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CATIE

TROPICAL AGRICULTURAL RESEARCH AND TRAINING CENTER

STRATEGIES FOR A JOINT EFFORT

to help small farmers of
the Central American Isthmus
to increase animal proteins
production.



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SUMMARY

CHARACTERISTICS OF THE RURAL ENVIRONMENT IN CENTRAL AMERICA

An obvious need:

Population will more than double by the year 2000 in the Central American countries. Food and energy requirements will consequently have to be increased accordingly.

The area, the small farmer:

The six countries of the Isthmus comprise a population of 16 million inhabitants. Of this, 94 percent live on holdings from less than 4 to 35 hectares. Net income per capita ranges from 49 to 172 dollars for farmers in those units.

Low income per capita, poor housing, poor soils, and small holdings describe the conditions of the small farmers.

Under those circumstances, he cannot take risks.

Most food crops are grown in small farms which account for over 70 percent of the staple food consumed in the area.

The technology:

Small farmers produce most of the food in the area; however, technology is not available for them. Most techniques being developed are for farmers having sufficient resources.

NATIONAL INSTITUTIONS AND CATIE:
A PERSPECTIVE FOR COOPERATION
TO IMPROVE SMALL FARMERS' LIVING CONDITIONS

The mandate:

Small farmers represent a large part of the population, have a large impact on food production, live in poor houses, and raise crops on poor soils; no technology is available in accordance with their resources.

CATIE, a civil, non-profit association is conducting research and offers training and technical cooperation in agriculture, forestry and animal production through close coordination with national institutions in the countries of the Central American Isthmus and the Caribbean.

The objectives:

To increase productivity and production of the small farmers toward improving their living conditions.

The functions:

Research on production, taking into account the economic and biological environment, using a systems approach, considering all limiting factors, studying systems used by farmers and utilizing methodologies to develop suitable alternatives.

Proven technologies and methodologies are transferred to national staff and farmers. This has been some of the main results of CATIE's research efforts. Ten alternatives for cropping systems have been produced in different areas to increase net income up to 334 percent with small increases in production costs.

Improved animal systems have resulted in increasing milk and beef production to the benefit of farmers' diet and the economy of the area.

Natural resources are properly managed toward conservation and efficient use. Technologies and methodologies that do this are being transferred to improve certain environmental conditions.

Technical cooperation from different programs provides assistance to all countries in many aspects.

The farm is considered as a unit; systems being promoted are based on this concept and on the socioeconomic environment.

Training, main resource for development. Graduate training is given to professionals of the area within CATIE's philosophy and methodologies. Noticeable demand from the countries is being partly satisfied through short-term training events.

In 1978-79, a total of 45 graduate courses were taught. More than 200 professionals attended.

Short-term training involved over 450 professionals during the same period. It is done through seminars, short courses, in-service training and workshops.

Technical Cooperation is aimed toward strengthening national institutions.

This activity is carried out through agreements signed with the institutions to promote already proven technology. This technology is transferred to the farmer. The training of national counterparts is carried out as part of this activity by getting them involved in the development of technologies at the farmers' level. A direct impact on production, diet and living conditions is achieved. The countries are requesting an increasing amount of services in the use of natural resources and conservation. Assistance is given in milk, beef, cocoa and coffee production in many countries of the region.

Integrated efforts:

To accomplish the main goals of the Center and the countries -improving the small farmers' living conditions.

A PROPOSAL TO STRENGTHEN THE ACTIVITIES OF ANIMAL PRODUCTION PROGRAM

Introduction

CATIE is a regional institution to promote research and to provide training and technical cooperation in close coordination with the national institutions.

To utilize its resources to better advantage, and to avoid duplication of efforts, CATIE works in cooperation with the International Centers. Their findings are used in CATIE's research work at the farm, and feedback from the farmer is provided to the International Centers.

Because of CATIE's regional scope, ample support is being provided to the national institutions. This fact, added to the quality and continuity of the staff which works in the field, with the farmer, is the main reason explaining the demand for assistance from CATIE.

CATIE has a germplasm bank unique in the region which collects, stores, and provides high quality genetic material to the countries.

Cooperation between the national institutions and CATIE is needed if the countries are to cope with the need for doubling food production, maintaining a rational use of natural resources and preserving a good environment for future generations. This cooperation is already functioning. Further demand to solve problems will require strengthening of CATIE's budget.

To help the countries meet such a challenge, increased budget support is needed to establish a permanent group of able professionals which will provide continuity of efforts.

Background information:

Plant proteins in the tropics are lacking some essential amino acids; animal protein, because of its high biological values, should be an important component of the human diet. In the area, 80 percent of the small and medium-sized farms have 60 percent of the bovine population. The available resources to feed animals are grasses, low in protein, and high in fiber content. Better utilization of these resources could increase milk production and contribute to an improved diet of rural families.

Small ruminants, swine, and poultry are also important components of the small farm. Their contribution to the overall enterprise has not yet been determined.

Through research, training and technical cooperation, the Program promotes milk and meat production and studies the role of the small animals in the farm, to produce suitable alternatives, capable of improving the small farmers' living conditions.

Justification:

The goals achieved by the Programs and the increased demand expressed by the countries at all levels, should be considered as sufficient evidence to support the petition for strengthening CATIE's basic staff.

The countries have expressed their support for CATIE's activities in the last meeting of the Ministers of Agriculture. This is considered an honor, although it also represents new challenges and more responsibilities.

Activities of the Program needing support:

The strengthening of the Program, necessary to carry out and fully implement their objectives and to achieve the goals within its main lines of action, will concentrate on the following activities:

- a) research, jointly carried out with the countries, on main lines of the Program,
- b) support for research and extension personnel of the national institutions to carry out their own programs,
- c) support for research, training and technical cooperation activities presently carried out by CATIE's staff.

Human resources needed:

Senior Staff, at high level, is requested in the various disciplines of the Program.

The requested personnel was strategically distributed over the years to complement actual needs of CATIE and that of the national institutions.

The positions requested represent the permanent staff necessary to conduct research, and to provide training and technical assistance according to the projected and increasing needs of the countries.

Budget requirements:

A three-year budget has been prepared to indicate the projection proposed for this period which will be necessary to meet the personnel requirements to cope properly with present and future demands for CATIE's assistance.

The number of personnel will reach a total of 14 by the third year, of which 5 will be financed by CATIE's budget and 9 will require extra funding.

The total contribution requested comes to US\$2,765,400. The impact of the additional resources on the total income for the first year represents an eight percent.

CHARACTERISTICS OF THE RURAL ENVIRONMENT IN THE CENTRAL AMERICAN ISTHMUS

AN OBVIOUS NEED:
More food and energy for
an increasing population

To cope with the food and energy requirements of an increasing population, most countries of the Central American Isthmus will have to more than double their food production and properly program the use and replenishment of their natural resources before the end of the next decade, thereby presenting a dramatic challenge for those involved in rural development.

THE AREA, THE SMALL FARMER: a challenge

The Central American Isthmus is made up of Costa Rica, El Salvador, Nicaragua, Honduras, Guatemala, and Panamá. The population of Central American Countries is about 16 million people and will be more than 35 millions by the year 2000. In 1970 the rural population represented 64 percent of the total inhabitants of which, 76 percent are located in holdings of less than 4 hectares, and 18 percent, in holdings between 4 and 35 hectares; the rest, only six percent, are located in properties over 35 hectares.

The average annual income seems to be correlated to the size of holdings: 49, 172, and 952 dollars per capita, corresponding to less than 4 hectares, between 4 and 35 hectares, and over 35 hectares, respectively.

The low income, added to the small size of the farms, as well as their being located on poor soils, defines and puts the small farmer in a difficult situation which inhibits him from taking risks.

Of the total area devoted to agriculture, farmers with less than 4 hectares, dedicate 60 percent of their land to food crops; those with holdings between 4 and 35, dedicate 41 percent to food crops; those with properties over 35 hectares, dedicate only 4.2 percent to food crops.

Although not programmed, small and medium-sized farmers of the area are responsible for producing a large percentage of the staple food consumed in the region. About 80 percent of this production comes from these farmers with small holdings, low net income, and poor soils.

THE TECHNOLOGY:
Unsuited to small
farmers' socioeconomic
environment

Although it is a recognized fact that the small farmers are involved in feeding themselves and a large percentage of the rest of the population, no technology has been developed that suits their particular socioeconomic and biological environment. New ideas and new research are needed to produce solutions which are both technically and culturally acceptable to tropical small farmers to increase production and productivity.

THE NATIONAL INSTITUTIONS AND CATIE: A PERSPECTIVE FOR COOPERATION TO IMPROVE SMALL FARMERS' LIVING CONDITIONS

Small farmers are a large part of either the total or the rural population; they have a noticeable impact on the staple food consumed in the area either from an animal or plant source; they live in poor houses, crop in poor soils, and the technology to improve their productivity and consequently their standard of living, is negligible.

THE MANDATE:
towards regional
coverage to benefit
small farmers

CATIE is a civil, non-profit, autonomous association, scientific and educational in nature, established to carry out, promote and stimulate research, and to provide technical cooperation and training in agricultural, animal and forestry production to produce technical alternatives for the regional needs of the small farmers of the American tropics, particularly in the countries of the Central American Isthmus and the Caribbean.

THE OBJECTIVES:
in accordance with
the environment,
resources, and national

CATIE's objective is to increase agricultural, lives tock and forestry production and productivity, especially of the small farmers of the Central American Isthmus, with the purpose of contributing to the improvement of their living standards by making proper use of natural resources within the framework of national policies, in close cooperation with the national institutions.

THE FUNCTIONS:
toward a
systems approach

*Research: for
production

Research to produce an impact on small farms' production and productivity has to take into account both the economic and biological environment. Methodologies capable of contemplating them are needed. By focusing research on a Systems Approach, considering all limitant factors, and studying systems being utilized by farmers, CATIE has developed a methodology that is being proven at the farmers' level, to generate technological alternatives, according with the farmers resources, consequently, easy to adopt. As a result of the research efforts, both methodology and technologies suitable to the environment are generated by close cooperation between CATIE staff and personnel from the national institutions.

Technologies and methodologies developed, after proven are transferred to the farmers and the national staff of the area.

A methodology to do research at the farm level, assistance to develop national programs in cropping systems, and the initial steps to establish a research network in the Isthmus, are some of the main results of CATIE's efforts. Ten alternatives for cropping systems including corn, beans, cassava, squash, pumpkin, sorghum and cowpea, in different combinations, have been developed.

They may produce an increase in the farmer's net income ranging from 66 to 334 percent, with an increase of only 15 to 23 percent in production costs.

Improved crop management and proper land utilization practices are contributing to a better and more efficient use of the small farmers' resources and producing additional income as a result of combining several annual crops. Significant reduction in soil preparation operations, better use of inputs, and the acquisition of additional products such as those coming from perennial plants and trees are other achievements of CATIE's research efforts.

Improved animal production systems have helped, through better crop management, use of tropical legumes and proper grazing practices, to increase farmer's net income. Breeds and crosses have been evaluate and those proven adaptable to tropical conditions have been selected and are being promoted.

CATIE has worked toward the management and conservation of the natural resources. Crop and tree associations significantly contributing to the farmer's net income have been identified. The Forestry Nursery has been renovated to provide material to be included in the research work. The Collection of New Species has been increased, the Latin American Forest Seeds Bank has been promoted. In addition, the development and utilization of wildlife species in several countries have been of noticeable help to the area.

Annual crops, perennial plants, rugged adaptable animals, animal management, wildlands and wildlife management and the socioeconomic factors affecting these systems are all part of the farm; and as such are considered by CATIE's efforts in order to provide proper answer to the farmer's problems.

*Training: main
resource for
development

Training is considered a fundamental tool to promote the methodologies developed in order to reach the target population. For this, a considerable number of professionals have to be trained to extrapolate and multiply the Center's efforts. Personnel from national institutions, who are involved in research, extension and education, are being trained through a long-term Graduate Program and short-term training activities.

There is a recognized need to design methodologies to accelerate training to help satisfy countries' needs. To achieve this, CATIE is making an effort to carry out training activities at different levels, using methods that make it possible to train larger numbers of professionals.

Agricultural engineers, agronomists, researchers, extension agents, technicians, university professors and students, and personnel from intermediate-level educational institutions will be the target of CATIE's training efforts.

In only one year (1977-1978), the staff of the Center gave a total of 45 courses within the Graduate Program carried out through a joint effort between the University of Costa Rica and CATIE. This involved over 200 professionals of the region and other countries in Latin American. The staff also participated in short-term training activities within the six countries of the Central American Isthmus, working together with the staff of the national institutions. These short-term training activities involved 450 professionals

through short courses, seminars, workshops, in-service training and international meetings. Through these efforts, CATIE is contributing substantially to strengthening a regional network of researchers and experts in agricultural development, interested and trained to do research oriented toward the needs and resources of the small farmers of the American Tropics.

*Technical
Cooperation:
toward strength-
ening national
institutions

Technical cooperation activities are carried out to make sure that technologies developed reach the farmers, and that there is a feedback from the farmer to the researcher.

To properly do this, appropriate and efficient methods of transferring technologies also have to be produced.

Technical cooperation activities, carried out through contracts and agreements with the national institutions of the countries, are the basic channels through which suitable technologies can be tested at the farmer's level, working with the personnel of the national institutions. This concentrated action serves as a model with the multiple purpose of transferring technologies to a large mass of farmers and to train personnel and test methods of transference to accelerate the process.

To accomplish such purposes, CATIE has signed contracts and agreements with the national institutions of the countries for the application of technologies, the planning and development of cropping systems, to exchange germplasm, to assist technically credit programs linked to livestock development activities, to promote milk production as part of land colonization projects, to train personnel, to develop agricultural practices and to manage wildland areas. Technical assistance has been given to Panama in the form of research related to livestock production in order to generate and transfer developed alternatives in this field. Many countries have been helped in planning the management of their natural resources, in managing watersheds, management and conservation of hydraulic resources, in development of national parks and in training programs for the conservation of the environment.

INTEGRATE EFFORTS:

- . Systems approach
- . Interdisciplinary team
- . Training and tech. coop.
- . Working with the farmer
- . At the farm level
- . With national institutions

To accomplish the goals of improving small farmer's living conditions, CATIE is using a multidisciplinary team, working in close cooperation with staff from the national institutions, in the farmers' fields, cognizant of the farmers' problems, and with the farmers' active participation in the process of developing alternatives. Research is conducted away from the experiment station using available inputs. Staff from the countries is trained using methodologies developed and proven suitable. Methods of technology transfer are being developed through promoting proven technologies.

THE STRATEGY:

*The programs:
four interacting disciplines in the same institution working at Turrialba and at the country level, to carry out research, training and technical cooperation

The Center has the privilege of having the four basic areas of production for rural areas: Animal Production, Annual Crops, Perennial Plants and Natural Renewable Resources.

Altogether, the functions assigned to the Center and the Programs designed to implement them, have made it possible for CATIE to produce a noticeable impact within the important area of production, an action recognized by the support provided by the Ministers of Agriculture of Mexico, the countries of the Central American Isthmus and the Dominican Republic.

CATIE's Programs have a regional projection and their actions are carried out through projects jointly implemented with the national institutions. Activities within the projects are aimed at the

generation of technology, methodologies for transference, training at different levels, and to assist the institutions through technical cooperation actions.

All the Programs carry out initial surveys to find out what are the predominant systems in the area. This survey is used to determine the main limiting factors in the system used by the farmer. Based on these and data on climatic and socioeconomic conditions, alternatives to the farmers' systems are designed. Validation in the farmer's field is the next step. Once validated, transference to the farmer takes place through technical cooperation agreements with national institutions. The Annual Crops Program concentrates its activities in the following areas:

- a. Development and improvement of cropping systems for small farmers in specific environments.
- b. Development of methodologies to increase the geographic area for which cropping systems alternatives can be recommended.
- c. Analysis of cropping systems behavior and their response to environment and management factors.

The Animal Production Program has four main lines of action:

- a. Development of specialized milk production systems.
- b. Development of beef production systems.
- c. Development of dual purpose production systems.
- d. Development of small animals production systems for small farmers.

The Natural Renewable Resources Program carries out activities in:

- a. Wood Production.
- b. Watershed and wildland management
- c. Agroforestry systems

The Perennial Plants Program emphasizes work on:

- a. Development of cocoa production systems.

b. Development of coffee production systems.

c. Multiple cropping perennial plants systems.

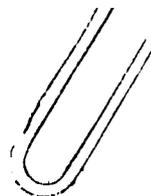
Efforts expanded in all these areas will generate technologies, will train people and will produce methods of transferring and evaluating the findings once they reach the main target-the small farmer.

Specific activities are being carried out in all the countries of the Central American Isthmus, and technical assistance is provided also outside the area.

The benefits of joint activities between national entities and CATIE on production, diet, resource conservation, and efficient use of natural renewable resources and inputs are evident. The methodology used is simple, easy to adopt, and applicable to most environments.

Demand for this kind of effort toward developing adequate technologies is increasing.

CATIE's present basic budget will become unsuitable to respond to the challenges of the 80's. Additional support will be needed to cope with it without stretching CATIE's staff beyond the point of reasonable efficiency.



A PROPOSAL TO STRENGTHEN THE ACTIVITIES OF ANIMAL PRODUCTION PROGRAM

INTRODUCTION

CATIE is a regional institution that works to promote research, training and technical cooperation in close coordination with national institutions. It is becoming a leader in the application of new methodologies for agricultural development by using interdisciplinary teams to work toward solving small farmers' problems.

Technical assistance available in different forms and provided by the Center, is in increasing demand.

CATIE also works in cooperation with the International Centers in a effort to better utilize their findings to avoid duplication of efforts or waste of resources.

Because of CATIE's regional scope, ample support is being provided to the national institutions. This fact, added to the quality and continuity of the staff which works in the field, with the farmer, is the main reason explaining the increasing demand for assistance from CATIE.

Examples of this demand are the recently approved projects on watershed and wildland management for Costa Rica and Panamá, whose governments have requested CATIE's assistance. Coffee and cocoa production are also main concerns of the countries, and a recent project financed by the World Bank in Panamá is going to be implemented through CATIE's assistance in that country.

In addition to this, the Center has a germplasm bank, unique in the area, which collects, stores and provides high quality genetic material to supply the needs of the countries.

To respond to the demands of countries that will be responsible for feeding 35 million people by the year 2000, and that will have to create a large number of jobs per country every year to maintain the increasing population, an institution such as CATIE is strongly needed if the continuity of efforts, toward increasing food production and protection of resources, is going to be provided.

To accomplish this, the Center needs increasing budget support in order to establish a permanent team of able professionals in the different areas and programs.

The Programs needing support are described below. The needed personnel and the corresponding budget are also indicated.

BACKGROUND INFORMATION

In the tropics, animal protein must be an important component of the human diet because plant proteins are lacking some essential aminoacids. However, in tropical developing countries, animal protein is not a significant component of the daily diet in spite of the presence of animals in small and medium-size farms. There is a lack of adequate technology for increasing animal production at the small size farm that must be developed under a different framework.

CATIE's emphasis on livestock research, especially from the viewpoint of milk production, is based on the fact that 80 percent of small and medium size farms hold 60.7 percent of the bovine population in Central America. Of the available resources on farms which can be used by animals most are high in fiber, low in protein content, and unsuitable for human consumption. Better utilization of these resources could increase milk production and contribute to an improved diet of rural families.

Considering the aforementioned situation, the Program intensifies research to determine practical production systems which, within the tropical environment, more efficiently utilize the available resources of small and medium-size farms, thus increasing animal production and productivity.

Small ruminants, swine and poultry are also important components of the small farm, but their contribution to the overall enterprise has not yet been determined. The energy and protein requirements of these species should be studied as well as their genetic potential. Further proper management has to be established so as to be included as a productive component in the whole farming system.

The demand for training national personnel is high, and the national institutions need further support in their training activities at all levels to maintain their efforts in research and technology transfer towards providing the farmer with technologies to improve their standard of living.

STRATEGY

Research in animal production is undertaken by a multidisciplinary approach, implemented through projects which study the existing systems, these studies provide the basic knowledge toward developing alternatives and solutions to the constraints to small producers. Milk and beef production systems are studied as well as the other species utilized by the farmer. Potentially suitable species, which can increase farmers' productivity and improve their diet and income, are also studied.

Training is considered a fundamental tool to promote the methodologies developed in order to reach the target population. For this, a considerable number of professionals are being trained through the Program's staff to extrapolate and multiply the Center's efforts. Personnel from national institutions, who are involved in research, extension and education, are being trained through a Graduate Program and short-term training activities. Using different training methods, the target population will be increased in the future.

To help supply the demand due to the scarcity of trained national personnel, training at different levels will be provided. This training will cover areas such as biological and economical research as well as methodology of technological transference.

MAIN LINES OF ACTION

A. "DEVELOPMENT OF SPECIALIZED MILK PRODUCTION SYSTEMS"

Importance and Justification

The Central American region continues to experience a high increase in rate of population growth; consequently, there is an increasing need for milk and dairy products which calls for frequent and abundant importations of these products. This occurs in spite of the exceptional ecological conditions for milk production existing in many areas of the region. Parallel to this, the demand for agricultural land is constantly increasing.

Regional studies indicate that from 25 to 65 percent of the milk produced in the area comes from small farms (less than 35 hectares), and results of case studies in the area show the importance of the animal component in the farm picture. Sampled farms have from 30 to 50 percent of the land in permanent pasture, and livestock produce 10 to 17 percent of the family income. However, though there is a deficiency in the region, investigation in milk production has not received special attention within the research programs of the area.

Because the Central American countries are importers of milk and dairy products, have rapid demographic growth, and consequently an ever increasing demand for dairy products, and because of the need to improve the small farmers' living conditions, there is plenty justification for a research program and the application of research results in milk production systems for small farmers.

Objectives

To develop milk production systems for small farmers, adapted to the ecological, geographic and economic conditions of the Central American countries, aimed to increase production through adequate use of available resources.

To guide and coordinate actions of national institutions dedicated to research and technology transfer and thus to contribute to increase their capacity to generate and transfer new practices for the benefit of the small farmers.

Methodology

The following stages comprise the research:

- a.- Identification of the limiting factors through a diagnostic stage involving milk production in target areas.
- b.- Generation of new knowledge to formulate improved milk production systems including factors requiring further study as well as individual components and their combinations. During this stage, sub-projects are carried out dealing with feeding sub-systems of dairy cattle in the tropics, and others such as the breeding programs for milk productions, disease and parasite control, and identification of toxicity problems.
- c.- The new knowledge as well as other data already available from research efforts of national and international centers, integrated to develop modified milk production systems including components of feedings, animal health, breeding, management and economic factors and their interactions.
- d.- The models are made available for field trial evaluations and adjustments, leading to the following stage or to further research should it then be necessary.
- e.- The last stage consists in large scale diffusion and transference of the systems to producers.

B. "DEVELOPMENT OF BEEF PRODUCTION SYSTEMS"

Importance and Justification

Beef production in the Central American Isthmus plays a very important role in the economy of the countries. However, this type of production has been linked to extensive systems which are low in productivity.

One of the most important problems affecting beef production in tropical areas is the extreme seasonal variation in forage production. As forage is the basis for livestock feeding in the area, the variation in its supply results in low growth rates and poor fertility.

The utilization of by-products, such as molasses and culled bananas and others that are available in the area, as well as intensifying the use of the most abundant resource -grass, the pasture could result in important improvements in beef production. Some of the practical results obtained show the additive effect of using molasses and pasture providing increases of 30 percent over grazing alone. When forage availability decreases, supplementing with crop residues can play an important role in maintaining favorable levels of production. Such effects are not only biological but also economical.

Studies carried out on crosses between two breeds and rotational crossings with more than two breeds can increase beef production. Results show that hybrids from the first cross are 12 percent better than their parents. Added to this, some of the reproductive characteristics have been shown to be of more importance than production factors.

As an example, hybrid cows, particularly those having Brahman and Criollo blood, produce up to 26 percent more kilograms of weaned calf weight per cow than the original breeds.

Objectives

To develop beef production systems through the efficient use of the resources available to the small farmer.

Methodology

- a.- Diagnosis of the situation to identify factors limiting production.
 - b.- Generation of new knowledge or component of the production system. They include the study of crosses as a means of combining adequate adaptation to the environment and a high reproductive efficiency within the tropics. Factors affecting grass production are also studied as well as the contribution from crop residues and different products and by-products, such as molasses especially for periods of grass scarcity. Biological factors affecting beef production and the efficient use of resources are also studied.
 - c.- Validation at the farm level of the production model and its adjustment if needed.
 - d.- Transfer of the models to the extension and technology transfer institutions.
- C. "DEVELOPMENT OF DUAL PURPOSE PRODUCTION SYSTEMS"

Importance and Justification

Most or all the potentially nutritional resources for livestock are high in fiber and low in protein and of the domestic species the ruminant is the best suited to utilize fiber and to accept non-protein nitrogen. When given in adequate amounts as feed source, they can be transformed into protein of high biological value, apt for human consumption.

Bovines are found in most of the small and medium-size farms in the Central American Isthmus and a large part of the total population are on such small farms. These farmers generally obtain milk from the cows even though they are not strictly of the dairy type. Milk is generally consumed on the

farm where it is produced and consequently could be used directly in improving the diet of the rural family, increase in production may lead to more income from selling it as milk or cheese.

Research on animal production in the past has focussed on developing technologies to improve either milk or beef production as specialized systems. Little effort has been done on this research of the dual purpose system at the farm level to help increase production of both milk and meat.

Objectives

To develop milk and beef production systems through developing adequate technologies permitting the efficient use of the resources available to the small and medium-size farmer.

To cooperate in the strengthening of the national institutions through training for research and through technical cooperation that permits the transference of improved systems to the small farmers.

Methodology

- a.- To know the reasons or circumstances inducing the farmer to make a number of decisions during the process of production. This makes possible a determination of the nature, range and the specific aspects to be investigated through the appropriate analysis of the farm.
- b.- The research, considers the components of the system as well as the adaptation of available knowledge leading to alternatives to the management problems at the farm level; those resulting most feasible because of simplicity and low cost, consequently more adoptable, are the alternatives to be validated. These solutions of different alternatives chosen for farm level validation are finally analyzed to determine economic and biological suitability as well as adoptability. Integrating different solutions, sub-systems can be put together making possible the development of milk and beef production systems.
- c.- This relationship with national institutions permits the transference of their staff validated alternatives as well as of methodologies used to develop them, to ensure the continuation of the research programs and of the evaluation of the alternatives to adjust them when necessary.

D. "DEVELOPMENT OF SMALL ANIMALS PRODUCTION SYSTEMS FOR SMALL FARMERS"

Importance and Justification

Small animals constitute an important and ever present element within the small farm. Their main role is to provide for the family diet, but they also play an economic role within the farm. According to statistics of the area, about 98 percent of the hogs of the area are produced in family type exploitations, as well as 75 percent of the poultry and 100 percent of the bovines and caprines. The way they are now being managed results in very low yields providing an inefficient use of the feed resources available at the farm.

The competition with humans for food and the scarce availability of feeding resources are reasons for the limited production of these species in some of the countries. This is also responsible for the decreasing numbers in other countries, such as in the case of sheep in Guatemala. Commercial poultry and swine production use high technology in contrast to that used by the small farmers. The extrapolation of technology has often failed because of the different socioeconomic conditions surrounding small farmers.

To increase production of small animals, there is a need to develop adequate technology, adapted to the environment and to the needs of the farmers. Such technology will result in increasing production to supply the family consumption as well as to produce an excess to be sold in the local markets. Research on these lines has been negligible or non-existent in tropical countries.

Objectives

To determine the role and the economic importance of the small animals within the farm and to develop through research, systems of production for small animals, considering the ecological, socioeconomic and technological resources of the small farmer of the Central American Isthmus.

To determine the possibility of using ruminants other than bovines by small farmers of the region.

To guide national institutions in research and technological transference, toward the use of improved methodologies in small animal development programs.

Methodology

- a.- According to the systems approach utilized by CATIE and the Animal Production Program, there is a diagnostic phase where prevalent systems are determined and studied together with their limiting factors and the role or economic importance of each of them within the farm.

- b.- Based on available resources, on the preferences and attitudes of the farmer and on the interaction of all the productive sub-systems of the farm, models for production are designed based on research within the farm. Validation is done at the farmer level to be later mass transferred to the many farmers.
- c.- Transfer of the validated models to the national institutions is done to achieve a wider scale of utilization of the results.

ACTIVITIES OF THE PROGRAM NEEDING SUPPORT

The strengthening of the Program, necessary to carry out and fully implement its objectives and to achieve the goals within the main lines of action mentioned above, will concentrate on the following activities:

- a) research, jointly carried out with the countries, on the main lines of the Programs
- b) support for research and extension personnel of the national institutions to carry out their own programs,
- c) support for research, training and technical cooperation activities presently carried out by CATIE's staff.

Support for these activities is needed to ensure that the national institutions will be able to implement their own programs in the future; to train their staff, following CATIE's philosophy, to identify and evaluate problems, to assign priorities in decision making, and to make sure resources and efforts will be directly channelled toward the development plans of each individual country. To do this, CATIE needs to increase the number of basic staff to provide the additional support needed to carry out cooperative activities among researchers and extension specialists, and to backstop projects related to CATIE's research objectives which are all to be based on a common goal-improving the living conditions of small farmers. Once the needed support is obtained, CATIE's position and credibility, gained by projecting its efforts toward the countries, by working with the staff of the national institutions, and with the farmers, will permit the Center to project further its influence and actions at the regional and national levels. The regional action of the Center will avoid overlapping of efforts among countries with the consequent saving of human and monetary resources, and will be independent of political fluctuations.

Justification

The goals already achieved by the Program individually and by all CATIE's activities using a multidisciplinary approach regarding farming systems, should be considered as sufficient to justify the request for funding to support basic staff requirements.

Most of the research results obtained from the main lines of the Program will be applicable within the next five or ten years. It then becomes obvious that there is a need for adequate human and physical resources to guarantee stability of CATIE's projections, the validity of its research and the adjustment of the methodologies developed, as well to provide permanent assistance to the national staff of the countries.

There is an obvious need to learn more about Animal Production systems; their role in the farm and ways to increase efficiency in the use of management practices and inputs. This has to be done if we are to cope with the challenge of doubling food production before the end of this decade, and if we are going to strengthen the economy of the countries.

Activities carried out through the Program enable CATIE to produce suitable alternatives for the region through extrapolating research results from one site to other similar areas, avoiding then the duplication and waste of efforts and other limited resources, by providing proper coordination among researcher and extension agents of the different national institutions.

The projection given to the Center through its innovative approach to development, applied during the last few years, has created an increasing demand on the services of the present personnel. The support provided by the Governments of the area constitutes an honor for the Center, but also an additional challenge and responsibility for the institution.

It is the intention of the Program, as well as that of CATIE in general, not to stretch its existent manpower beyond the point of reasonable efficiency. To further extend activities and to better support present operations, the Program and the whole Center must have the solid support of a highly qualified staff. Additional and stable budget support is needed to hire the required staff, acquire the needed equipment, and obtain research inputs.

HUMAN RESOURCES NEEDED

To continue efforts already initiated, there is a need for the Senior Staff presented in Table 1. This staff will consist of high level professionals in the various disciplines of Animal Production.

The staff will be located at Turrialba headquarters and will cooperate more closely with the national institutions; a considerable number will be located in each country.

The total number of required personnel has been strategically distributed over the years to respond strictly to activities having priority and to complement the actual staff of CATIE and that of the national institutions. To determine the needs, both CATIE's personnel and national staff were considered.

Requirements for the first year call for two Animal Production Specialists, one for ruminants to continue and increase already established research programs and one for non-ruminants to emphasize efforts in poultry, swine, and other small animals, very important within the farm.

The second year will require the services of an Animal Breeder for non-ruminants to complement the work of the Production Specialist and to help in the development of better and more suitable animals for the small farmers' environment. An Agrostologist to conduct research on adaptability of species to the different ecological regions will also be needed. Tropical legumes and grasses should become one of the most important sources of nutriment, specially in the lowlands; research to determine the best species and combinations will be carried out by the Agrostologist. The increase of activities with different animal species will require the services of a Veterinarian to provide support on a regional basis. An economist is also requested to support other staff activities as well as to complement actions related to surveys, diagnosis and case studies in different areas to determine the factors limiting production. A Training Coordinator will also be required. Most Program activities, even those directly related to research, imply some training actions. Added to this, the Program carries out teaching at the Graduate level as well as through short courses, seminars, workshops, and in-service training at headquarters and in the countries. These specialists will complement the personnel of the Program and will help in the long-term projection of the activities in their respective fields.

These positions representing the required permanent staff will be necessary to conduct research, training and technical assistance according to the projected and increasing needs of the countries.

Junior staff, as well as general support personnel for research and training to increase the efficiency of the Senior Program Staff, is included in the proposal. Funds are also requested to cover operational costs, since that part of the present costs are being covered by special projects.

Costs pertaining to infrastructure, such as office remodeling and small working facilities, are also included.

REQUIRED BUDGET

A three-year budget has been prepared to indicate the projection proposed for this period which will be necessary to meet the personnel requirements to cope properly with present and future demands for CATIE's assistance.

In Tables 1-7, the total and additional budgets needed by the Program are shown. Personnel, materials, and equipment are also included. The Tables also show an analysis of the present and proposed budgets for three years.

Table 1 indicates the total Program Senior Staff and additional staff funding required. There are 9 required for the first year (4 additional) and 14 for the third year, representing 9 new positions. All personnel costs include benefits and allowances, as well as social security costs.

Table 2 shows personnel costs, support personnel costs, as well as other support costs.

The total contribution requested for the first year amounts to US\$886,900; and for the three-year period, it comes to US\$2,765,400 (Table 3).

The proposed situation (Table 4), regarding the percentage of the total Program resources represents a change from 18 to 42 percent for the first year.

Regarding the impact of the additional resources on the total income for the first year (Table 7), it only represents eight percent.

TABLE N^o 1. CATIE, ANIMAL PRODUCTION PROGRAM. REQUIRED BASIC PROFESSIONAL STAFF AND COSTS FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Position	Academic Level	First Year	Second Year	Third Year	Total
1. Program Head	PhD.	44.0	47.0	50.0	141.0
2. Animal Breeder	PhD.	41.0	44.0	47.0	132.0
3. Animal Nutritionist	PhD.	41.0	44.0	47.0	132.0
4. Animal Nutritionist	PhD.	41.0	44.0	47.0	132.0
5. Agrostologist	PhD.	38.0	41.0	44.0	123.0
6. Animal Production (Rumiant)	PhD.	35.0	38.0	41.0	114.0
7. Animal Production (Non rumiant)	PhD.	35.0	38.0	41.0	114.0
8. Animal Nutritionist (Non rumiant)	PhD.	35.0	38.0	41.0	114.0
9. Agrostologist	PhD.	35.0	38.0	41.0	114.0
10. Animal Breeding (Non rumiant)	PhD.	--	38.0	41.0	79.0
11. Training Coordinator	M.S.	--	43.0	36.0	79.0
12. Systemologist	PhD.	--	44.0	47.0	91.0
13. Veterinary-Physiology	PhD.	--	41.0	44.0	85.0
14. Economist	PhD.	--	38.0	41.0	79.0
ADDITIONAL FUNDING REQUIRED		(140.0)	(356.0)	(373.0)	(869.0)
TOTAL SENIOR STAFF COSTS		345.0	576.0	608.0	1.529.0
TOTAL SENIOR STAFF POSITIONS		9	14	14	

TABLE N^o 2. CATIE, ANIMAL PRODUCTION PROGRAM. SUPPORTING COSTS OF BASIC PROFESSIONAL STAFF, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Position	First Year	Second Year	Third Year	Total
PERSONNEL	248.0	356.0	356.0	960.0
TRAVEL AND PERDIEM COSTS	82.0	121.0	121.0	324.0
EQUIPMENT AND COMMODITIES	200.0	82.0	8.0	290.0
COMMUNICATION COSTS	20.0	20.0	19.0	59.0
MAINTENANCE AND OPERATION COSTS	46.0	37.0	37.0	120.0
SPECIFIC INPUTS	75.0	90.0	107.0	272.0
ADMINISTRATIVE AND LOGISTIC SUPPORT	150.0	160.0	170.0	480.0
GENERAL COSTS	100.0	20.0	--	120.0
TOTAL STAFF SUPPORT COSTS	921.0	886.0	818.0	2.625.0

TABLE N^o 3. CATIE, ANIMAL PRODUCTION PROGRAM. SUMMARY OF PROJECTED BASIC COSTS,
BY CATEGORY AND SOURCE, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Description	First Year	Second Year	Third Year	Total
BREAKDOWN BY CATEGORY				
1. Senior staff costs	345.0	576.0	608.0	1.529.0
2. Staff support costs	<u>921.0</u>	<u>886.0</u>	<u>818.0</u>	<u>2.625.0</u>
TOTAL	1.266.0	1.462.0	1.426.0	4.154.0
BREAKDOWN BY SOURCE				
1. CATIE available resources	379.1	454.9	549.6	1.383.6
2. Additional resources required	<u>886.9</u>	<u>1.007.1</u>	<u>876.4</u>	<u>2.770.4</u>
TOTAL	1.266.0	1.462.0	1.426.0	4.154.0

TABLE N° 4. CATIE, ANIMAL PRODUCTION PROGRAM. TOTAL PROGRAM RESOURCES PRESENT AND PROPOSED SITUATIONS, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Description	First Year		Second Year		Third Year		Total	
	US\$000	%	US\$000	%	US\$000	%	US\$000	%
PRESENT SITUATION								
1. Basic activities-CATIE resources	379.1	18	454,9	18	549.6	18	1.383.6	18
2. Contracts and specific agreements	1,750.2	82	2.100.2	82	2.537.8	82	6.388.2	82
TOTAL	2,129.3	100	2.555.1	100	3.087.4	100	7.771.8	100
PROPOSED SITUATION								
1. Basic activities-CATIE+additional	1.266.0	42	1.462,0	41	1.426.0	36	4.154.0	39
2. Contracts and specific agreements	1,750.2	58	2.100.2	59	2.537.8	64	6.388.2	61
TOTAL	3.016.2	100	3.562.2	100	3.963.8	100	10.542.2	100

TABLE N° 5. CATIE, ANIMAL PRODUCTION PROGRAM. RELATIONSHIP BETWEEN BASIC RESOURCES AND FUNDING FROM SPECIAL PROJECTS; PRESENT AND PROPOSED.

(THOUSANDS OF 1980 US DOLLARS)

Description	PRESENT		PROPOSED	
	US\$000	%	US\$000	%
1. Gross basic income	2.897.6	29	3.784.5	34
2. Contracts and agreements	7.170.7	71	7.170.7	66
TOTAL	10.068.3	100	10.955.2	100

TABLE N^o 6. CATIE, ANIMAL PRODUCTION PROGRAM. REQUESTED ADDITIONAL FUNDING EXPRESSED AS A PERCENTAGE OF TOTAL BASIC BUDGET FOR 1980.

(THOUSANDS OF 1980 US DOLLARS)

Description	US\$000	%
1. CATIE available gross basic income	2.897.6	77
2. Additional Program resources required	<u>886.9</u>	<u>23</u>
TOTAL	3.784.5	100

TABLE N^o 7. CATIE, ANIMAL PRODUCTION PROGRAM. REQUESTED ADDITIONAL FUNDING EXPRESSED AS A PERCENTAGE OF CATIE'S TOTAL BUDGET FOR 1980.

(THOUSANDS OF 1980 US DOLLARS)

Description	US\$000	%
1. CATIE total 1980 available income	10.068.3	92
2. Additional Program resources required	<u>886.9</u>	<u>8</u>
TOTAL	10.955.2	100

TABLE N° 8 . CATIE, GLOBAL BUDGET SUMMARY 1980 .

(THOUSANDS OF 1980 US DOLLARS)

Description	US\$000
1. Direction	101.7
2. Technical Coordination	155.3
3. Programs	
3.1 Annual Crops	2.704.8
3.2 Perennial Plants	516.8
3.3 Animal Production	2.129.3
3.4 Natural Renewable Resources	2.147.4
4. Technical support units	916.8
5. Administration and services	593.4
6. Farm operations	371.8
7. General costs	431.0
TOTAL	10.068.3