national personnel, international technical interchange, commodities, and technical assistance. Duration of the project is three years. Mission personnel active in the design of the project were transferred before significant project activity took place, and project management has just passed to the fourth USAID officer.

ICA initiated project activities in the fall of 1976, in order to take advantage of both 1977 crop cycles, although final agreements were not signed until later. However, ICA considers the project as starting in January 1977, since it considers these years at best a short time for the project and wants to use three complete crop years. The project operates in three ICA districts, identified as technology transfer districts. I visited two, both in the Andes, one in the South with headquarters in Garzon, Department of Huila, and one in the East Central, headquartered in Pamplona, Department of North Santander. Two Mission officers also visited Pamplona -- David Schear, Rural Development Officer, and Janice Weber, Evaluation Officer. The third technology transfer district is in the Guajira. While we were in Pamplona, five ICA officials from Bogota and two from its Region Seven Headquarters in Bucaramanga were in the district for the annual evaluation seminar with the professional staff of the district.

Project Organization

Although there are variations, a typical district is headed by an Ingeniero Agronomo (B.S. in Agriculture), and covers nine or ten municipios (counties). Sub-professionals of ICA, called "practicos", form the major interface with the campesinos. A "practico" has about 12 years of education, with a specialization either in agriculture or home economics, although there are variations in the pattern of education. Each practico is assigned a work front, consisting of one or more communities or neighborhoods, in which he works with about 30 families.

In Garzon, the district director has a staff of an agronomo, a veterinarian, an agricultural economist, a home economist, and a sociologist. The district is divided into four sectors, each with a veterinarian and an agronomo. These 14 professionals spend considerable time in the field and in contact with farmers, but their major responsibility is to back stop the practicos. Garzon has 23 practicos -- 13 in agricultural extension, 8 in home economics extension, one in communication, and one in animal sanitation.

The Garzon district also has a 500-hectare farm, Granja Yamboró, with a veterinarian in charge. Its principal purpose is the production of improved lines of cattle for distribution to farmers, large and small, but they are also using it for the production of clean sugar cane cuttings for propagation, for replication of on-farm research, and for some simple experimentation pasture management. The farm was acquired from the Huila Department of Agriculture and has been put in good shape. It has three breeds of cattle -- Zebu, Brown Swiss, and Bon (contraction for white with black ears) a Colombian breed. Cattle are sold, not given away. There is some problem with theft, one way to achieve diffusion.

The Pazplona District has three sectors, each of which covers three municipios. Assigned to the district are five agronomos, three veterinarians, two economists (one from Peace Corps), one social worker, and 26 agricultural practicicos, each with a work front, and up to 60 cooperators. There are no home economists in the district, the only female worker being the social worker who, incidentally, is also the only member of that profession in ICA.

Both districts work with a minimum of facilities. Less than half the professionals have vehicles, some of which are personally owned. A few of the practicicos have motorcycles. They rely on buses, horses, shared rides and walking. This lack of transportation does not seem to be reflected in a morale problem or a giveup attitude. The project will provide vehicles, but the Colombian bureaucracy functions slowly, and the USAID alternatives, to the extent there were any, were not used.

In each district, a practico uses the conventional extension methods -- field days, meetings, courses, posters, talks, visual aids, and radio. Farmers outside his group will seek his counsel and assistance on an ad hoc basis. Our practico estimated that in his 10 months on the job some 80-100 farmers outside his 30 cooperators had such contact.

Program and Concepts

The Technology Transfer Project has produced a new set of terminology. In some cases the terms may be only labels, but in many cases they reflect innovative concepts.

The desk analysis (from secondary sources) does not represent a new concept, but it apparently mobilized data not commonly mobilized on a municipio basis. ICA has made good use of the data in selecting municipios in which to work, in selecting areas to which it should give attention and in the allocation of personnel among the municipios. The desk analyses of the three areas was one of the first activities initiated. With considerable input from Peace Corps, this work has now been published.

The field analysis is a set of concepts -- technical explorations, production capacity (of land), production systems, local technology, first approximation, technology records and technology follow up.

Technical exploration (exploracion tecnica) was accomplished by ICA teams made up of national researchers and regional experts as well as local people. This was accomplished quickly by means of windshield and binocular surveys, the latter resulting from the topography of the Garzon area. The team stationed itself on mountain tops from which it could get a panoramic view of the agriculture on surrounding mountain sides, and with the aid of binoculars made an estimation of the land use capability (unchangeable phenomena) and the production systems being used (changeable phenomena). These estimates were verified and adjusted in seminars involving practicos experienced in the area.

The productive capacity of the land (Conjunctive Productiva, or CP) was determined on the basis of altitude, slope, and other aspects of topography. These data were discussed in a seminar with ICA district personnel and served as a basis for a sample for a field survey, conducted in December 1976 in Garzon. This survey did not involve interviews with farmers, but rather observations according to a schedule.

Sistemas de Produccion (SP) were also determined at the same time and were used in much the same way as the CP's. SP would translate more into the English "Type of Farming" areas than into "Farming Systems".

Tecnologia Local (TL) is a description of the techniques being used by the campesinos of the area.

The First Approximation is a tentative technology recommendation, an adjustment of what the campesino does (traditional technology) by what ICA knows (institutional technology). A commodity budget of costs and returns is used for this comparison.

On-farm experimentation serves as a test of the first approximation, as well as the development of technology appropriate for both the small farmer and for the location. It is some times referred to as technology adjustment, another new term.

The project makes heavy use of the Ficha Tecnica, a term difficult to translate. Literally, it would translate, "Technical Form". It has some of the attributes of what we know as farm records, but it emphasizes (or is oriented to) the technologies and the economics of single commodity production rather than the economics of farm management. It also contains social accounting data and other information. Data for the ficha tecnica is gathered by practicos on a current basis. It covers a calendar year and forms a bench mark of cooperators. ICA thinks of it as a "stopped-action" snapshot, reflecting to a certain extent an assumption that farmer traditional technology is static.

The Hoja de Seguimiento (translated as follow up sheet) is a simplified version of the ficha tecnica and is maintained by the practicos on their cooperators after the ficha tecnica is complete. It attempts to record change in farmer technology, caused by ICA action, and is considered a motion picture.

Head and Tails Analysis, another concept, is the identification of the best farmers, with the intent of testing and diffusing their practices.

Both the Pamplona and the Garzon Districts made use of all the concepts and instruments involved although there were differences in how they were applied. Pamplona did not use the Binocular Survey in exploracion tecnica but used a series of visits to farmers, by three-man teams of national and local personnel, for the same end. Because of these visits, it did not conduct the initial farm survey, as did Garzon, but initiated the ficha tecnica somewhat earlier, in December 1976. Garzon started it in March 1977. Both covered the two annual production cycles.

Two commodities illustrate something of ICA's operation, sugar cane and arracacha. Sugar cane is produced in both areas, arracacha is important in Pamplona.

There are two sugar cane industries in Colombia, one being an integrated industry of large firms on flat fertile soils, largely in the Cauca Valley, for the production of sugar. The other is a small-farm, mountainside operation found over a large area of the country for the production of panela, a crude brown sugar, processed in a trapiche, a plant of very small-scale and simple technology. ICA works only with the panela producers. Panela is in direct competition with coffee, the high prices of which have forced land out of panela production. The current demand for panela is good, and markets are largely local.

Traditional panela production methods involve stands up to 20 years old, little or no fertilization, and almost continuous harvest of mature canes. In part, this technology is force of tradition, but continuous harvesting practice has a rational explanation -- the desire of the farmer to have a continuous income. Further, the continuous harvest prevents an overload of trapiche capacity as well as market gluts.

ICA is developing a system of panela cane production and harvesting that accommodates the need for clean cutting in modern technology management and the need for continuous harvesting to satisfy farmer desires.

Arracacha is a root crop on which ICA has done little work, although it does have a small collection of varieties. ICA "discovered" it in the exploracion tecnica in Pamplona, along with the fact that there was a considerable variation in productivity among farmers. Preliminary investigation indicated that land breaking with animal power and a fertilization scheme using potato crop residues explained a large part of the difference. These practices are being tested in the on-farm experimentation.

Research

On-farm experimentation is a significant part of the project. Pamplona has one agronomist assigned the responsibility. In Garzon the responsibility is more diffuse. Garzon has 19 experiments, Pamplona more than 20, each one replicated in several locations in the district. The districts receive considerable help from the national research system of ICA in selecting experiments, designing them, and in analyzing data. Data analysis causes some problem, in part because there are two production cycles per year in Colombia, and the time in between is short. They are attempting to use the computer. ICA shares access to a large machine. Problems are also encountered in the on-farm experiments. Some farmers have a curiosity and an experimental nature, but many do not, and much data is lost. Garzon is replicating each of its experiments on it Granja Yaboro, and Pamplona is considering renting land from the farmer in order to maintain adequate control of the experiment.

Participation of the national and regional research personnel seems to be good. They also conduct some research in the area themselves and are accessible for consultation. The problem in Garzon of white leaf in plantains, believed to be aggravated by deficiencies in minor elements in the soil, is being aggressively addressed by national personnel of several disciplines and local people.

In the evaluation seminar in Pamplona the on-farm research component received considerable attention, mainly the content of the experiments and their design, and the way that the national research system could help to improve the experiments. Even with its problems, on-farm crops research is progressing better than adaptive livestock research, which requires more careful control and more time. KA is worried about adaptive livestock research and is considering a seminar to try to figure out how to handle it.

However, it was notable that two aspects did not receive much attention. One was the problem of doing research on farms. The problem was noted, and alternatives were discussed, but little attention was given to solving the problem. Another aspect given slight attention was the identification of problems to which on-farm research was addressed.

The most familiar patterns in the adaptive on-farm research are variety evaluation and adaptation tests, fertilizer rates, population density and plant spacing, and soil preparation. ICA concentrates on a few of the more important commodities in each work front. Most of this is done on single commodities, but some is being done in crops grown together.

The project also funds a variety of research activity at the national station on the Sabana of Bogota as well as on the branch experiment stations. We saw very little of this. The following account is based on what we heard about and has limited usefulness in judging the total project research effort.

The national research service has assumed responsibility for mapping the soils of the three areas in which the districts are located. This is done largely by soil tests. The aim is to provide a mechanism by which results from one area can be extrapolated to others which have similar soils.

The agricultural engineering program of ICA has three programs -- farm machinery, water management, and farm products processing. The project finances activities in the latter two. The water research we heard about was initiated long before this project, as was some of the processing research. The latter includes activities in panels trapiche operation, rustic on-farm grain storage, grain dryers, extraction of cassava starch, and shelling of peas and beans. We did not have time enough to understand the relevance of these activities to project activities or how ICA plans to diffuse these technologies in the district areas once they are developed. We did find out interviews with SENA (a training agency of the Department of Labor) that there is a considerable technology already available in the operation of trapiches, and that SENA is teaching it.

Research in communications plays a large part in the project. There is much information on the Ficha Tecnica relevant to the communications problem, and communications workers are heavily involved in processing the data from it. In the Pamplona area the group is active. It has made an evaluation of radio, of three billboards, and of various other activities. Their analysis showed that most farmers in the work fronts listened to a Cucuta station rather than the local station. This has led to a 30-minute program three times a week which costs about \$40 a month for the air time. Pamplona assigns one practico to work in communications, including field days, posters, tours, meeting courses, and radio.

Little impact of the adaptive research can be reported at the end of one year. In Garzon some tests attempted to find the local corn and bean varieties that combine best in associated cropping. One combination looks better than others at the end of one year, but no recommendation has emerged. In Pamplona preliminary indications are that farmers may be using too much of certain fertilizer products from an economic viewpoint. One reason for the lack of research results is the dependence on the national system to process data and its delay.

Paperwork, Data Processing, Publications

This project has generated a considerable amount of data and other paper. My estimates are that in the Garzon district it will take about 75 man-days to tabulate the data from Ficha Tecnica. They were in this process during my visit. The Pamplona exercise was a couple of months ahead, and I have no estimate of the time it took. Some frequency distributions and percentages were taken off in the district office. At the seminar a computer run on some of the data was available. There is still much of the data that is not tabulated and analyzed. This is in addition to the data generated by the experimentation component of the project.

ICA is also concerned with the paper work and administrative chores for their district directors who have the responsibility for 40 to 60 persons. In the evaluation seminar, several alternatives were sought to ease this burden.

The project has been a prolific producer of publications. Some of these, such as the desk analyses, are substantive. Others are methodological. They vary widely in quality, some of the methodological ones being little more than a translation of some foreign publications. Some of these border on the trite, and others contain no adaptation to the resource limitations and urgent needs of field personnel. On the other hand some are quite good.

Communication, Organization and Diffusion

Organization is used more heavily by ICA for diffusion (technology transfer is the in word) than it is for knowing and understanding the farmer and his problems. Without seeing an "organization" in action, I do not have an adequate feel for activity in this area. ICA works largely with groups it organizes, and in most cases for a specific purpose. In one case in Pamplona, the Board of Directors of the local Accion Comunal was used, largely because it was a legal corporate entity, and one was needed. In Garzon, organizations are formed around problems and are used mostly by the home improvement agents to work on quality of life problems, such as the building of latrines, rather than on production problems. This scheme was noted as a departure from the general purpose home improvement clubs widely used in extension around the world.

The small number of families with which ICA works intensively (30 or so per practico) are not formally organized. ICA does organize "courses," in which many cooperators participate.

In Pamplona, much of the organizational work is done by the social worker. Her work is not limited to the so-called social problems, in fact it seems to emphasize production or economic problems. She has organized all male groups to try to solve essentially technical problems -- such as supply of animal medicines and disease problems of arracacha. Although she refers to her work at times as community organization and development, the groups seem to be oriented by specific problems rather than a general purpose.

Garzon, with a supervisor and eight home economics practicos, emphasizes family nutrition to a much greater extent than does Pamplona. This takes the form of a family garden and the production of small animals, such as rabbits and chickens.

Diffusion and communication activities are not very much different from the conventional. Some experimentation and evaluation is going on in Pamplona.

ICA Operations

ICA started its existence some 20 years ago as a research conventional agricultural organization resulting from a Rockefeller Foundation operation. In a sweeping organization of the agricultural institutions in 1969, many other responsibilities were assigned to it -- quality control of agricultural inputs, supervision of quality seed production, animal and plant disease control, supervision of private technical assistance, and extension. Throughout the '70's ICA has been attempting to give more attention to the small farmer, a specific government policy, even while it attends its original research function and discharges the new responsibilities. It has suffered extreme budget problems during this period and a heavy loss of highly trained personnel provided by generous USAID and Foundation support. In spite of its troubles and increased responsibilities, ICA seems to have turned in a remarkable performance.

Through earlier USAID projects (modeled after Puebla), the famed Canadian-sponsored Caqueza project, and an integrated rural development project (DRI), ICA has had increasing experience with the small farmer and his specific problems. Thus, the Technology Transfer Project (ICA's designation of the current project) is more a stage in evolution than it is a discrete innovation. In fact, in part the current project aims to perfect methodologies established earlier as well as to generate innovations.

Note was made earlier that ICA was not heavily involved in the design of this project. Nevertheless, ICA is enthusiastic about this project, and the enthusiasm is noted both in the field, in the Bogota headquarters, and in the encounter between field and headquarters people. Contact with the small farmer has resulted in an impact on the general research program. ICA has released a new wheat variety, ICATAL, one which it calls a rustic variety (more new terminology) which will thrive without the pampering commonly associated with the high yielding varieties, although some consider IR-8 to be rustic. Claims are that ICATAL, when treated exactly the same as traditional varieties, will increase yields up to 400 kilograms per hectare. ICA has solved a problem of seed viability in Brachiaria, a grass that will do well on relatively infertile soils of the Llanos. The grass sets seed well, but it is of such low viability that it formerly took up to 300 kilos per hectare for a stand. R&D at ICA found that minor elements added to seed production plots would increase viability to the point that it is possible with extreme care to get a good stand of Brachiaria with as little as one kilo per hectare.

ICA has specific points of view relevant to this project. Its chief aspiration for the project is that it will help develop a process by which much improved decisions can be made in the research program. This because resources are meager in relation to the research needs. That's a logical purpose, but there is an alternative which my bias would recognize that is to create or to solidify a class of prosperous, even if small, commercial farmers.

The other relevant viewpoint concerns the small farmer. ICA's interest in the small farmer stems directly from a government policy with respect to the small farmer which has the objectives of increased food production, increased productivity per acre, increased income, and increased employment. This could imply that ICA does not have an inherent interest in the small farmer and that its attention to that subsector is subject to modification in a four-year cycle. However, this fact is in no way betrayed in the operation of this project.

The Technology Transfer Audience

I was able to visit four farmers, two in each district. No claim can be made that they are representative, but unless they were far from the norm, one can conclude that ICA is not working with the poorest of the poor. ICA defines a small farm as being under 20 hectares.

Alonzo Sagostui owns about 15 hectares high on a mountain side out of Garzon. He has a reasonable house and piped water for household use and a small garden. The land is relatively fertile, even though steep. In his garden there were beets, carrots, tomatoes, cabbage, potatoes, onions, and lettuce that I saw. He was also producing rabbits, guinea pigs, and chickens. His crops were cane, coffee, plaintain, ramio, and pasture. He plans to produce yuca this year and corn and beans in association. He also had three pigs, four cattle, and horses. ICA is experimenting with cane fertilization and seeding and with ramio which is a protein feed producer. Coffee is important on the farm, but ICA does not deal with it in any way.

In the municipio of Oporapa, Emiliano Chevarro, also with eight children, owns about 13 hectares of steep but relatively fertile soil. He has water under pressure, from an urban water system, a few vegetables, and a general farm. He is building a new house, of brick from Pitalito, with storage and handling facilities on the first floor and living quarters on the second. There was no sign of cane, but he had just built a rustic coffee dryer, a sort of chest of drawers that could be pulled open for sun and pushed in for rain. One motive for the dryer was the high price of labor.

The third farm visited was in the Zulia neighborhood, Municipio of Salazar, Pamplona district. It has 20 hectares with sugar cane, coffee, and pasture. He had just bought a new \$750 Trapiche and has constructed a shelter, having sold his cattle to finance it. It, too, had running water for the household and a good house recently improved. The practico estimates the farm's gross income at about \$3,500 per year before he modernized his cane production.

The fourth farm was also in the Pamplona area. The owner claimed a little over five hectares, but it seemed larger to me. He has farm irrigation from a small system he and three other farmers own. His main enterprise is truck farming, but he also produces potatoes and has both cattle and pigs with rather good blood lines. He does not own animal power, but hires his land plowed with animals. ICA is running a fertilizer experiment on potatoes on his farm. He sells his produce to truckers at the farm and does not complain about the market

All but the first of these farms were on the road. It took about ten minutes to reach the first farm from where the vehicle had to stop. Because of farm size a cooperators practices are not highly visible to many other farmers. Neither does the topography facilitate day-by-day witness of a cooperators practice.

Linkages

In this project ICA has no formalized linkages as it does in the DRI (Integrated Rural Development Program), in which it is heavily involved in other areas. It does work with SENA, who provides it with some of its courses, and with Caja Agraria, the government agency responsible for credit. In the Garzon district, which emphasizes social problems, the third most important linkage group is with the agencies dealing with health. Garzon district held a seminar a year ago with some 20 other agencies active in rural life in Rhila and plans a follow up seminar.

ICA itself is such a large organization that linkages among its own units are important. Project personnel, who mostly belong to the extension arm of ICA, report a marked improvement in their linkages with researchers, both in quantity and quality. They emphasize the easy access they have to researchers.

District personnel have no contact with the DRI districts of ICA, but regional and national personnel do. To a certain extent ICA operates the same in both types of districts, but DRI emphasizes credit to a much greater extent than the Technology Transfer project, which in turn emphasizes innovation more than DRI.

Technical Assistance

Procurement of technical assistance has been a delayed process, as has been the procurement of vehicles. Bids were received from firms proposing technical assistance during this visit.

International Technical Interchange

There had been no use of funds provided for technical interchange during the time of this visit.

Analysis, Discussion, Impressions

General

This project is making adequate progress, even good progress in many respects. Personnel are enthusiastic and hard working even in the face of significant obstacles, such as the lack of transportation. There have been significant steps in the evolution of ICA operating style to bring it in closer interaction with the small farm operator, and to bring the researchers in more firm support of ICA's extension workers who are responsible for serving the small farmer. The concept of adaptive research in itself is not new, and ICA has been using the result demonstration extension method which yields some information, but the involvement of essentially extension people in a systematic on-farm adaptive research program is innovative.

This discussion aims to be exploratory. The project is working in an innovative area, that of attempting to develop a technology for relating a national agricultural technology innovation system to the small farmer sub-sector. Because it is innovative, there are no fixed guidelines. We do have hypotheses, none of which have passed a rigid empirical test. This situation encourages individual and personalized interpretations of the data and experience. This section is largely made up of my own interpretations and judgments and will be useful only to the extent it provides insights to those charged with project implementation, a responsibility that often places important restraints on imagination.

Conceptualization

Three conceptualizations figure in my discussion. One is the concept of social systems. ICA is a social system, i.e., a collectivity of people which has certain norms and standards, beliefs and technologies, rewards and sanctions, resources and facilities, and a means of awarding status. While the collectivity of small farm operators does not have a single organizational structure, it is useful to think of it as a social system with its norms and standards, beliefs and technologies, rewards and sanctions, resources and facilities and means of awarding status. The two systems have much in common. Both are undergoing change, even if at an evolutionary pace. Both have traditions and are being pressed to "change practices.": Both are short of resources.

The two social systems deal with three technology systems. One is the technology used by the small farmer to produce his output, grains, vegetables, and livestock. The second is the agricultural production technology with which ICA deals. That is its product, its output. Finally, ICA has a set of technologies by which it generates and distributes its product or output. Just as the farmer needs "appropriate technology" to produce his output, ICA needs "appropriate technology" to produce its output. It is this set of technologies (often called methodologies) that is the object of this project. ICA is the system that is responsible for innovations in both systems, i.e., it is responsible.

The second conceptualization distinguishes science from technology. Terminology is not precise in this area, especially in agriculture, but usually "research" is associated with science, the process of analysis, and the development of new knowledge. Technology, on the other hand, is associated with synthesis, with the process of technology development, the "D" of R&D (Research and Development) used widely in fields outside agriculture. Technology is something useful, a technique that works, a new machine, a set of practices, or a new variety. This dichotomy between analysis for new knowledge and synthesis of something useful can be applied to social phenomena as well as to the biophysical. The ICA project currently pertains nearly as much to the development of new knowledge as it does to the development of social technologies, a set of practices that are useful to some end. That new knowledge must be synthesized into a technology in order to have a payoff.

The third conceptualization concerns the role of science and technology in development. Farmers are interested in technology, not knowledge. They don't need to understand IR-8 as long as it performs. They are interested in a specific kind of technology. One of the central functions of technology innovation in agricultural development is to provide producers with a technique (technology) that helps them economize on relatively scarce resources and make heavier use of the relatively abundant resource. It is on this point that the concept of "appropriate technology" has to be based. A good Corn Belt technology makes a heavy use of relatively abundant capital in the purchase of relatively abundant inputs and machinery in order to save relatively scarce labor. Since the abundance-scarcity ratio of the small Andean farmer is different from that of the Corn Belt farmer, so also will his technology appropriate to him be different from that appropriate to the Corn Belt Farmer.

Design

This project is more complex than it appears. It was designed to develop five subsystems (presumably constituting a total system) and is being implemented in three areas. Design is logical. It addresses an important problem complex -- that of developing and delivering technology appropriate to the small farmer and reflects a reasonably accurate diagnosis of the problem complex. In retrospect after more than a year of experience, there are alternatives for modifying the design.

One improvement needed is simplification. It now appears that it is not feasible in a three-year project to achieve all that was intended, or to give adequate attention to all the variables. Keeping them in will make it difficult to achieve an adequate focus and encourages a proliferation of activities and a dispersion of

effort. Most activity has been aimed at the first two subsystems. This is fortunate, since in my judgment these represent the most serious factors limiting the effectiveness of technology innovation systems. Little has been accomplished in marketing, and many of the group concepts included in the design have received relatively little attention. ICA has addressed the third and fourth subsystems under its concept of communications.

Also needed in design improvement is an integration of the systems. Emphasis on subsystems has tended to create a set of discrete categories of action that in a sense works against development of a system. The monitoring and evaluation subsystem, for example, is discrete and includes certain activities essential to the other subsystems. There are some elements of evaluation that need to be outside the system and thus not properly placed in a subsystem. Another example is the participation of the farmer in the selection of problems to work on. In many ways this is inherent in the subsystem of knowing and understanding the farmer.

I find that one of the important elements of design, risk insurance, to be incongruous with the overall concept of the project. The system is designed for the "development of technology appropriate to the small farmer." It's difficult to understand how an appropriate technology can increase risk. It would seem to me that a fundamental criterion of appropriate technology is that it reduce risk. The presence of the risk guarantee reduces pressure on R&D workers to come up with a technology that is genuinely appropriate. The concern over risk is associated with the attempt to convince farmers to use a capital intensive modern technology, the very problem this project addresses. This project aims to develop a different kind of technology. ICA itself provides data from Caqueza, Pasto, and Pamplona that a rational use of technology will reduce crop production costs with no harm to economic returns. The "rustic" varieties now being released perform better than traditional varieties even without pampering. Finally, the ICA client is not so close to the margin that he will be wiped out by any reasonable error. He constantly stands risk considerably greater than is involved in using a technology "architected" for his needs and "tested and adapted to his situation."

There may not be much saving by cutting out the risk guarantee, but whatever it is can find a much higher return from other uses. Even if there were no saving, subsystems one and two will be stronger if they do not have this crutch to lean on.

Quantification, Objectification, and Paper

This project relies heavily on analytical techniques that aim to quantify and to objectify, a high proportion of the techniques coming from the discipline of economics. Many resources are devoted to these kinds of analyses. There is a high probability that this effort will end in frustration, largely because we simply do not have the technology either to observe (collect data) or to analyze data that will help uncover all of the important variables. The what of farmer practices can be quantified and perhaps made completely objective by today's analytical techniques. It is a much more difficult task to discover and explain the why of the practices by objective, quantitative technologies. These are the variables that likely have the greatest utility in designing new technology. They cannot be ignored simply because of measurement problems.

Besides the effort it takes, this attempt at quantification incurs another risk, that of causing ICA to overlook the value of judgment and intuition of an experienced staff and of tying up resources that could better be used in developing and exploiting the human resource. The human intuition can handle more variables more quickly than any quantitative technique we have available. Sometimes the variables are not handled very well. Sometime they are. In its capable staff, ICA has a significant resource. It needs to develop techniques for improving the use of its own staff judgment and intuition, based on its training, experience, and wisdom. The economics trade has techniques for structuring problems so that the judgment of people can be more effectively applied. Economics technology is not limited to quantitative analysis.

Sometimes the analytical techniques discourage the use of these capabilities. The general scheme which ICA is attempting to perfect calls for what it calls a Heads and Tails Analysis. This analysis aims to identify the best farmers so that their practices can be diffused among the others. The methodological manual explaining this analysis includes a rather complete statistical analysis, including standard error, analysis of variance, and confidence limits. If it requires analysis of this precision to distinguish good farmers from the others, the difference is not great enough to bother with.

The greatest problem, however, is opportunity lost. Preoccupation with the measurable discourages (if it does not preclude) the development and utilization of imagination and creativity, the unmeasurables.

Plants and People

ICA's traditional orientation to crops is also manifest in the techniques used in the exploracion tecnica by which it determined land-use capability and production systems. The techniques were largely visible, in one region entirely so. In neither region was there evidence that much data on farmer experience, farmer wisdom, and farmer conception of problems was gathered and utilized. It's difficult to judge what such data would have added, but in other countries in which there is rather intensive contact with the farmer, this contact is found to add considerable to the professional's understanding of the farmer. The techniques ICA used likely produced good information on what technology the farmer was using. It was likely less useful in explaining the why of that technology. Often it is in the why of a traditional practice that the best insights are found for orienting technology development efforts. Experience with farmers in this style is leading some workers to declare "one ignores farmer wisdom at his own peril."

The evidence is that there was little discussion either with the farmer or with the practico in the processes of problem definition and of program development, including selection of the adaptive experiments. It could be that ICA is simply underestimating the wisdom of the farmer -- and even of its own practico -- and thus underutilizing two significant resources.

The role of the practico in relating the ICA system to the small farm operator system deserves attention. He lives very close to the farmer and has more intensive contact with the farmer than does any other category of ICA personnel. He may have more contact with the farmer than with other ICA personnel. Yet he is of ICA and has reasonably good formal training in agricultural technology, as well as continuous updating in his job. He is virtually a member of both social systems and the key to linkage of the two systems. The practico's current role in the subsystem of knowing the farmer is one of data collection and supply. He is involved very little in problem analysis and program development, i.e., in providing judgment. This may be as significant underutilization of the resource given his training, experience, and position in the two systems.

Farm Management

on

ICA's tradition is to work/single crop technology and single crop economics and this project is heavily biased in that direction. There has been a shift to associated cropping, reacting to traditional farmer practice, but ICA's analysis and technology is still oriented to single crop technology. In other words, corn and beans grown together are treated with the same concepts as a single commodity would be. The concept of total farm management is not used. It could make considerable

difference. For example, many of ICA's clients are coffee producers, but ICA has no responsibility for coffee. Yet, where it is adapted it competes with ICA crops for land and labor and is the most profitable crop on the farm. I found no evidence that ICA had considered the economic relationship to coffee in developing the technology for its crops or in selecting its crops.

The clientele of ICA is not made up of have nots. It deals with farmers of up to 20 hectares, almost 45 acres. Many of these are on steep land, but much of it is both relatively fertile and relatively resistant to erosion, enough so, at least, that it performs well under good management. It is my judgment that ICA cannot be faulted for working with this range of farmers. In the modern sense it is a class of small farmers, and if this "smaller" (if not small) farm technology won't trickle down, at least ICA is making a transition toward the smallest of the small, and the next step can be expected to be easier.

What does need analysis is whether ICA has an adequate strategy for exploiting the opportunity this group presents. I was impressed with the possibility of animal traction. A farmer with ten or more hectares of fairly good land has relatively more land than labor. Animal traction is rather widespread in Colombia. It doesn't require any abrupt cultural shift, at least in some areas. Most farms have cattle and horses, both of which can be produced on the farm. Both represent capital accumulation, which these farms are completely capable of. This seems to be a relatively clear opportunity to use more of the relatively abundant land and grass to economize on the relatively scarce labor. The same rationale may apply to small irrigation systems which may embody technology appropriate to some farmers.

The technology of farm management would provide ICA with a mechanism for addressing this sort of question. It would place income in the dominant position among the criteria of a small farm policy, but it would get increased production, since that is the only logical way to increase income. It would apply the productivity concept equally to labor as well as to land, which is sound. It is difficult to foretell the impact of such an orientation on employment. It could well increase, but not, probably, from work in which energy supply is the chief labor output.

A farm management orientation would serve two other functions to a degree. One is marketing. Farm management can address the marketing problem by the selection of crop and livestock enterprises, by the mix of enterprises (diversification), by timing of harvesting and marketing and by use of on-farm storage. All of these, plus the more complete and economic use of the farm resources can also provide the incentive function. One doesn't have to rely solely on government pricing policy to provide incentive for the adoption of relevant technology.

Perfection or Experimentation

There are at least two strategic orientations that could have been used in implementing this project. One orientation consists of conceptualizing a country-wide methodological system and the utilization of project activities to perfect that system. This approach is roughly analogous to that of the deduction concept in logic, in that it involves making specific application from a generalization. The alternative approach is roughly analogous to the induction concept from logic, i.e., the development of generalizations from specific experiences. This approach would involve considerable experimentation. The project orientation is toward perfecting a general countrywide system. It does involve limited experimentation. It is difficult to argue against a country-side system, but I would argue that consideration be given to a considerably heavier use of experimentation in the process. The project organization is ideal for experimenting; with its three districts, each one with sub-districts (under some name) in turn composed of work fronts.

There are any number of experiments that could be conducted. The short time left in the project would not provide an accurate resolution in many cases, but it would provide an opportunity to install the experiment, perhaps using external technical expertise, which ICA could follow after this project ends.

1. One experiment should address farm management, i.e., the whole farm concept. It could work in either a two municipio sector of Garzon or a three-municipio sector in Pamplona, a municipio in each, or some combination that would involve both. A single work front may serve, but it seems quite small. The experiment would require intensive work from a farm management expert, but since it is an experiment aimed at helping devise a system, the intensive work could be justified.

The farm management approach analyzes the total resource available -- land, labor, capital (including access to conventional credit), and management ability of the farmer -- and works out a farm plan that makes best use of them in terms of family interests. Farm management technology is well developed in many countries, and since it deals more with process than with substance, it would be relatively easy to transfer. This expertise could be provided by the technical assistance component of the project.

An experiment in farm management is completely consistent with the project. Farm management is an agricultural technology in exactly the same way that spacing, population, varieties, and fertilizer usage are, and thus is the legitimate business of ICA. By involving the management process, ICA, via its own technology, would provide itself with a powerful and versatile tool. It could have some impact on marketing and incentives for adoption of improved technology, perhaps

considerable. Analysis may prove that the individual small firm can have more control of its destiny than is commonly realized. Work in farm management may well be the best known technique for knowing and understanding the farmer -- his problems, his scarcity-abundance ratio, and his opportunities -- and providing a guide to technology development. This knowledge is also useful to other agencies in devising farm policies appropriate to the small farmer.

2. A second useful experiment would involve the farmers and the practicos in the processes of problem identification, selection of commodities to work on, the kinds of adaptive experiments to use, the choice of farmer experimenters, the kind of communications methods to use, among other items. This experiment would not require either specialized talent or extensive work. It would involve several local meetings, (perhaps of cooperators in a work front), called in a manner that both ICA and the farmer are accustomed to.

The two important items for these meetings are the ICA personnel who attend and the way the meeting is conducted. These kinds of meetings need to be attended by the district agronomes, practicos, and veterinarians and by national and regional research personnel. Social scientists can help organize and run the meeting, but the dialogue needs to be between farmers and experts on technical and economic problems. The meeting should be conducted for the single purpose of getting information from the farmer. ICA's role should be to question and to listen, certainly not to argue and probably not to impart advice or recommendations. If a farmer does have a question, it can be answered after the meeting.

A variation of this experiment would be to hold a meeting of practicos, probably by districts for exactly the same purpose. National and regional personnel should attend, and the meeting should be conducted in the same way -- i.e., the agronomes, veterinarians, and post-graduate degree holders seeking information, judgments, and insights from practicos. This meeting also should avoid arguing with practicos and with imparting technical information. Its sole objective should be for harvesting their wisdom. Such a meeting may well show up the need for training, but to attempt it in this meeting would threaten the meeting's most important purpose.

It is my hypothesis that ICA is underutilizing the accumulated wisdom of both the farmer and the practico. In various other countries, researchers have reported this wisdom to be substantial. ICA can test both the nature and extent of this wisdom and my own hypothesis and can do so relatively easily.

Incidentally, SENA has had experience with these kinds of discussions.

3. A third type of experiment involves organization. ICA has had experience with the general purpose, "community-development" group, with the special problem, ad hoc group, and with the group organized for a course, taught either by ICA or by SENA. This experiment could involve a group that is permanent, much like the general purpose group, but it would have limited objectives, something like the ad hoc group. Its objective would be the development of an extension program. It could take advantage of the formally organized Junta for Accion Comunal. Its function would be to help organize meetings to help identify problems, to recruit ICA users or cooperators, to locate farmer-experimenters, to recruit crowds for field days as well as help plan them, and to help in many other ways to put on a technology innovation program. Given the experience Accion Comunal has had in Colombia of raising local funds, it could raise some local funds to help finance local extension costs, such as radio programs, billboards, posters, or some share of the practico's transportation costs.

4. A fourth area of experimentation pertains to communication and would consist of a series of experiments. ICA has been doing some experimentation in this area -- evaluating the impact of radio, of billboards, and of handbills, among other discrete techniques. These serve a useful purpose, but in most cases individual techniques serve most effectively when used in combination with others. Radio, for example, has many advantages, but being a verbal medium it often serves best in supporting other techniques rather than standing on its own. ICA has a strong communications staff. If one or two of them were assigned certain units -- a work front or a municipio -- with which they were to work to devise and test a communications program, many useful insights could be gained. In communications the distinction between research and technology becomes significant. It is easy and tempting to engage in research in communication that produces an abundance of knowledge. What is needed, however, is a system or a program that works, the "D" of R&D, and if knowledge does not serve to develop such a system or program it serves no purpose.

5. A fifth set of experiments has to do with data collection and handling, especially that data which pertains to farmers. ICA could well experiment with ways to collect the same amount of information with fewer observations and thus less data to process. It also needs to develop some ways by which district personnel can do some analysis, even if tentative. For example, ICA in this project has published a methodological manual on linear programming. It is not likely that district personnel are going to be able to make much use of standard linear programming. It is possible that they would find a need for farm budgeting or other more simple techniques to do the same job.

6. A sixth experiment concerns linkages in the diffusion of technology. There are some 20 institutions working on rural problems in Huila, and there is likely about that same number in North Santander. Some of these organizations have field personnel in personal contact with farmers, much as the ICA practico is in contact with the farmer. Once ICA is relatively set on its technology for the small farmer of an area, it could experiment with the use of the field staffs of other agencies as retail extension workers. This would require a type of wholesale extension of ICA in which it would extend the technology to the field staffs (through training courses, publications, and other means) and give them general technical support so that they could serve as diffusion agents.

This experiment would best be done by district, and it would be virtually impossible to have a control, but it would provide considerable insight to organization and linkage.

7. Another "experiment" is more an analysis than an experiment, but it has to do with alternatives. At least three such needs come to mind.

(a.) ICA has a variation among its districts in the ratio of professional workers (agronomists and veterinarians) to sub-professional workers (practicos.) This project may offer an opportunity to gain some insights into an optimal ratio of these two categories of workers, which would be useful in ICA's personnel allocation throughout the system.

(b.) ICA also has a variation in the number of farms attended by a practico. This is another ratio that is significant to the efficient operation of ICA, and insights regarding what would be a reasonable norm would also be useful.

(c.) ICA needs an analysis of its strategy, and of alternatives to that strategy. For example, in some work fronts it addresses only four commodities. It could be calculated, with very little effort, the changes that would have to occur in the production and productivity of those crops in the area in order to produce total returns equal to ICA's costs allocated to the area. ICA's resources are scarce in the same way that the farmer's resources are, and ICA must be as concerned with its own resource productivity as well as the productivity of agricultural resources.

A final word on experimentation. Experiments in this project can serve a highly useful purpose without rigid control and completely objective and quantitative analysis.

International Technical Interchange

ICA can well take more advantage than currently of the experience of others in the work it is doing. Some of this experience is close by. The Colombian entity SENA has become more aggressive in the last few years and aims at much the same objective that ICA has, namely helping the small farmer and his family by means of providing better information and improved skills. In the problem of trapiche management and operation, both are working on the identical problem. There is evidence that SENA is already teaching what ICA is still researching. However, perhaps SENA's most valuable competence from ICA's standpoint is its knowledge of how to organize and teach the small farmer, including the identification of problems around which teaching is organized.

Another body of international experience is provided by the international centers which have done extensive work in the evaluation of technology by small farmer criteria and the identification of small farm technology needs. A great amount of this work is published. Per Andersen of CIAT, Don Winkelmann of CIMMYT, Randy Barker of IRRI, and J. G. Ryan of ICRISAT have all done and published extensive work. The CIAT library almost certainly has all of these works, since CIAT itself was heavily engaged in it at one time, and certainly could acquire what it does not have. All of the persons mentioned are agricultural economists and used methodologies with which ICA is competent, although much of the work reported was interdisciplinary.

Just a little bit farther away, in Central America, work is also being done with similar objectives. ICTA in Guatemala, a new organization, was conceived and organized in its entirety by some of the same principles as is this project. It has worked out the on-farm experiment and the field test (two different concepts) to a relatively fine degree. CATIE, with headquarters in Costa Rica and headed by a Colombian, has a project in multiple cropping. It uses methodologies of knowing and understanding the farmer for the same purposes as the ICA project.

There are others, but these are the ones that ICA could tap into with the least effort and in a very short time.

When the technical interchange takes place, it needs to be with the right mix of personnel.

Recommendations

These recommendations are based on the best knowledge that I have been able to acquire and on my interpretations of that knowledge and judgments of what needs to be done. In most cases the rationale for that judgment has been presented, mainly in the section of this report called "Analysis, Discussion, Impressions," but in some cases elaborated here.

1. This project should be considered to be making adequate process and should continue on much the course that has been outlined for it. None of the following recommendations should be implemented in such a way as to significantly alter its general course or cause it to lose its current sense of direction. ICA has provided competent and stable management, and USAID management needs to respect that stability and competence.

2. While the original design was good, given the information available at that time, project experience indicates that some design changes should be made. One change would be to simplify by dropping some activities. Another is to integrate by not emphasizing the discrete subsystems. Such components as marketing, group buying, hiring of farmers as part-time extension workers, and risk guarantee should be dropped out. Much of the monitoring and surveillance should be considered as part of each subsystem. Overall project evaluation should be independent of the system. Some of the farmer participation elements are inherent in knowing the farmer and architecting and testing new technology.

USAID and ICA should determine fairly precisely the modifications in design. The analysis of this report can be used, but tempered by USAID and ICA criteria.

3. The project should take immediate action toward the specific end of achieving a significantly heavier involvement of the farmer in the determination of ICA local programming. ICA has not developed an adequate technique for involving the farmer. This is evidenced by the manner in which the technical exploration was accomplished. There was a minimum of personal contact with the farmer. It is evidenced by the manner in which the ficha tecnica is used. Practicos and farmers are involved as objective data suppliers and gatherers -- not in providing judgments and explanations. It is evidenced by the lack of attention to problem identification in the evaluation seminar (actually a lack of questioning whether the on-farm experiments were addressing the major problems of the area farmers), and finally, by the lack of attention on how to deal effectively with farmers in on-farm experimentation, one of the ways that farmers do participate.

In my judgment this is the weakest part of the project. That judgment is based on evidence from other sources that the wisdom of the individual peasant farmer is much greater than it is commonly thought to be. There is also evidence, some from Colombia, that organized, the peasant farmer can generate considerably more power than is commonly thought. The project does not have to rely on this evidence. It has the resources and the opportunity to treat the assertions as hypotheses and test them through experimentation, actually not very difficult experimentation. Experiments numbers 2 and 3 listed in the analysis section of this report (pp. 21-22) would provide such a test. Fortunately, this defect is easy to correct. (The Colombia experience with Accion Comunal indicates the inherent power of organization. A three-volume study "Strategies for Small Farmer Development: An Empirical Study of Rural Development Projects," DAI, 1975, contains much evidence. A copy can be made available if USAID doesn't have one.)

As part of getting increased farmer involvement, ICA should do some experimenting on how to make on-farm experimentation work better. Problems in on-farm experimentation can be instructive, both in how farmers deal with technology and in the kind of extension work that will be needed. The Guatemala experience of ICTA may be helpful. A mimeo by Estalfo Fumagali and Bob Waugh of ICTA explains the system.

4. This project needs to make fuller use of its opportunity to experiment with different methodologies for understanding the farmer, identifying problems, generating technology appropriate to the farmer, and for disseminating it. Some experimentation would enrich the project without distorting its current trajectory.

My own evaluation places experimenting with a farm management program in high priority. Farm management is a substantive technology in its own right. It is much more than farm records. In addition, farm management as an activity is an exceptionally useful tool for understanding farmers and their scarcity-abundance ratios. It is my judgment that ICA may find that its single crop technology could be made much more powerful when disseminated in a farm management context.

5. ICA should take immediate steps to take advantage of the experience of others. International trips would have to be taken in connection with the crop cycles. However, it could start making plans now for some travel, at least to Central America. The fact that it is late in the project is not relevant, since ICA will be in operation long after the project is complete.

Of most urgency is the need to synthesize the lessons learned from such Colombian Experience as that of SENA and Accion Comunal and the experiences reported by DAI, and to take advantage of the methodological work of the International Centers on technology evaluation that can be found in the CIAT library or acquired through the CIAT facilities. A good start on both of these tasks could be made with two or three person-months of time and at very little other cost.

The first trip should be to Central America and should involve a mix of ICA personnel that (a) can adequately evaluate what it sees in its various aspects and (b) can have an impact on the ICA program when it returns. Some thought needs to be given to the possibility of bringing in consultants experienced in the process.

6. The Mission should investigate the alternatives it has for extending this project, not necessarily with the addition of new money. There may be some arrangement by which AID/W can help with management or monitoring responsibilities, if such an arrangement is needed when the Mission terminates its operations.

Some economies could perhaps be achieved through project management to allow the current funding to cover a longer time period. A possible economy, for example, is to reduce spending for research that does not grow specifically from a problem identified by an innovative methodology of the project. Some central research does need to be financed, since the project aims to influence research project selection based on knowledge and contact with the farmer.