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SMALL RUMINANT COLLABORATIVE RESEARCH SUPPORT PROGRAM (SR — CRSP)

DEVELOPMENT DESIGN ASSOCIATES

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PROLIFIC SHEEP RESEARCH

and

INSTITUTION BUILDING

A proposal for a

COLLABORATIVE RESEARCH PROJECT

prepared for the

SMALL RUMINANT CRSP

by

Ridwan Blond

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SUMMARY

1. A proposal is offered for a 5-year project which is designed to strengthen the capability of a livestock research system in a developing country.

2. Research focused on developing prolific sheep production systems, is the vehicle by which improvement of the research system is accomplished.

3. The research effort is a collaborative undertaking in which US and host country scientists jointly develop and execute research agendas to meet the demands of the project objectives.

4. The proposed project is characterized by:

- treating the Research System as the entity for improvement, rather than seeking piecemeal improvements to just some of its components, such as by skills improvement training;
- a major role for host country officials in the conception and design of the project, as well as an incremental role in the responsibility for its implementation;
- a project process which generates improvements in organizational and management aspects of the research system, in response to specific needs arising from the prolific sheep research agenda;
- a multidisciplinary research program made operationally coherent by focusing on a common goal and mutually agreed research strategies with close working relationships between the subprojects of the different disciplines;
- a project process which initiates the integration of research components from the outset, and places reliance on a formal model for generating production system scenarios;
- the design of an extension component which is based on farmers' needs and motivations, and which is used to inform research directions from an early stage;
- a Project Development Phase, which is of particular importance in the project as designed, since it allows early contributions of host country key actors, as well as early development of interdependencies between disciplines.

5. The critical outputs of the project are expected to be:

- an improved small ruminant research system, which is better equipped to undertake the long term research and development on sheep production systems that was initiated in this project;
- a small ruminant research system which can demonstrate its usefulness to both government and to producer groups;
- research results which form a major basis for developing improved sheep production systems, by more efficient use of scarce resources.

6. The project is designed for implementation by the Small Ruminant CRSP, which is also required to undertake responsibility for the Project Development Phase.

7. The expected cost of the project has been developed for each of three potential modes: as a regional initiative; as a major component of AID missions' development portfolio; and as a minor component. For the 5-year project envisioned, these total costs are:

Option I	Single Overseas Site	$4,542,000
Option II	Single Overseas Site	$3,011,000
Option III	Regional with 4 Participating Countries	$7,150,000

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS
Program or Sector Goal: The broader objective to which this project contributes: Raise livestock productivity of low resource farmers to improve their incomes, improve household nutrition and provide source of inexpensive animal protein and hides for country at large by improving institutional capacity for developing goal oriented research.	Measures of Goal Achievement: 1. Physical Product 2. Farm Income 3. Increased consumption of livestock products
Project Purpose: Build capacity for improvement and maintenance of small ruminant production system	Conditions indicating purpose achievement: Well motivated research teams showing initiative and creativity 1. Research oriented to achievement of government/policy objectives in applied and problem solving mode. 2. Research linked to client group(s) through effective two-way information system. 3. Research system capable of generating government support and funds. 4. Process instituted whereby resource system can be adaptive and learn from experience.
Outputs: Improved Research capability Improved management for research system Improved linkage between research system and clients, and policy makers Improved Sheep production system	Magnitude of Outputs: Investment in Livestock research Increased numbers of skilled scientists and technicians Goal oriented behavior of individuals and teams, with similarly specified tasks and roles Process operating for goal formulation that includes needs of government and farmers Net increase in farm income for sheep farmers Higher sustained offtake of sheep products
Inputs: Host country: Contribution of staff, research and extension facilities, institutional support SR-CRSP Participating Institutions: Administrative Direction, Staff and research facilities USAID: Funding	Implementation Target (Type and Quantity) See Budgets and Implementation plans

MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	<u>Assumptions for achieving goal targets:</u>
Farm Survey National Bureau of Statistics	Maintenance of Government support and investment in Agricultural research and extension Research is relevant to farmers' needs
	<u>Assumptions for achieving purpose:</u>
Research system survey compared with baseline survey Is research organized to meet system objectives? Are tasks and roles well defined and being carried out? Examination of extension agent performance, their reports, the influence of reports on research Farmer survey: Are they familiar with newly developed technology. What efforts made by institution/system to develop plans for future, and obtain support for these? Evidence that system monitors its own performance and responds adaptively to such information	Government provides incentives both financial and professional Acceptance and wider application of research organization development methods
	<u>Assumptions for achieving outputs:</u>
Budget records Head count Questionnaire seeking evidence that people know what they're doing, why and how they interrelate. Inquiry of government and farmers on relationship of current research to needs Farm Surveys Ministry records	Key actors taking performance of livestock research system as important goal, and recognizing complementary roles of skills improvement, and organizational improvement. Research system accepts both government and farmers as target groups for research.
	<u>Assumptions for providing inputs:</u>
Project Accounts	

BACKGROUND

I. Strengthening Research System Capability

Most developing countries are to a greater or lesser extent in the throes of moving away from traditional agriculture towards practices which are more productive. Not much more than a generation ago it was widely believed that technology transfer lay at the heart of a shift towards a more productive agriculture. Among the many assumptions upon which this belief rested, was the notion that the requisite technology already existed in the technically more advanced countries. More recently, the agricultural development community has had to face the fact that more often than not, off-the-shelf technology which suits the needs of a developing nation, does not exist. This is especially true of tropical countries and those with some environmental factor markedly different from those found in more technically developed countries. What is equally important is that even where technical solutions already exist, their transfer into a new socio-economic context raises new problems and often results in an unsatisfactory answer to assisting people meet their needs.

These views have been instrumental in encouraging a much increased effort on the part of the developing countries to engage in their own research to develop new agricultural technology and production systems, that take into account their particular physical and social environments. Front runners in the thrust to develop new technologies suitable for specific developing regions have been the International Research Centers (IRRI, CIMMYT, etc.), which have demonstrated the value of applied research in tackling the problems of agricultural development.

In pursuit of developing domestic research capability, it has now become commonplace for promising research scientists to be trained overseas in the latest techniques of their field. But the effectiveness of this approach has been questioned. On return to their homelands, the performance of these scientists, in addressing critical problems for the development of their country, has been generally disappointing. A survey of the nature of research conducted, and the facilities available makes it hard to sustain the view that slow progress is simply an outcome of tackling intractable problems. Neither is it obvious that the answer lies simply in training greater numbers of scientists.

In looking for an explanation of the low effectiveness of well-trained research scientists in developing countries, attention must be directed towards the Research System of which they are but a single component.

Without attempting to give an exhaustive description of a Research System, there are certain minimum components and characteristics which jointly constitute an effective research system and which are worth spelling out because of their bearing on the entire question of how to make more effective use of scarce research resources. The basic characteristics required by a research system are these:

- Clearly defined goals that are both consistent with national policy objectives and within the technical capability of the research system;
- A process for identifying researchable problems, the solutions to which are major contributions to goal achievement;
- A process for developing strategies for tackling selected problems, and a means of choosing research strategies that make optimum use of scarce research resources coupled with promise of success;
- A means of converting a research strategy into a cluster of tasks and allocating these among research scientists, technicians and other workers in ways compatible with their skills;
- A means of identifying and training personnel in the performance of new tasks, and encouraging career development, leading to a cadre of trained and experienced scientists and technicians;
- Ability to build effective research teams, minimizing the effects of obstacles such as ego-gratification, staff turnover, weak incentives for improved performance, etc.;
- Ability to acquire resources needed for effective research, such as physical facilities, information, staff salaries and incentives, and general running costs;
- Ability to maintain the support of the government/ministry by delivery of cost-effective research results;
- A process for assessing its own performance, both in terms of its ability to tackle "right" problems in effective ways with optimal use of resources. This will require ongoing monitoring systems quite separate from the type used for management control of budgets.
- A way of maintaining links with the targeted beneficiaries, that allows their input to inform research and to assess the value of results produced.

It is common experience, most especially in developing countries, that many components of these features of a research system are either lacking or barely functional.

The problem that must be faced, therefore, is that of designing a strategy that will promote the effectiveness of research through improvement of the research system. This requires both the development of the research organization and the strengthening of individual and team skills to undertake goal related tasks. So long as there exists no functionally coherent research system or process for developing one, simply training individuals in more complex skills is unlikely to contribute to improved performance of the system.

II. Prolific Sheep Research

Small ruminants form an integral part of most agricultural systems. The largest numbers are to be found between the 35° latitudes north and south where most of the human population and indeed, most of the poorer, less developed countries (LDCs) are also to be found. In most of these regions, the numerical importance is a reflection of the adaptation of small ruminants (sheep and goats) to man's exploitation of his environment. They do possess characteristics of considerable importance to the smallholder. For example:

- They are small, and therefore
  - -- easy to shepherd and handle by any family member
  - -- easy to kill and consume before spoilage in hot areas
- They consume feeds completely unusable by man and convert them to products useful to man
- They generate a variety of products, such as milk, meat, hides, hair, and wool, and wealth which support food and cottage industries
- They are a useful mechanism for storing reserves in times of plenty for use in later times of need
- They are able to use marginal lands and crop residues from arable croplands
- They have a low initial capital cost and a low maintenance cost

The concentrations of small ruminants are particularly high in the Near East and North African regions where their density relative to the human population is unequivocally the highest among the LDCs.

Approximately 15 percent of the world's sheep are in the relatively small area of North African and the Near East, a largely arid to semi-arid region with desert scrub and woodland shrub the predominant range types. Much of the land has little value for cultivation and if properly managed, is best suited and most efficiently utilized for pastoral enterprises. Livestock production systems vary from nomadic and transhumant to smallholder with the primary focus on meat production from sheep and goats.

The region's sheep population is currently estimated at 45 million head. Numbers have grown sharply over the past 25 years and are continuing to increase. Several recognized breeds in the region include Timahdite, Sardi, D'man, Omani, Ossimi, Chios, Rahmani, and Awassi.

The sheep industry is one of the most important agricultural sectors in North Africa and the Near East and is well integrated with the land use and crop production

//

systems. The sheep in this region, although they produce well below the level of the developed regions, are generally more productive than those in other areas of the developing world. This is evidenced by the higher annual percent slaughtered and the higher quantities of meat and milk per head from the flocks in this area. As an example, approximately 30% of Morocco's red meat demand is met by sheep and even more importantly, the price for meat from all other species is largely determined by prevailing mutton and lamb prices. In many instances, demand for lamb and mutton, the meat preferred to beef, is increasing and frequently exceeds the supply.

Most animals are kept in private or tribal flocks and suffer the common problems of sheep in this harsh and difficult environment. Little specific information is available about their production, but it seems apparent that some breeds, such as the D'man, possess a number of extremely valuable traits, particularly high fecundity and a non-seasonal breeding cycle. Yet despite the present importance of the sheep sector to the region's economy and food supply and their potential for a substantially increased contribution in the future, little widespread attention has been paid to mitigating the constraints on their productivity.

Recently there have been numerous expressions of interest from high level authorities in the region toward pursuing an active small ruminant upgrading program. These include His Excellency, the Minister of Agriculture in Egypt, where an active program on indigenous sheep is directed in the Ministry by Dr. Aboul Naga, to Dr. Lahlou Kassi at Hassan II University in Morocco, Dr. M. Louca working with Chios sheep in Cyprus, Dr. B. C. Yalcin in Turkey, Dr. Ian Mason of the FAO in Rome, and Dr. M. Farid at the Arab Center for Drylands Research in Syria.

A particular focus of the interest is the possibility of intensive study of the prolific sheep and goat breeds, some of which, such as the Chios or D'Man, are indigenous to the area, and others, such as the Romanov and Finnish Landrace, have already been imported. These sheep and goats have outstanding characteristics, such as high prolificacy and a year around breeding season, which, if properly exploited, could significantly increase production. A sustained increase in sheep output in the order of 15% is a realistic estimate of what could be achieved based on feasible levels of inputs in a developing country. An increase in this order could have a very important impact.

In October 1981, the Small Ruminant Collaborative Research Program (SR-CRSP), a joint venture between USAID, Agricultural research institutes in both the USA and overseas, sponsored a workshop to bring together the world's experts in the study of

prolific sheep. This workshop set out recommendations for a research program, and the outputs that might be expected from it. (These excerpts from the Workshop Proceeding are attached as Appendix I).

The Problem

Reproductive capacity in the female is a major constraint in all food animal systems of livestock production. In sheep and goats, it is the single most overriding constraint. There are several identifiable components to overall reproductive capacity, specifically:

- fertility -- the ability of the female to conceive at breeding
- frequency of reproduction -- interval between parturitions, which is strongly affected by the tendency to seasonal breeding
- prolificacy -- the number of live young born per female per parturition
- survivability -- the number of young born that are reared to market age

Each of these parameters in turn possesses sub-components which are researchable and subject to maximization by proper husbandry techniques. For example, survivability may be a function of the number in the litter and therefore birth weight, the milk yield of the dam, the suitability and hygiene in the environment and the availability of feed. In the developed countries, many of these constraints have been overcome through research and the application of better management systems based upon a comprehension of the underlying physiological mechanisms involved in female reproductive capacities.

In the LDCs, the knowledge available has not been applied, adaptive experimental work to test known systems has not been done, and the basic research required as absolutely essential to determine the value of local breeds and the potential for their improvement remains untouched.

Because the potential for improving production is so great in those countries of the Near East and North African region where small ruminants are so critical to the livelihood of the smallholder, the present proposal is to focus on the greatest single constraint, reproductive capacity of the female. It can be fully expected that the techniques which will arise from this research could increase reproductive capacity in the females by up to 50%, with only marginal increases in inputs.

The reason why such advances may be possible is that:

- prolific sheep and goats have been identified--some of them in the North Africa and Near East region. Such sheep transmit their prolificacy in crosses with less prolific, but often better adapted breeds.
- non-seasonal breeders have been identified in the equatorial tropical and sub-tropical regions where the major problems exist.
- Most of the management, nutrition and health constraints can be overcome by adaptation of practices developed and used elsewhere, ensuring high survival rates in lambs born.

High prolificacy, non-seasonal breeding and high lamb survival become very powerful multiples in increasing the productivity of any small ruminant enterprise.

The recent workshop brought together a number of scientists to formulate basic criteria for research with prolific sheep and to facilitate the rapid exchange of new information on its practical application in the field to benefit the smallholder. This recognized that there is also a need to accompany research on Reproduction with an assessment of the Nutrition, Management, Economics and Sociology components of the system. An investigation of the relationship among cropping patterns, forage production, by-product utilization, and livestock productivity will be especially important if adequate feed supplies are to be maintained for large numbers of more prolific sheep. It is equally important to understand the impact that alternate husbandry practices might have on the traditional production systems in the region. Finally, in the broadest sense, the investigation of the unique attributes of prolific sheep provides researchers with an opportunity to discover and apply significant scientific knowledge on an important but long neglected species to potentially large numbers of animals over a large portion of the world.

PROJECT PURPOSE AND GOALS

The primary purpose of the project is to strengthen the capability of research to contribute to development of improved livestock production systems for use by limited resource farmers. This purpose will be pursued through a program of collaborative research on developing improved sheep production systems with particular emphasis on incorporation of prolificacy characteristics.

The project through its primary purpose and ancillary outputs contributes to the broader goals of:

- building the capability of the host country institutions for self reliance in solving problems of food production through improved technology of management
- improved incomes and nutrition in the rural sector
- increased participation of target groups in the design of their own production systems.

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THE PROJECT AND US-AID SECTORAL POLICY

This project proposal conforms closely with the policy developed by US-AID in relation to food and agricultural development. The project's emphasis on the developmnt of institutional capacity for improving research in agricultural developments, and its selection of collaborative research on removing constraints to food production, are closely allied with recent expressions of USAID policy. The following excerpts from the US-AID Policy Paper, May 1982, illustrate this:

> 'A main thrust of the policy is on the development of a **domestic human and institutional capacity** that permits a country to develop and apply food and agricultural science and technology. This recognizes the location-specific requirements for the effective application of improved agricultural technology. However, the policy also requires a more vigorous effort by A.I.D. to support the identification, transfer and adaptation of **existing appropriate technologies**, as well as the **carrying out of food and agricultural research** and application of improved technologies through U.S., international, regional and national institutions.'
>
> 'Particularly vital to the establishment of self-reliant, sustainable food and agricultural systems are national institutions that give a country the capacity (1) to generate and apply a continuing stream of innovations designed to increase agricultural productivity and incomes; and (2) to evaluate and adapt technologies transferred from developed countries and international institutions.'
>
> '• A.I.D. will therefore give special emphasis, with a sufficiently **long-term commitment**, to helping countries develop the institutional capacity for food and agricultural planning and policy analysis; basic and adaptive research, education and training; and disseminating improved technology and related information in a cost-effective manner.
>
> '• Social scientists (e.g., economists, anthropologists, development planners and policy analysts) and physical and biological scientists and technicians from developing countries and the United States will work together to conduct applied research and to develop individual and institutional capabilities intended to increase the productivities and incomes of the broad majority of rural producers.'

The design of this project is very much in the spirit of the AID policy paper, and provides a means of translating it into operational terms.

THE PROJECT AND THE SR-CRSP

The Small Ruminant CRSP has now been operating for three years in five overseas sites, Indonesia, Kenya, Morocco, Brazil, and Peru, and involving some thirteen collaborating US institutions. The CRSP style of project was an innovation in the late 1970s, and the Small Ruminant CRSP (SR-CRSP) was the first of these to become operational. As with any innovation, there were many problems to be solved and difficulties to overcome before the SR-CRSP project could be regarded as proceeding successfully. Not least of its achievements has been its ability to learn how best to manage itself in a way which is consistent with its own objectives. This has demanded a process of institutional learning; a structure was required to manage a large variety of institutions which had never worked together before. The term 'collaborative research' had to be given an operational meaning which could only be derived through negotiation, through patience, through a process of mutual understanding and learning between all those involved. Practical issues have had to be organized and solved at field level, and systems organized to produce the kind of research that the project needed. In concentrating on the research output of the project, it is easy to overlook another output of the project: The development of an organization that has learned how to manage a collaborative research project where very little precedent could be used for guidance. In fact, the SR-CRSP has become a resource for future projects in very much the same way as capital or technological expertise. This resource can now be used as a basis for the design of further projects under the Small Ruminant CRSP umbrella, in a way that would not have been possible several years ago, before the experience with the existing CRSP projects was obtained. Allowing for variations in environment, the existing five SR-CRSP activities follow much the same lines conceptually, and were the outcome of the original thinking by both the CRSP originators and those who sought to put these projects into practice. The design of this project is very much influenced by the lessons learned in the Small Ruminant CRSP program and builds upon the organizational strengths that have already been developed to implement the existing Small Ruminant projects.

In common with the ongoing SR-CRSP projects, the Prolific Sheep Project is also designed with an explicit systems view. It departs from earlier designs in two main areas. The first of these lies in the way it addresses the question of institution building in the host country. If the livestock production systems that are being developed by Small Ruminant CRSP activities are to continue to be improved and maintained after the project is concluded, the host country research/extension capability needs to be strengthened and developed to take on this function. Institutional strengthening is

required for this to take place, and therefore, is seen as a primary output of the project; it is not relegated to the position of a beneficial spinoff from other activities. Moreover, in this project the development of institutional capability is an output which has to be planned and the process subsequently managed, rather than left to vague chance.

Second, whilst the range of research disciplines may be similar to that found in existing Small Ruminant CRSP Projects, there is a fundamental difference in the way the inter-relationship between these disciplines is managed, and research agenda developed. Experience in existing SR-CRSP projects suggests that it is inadequate to rely on some last stage integration process, which is brought to bear on information developed by the various disciplines and then attempting to weld it into a coherent whole. The process of integration in this project is one which is integral to the design of the project, and which commences even before research activities. An approach is specified which is intended to ensure that no research is undertaken which is not particularly significant in obtaining project objectives. In this way, new knowledge is not sought if it cannot be seen to serve the goals of the project. This approach should lead to a research program which is highly cost effective.

PROJECT DESCRIPTION

The project purpose is to contribute to building a research system able to develop and maintain improved livestock production systems. To do this requires an organization and operating procedures for identifying significant problems, developing relevant research agendas, producing results valued by target clients and which guide their practices, capable of monitoring progress towards its goals, evaluating its product, and adapting where necessary to improve its performance.

Project activities to develop such a research system are centered most visibly around Prolific Sheep Research, pursued jointly by scientists from both the host country and the U.S. The aim of this research is to contribute to the development of improved sheep production systems. A major task of this research is expected to be the incorporation of prolificacy traits into local sheep so that the reproductive performance of ewes is improved. The preliminary research agenda for this project is similar to existing SR-CRSP research agendas: it is multidisciplinary, involving investigations in breeding, nutrition, forages, health, economics, farming systems, and social factors. A schematic representation of the research operations and objectives of this project and of institution building outputs is shown in the Means-End Logic Chart (page 23).

A significant and innovative feature of this project is an explicitly designed project implementation process, intended to be an exemplar and a catalyst for institution building, organization development and improved management, including especially

- -- a design for the integration of project sub-systems which will be operational from project commencement;
- -- a much greater participation of host country personnel at all stages of the project, most particularly in the design stage;
- -- a shift of project primary purpose from establishing an improved system for small ruminant production, to establishing an improved capability for innovative and sustained improvements in livestock production--this capability to be validated by the improvements secured.

In this design, the project process--including the process of project development--is as much a part of the project as is the agenda for research. It is for this reason that this section on Project Description includes descriptions of the Project Process and Project Development, which are regarded as integral with Institution Building and the Research Agenda.

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INSTITUTION BUILDING

This project is intended to strengthen the capability of formal government structures working together with scientists and farmers to improve and maintain livestock production systems. The objectives and activity outputs needed to achieve the project purpose are described below and summarized in Chart 1 (page 18).

Efficient functioning of the research system in the project will make a number of demands. The most obvious of these is for the availability of scientists and trained technicians. For their skills to be used effectively, organization is required: Objectives need to be specified and research strategies chosen; resources have to be made available; a coherent set of goal-related tasks specified; recruiting or training of staff for specialized functions may be needed; management systems need to be designed; a method for keeping track of performance is required.

These are needs of any research project. However, the purpose here is not simply to do the research but to build the capability for research design and management, and in a way that will have impact on farming practice. Thus, in this project, the process by which research is designed and managed will be explicit and defined in a manner which becomes institutionalized. This conscious focus on the process of research management is the means by which Institution Building is to be achieved in this project.

This approach is based on the idea that the most vital function of an institution is its 'process,' the mechanism by which it determines, then achieves its objectives.

Accordingly, the design for the Institution Building aspect of this project is made dependent on institutional objectives. It is formulated to provide responses to the question 'what is needed to establish an efficient, self-sustaining system for research, development and extension?'

The organizational needs of the project are regarded as a microcosm of the needs of the entire livestock research, development and extension in the country. The management of this project can therefore provide a style and experience which can be adapted more widely. The process by which project technical objectives are translated into an organization and procedures for achieving them is one which can provide a pattern for other such activities.

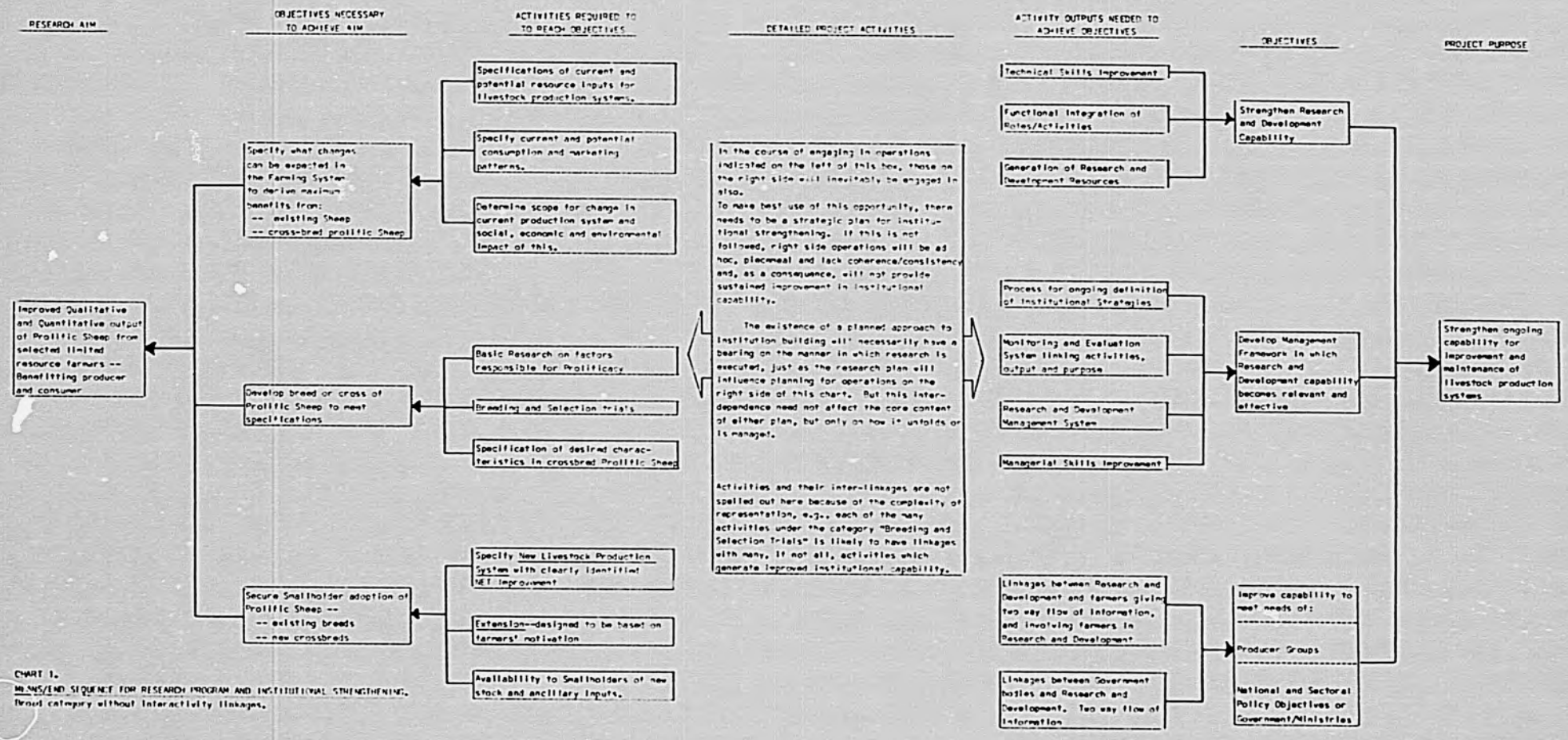

CHART 1.
MEANS/END SEQUENCE FOR RESEARCH PROGRAM AND INSTITUTIONAL STRENGTHENING.
Broad category without interactivity linkages.

PROJECT RESEARCH ACTIVITIES

The bar chart (Chart 2) gives an outline of how different component research activities are sequenced and of the major linkages between them. It must be emphasized that ideas on the duration of each activity are only preliminary at this point. More precise estimates will emerge at the project paper stage and, in any case, some flexibility is desirable to allow for unexpected obstacles or opportunities. In each activity, the level of effort is likely to vary over time. Initial stages may require low staffing and expenditures and, even after completion of the most vigorous stage, activities are likely to continue at a much reduced level to clear up outstanding matters, and to respond to the requirements of other components. Much of this detail is omitted from the chart to avoid overcomplexity.

Multidisciplinary research directed towards a common goal makes heavy demands on activities which relate diverse research components. Linkages, therefore, between different research activities are a cornerstone to the success of this project. It is often difficult to chart them, however, without distorting the picture of interchanges as they in fact occur. Accordingly, most linkages have been omitted, and the only ones depicted are those which must be established before another activity can logically proceed.

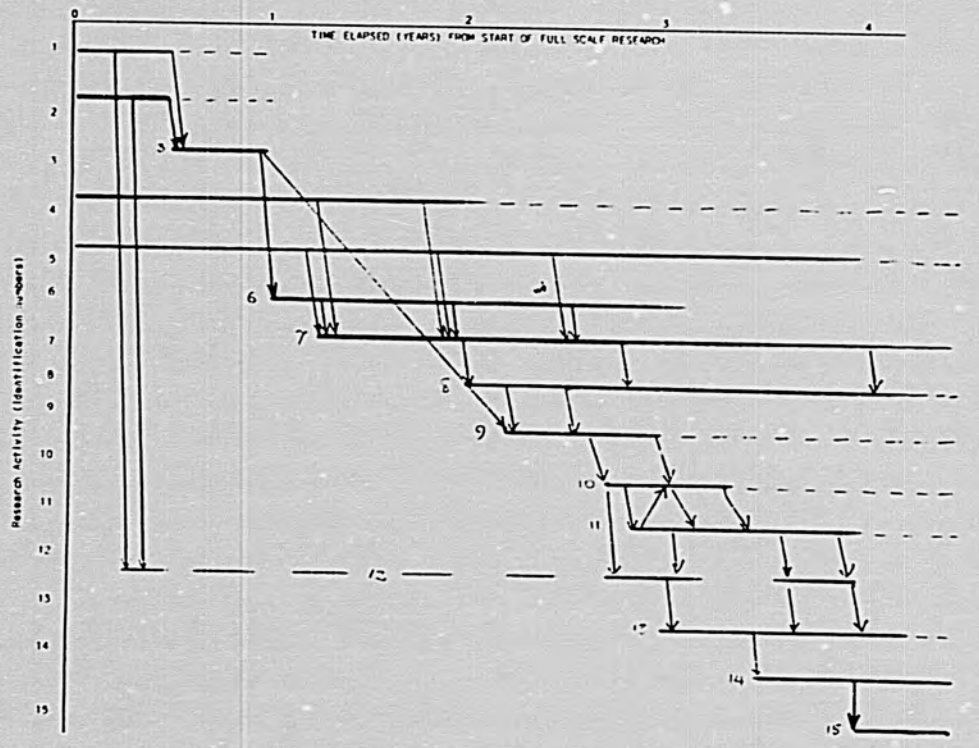

CHART 2.
RESEARCH ACTIVITY DESCRIPTIONS, THEIR SEQUENCES AND LINKAGES

Solid horizontal bars indicate period of highest level of effort. Dashed horizontal lines indicate a lower level of effort directed towards conclusion of longer term work and also in support of other areas of research. Vertically directed arrows signify major points of information input from one research activity to another; they are obligatory in the sense that such inputs are required before another activity can proceed.

ACTIVITY DESCRIPTION	SUB-PROJECTS WITH MAJOR RESPONSIBILITY
1. Characterization of existing livestock/sheep production system, especially with regard to inputs/outputs, and role of livestock production in social system.	Production Systems/Economics/ Rural Sociology
2. Specification of current and potential patterns of consumption and marketing including social dimensions.	Economics/Rural Sociology
3. Assessment of potential for change in input mix to realize more of genetic potential.	Nutrition Animal Health
4. Research on Genetic potential of existing breeds of Prolific Sheep by relaxation of constraints: food, health, stress, etc.	Production Systems Animal Health
5. Basic research on factors responsible for prolificacy.	Breeding
6. Specification of desired characteristics in cross bred Prolific Sheep.	Breeding Production Systems
7. Cross breeding amongst selected strains.	Breeding
8. Performance trials of crossbred Prolific Sheep.	Breeding
9. Specification of new Prolific Sheep Production Systems, including management characteristics and social implications.	Production Systems/Rural Sociology/Animal Health
10. Demonstration of new Prolific Sheep production systems in selected smallholdings.	Production Systems Extension
11. Refinement of production system.	Production Systems Extension
12. Design of Strategy for change of production system (extension, marketing, legislation(?), etc.)	Production Systems Extension
13. Extension activities.	Extension
14. Volume production of new breeds or inputs.	
15. Program development review: Scale, further improvement directions.	

The design philosophy of this project requires major participation by host country institutions at all stages. It is especially required in the process of project development, in which the research agenda is given its outline design. Adherence to this principle does not permit design of the research program in vacuo. It is, however, feasible to indicate broad features of the proposed design, recognizing that emphasis on this or that aspect will be dependent on site specific situations.

The research objective, and the research activities needed to sustain this, are shown in Chart 1 (page 18). Chart 2 (page 20) provides an outline of major research activities and how they might need to be sequenced.

Subproject areas and a brief description of the scope of their enquiry that can be identified at this stage, are as follows:

1. Livestock Production Systems Subproject.

- Develop integrated and comprehensive production strategies for use by limited resource producers through research that specifies biological, technical, management, marketing and economic constraints.
- Develop a formal quantitative model of livestock production opportunities for the target producer group. This model will synthesize data outputs from all subprojects and generate a series of alternative sheep production scenarios.

2. Agricultural Economics Subproject.

- Develop procedures for ex ante evaluation of technological and management packages under farm level conditions.
- Evaluation of the place of prolific sheep in the rural household economy, including its effects on income and nutrition.
- Conduct studies of markets and marketing (local, regional and national) to identify constraints and opportunities which bear on the potential significance of research.

3. Rural Sociology Subproject.

- Investigate role of social and cultural factors in the current sheep production systems in the project areas.

- Explore the probable impact of an improved sheep production system on the producer group and the local rural economy.
- Seek answers to what social or cultural factors need to be taken into account in designing a new production system, the likely responses to the proposed changes and the problems in implementation that can be anticipated.

4. Nutrition Subproject

- Establish the basic metabolic differences that confer adaptation on local breeds.
- Test the response to improved standards of nutrition that are cost effective for the smallholder.
- Design overall nutritional strategies for the smallholder incorporating the array of available by-products.
- Integrate nutritional practices into cropping, other livestock practices, and the sociological constraints.

5. Animal Health Subproject.

- Identify key health problems affecting sheep in the specified location that have influence on productivity.
- Explore measures for cost effective health improvement packages to be developed for use by limited resource farmers

6. Sheep Breeding and Genetics Subproject.

- Investigate physiological aspects of prolificacy which need to be better understood in order for the target producer group to manage prolific sheep more effectively.
- Evaluate the two or three major breed types available with regard to production and reproduction at both optimum levels of nutrition and management, and at sub-optimum levels which represent technically socially and economically feasible improvements on current practice.
- Compare under the above optimum and sub-optimum conditions, the best indigenous breed type and crosses between that stock and the stock employed for upgrading.

7. Forage Production Subproject.

- Identify quantity and quality of forages currently available for sheep/goat use throughout the year in the project target location.
- Explore the value of changes in current cropping system and forage production which could lead to increases in livestock production, without loss of net crop value or significant increase in risk.
- Investigate forage utilization methods that could be potentially open to the producer with limited resources.

8. Extension Subproject.

- Examine the factors that motivate the target producer group in reaching decisions affecting livestock production.
- Explore how farmers' motivation can be utilized in designing appropriate sheep production systems.
- Define the most effective strategies for disseminating information about new production packages and how farmers can be involved in evaluating these.
- Explore how the needs and views of target producer groups and their special knowledge of local conditions can be obtained and incorporated in the research process.

The above groupings of research themes, clustered into sub-project format, need not define rigidly the content of each sub-project. Depending on the circumstances and the strengths and interests of potential US and host country participants, it may be advantageous to re-arrange these clusters. Note also that most research activities will require extensive collaboration with other subprojects, a feature which is not made explicit in the descriptions given.

PROJECT PROCESS

The project process is intended to accomplish a series of management objectives which are required for sound project execution. In addition to emphasizing the specification of objectives, performance criteria, monitoring, etc., the project process places a high premium on adaptive learning and team building. The need for special attention to organizational adaptive learning is particularly important in the development of research capability. Problem sets do not remain fixed in applied research systems, and much is to be gained by a management which can adapt responsively to identify and address the various research problems that will emerge.

Team building, as a conscious component of management, is critical where several interdependent research activities are needed to accomplish goals. Team building activities help manage the often detrimental, yet generally avoidable, conflict between individual goals and overall project objectives.

The objectives that project management needs to achieve are:

1. to establish the goals of each subproject or component and the strategy by which they will be pursued. Performance indicators will need to be specified so that magnitude of progress and appropriateness of direction can be monitored.
2. to establish how the results of each subproject relate to the activities of other subprojects; how the need for information by any subproject can be met through the research agenda of another.
3. to translate strategies for goal pursuit into research programs for each subproject, and in turn translate these into a series of tasks. It is especially important not to neglect communications between functions that are interdependent.
4. to aggregate tasks into clusters, which then become job descriptions.
5. to establish ways of monitoring the performance of tasks, the overall performance of subprojects and the project overall. Full and honest feedback presupposes trust and encouragement to team members to provide this. It is a major task in team building.
6. to develop the ability to respond to monitoring information, by early recognition of problems (or of unforeseen opportunities) and by taking corrective action before problems become of major significance.

7. to establish a management style that fosters among project participants shared views of the project and its activities and the recognition of mutual interdependency, and other characteristics that encourage people to see themselves as secure and valued members of a team. Particular attention will need to be paid to early recognition of conflicts and their rapid resolution.

8. to establish understandings with interfacing agencies, ministries, institutes, etc., so that potential misconceptions, fears, protection of private interests, etc., can be dealt with promptly and easily and do not grow into major problems which are avoidable.

Few, if any, of these objectives can be achieved by initial once-and-for-all decisions. Most will require continuous attention during the project so that activities are guided by the light of experience and new understandings. The process for achieving these objectives must therefore be ongoing.

The objectives just described relate to the strategic level of the management process, which is the highest one operating in the project implementation phase. It is vital, if the research system is to function efficiently and with a sense of purpose, that these management objectives be consciously and explicitly pursued. These objectives are generally not made explicit. They are handled implicitly and intuitively by project managers. Under the pressure of events, they may be subordinated to other concerns and only pursued explicitly when there are signs of things going wrong. Arrangements are then made for meetings, discussions, activities of advisory groups and so on. Many of the problems and failures in development projects bear witness to this false economy of effort. In a project intended to improve research system management, this stage cannot be left to ad hoc procedures. But neither is it simply a matter of an expert drawing up regulations and a check list for the project to follow. If management skills at this level are to be imparted, this will best be done by establishing a style of management which is embodied in an explicit process tested, and evolved from practical experience, in the context of project needs.

To give a structured framework for this, and to manage the process of developing this aspect of research management, it is proposed that a management/organization development consultant be included in the early stages of the project. The role of such a specialist would be to facilitate and guide the process and direction of meetings/workshops in which strategic level management is being developed and

imparted. A specialist with experience in handling management and organizational problems through group facilitation techniques, and with the ability to understand the contributions and needs of various researchers, administrators, and farmers, offers an added benefit of particular value in this project. The pitfall that needs to be avoided is planning by compromise and trade-off. Plans developed in this way are usually goal-evasive, avoiding purposive strategies in order avoid conflict. The function of the consultant in this respect would be to manage the processes of project design so that turf protection tactics and power-plays interfere minimally with the design of project content and process. A successful effort in this direction also provides host country personnel with a demonstration and practice in using a management technique which is of widespread value in handling multi-disciplinary teams.

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INTEGRATION

The strengths that derive from tackling complex problems through multi-disciplinary research are not without cost: a demand is made for a planned and managed mechanism for integration of both the direction of research and its findings. Without this, research efforts between disciplines tend to diverge as they are directed towards problems which are poorly focused on the objectives of the overall project. In addition, without an integration process, research findings cannot be assessed with regard to their significance for project goals, for their influence on the complementary research of the other disciplines, or indeed fully utilized to have impact in achieving the objectives of the project.

It is of crucial importance to the project, that the entire question of integration be planned from the outset, and managed and monitored throughout.

A plan for achieving this is offered, but it must be stated explicitly that any process of integration implies cooperation between parts. If people involved in subprojects or components are unwilling to accept the necessity for integration and the constraints this places on their freedom, the output of the entire project is jeopardized. Prospective PIs must be made aware of this at the earliest feasible moment. The body responsible for developing the project in its early stages, and later the M.E., is enjoined to reject participation by PIs/SIs whose over-rigid adherence to the narrow goals of their own research prevents willing collaboration to achieve benefits for the project overall.

Integration Processes in the Project

Any integration design must stem from a clear understanding of what the overall effort is trying to achieve, and of how integration of parts will help in attaining the goal. Purpose is the key integrating dimension.

A consequence of proceeding from this starting point is that research is pursued in order to provide answers to questions needed to achieve the project objective. Determining "what needs to be known" is a collective responsibility. The effective direction of the project depends on the quality of this determination.

Moreover, if "purpose" is the key to integration, then it follows that the views of purpose held by the members of an interdisciplinary team must be shared and consistent. There needs to be a common goal and a shared view on what needs to be done to achieve it. Any process which seeks to integrate a research agenda and findings must begin by establishing such commonality.

What needs to be achieved by means of the integration process, is represented in Diagram 1 below. This is crude, and in practice the stages are not so separate and linear in sequence, but it shows the important developmental stages that are needed if the project is to attain synthesis of useful knowledge and reach its goals.

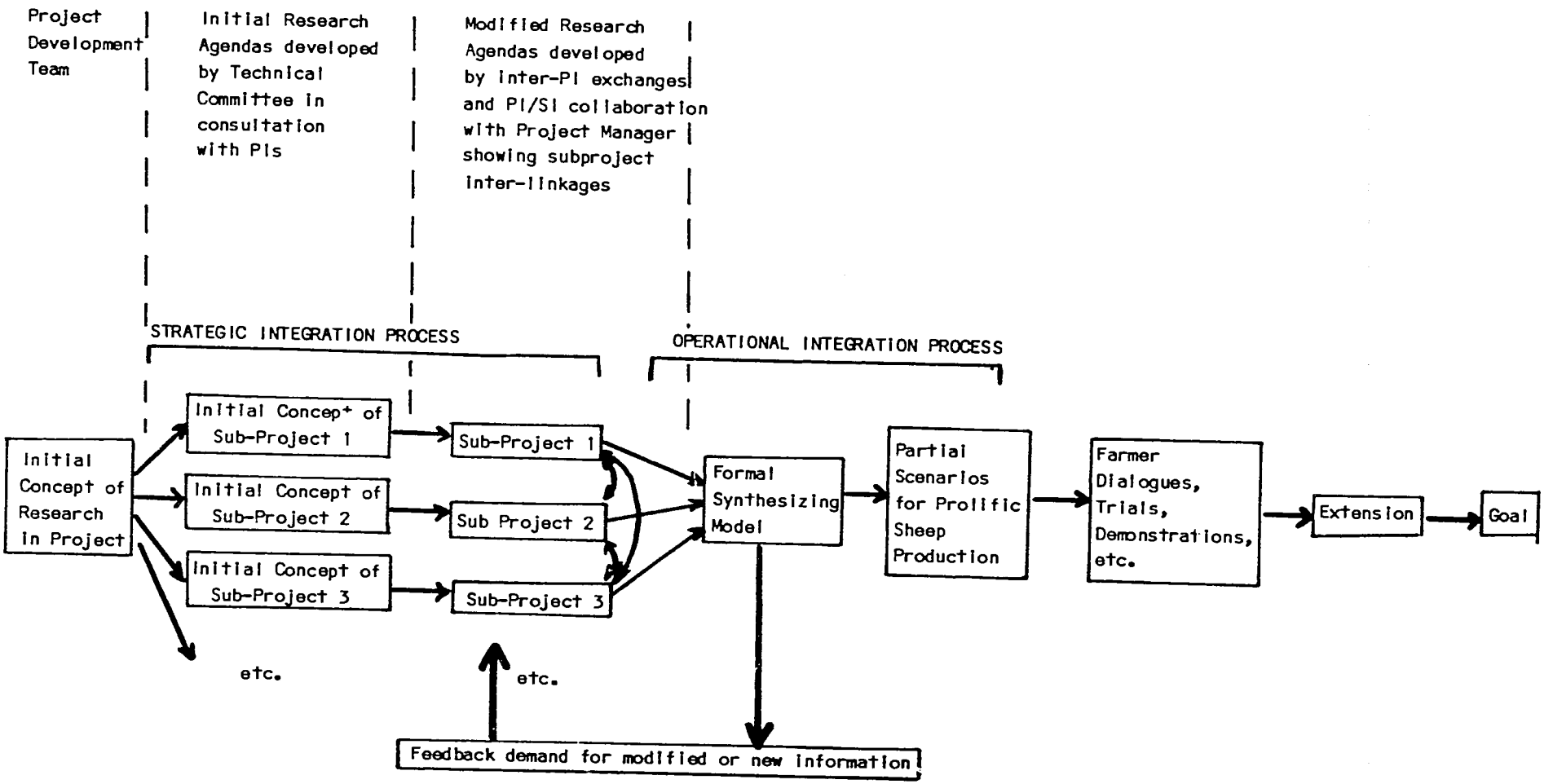


Diagram 1. Conceptual Representation of project stages showing integration processes.

Note that the scheme proposed shows two levels of integration process, each performing a different task. The essential first stage integration task, referred to as Strategic Level Integration, is intended to provide the broad framework in which subproject research directions are integrated, so that they can yield data susceptible to a later stage of integration. This is achieved by:

1. Establishing common understandings between PIs on project goals and strategies;
2. Breaking strategies down into research agendas and operational tasks;
3. Developing a process of dialogue by which collaboration between research subprojects can be realized, and establishing how this is to be managed.

Strategic Integration is a product of: The joint efforts of the Technical Committee and PIs to develop subproject research agendas; refinement of these by exchanges between PIs as they indicate what information they need from other subprojects; collaboration between PIs/SIs and the Project Manager as operational needs and interdependencies are worked out practically.

Operational Level Integration is based on the assumption that Strategic Integration is proceeding successfully, and that Operational Integration can derive its inputs from modified research agendas.

The Operational Integration stage brings together data derived from research. Various types of model may be developed to provide the framework for this stage, and in some situations, where complexity is limited, mathematically specified predictive models may be preferred. In the present case, a predictive model (that necessarily encompasses the farmer's decision making component) would be inappropriate. First, because the technology does not exist to achieve this objective with any reasonable chance of success, and secondly, it would he too costly and time consuming.

This proposal proposes a much less ambitious approach, which can encompass the broad range of areas of enquiry, such as a model that provides partial scenarios as its output for different assumptions, especially those regarding the input mix and constraint set. Linear programming techniques might be usefully applied, at relatively low cost, and in a time frame consistent with project needs. It must be emphasized, however, that the output of LP, or other models, would not be used to attempt to forecast the future state of the farming system. They would provide alternative conditionally feasible scenarios, which could then be used as a basis for common-sense discussions appraising

the new technology and production system in which the ultimate users took part. The most attractive, most acceptable, production system out of a range of possibilities would be explored using this procedure. By drawing on the farmers' knowledge of their own system (including implicit features of their decision matrix), by involving the target groups in discussions on what is being developed for their use, a number of further benefits can be expected. These include especially:

- -- farmer's group participation, which helps confer a sense of 'ownership' of the research and of its product;
- -- relieving the burden of analysis and integration which would result from attempting to model farmers' behavioral characteristics;
- -- initiating extension work with a process which involves farmers in the design of the system that they wish to adopt and that they are prepared to advocate and press for;
- -- drawing on local knowledge and scientific expertise in a way that increases the likelihood that problem solutions will be technically sound and workable in practice.

COLLABORATION AND PROJECT DEVELOPMENT

For "collaborative research" to have meaning in reality, host country scientists and officials need to be part of the process that designs the project. If they are to give their best effort to the project, they must have a sense of ownership in the matter of project content. It is not that there should be nominal joint ownership with foreign scientists: it is essential that each group has contributed its thoughts and experience. These are likely to be complementary: foreign scientists bring the methodology of a successful science, up to date technology, and improved possibilities for research and training; host country scientists, in addition to providing the in-country research base, can provide understandings on the relevance to the people of different research objectives and the feasibility of different strategies within the particular context of their country.

To achieve most effectively the complementary inputs from visiting scientists and from host country officials and scientists, collaboration should begin early, preferably in the phase of project development. This document therefore puts forward a design for a collaborative project, which is intended to be the basis for discussions between host country officials and a project development team in the Project Development stage,

Project Development

Project development is frequently seen as nothing more than a statement of what needs to be done before the project can be prepared for funding and made operational. While this is true, it is also an unnecessarily constricted view of project development. In a project which is explicitly collaborative, there are advantages to regarding Project Development more as the stage in which the project is initiated. If the project is subsequently approved for funding, then it will proceed not merely according to a blueprint worked out in the project development stage, but by the same process of interaction between key actors, who were jointly responsible for developing the project design to the Project Paper stage.

The change of actors usually required between project preparation and project implementation, leads to unavoidable discontinuity which makes it hard to arrange project development as the stage initiating the project process. In the present case, where the existing SR-CRSP is proposing a new project, no such discontinuity need exist. Project development may therefore include, with advantage, a much more complete agenda than is usually permitted, and this provides an opportunity for starting the project process off in a way that can avoid many misunderstandings. The future

project can then be explored in much greater detail, and principals will have the chance of spending greater time working together, reaching a modus vivendi.

Key Activities in Project Development (PD)

The following sequence of activities is seen as comprising the Project Development Phase:

1. Approval of funds for ME of SR-CRSP to proceed with PD.

2. ME, with advice from the Technical Committee, selects a team who will be responsible for PD. The team should include the following:

   a. Team Leader, with administrative (preferably SR-CRSP) and livestock background, who is a skilled negotiator and who can maintain coherence in the team (Program Director, SR-CRSP).
   b. Specialist in agricultural development project design and management, with skills in conceptualizing the project overall, and therefore able to ensure an integrated plan, and management process, consistent with project goals.
   c. A small ruminant breeding specialist, able to discuss technical requirements for different research tracks.
   d. Livestock production systems specialist and/or livestock economist, representing some of the other disciplines to be involved in research.
   e. Within the limits of the budget, the PD team is free to co-opt, in an advisory capacity, such additional expertise as is considered necessary.

3. The PD Team or its authorized representative investigates the potential for this project in different countries. This will involve preliminary discussions with USAID Regional Bureau chiefs, and country desks, followed by communication with USAID missions in potentially available country sites arising out of these discussions. With guidance from a supportive AID mission, the team would explore the interest of the government and other institutions of the potential host country.

Activities of other development agencies in potential country sites/regions should be investigated to avoid overlap, and to develop complementarity of agendas where this would be appropriate. Development of good relations with other organizations working in related fields is to be encouraged, and an early initiative in this direction is helpful in generating goodwill and understanding.

4. The PD Team broadens the scope of the exploration with potentially interested countries, shortlisted as necessary to conserve project funds. This will involve the team visiting several countries, initiating talks at ministerial level, and proceeding to identify possible collaborating institutions and scientists.

The present proposal is to be used as a basis for discussion, and several copies should be supplied to the relevant ministers some weeks ahead of the arrival of the P.D. team.

It should be emphasized that this initial project design, though intended to be conceptually complete, is to serve as the point of departure for the final design of a collaborative project.

5. The team will not content itself with identifying host country personnel and institutions who will be involved in the project and exchanging letters of understanding to this effect. It will be an explicit duty of the team to encourage inputs to a modified project design so that there is developed in the host country, a sense that it's 'their' project, because they put something into it. In fact, commitment to making this input may well be used by the team as a criterion of whether a potential institution could be a worthwhile collaborator.

6. The team concludes its effort by preparation of a report/proposal containing the modified project design which provides USAID with the material for incorporation into a Project Paper. The team's report would be expected to include:

   a. A re-statement of the Project's purpose and goals and the strategies to be employed, together with the performance criteria which are used to keep the project on course, and to evaluate its performance.

b. Modifications to the initial design for the project as guided by government policy, local needs, experience, and conditions. This should take into account not only the technical feasibility of the initial design for attaining project objectives, but also the social, political, and administrative dimensions.

c. Statements of institutional arrangements for project implementation, defining broad institutional responsibilities, authority and inter-institutional linkages.

d. Details of who, at the senior level, is to be involved, a full specification of their roles, responsibilities and authority, and how they relate to each other. Guidelines on use of students and trainees should be established.

e. A detailed description of tasks that will be undertaken in the first year of the project, and a less detailed task definition for the remaining years.

f. A detailed description of the management arrangements for the project, including the provisions made for continuous monitoring of progress and for adaptive responses in all aspects of implementation, in the light of experience or unexpected conditions.

g. A budget, which includes a statement on allocation of responsibilities between institutions for its proper management.

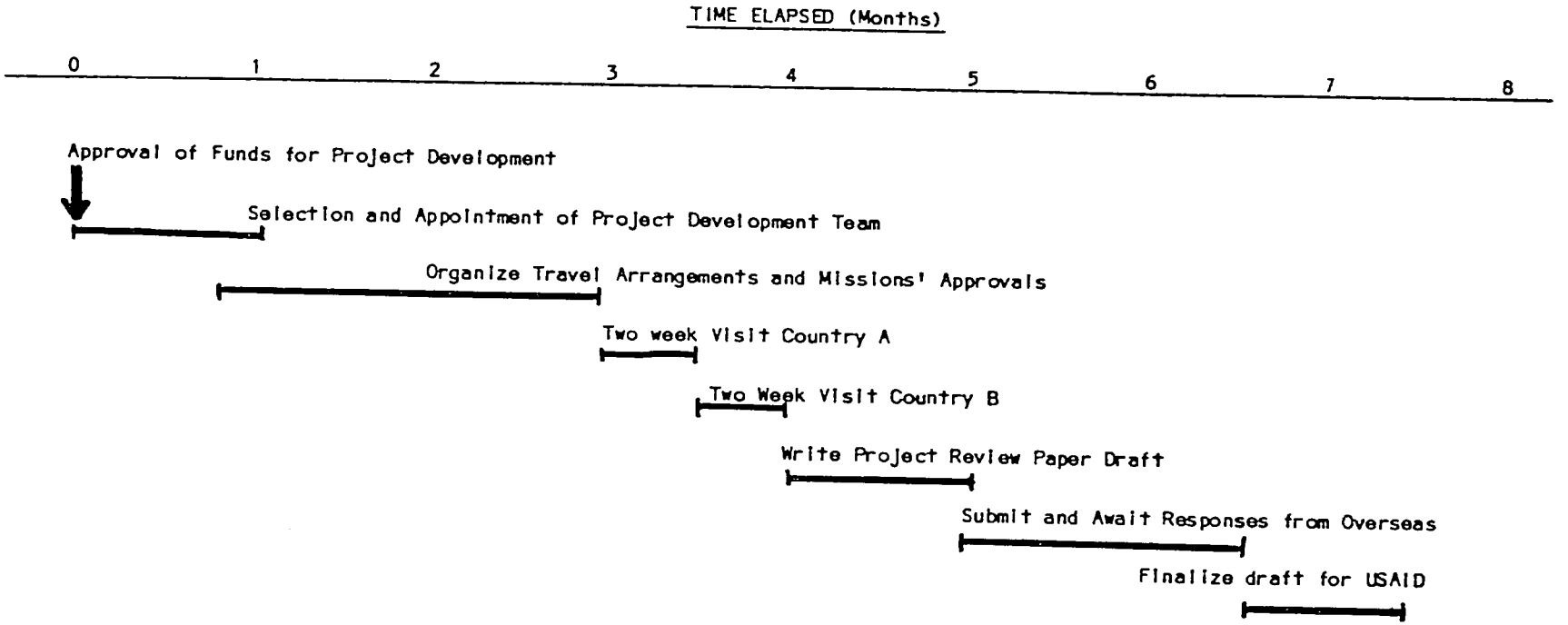
Aside from its value in providing material for preparation of a well-documented Project Paper, the unusually large effort called for in project development is expected to lead to significant benefits. It would therefore jeopardize the development of an improved mode of the SR-CRSP if it were to be rejected because it does not conform to administratively set norms.

Particular benefits expected to be derived from this style of project development process include:

- Maximum feasible participation of the host country institutions in the design of the project, thus conferring 'ownership' and 'legitimacy' at an early stage.
- Provision of a realistic opportunity for coming to grips with differences of viewpoint among the principal parties, and allowing time to explore how these can best be managed.

- Avoidance of confusion that arises when the content of this stage of project delineation is pursued at the beginning of the project proper, when project implementation is trying to get under way.

- A least stress situation when key actors from the ministry, the research organization, USAID and the SR-CRSP can get to know each other's strengths and weaknesses. This can pay high dividends in the future smooth running of the project.



ACTIVITY SEQUENCE FOR PROJECT DEVELOPMENT

Project Development: Tentative Budget

TRAVEL		
Overseas Travel (Air fares)		
5 round trips, California-M.East		$12,500
1 round trip, California-M.East		2,500
Local Travel Overseas		1,000
Domestic Travel (Air fares)		
4 persons, round trip, for 2 meetings in e.g., Davis		2,500
PER DIEMS		
Overseas:	30 days x $70 x 5	10,500
	10 days x $70 x 1	700
Local:	4 days x $70 x 8	2,240
SALARIES		
Team Mission Overseas		
22 x 5 x $280 p.d.		30,800
Team Leader Overseas		
10 x 1 x $280		2,800
Meetings		
5 persons, 2 meetings, 2 days each		
20 x $280 p.d.		5,600
Report Writing		
15 man-days, 15 x $280		4,200

OFFICE COSTS	
Communications	500
Typing, Copying, etc.	750
Total	76,590
Contingency (15%)	11,490
FINAL TOTAL	$88,080

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Project Development Output

The end result of this phase of project development will be:

- identification of host countries to be involved in the project, including for each: the government official who acts as guarantor, the participating institution(s), the senior counterpart scientists.
- outline definition of a project, including goal specification, preliminary research agendas, a budget and a timetable.
- understanding and support of the project by the USAID mission/program director for each country concerned. This will have been achieved by involving mission personnel in the discussions wherever appropriate, and taking account of their needs and objectives.
- agreement between the SR-CRSP management and host country institutions, on the allocation of responsibilities and specification of roles for each in the phase of project implementation.
- preparation of a report containing all material necessary for USAID to develop its Project Paper.

It should be noted that the following stages are not included in the project development phase as described.

- Selection of US participating institutions and the principal investigators who will be involved.
- Development of detailed research agendas including strategies for action, phasing of components, selection of staff.

These have been omitted from the project development phase to keep costs down prior to project approval. Once the project is authorized and project funds available, a prime task will be identification and recruitment of American PIs who are willing to engage in collaborative research. It is recommended that the Project Development Team be given this responsibility. A workshop in the host country will be required in which all PIs (US and host country) are involved in developing detailed research programs and the cross-linkages between the sub-projects.

ORGANIZATION FOR PROJECT IMPLEMENTATION

The organization for project execution is based on the SR-CRSP providing the U.S. scientific input and accepting responsibility for overall project management. The SR-CRSP is well-equipped for this function: It has several years experience in organizing applied collaborative research in five different countries (Brazil, Peru, Kenya, Indonesia, and Morocco). It would be a waste of experience and of a painstakingly built organization if the opportunity of utilizing the existing structure were discarded. However, a number of modifications are proposed which could add to the organization's effectiveness. Further, although the broad organizational framework of the SR-CRSP can be utilized with a few modifications, it would be inappropriate for this proposal to specify in detail the organizational arrangements for implementation which involve host country institutions. These will need to be developed in collaboration with the appropriate institutions. Outline specifications will be given, as well as details of the steps necessary to develop it further.

Technical Committee (TC)

The basic responsibilities of the TC remain as in the existing SR-CRSP. Its authority, however, becomes country specific. The composition of the TC is to be enlarged to include, in addition to all US principal investigators,

1. All host country PIs
2. Program Director (Director of ME)
3. Project Manager
4. Integration Group Chairman*

Management Entity (ME)

The current ME will be expected to perform its present role, with some amendments, for the new project, and will continue to be advised by the TC on matters related to the substance of research.

The amendments referred to include:

* Based on the assumption that the recommendation of the Report on the Systems Analysis Panel (June 1982) is implemented.

1. An enlargement of the role of the ME in ensuring integration of project components. A weakness of the present SR-CRSP is the lack of consensus on a strategy for integration, unspecified procedures for securing it, and the diffusion of responsibility for its accomplishment.

2. The ME, in consultation with the TC and BIR, should have more authority to select participating US institutions or PIs. This is likely to be particularly important if research agendas are to be developed through interaction of PIs, rather than as isolated components.

External Evaluation Panel (EEP)

In view of the modified nature of this project, compared with existing SR-CRSP projects, some modifications to the existing EEP could be advantageous for evaluation of this project. Chiefly, these involve changes in the composition of the Panel and their Terms of Reference. These points are given in detail in the section 'Monitoring and Evaluation.'

Participating US Institutions

These will need to be chosen on the basis of the research agenda developed initially in this proposal and subsequently by the ME/TC in consultation with host country representatives.

In selecting participating institutions and personnel, it would clearly be a major advantage if:

1. A research agenda is established first, and participants subsequently selected to meet the demands of that agenda; and

2. The compatibility of senior personnel, particularly as regards their ability to work collaboratively as team members could both be taken into account.

Host Country Research Institutions

The allocation of responsibilities for implementation between US and host country institutions is the proper concern of discussions between the Project Development Team and host country personnel. No effort will be made in this proposal to prejudge what these should be. There are, however, certain conditions which would need to be met by

host institutions if this project, as designed, is to be successfully implemented. Foremost amongst these are:

1. The host country client should recognize that strengthening the research system as a whole is required for long term and continuing improvement of livestock production systems, and that piecemeal efforts, such as improving technical skills, are unlikely to have significant impact.

2. The client will need to accept that, in principle, this project can make a valuable contribution to strengthening the research systems, and is therefore endorsed. While minor changes and organizational arrangements are expected, major alteration in the scope of the project, or in the process and style of its execution, would amount to rejection.

3. The project as conceived may cut across host country administrative boundaries. In particular, this design calls for a close working relationship between research and extension, which may pose problems if these areas lie in separate jurisdictions. It will be necessary to negotiate this problem, and to avoid eliminating a vital ingredient of the project, simply to meet administrative convenience. If need be, a new link will have to be forged that relates the two activities, research and extension.

The Process of Developing the Project Organization

It is the aim of the project to foster growth in organizational strength and ability. Providing the host institutions with a pair of expensive crutches which are removed after five years is increasingly recognized as an unlikely, if not counterproductive, way of achieving this objective.

The preferred style requires a project designed so that its organization and its process can be convergent with existing institutional arrangements, and in this way, its momentum can, in large measure, be sustained after formal project completion.

In practice, this is likely to require that

1. The client has a substantial ownership stake in the project, established by his participation and input during the design phase and its subsequent evolution.

2. As the project proceeds and client personnel become more able and the project process more established, a greater responsibility for conduct of the project should devolve upon the host country institution.

This is a learning process. It would not be desirable to impose a time schedule on this, since too little is known about the rate at which progress can be made. However, it needs to be stated as a clear intention and, if necessary, procedural guidelines and criteria agreed upon concerning such shifts of responsibility.

To help achieve this, it is proposed that the project's organization be designed jointly by principal participants from collaborating institutions. A design is required such that the project process is 'owned' by the host country institutions, can become part of their fabric and lends itself therefore to long term continuing improvements in livestock production systems after conclusion of the project. The project can therefore be regarded as initiating a process directed towards improved research institutions more capable of achieving their purpose efficiently, and thereby improving livestock productivity.

The organization that is built for carrying out the project must be consistent with the demands of the organization's task if it is to be effective. However, there are many features of organizations which can be designed in more than one fashion, each consistent with purpose. The option chosen in such circumstances is usually dependent on socio-cultural factors, and personalities of key actors. It would not be desirable,

therefore, at the outset to specify these characteristics. Instead, a process for designing the project organization is proposed which is intended to ensure this consistency (not only as it applies to the structure of the organization, but also to the procedures by which the organization functions).

This process starts by establishing the purpose-oriented framework for the organization. For convenience, this will be termed the Project Design Process (PDP) in the following description.

Conceptually, the PDP has two distinct phases, Strategic Planning and Operational Planning. Strategic Planning in essence emphasizes broad, systemic issues and problem conceptualization. The success of strategic planning rests heavily on identification of major issues and problems from a systemic viewpoint, conceptualizing such issues and formulating policies to manage them, and integrating these through the management of the operational subsystems.

For the purposes of the project, all senior or principal actors would be involved in strategic planning activities. These should include:

Program Director	----	SR-CRSP
Senior Official(s)	----	Ministry of Agriculture/Livestock Development
Institute Director	----	Collaborating Research Institution
Program Director	----	Collaborating Research Institution
Representative	----	SR-CRSP Technical Committee
Principal Investigators	----	Participating institutions in US and host country

The output of Strategic Planning provides the goals for Operational Planning, which has as its design objective to develop subsystems, each with clearly defined roles and well specified tasks.

The success of the operational design will rest heavily on:

- comprehensive and detailed task specification;
- definitions of responsibilities in carrying out these tasks;
- recruitment of individuals capable of performing specific tasks; and
- the integration of task outputs with other subsystem outputs.

Project personnel who will be involved in operational planning include:

Planning Director	----	SR-CRSP
Representative	----	SR-CRSP Integration Panel
PIs	----	US and Host Country institutions

Project Implementation in the Field

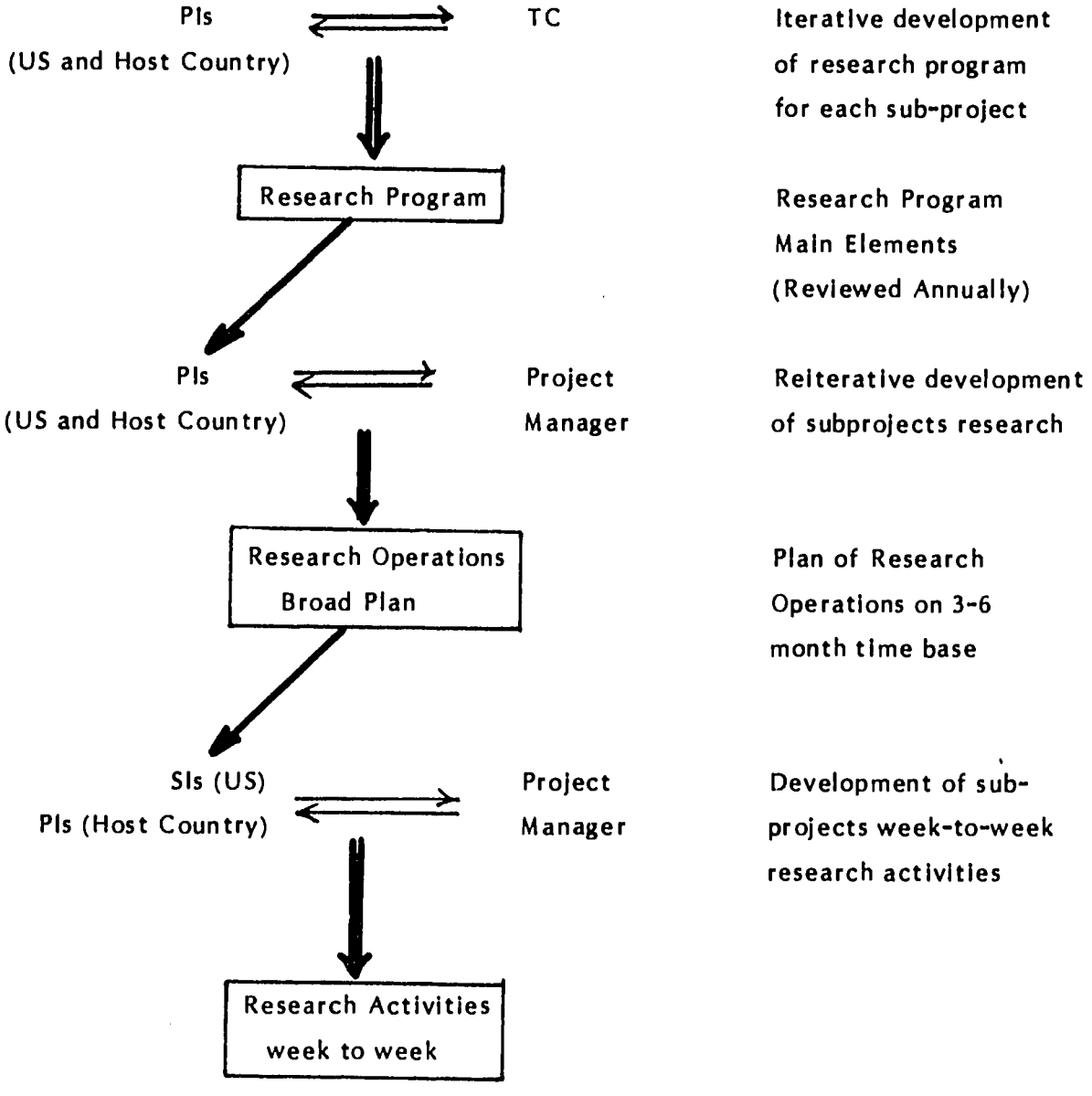
Arising from Project Development activities is the broad research agenda for the entire project. It will be specified sufficiently for potential subproject research programs to be outlined, together with a notion of their sequencing. The Project Development Team has the responsibility of identifying and recruiting US institutions and PIs who would in principle be prepared to participate in such a program (see p. 40). These PIs, their host country counterparts, the Program Director, the Integrating Team Chairman, and the Project Manager (when appointed) form the Technical Committee.

One of the tasks of the TC will be to develop the research program for each subproject. It will do this with particular concern for issues of integration of research components and significance of research in relation to project objectives.

The development of subproject research programs in the TC is an iterative process: since each program is interdependent with others, a set of programs need be developed by successive approximation as the implications of each for the conduct of other programs is taken into account.

This stage is represented in the accompanying flow chart, together with successive stages as each subproject research agenda is broken down ultimately to a series of specific tasks and week-to-week plans and schedules developed in the field by the Project Manager and researchers.

Flow Chart Representing Authority Structure for Planning Research Activities



A departure from earlier SR-CRSP projects is evident here in the role of the Project Manager, who takes the place of the Site Coordinator. The Project Manager is responsible for coordinating research operations in the field and for ensuring adequate and timely flow of information between PI/SIs from different subprojects, at field level. He will be given substantial authority to ensure that research operations relate well to the established research program, that project researchers coordinate their efforts, and embark on research activities in a timely manner. He will act in addition as project liaison, relating the project to host country institutions as well as to USAID.

The important point is that the PM acts as a focal point for control of project operations, having the power to delay some, advance others, etc. ... in order to give a coherent process. As part of this function, the PM will monitor continuously the progress of each subproject and the overall output of the project. Such monitoring is for project control purposes only, serving as a basis for adaptive management and inputs from the TC and ME. It should not be confused with project evaluation.

Responsibility for conducting research activities in the host country is vested in the Host Country PIs and the resident expatriate SIs. Unless by special arrangement, all SIs will have not less than 2 years post-doctoral experience in their field of expertise. They will be nominated by the US PI for the subproject, and they function as his resident representative and are responsible to him. The major research roles of expatriate PIs is in setting up the original research program, helping maintain its progress and quality and recommending changes to achieve research goals more effectively. They will also be responsible for conducting any aspect of required research that cannot be done in the host country, but requires more sophisticated facilities available at the home institution.

PROJECT COSTS

FINANCIAL ARRANGEMENTS

Project Development -- Phase I

Approximately $88,000 is required to complete this phase and provide the basis for the project paper. Details of this budget are set out in page 38.

Project Development -- Phase II (Post Project Authorization)

Completion of Phase I of Project Development provides the basis for preparation of the project paper. Overseas sites and host country collaborating institutions will have been identified and institutional and organizational arrangements for project implementation will also be completed.

Following project authorization, the final phase of project development may be completed. The central theme to this is the selection of participating US institutions and the PIs who will be involved, and following this, development of detailed research agendas, including phasing of interrelated components. All work on the research agendas and phasing will need to take place at a meeting of all PIs in the host country. A specific budget allowance is needed for this purpose; details are set out below.

Project Development - Phase II: Budget

Recruitment of Project Manager	$1,000
Sundry costs: Selection of participating institutions/PIs, etc.	1,000
Overseas Travel (one site)	
8 PIs, PM, Program Director, 10 x $2,500	25,000
Overseas Per Diem	
10 x $65 x 7 days	4,550
General office costs	
including typing, telephone, telex, mail, etc.	500
TOTAL	$32,050

Project Funding

Several alternative arrangements are possible for the mechanism of funding the PSP. Each has advantages. The most favored approach is that USAID be requested to provide funding as a separate grant to the SR-CRSP, with UC Davis as the grantee. The advantage of a separate grant is that it allows new terms of the grant to be negotiated, which are more in keeping with the design of the PSP, and the managerial requirements needed to implement it.

PROJECT BUDGET OPTIONS

Three separate options are offered for funding the project and the manner of its implementation. The basic differences between these options are the levels of effort (and hence the rate of progress of the project) and whether the project is regional in scope or applies to isolated countries. These will be considered in turn and budgets* given for each.

Budget I (p. 52) refers to a project with a similar progress rate to that found in the SR-CRSP. For each project site overseas, the 5-year overall cost would be $4,542,000, which includes contributions from the host country and matching funds from participating US institutions.

Budget II relates to a project which maintains the same content and integrity as with Option I, but the inputs are less, progress is slower, and the end of project status is less advanced. In seeking to lower the cost of the project from that shown in Budget I, it is important not to cut out project components. To do so would destroy the integrated nature of the design and compromise the results. Instead, it is proposed that a lower cost project should be less ambitious about progress made in the lifetime of the project. It is especially important in this regard that the host country be given the capacity to continue the research after project termination. Too severe a pruning of the budget may impair the capability to do this. It is not easy to estimate what this critical lower funding level is, but it is difficult to see the project developing the necessary momentum

* It should be noted that precise budgets for the project cannot be established at this stage owing to the lack of a detailed research agenda and work plans. Equipment and personnel requirements cannot therefore be determined with precision. In addition, each of the institutions which might participate in the PSP have differing rates of remuneration and overheads. The budgets that have been developed are therefore intended as guidelines. Complete budgets must be prepared at subsequent stages of project development.

if the funding level is less than two thirds that of Budget I, i.e., less than about $3,000,000 in total for the 5-year period.

The third option is pursuing the project at a regional level. This implies that three or more countries can identify a common goal and that a substantial part of the research can be conducted at a central institution. This option allows for the same research progress as in Budget I, but at a lower cost per country. Though it may be argued that this is a more efficient approach, potential political difficulties may override this consideration. In addition, this option does not offer equally improved institutional capacity for each country involved. The emphasis inevitably will be towards building the major capacity in the country housing the bulk of regional facilities, with more minor improvements in the other countries involved. Resolution of this apparent problem will depend on the distribution of project activities between the central facility and the individual participating countries. This is clearly an issue for careful negotiation, should the regional option be chosen.

PROJECT OPTION I

Budget Summary*

(Entire costs in US $ of 5-year project/per site)

	x$1,000
Project Development Phase II	33
Management Entity	262
Principal Investigators	470
Research Assistance (US)	175
Facilities and Equipment	118
Host Country Site Office Running Costs	250
Resident Project Manager	395
Resident Senior Investigators	860
Host Country Facilities	100
Host Country Counterpart PIs	120
Host Country Technical Assistance	120
Overseas Training	103
Overheads (33-1/3% on modified direct costs)	843
Subtotal	$3,754
Contingency (10%)	375
Subtotal	$4,129
Inflation (10%)	413
TOTAL	$4,542

Total Project (5-year) Costs - Option I

x$1,000

	Total Cost	LDC Contribution	Matching Funds	USAID Grant
5-yrs.	4,542	340	325	3,877
p.a.	908	68	65	775

* The basis for these estimates is provided in Appendix II.

PROJECT OPTION II

Budget Summary II*

	x $1,000
Project Development - Phase II	33
Management Entity	150
Principal Investigators	335
Research Assistance	100
Facilities and Equipment	118
Host Country Site Office Expenses	150
Resident Project Manager	395
Resident Senior Investigators	400
Host Country Facilities	100
Host Country Counterpart PIs	60
Host Country Technical Assistance	120
Overseas Training	50
Overheads	477
Subtotal	2,488
Contingency (10%)	249
Subtotal	2,737
Inflation	274
TOTAL	$3,011

Total Project (5-year) Costs - Option II

x $1,000

	Total Cost	LDC Contribution	Matching Funds (10%)	USAID Grant
5 yr.	3,011	280	204	2,527
p.a.	602	56	41	505

* Estimates based on Option I budget with adjustments.

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Budget Summary III

(Entire costs in US$ of 5 year Regional Project)

Basis for budget derivation for regional project option III

The concept of a regional research center can be justified so long as:

1. There are similar ecology and production environments for selected producer groups in each participating country.
2. Those parts of the research agenda that are to be conducted centrally have a common applicability in the countries involved.

Economies of scale for a regional project accrue mainly from not having to duplicate expatriate resident staff for each country. Some savings from non-duplication of equipment is likely, especially when fewer vehicles need be purchased. Savings are likely to be offset by increased transport costs for staff and livestock.

The budget for a project involving four countries is presented in Budget Summary III. This is an outline budget based on crude estimates of how the project might be implemented, and in particular the allocation of research functions between the central institution and local institutions. The project cost will increase above estimates as the volume of work in each individual country increases.

PROJECT OPTION III

Budget Summary III

Entire Costs in US$ of 5 year Regional Project with 4 Country Sites

	x 1,000
Project Development	$40
Management Entity	390
Principal Investigators	830
Research Assistance (US)	280
Facilities and Equipment	282
Site Office Running Costs	471
Project Manager	420
Resident Senior Investigators	1,276
Host Country Counterpart PIs	312
Host Country Technical Assistance	240
Overseas Training	152
Regional Center Training	42
Overheads (33% on modified direct costs)	1,183
Subtotal	$5,918
10% Contingency	592
Subtotal	$6,500
10% Inflation	650
TOTAL	$7,150

Total Project (5-year) Costs - Option III

x $1,000

	Total Cost	LDC Contribution	Matching Funds	USAID Grant
5 years	7,150	652	650	5,848
p.a.	1,440	130	130	1,169

EXPECTED PROJECT RESULTS

Institutional

The following is a profile of improvements that the project is expected to generate. The pattern of emphasis on different outputs will vary according to the need of the host country system, and will be reflected in this section of the Project Paper.

The proposed 5-year project is expected to result in a small ruminant research system that has the following improved characteristics:

1. The research system will have developed a conceptual basis and organizational procedures which enable it:

   a. to identify researchable problems which have major significance for the farmers it is trying to serve. To do this, information links with farmers will have been established, as well as criteria for assessing how researchable a problem might be.
   b. to engage in multidisciplinary research in a way that engenders integrated and coherent research results, all focused on solving the same problem.
   c. to assess its own performance as a research system that utilizes resources and generates improved solutions to problems.
   d. to make adaptive changes in the way it is managed so that it can improve its performance.

   The management skills needed to accomplish these improvements will be developed in selected personnel by a mixture of formal training, on-the-job training, and by example.

2. Small ruminant research potential in the host country will be augmented by improved technical skills in scientists and technicians. The specification of these improvements (personnel level, numbers, and particular skills) will be presented in the project paper when specific sites have been identified and surveyed. Improvements will be made only in those skills which are required in order to solve the research system's current problem set. It is not an opportunity for broad scientific or technical education.

3. The small ruminant research system will have improved links with:

   a. the intended beneficiaries of its research, to ensure a continual awareness of real needs.
   b. The Ministry that sponsors the research system's activities. As a policy instrument, the research system should maintain an active two way dialogue with its sponsor. In one direction, the research system would have improved ability to translate the Ministry's policy into research programs. In the opposite direction, the system should have increased ability to advise the Ministry on farmer needs and perceptions, as well as future projection of research progress.

Technical

The major technical achievements which are the expected result of the projects research activities, are these:

1. A characterization of the sheep production system(s) in the host country, including how these are related to alternative use of resources for production of crops or other livestock.

2. An understanding of the current and potential role of sheep in the economy of lower income rural households, and in the economy of the country as a whole.

3. Improved knowledge of the genetic potential of existing local sheep breeds, and how these would need to be managed if they were to be used more productively.

4. Improvements in the knowledge of factors responsible for prolificacy and the manner in which these factors are inherited. This knowledge will permit improvements in the design of breeding programs involving prolific sheep.

5. A program for producing improved crossbred sheep from selected parent lines. The project is expected to identify promising breeds for crossbreeding, and to have completed 2 breeding cycles by project completion. The new crossbreds will undergo trials both in local farmer production environments as well as those pertaining on the experimental station. Within the 5-year span of the project, it

should be possible to complete a full evaluation (including reproductive performance) of one F_1 generation, and a preliminary evaluation of the generation produced by the first back-cross. These evaluations will be adequate to assess the utility of continuing research and development of these crossbred varieties.

6. Specification of a production system that local farmers can utilize for improved performance using the new crossbreds or varieties.

It must be emphasized that breeding new varieties of sheep is inherently a slow process, and the 5-year project span does not permit finalization of activities connected with developing and establishing an improved sheep production system. The emphasis of the project on institution building allows for an increasing share of the project research burden to be undertaken by the host country research system. By the time of project conclusion, continuing research should be within the capability of the host country institution.

Targeted Beneficiaries

An early task for the project will be to specify the intended beneficiaries of the improved sheep production system. Guiding principles in this selection will center around farmers of limited resources. But it will be necessary to discriminate further than this so as to focus on a group that is more or less homogeneous with respect to the resources at its disposal, and the nature of its current small livestock production system.

Having established the intended primary beneficiaries, the particular benefits that they could expect from the project or from the momentum developed by the project, are as follows:

1. A net increase in the productivity of the farm household that results from more efficient resource utilization by improved performance sheep with better management practices.

2. Higher disposable incomes of selected farmer groups utilizing new types of sheep.

Other expected results, not focused on the primary beneficiary, are:

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1. increased red meat supply for either domestic consumption or for export

2. increased volumes of by-products, including wool and skins, which can be important commodities for developing or maintaining cottage industries.

End of Project Status

It is not feasible at this stage to make forecasts of how far the project is expected to have progressed by the end of its five year term. To do this will depend on a survey of individual project sites, taking into account the existing strength and facilities of their livestock research systems, and the magnitude of the changes that are needed to establish new sheep production systems that can offer the farmer significant economic improvements.

MONITORING AND EVALUATION

MONITORING FOR PROJECT MANAGEMENT

An added responsibility of the ME in this project is to provide the leadership needed to ensure smooth dovetailing of the activities and outputs of component subprojects. To achieve this, it will be necessary for all subprojects to develop annually a workplan and schedule.

Individual subproject workplans will need to be coordinated with the needs and outputs of complementary subprojects, by a process of negotiation and by making mutually satisfactory adjustments. This task is best tackled on an ongoing basis, whenever all PIs meet, but certainly not less frequently than annually.

Quite apart from the obvious benefits in coordinating work programs, these schedules, set out as Gantt charts, provide the ME with a basis for monitoring the progress of each research component. Combined with progress reports from the project manager, such monitoring can give the project a more responsive management, able to assist in making adjustments to overcome unexpected obstacles, or to make the most of fresh opportunities that could not be anticipated.

INTERNAL EVALUATION

It is proposed that an Evaluation Panel be established by the BIR/TC, for the purpose of reviewing the project annually. The purpose of these evaluations is to provide the BIR, the TC and the ME with an independent assessment of project performance. Consistent with the increased responsibility of the ME for monitoring and coordinating project activities, will be the task of the ME to receive and respond to the report, in consultation with the TC or BIR. The External Evaluation will not be addressed to PIs and subprojects, nor will they be expected to respond directly to it.

The Evaluation Panel should be composed of experienced personnel drawn from institutions which are not otherwise participating in SR-CRSP activities. In selecting such a panel, the BIR/TC is enjoined to place emphasis on the breadth and type of experience as a selection criterion. It is desirable that substantial experience with overseas development projects be embodied in the panel as well as representing a range of disciplinary interests. It would be pertinent to include experts with the following areas of expertise and experience:

- Institution building/organization development, especially if possible, with experience in the management and development of agricultural research systems;

- Animal Husbandry, or breeding, especially in relation to livestock development programs in Third World countries.

- Agricultural economics, with an explicit 'systems approach' to problem solving.

- Sociology or economic anthropology, with widespread experience in relation to rural and agricultural development in LDCs.

It is important that an understanding be reached at the outset, between the project implementors and the Internal Evaluation Panel, on the performance criteria by which the project should be assessed. These criteria should be incorporated into the Terms of Reference of the Panel.

Evaluation missions must be seen as critical events during the life of the project, because of the influence they can have on subsequent project direction and performance. Evaluation missions, in addition to comprising high caliber personnel, will need to be well conceptualized. To assist this, budget provisions will need to be made for the Evaluation Panel to give them the time to develop jointly the detailed criteria that will be appropriate for their task. There are clear advanatages to doing this prior to their overseas mission.

The Internal Evaluation Panel may be regarded as having two tasks:

1. Evaluating the performance of the SR-CRSP in its execution of the project.
2. Evaluating the success of the project in generating the expected outputs.

A suggested outline of the major criteria by which the project may be assessed, are given below. Evaluation at different phases of the project will demand different emphasis amongst the suggested criteria, but the Panel is urged to include as wide a spectrum of criteria as possible in their report.

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Criteria for Evaluation of Project Implementation

1. Performance of the Project Development Team:

Selection of U.S. Institutions and Personnel:

- Was this pursued with adequate consideration for
  - a. the type of expertise/experience required?
  - b. the willingness to work collaboratively as members of a larger team?

Identification of Host Countries/Institutions/PIs:

- Was the selection of country based on sound economic, social and biological considerations?
- Was the choice of participating host country institution compatible with the research and institution building aims of the project? In particular, was it clearly established that a demand for this project existed?
- Was the choice of counterpart PIs consistent with the aims and spirit of the project?

Collaborative Design of Project:

- Does the project design reflect the expressed needs and input of host country officials?
- Do the detailed research agendas and schedules indicate due provision for the inter-dependent character of research sub-projects.

2. Performance in Institutional Development:

- Has the project been able to establish among PIs a shared view of the use of the research project to foster institutional improvement?
- Has the project instituted a process by which research problems are identified, strategies and agendas developed, research teams recruited and requisite skills developed?
- Has a style of research project management been set up that is endorsed by the host research institution. Is it a style/process that it would 'own' or wish to copy or develop further.

- Has the project made progress in improving the management capacity of the research system (within the microcosm of the project)? What formal training or experience has been offered that helps in providing the host country/institution, with improved research system management skills?
- Are adequate steps being taken to prepare host country staff for a greater share of responsibility in implementing the project?

3. Research Activity Performance:

Performance of Project overall:

- Are the research agendas adequate overall to accomplish research objectives?
- Are research agendas sufficiently coordinated conceptually and operationally, to offer an approach to problem solving that is efficient and cost effective.
- Does the project management (both PM and M E) provide the leadership needed to assure confidence and morale for successful team building and pursuit of multidisciplinary research.
- Does project management take adequate and timely steps to overcome problems (financial, logistic, personnel, institutional, etc.) which jeopardize research schedules?

Criteria for Evaluation of Project Impact

The primary purpose of the project is improving institutional capacity for livestock research. For the project to have its intended impact, it is necessary that a project process be developed which serves as both exemplar and pilot for the host country research institution. If it is to offer a strategy for institutional improvement, the process must be consistent with the capacity of the host institution for undertaking its own improvement as well as meeting the technical needs of the project. What is being evaluated here is whether the essentials of an improved research system are (as exemplified in the project) are being adopted by the host institution.

Criteria that might indicate that this is taking place include:

- a belief amongst host country officials that the PSP continues to offer a strategy for enhancing their research system capacity;
- a continuing interest/input by the host country institution into the project (over and above seconded staff), that is evidence that the PSP is their 'pilot' for institution building;
- a growing capacity of counterpart staff (scientific, management, administrative), both as individuals and as teams, to accept and develop further the PSP 'project process' as a means of improving their research system performance. For example, it would be appropriate to examine whether counterpart staff really understand and appreciate the value and techniques for monitoring their own group performance, and if so, whether they are developing procedures for responding adaptively to increase performance efficiency.
- evidence that research by teams of complementary specialists is beginning to take place.
- evidence that research is problem-oriented with high value (economic or social) payoff, and not merely academic.
- evidence that the research institution is developing links with its potential clients (various classes of farmers, producers, etc.) such that it can be informed of their needs, and the user-benefits of research solutions.

The above criteria have not been developed into performance indices. Again, this might best be tackled in the light of specific circumstances and project locations.

However, the spirit of the evaluation as indicated in the list of suggested criteria, is evident. In contrast, it would not be considered appropriate if increased numbers of staff, enlarged research budgets, or a more prolific publication record, were in themselves used as evidence of improved institutional performance.

ASSUMPTIONS

Key assumptions that have been made and which must be upheld if the project is to achieve its objectives, have been outlined in the logical framework. In the absence of definite country locations for the project, and hence, no knowledge of institutions and personnel involved, no assessment can be made at this stage of the strengths of these assumptions in specific circumstances. This will be an important task for the project development team, and will need to be fully addressed in the Project Paper.

INSTITUTIONAL FEASIBILITY

US Institutions

In several areas, the project departs significantly from the design of the existing SR-CRSP. This raises the question of the feasibility of project implementation using the present CRSP organization. There can be little doubt that the experience to date has demonstrated the SR-CRSP's capability for effective and responsive management of a collaborative research project. The performance is made all the more creditable by having to contend with predetermined sub-project research agendas that were conceptualized with little or no sense of interrelationship or coordination, and with little incentive to develop it.

More open to question is the preparedness of participating institutions and scientists to coordinate their agendas and efforts throughout the project, even though this may mean less individual kudos. If this can be assured, there is an excellent chance that the US institutions can deliver what is expected of them.

Recruitment of scientists and support staff of the caliber, and with the range of expertise, needed, is not expected to present problems. There is some doubt, however, on the ability of universities and comparable US institutions to be able to provide practical expertise in organization development, such as would be needed to assure success in the planned development of the research system. Recruitment of this specialist is essential to the accomplishment of project objectives, and provision should be made to recruit from outside the universities where such expertise exists.

Host Country Institutions

Until overseas locations and participating host country institutions are identified, it is premature to address the question of host country institutional feasibility. There are, however, several general issues which are important and which will need to be considered in the context of feasibility during the project development phase.

Attention will need to be given to the ability and willingness of the host country livestock research system to engage in the process of its own improvement. Obviously, this will depend on a great many factors. The most important of these centers on the demand for such improvement by senior government officials, and the willingness of key

actors in the research system to accept change. Reference has already been made to the need to assess this point with some care at the project development stage.

A second feature governing institutional feasibility is the caliber of staff that can be recruited as host country counterparts. Experienced scientists and technicians are frequently in high demand in developing countries and it may not be possible to secure the services of senior scientists as project PIs. In these circumstances, alternative courses of action would need to be considered, such as scaling down the research program or by placing more reliance on resident scientists from the US (obviously a much more costly option).

The experience and ability of host country counterparts will also have a major bearing on the feasibility of devolution of responsibility for project implementation, and for sustaining its momentum after termination of the project.

TECHNICAL FEASIBILITY

Although the outcome of research into developing improved prolific sheep production systems cannot be predicted, there is good reason to believe that existing technology and experience in breeding, nutrition, forage production, health care, etc., are adequate to achieve the objectives. It should be emphasized, however, that such feasibility is restricted to situations in which forage quality and availability are not the limiting factors for livestock performance. In arid areas, for example, where there are absolute or seasonal forage deficiencies, it would neither be desirable nor feasible to incorporate prolificacy in the sheep production system. This project may only be considered for implementation in situations where there is a surplus of feedstuffs, over and above present maintenance requirements. Morocco is an example of this, where the increasing extent of irrigated agriculture is producing surplus crop residues with potential as livestock forage. Similar areas may also occur in many of the developing countries heavily dependent on crop production.

A further question of feasibility is whether substantive results on developing a prolific sheep production system can be accomplished within the proposed 5-year span of the project. In addressing this issue, it is important to re-state that this is not the primary objective of the project and that the question of its feasibility is not paramount. Even so, it is important to assess what progress is technically feasible within the time horizon of the project.

Livestock improvements through genetic manipulation are inherently long term endeavours. In developing a sheep breed with improved performance characteristics, there is the choice between achieving this by means of a cross-breeding or by genetic selection from existing stock. To achieve more rapid results, the project is opting primarily for the cross-breeding alternative, even though in the early years this will mean farmers using non-local rams or semen for breeding. Breed stabilization is likely to occur subsequently, when use of exotic breeding stock will no longer be needed. The choice of crossbred sheep is regarded as offering greater immediate improvements, and is more technically feasible within any realistic project time frame. In any case, the project emphasis on developing indigenous research capacity capable of sustaining the thrust of research initiated in the project, allows for bringing the work to a successful conclusion subsequent to termination of the project.

Emphasis on cross-bred sheep need not exclude a selection program being mounted simultaneously, but improvements obtained through this means are typically of the order of 1½% per year. Improvements visible during the lifetime of the project would therefore

be small, and a long term commitment to continuing this initiative would be needed from the outset.

SOCIAL IMPACT

Institutional Improvements

The project is designed explicitly to have a positive social impact stemming from improved institutional performance. Research establishments with agendas more responsive to the needs of the rural community are proposed. Procedures for involving small farmers in the design and selection of new sheep production systems, are made explicit and play an important role in the project.

Generally, increased exchange between research scientists and intended beneficiaries of research is promoted and is regarded as socially desirable.

No other major social impacts are anticipated as a result of institutional strengthening.

Improved Sheep Production Systems

The focus of project research is smallholder sheep production systems. The intended benefits of increasing the productivity of sheep are therefore expected to accrue to those livestock owners who are most in need: the small farmers. The expected impact is likely to be in improved diets and standards of living.

The more efficient use of feed resources that the project expects to develop will make new demands on labor. In particular, increased labor is likely to be required at lambing and for a period thereafter. This labor is traditionally provided by women and children in the intensive management situation we are considering. The precise magnitude of increased effort is difficult to forecast at present, but in general terms, is not expected to be large enough to create major problems in labor allocation.

Availability of increased forage should not be a problem since the production system will be designed to fit sheep numbers with forage output. There is likely to be more labor required to supply cut forage to penned sheep in the zero-grazing systems commonly found in smallholder farms. The magnitude of this increase and how it is shared amongst household members will need to be investigated. There are no a priori reasons for supposing that the extent of this change would be unduly disruptive socially.

In establishing improvements in sheep production and contributing to net gains in farm productivity, it is likely that changes in present cropping patterns will be called for. In subsistence households, this in turn can lend to changes in the patterns of food consumption. The influence of likely changes in this on the nutrition of families must be taken into account in the design of new production systems. Detrimental changes are

only to be expected if a greater proportion of household production is converted into cash income, and this then used to purchase commodities that do not offer an adequate diet.

ENVIRONMENTAL IMPACT

The development of a more prolific breed of sheep in this project is intended for situations where ample year round supplies of forage are available. The project is not suitable for extensive systems of sheep management that are found in semi-arid rangeland where there are seasonal forage deficits. Feedstuffs are expected to be supplied mainly from cultivated land, in which crop residues are utilized as part of an agricultural system in which livestock and crop production are closely inter-related. It is not anticipated therefore, that increased numbers or turnover of sheep flocks will place any additional burden on marginal land or areas that are ecologically fragile.

ALTERNATIVE STRATEGIES

Several alternative strategies have been considered as ways of achieving the project purpose: strengthening the capability of host country institutions for ongoing improvement of livestock production systems.

One alternative considered was to take a partial approach to institutional strengthening. In effect, this meant that instead of examining the entire research system and strengthening the elements of it in a coordinated fashion, only one or two would be chosen for improvement. Typically, this might involve offering technical training to increase the number of research scientists and technicians with a certain level of relevant skills. This approach is appealing on account of its simplicity and its acceptability to many host institutions. A common failing in this approach is to end up with research skills that are badly utilized because of poor problem definition, a research program that is poorly focused on problems of critical significance, inadequate research facilities, including funding, a weak information system that fails to inform researchers of client needs and the impacts of earlier research, and insufficient government support.

Unless therefore, skills training were specifically identified as the systemic bottleneck, it would be hard to justify pursuing a strategy that strengthens this element alone.

The project as designed seeks to make a research program a vehicle for improvements in systemic capability. An alternative strategy which still recognizes the validity of the whole system approach might be to choose ways for upgrading the research system other than the 'hands on' approach advocated. One strategy considered would involve a comprehensive analysis of the existing research system to discover its strengths, weaknesses and potentials. From this, a prescription would be developed as to what an improved system would look like, and the training and reorganization that would be required to attain it. Again, this approach commends itself by the simplicity of its concept. But several weaknesses diminish its attraction and led to its rejection as an alternative.

1. Prescriptive approaches to the development of organizational capability tend to be normative. In their thrust towards more efficiency, models are commonly used that ignore socio-cultural and political contexts, which are among the realities that require accomodation in practice. Without this aspect, much prescriptive thinking fails to have impact.

2. Efforts at institutional development that are not oriented by well-defined objectives tend to be less effective in practice than those that are guided by purpose-linked specifications. Training, for example, as a necessary part of building institutional capability, cannot be aligned to specific tasks--it has to be general--often too general to be of immediate practical use.

3. Institutional development based on diagnosis and prescription, tends at best to produce all the necessary components, but nothing to link them together and create action oriented teams that combine technical, administrative and managerial skills.

ISSUES

1. Critical to the success of this project is the commitment of the senior members of host country organizations involved. Almost certainly this will require strong support from senior staff in the relevant ministry as well as that of the Research Institute University Director.

2. It has been assumed in the design of this project framework that effective collaborators exist in the host country. This may not be the case, either because of too low a level of experience to be effective counterparts, or because a particular discipline is simply not well represented in the research system involved.

The existence and availability of effective counterparts should be explored at an early stage of project development. Where counterparts would need to be seconded from another organization, the prospects of this should be examined. Consideration should also be given to the merits of training host country personnel in specialized techniques prior to commencement of research. If this were both desirable and feasible, it could be used to avoid delays in the research schedule.

The commitment at these levels is particularly important because the project seeks to intervene systemically, and thus encompasses much wider issues than the domain of a single scientist, however prominant he might be. Upper echelon commitment is the singlemost important institutional factor which needs to be taken into account in selecting sites for the project. Criteria fcr assessing the extent of commitment would need to be explored. Clearly verbal enthusiasm would be insufficient; firm resolve to provide adequate staff for the project on a full time basis, and the willingness to offer performance incentives might for example be indicators of serious support.

POTENTIAL PROJECT SITES

From the point of view of their environments and economies, a number of middle eastern and African countries have a strong potential interest in research on prolific sheep production systems. These countries include Syria, Turkey, Egypt, Sudan, Ethiopia, Morocco and Tunisia. Some of these already have a breed of prolific sheep (e.g., Morocco); others, such as Eqypt, in spite of a large sheep component in their livestock sectors, have no prolific traits in domestic flocks.

A Prolific Sheep Workshop, sponsored by the SR-CRSP, was held in October/November 1981, with the aim of bringing together scientists interested in research on proliic sheep. One outcome of the workshop was expression of interest from senior scientists in Egypt and Morocco on mounting a collaborative project centering on development of prolific sheep research systems. While the interest and enthusiasm of scientists is vital to the success of the project, it is insufficient to provide the institutional commitment required by this project. The identification of such interest and capability does however provide the Project Development Team with a valuable starting point for exploring the potential support for the project in these countries. In areas where prolific sheep are already found, there is substantial scope for improvements in other performance characteristics of these animals, which can be obtained through breeding with other varieties, and by developing improved management practices. Where the prolific characteristic is absent and reproductive performance in the female is the limiting factor in flock output, large improvements can be expected through incorporation of the characteristic in crossbreds.

Morocco

Evidence for the relevance of the proposed project for US-AID's assistance to Morocco can be seen in the Morocco CDSS (FY 1984). Small farmers and livestock owners are targeted for assistance:

> 'Groups I and II (cultivators of rainfed crops, particularly cereals and livestock grazers) are the target groups for USAID/Morocco's strategy. The economic activities characteristic of each group are highly interdependent: about 80 percent of the small cereals farmers raise livestock, and many livestock herders utilize crop residue, range and forested areas for grazing.'

The need for improved livestock management based on integration with forage production is also clearly identified.

> "Feed resources are limited to fallow, crop stubble and village grazing (roadsides, etc.). Income from livestock husbandry (per animal unit) is very low. Forage cultivation in rotation with other crops and increased cereal production (increased amount of by-products used as feed) could substantially increase the farmer's cash income from improved livestock production.
>
> "Very little public or private effort has been given to support the production of feed (forage) for the vast multitude of ruminant livestock. High grade dairy cattle are a minor exception. Livestock production is basically a gathering and scavenging operation, not a scientifically developed system. The livestock economy probably has already reached and passed the limits of sustained yield under these practices. There is no choice now but to modernize the livestock industry and base it increasingly on managed range and forage produced as an integral part of a crop-livestock farming system or accept declining output and ecological degradation."

The proposed project can offer a substantial contribution to these objectives by developing improved sheep production systems with superior reproductive performance, and at the same time, endowing the host country with the research capability of making continuing improvements after project termination.

Egypt

Despite the interest of Egyptian scientists in a prolific sheep project, there are *a priori* grounds for suspecting that this project may not be most germane to their needs. It is true that there is a high and increasing demand for red meat in Egypt, but most experts report that seasonal feed limitations are the major constraint, not reproductive performance.

Furthermore, sheep appear not to be a preferred livestock species for the smallholder, whose preference is for dual purpose cattle, or buffalo on account of the high value of milk production.

The Project Development Team would need to explore the validity of the project in this context when they make an initial survey of Egypt as a potential project site.

Other Countries

Several other potential sites for the PSP, and on which no initiative has been taken at this time, include Syria, Turkey, and Indonesia. Their demand for a project of this type will need to be explored in the Project Development Phase.

EXPERIENCE WITH SIMILAR PROJECTS

Action-Based Institutional Development Projects

The action-based approach to institution building is characterized by emphasis on in country, on-the spot institution development as it deals with "live projects." It is tailored to answer institutional needs that emerge through engaging in real project activities. Action-based institution building makes use of project activity experiences and project problems as focal points for institutional improvement.

US/AID experience with this approach has been limited, but includes:

- The National Planning Project, USAID-Government of Jamaica (US-AID-Jamaica Project 532-0039).

- .

(This section to be enlarged)

Multi-disciplinary Collaborative Research Projects. The experience with the CRSP projects (Small Ruminants, Bean and Cowpea, Sorghum and Millet, etc.) provides both insights and opportunity for appraisal of this style of project. A potential strength of this type of research project is that research can be directed at solving fairly major problems that require cooperation of several disciplines in a concerted research effort.

In general, multi-disciplinary research requires higher coordinating/integrating inputs than simple projects. In principle, this need not present difficulties so long as it is given early recognition, and adequate provision made for it. This has seldom been done. Collaboration also can present problems, especially where this has become only nominal. A common cause of this problem is that host country personnel are inadequately involved in all stages of project conception, design, and implementation. The effect of this omission is that they feel no sense of ownership of the project content and cannot therefore be expected to have the commitment to its success. These problems can be overcome, especially in the hands of experienced teams who recognize these dangers.

ABBREVIATIONS USED IN TEXT

BIR	Board of Institutional Representatives (of the SR-CRSP)
EEP	External Evaluation Panel (of the SR-CRSP)
LDC	Lesser Developed Country
ME	Management Entity (of the SR-CRSP)
PD	Project Development
PDP	Project Development Phase
PI	Principal Investigator
PM	Project Manager
PP	Project Paper (USAID document)
PSP	Prolific Sheep Project (a convenient though imprecise term for the project proposed in this document)
SI	Senior Investigator (junior to PI)
SR-CRSP	Small Ruminant Collaborative Research Support Program
TC	Technical Committee (of the SR-CRSP)

APPENDIX I

EXCERPTS FROM THE PROCEEDINGS OF THE PROLIFIC SHEEP WORKSHOP, OCTOBER/NOVEMBER 1981

GENERAL RECOMMENDATIONS

1. Establishment of an international collaborative research program on prolific sheep is justified and worthwhile.

2. Steps should be taken to establish the framework and funding under which such collaboration can occur.

3. The broad goals of the Prolific Sheep Program (PSP) should be:
   - o Exchange of knowledge and skills in the development and management of prolific sheep.
   - o Facilitate joint research planning in order to improve the consistency and design of research work.
   - o Share funding responsibilities among several participants of the program.

4. The specific research goals of the PSP should be to:
   - o Compare, characterize and improve the performance of prolific sheep in all the environments and management systems represented.
   - o Identify the breeds and crosses most suitable for specific environments and production systems, by a series of linked breed comparisons.
   - o Study the genetic and physiological basis of prolificacy in the different breeds.
   - o Study the utilization, exploitation and management systems for prolific sheep.

5. The creation of a single large center for the study of prolific sheep is not recommended. This would absorb enormous sums of money that could more usefully be channeled to support on-going research in several centers.

6. Incorporation of Near East Centers of excellence (at the present time defined as IAV Hassan II University, Morocco and Ministry of Agriculture, Egypt) will require special inputs from external resources to equip them for full participation. In Egypt, the most urgent current need is for additional equipment and training in the area of physiology, and in Morocco the addition of a more comprehensive genetic research component.

7. Inclusion of other countries where intensification of sheep production is needed, is recommended for exploration - possibly the Arab Research Center for Arid Lands. Resources from OPEC nations should be encouraged because of the potential benefits to them from increased availability of sheep for importation.

8. It was recommended that a small committee* take responsibility for organizing a Technical Workshop of Prolific Sheep to be held in Edinburgh in 1983 to bring together and update all the information on prolific sheep.

9. The members of the present workshop will serve as a review panel for the development of any future project papers.

*Consisting of Land (Chairman), Bindon, Robinson, Aboul Naga and Lahlou Kassi.

OUTPUT FROM AN INTERNATIONAL COLLABORATIVE PROLIFIC SHEEP PROGRAM

Several benefits are expected from international collaboration in the area of prolific sheep research work. They may be summarized as follows:

- Exchange of knowledge and skills in the development and management of prolific sheep.
- Joint planning of research leading to improved design and more consistent comparative data.
- Systematic training of farm managers, technicians and scientists in the use of prolific sheep.
- Shared funding responsibility among several international participants.
- Improved characterization and comparison of the known breeds of prolific sheep.
- Improved crosses to provide sheep suitably adapted to a wide range of environments.
- Improve the basic understanding of the genetic and physiological control of prolificacy.
- Experiment with crosses not made in any of the existing national programs.
- Systematic exchange of germ plasm through new approaches such as embryo transfer.
- Encourage closer scrutiny of potentially prolific breeds not yet well researched.
- Encourage more rigorous examinations of the nature and importance of genotype x environmental interaction.
- Improve the extension skills for disseminating new breeds, new knowledge and new management practices.
- Encourage greater self sufficiency in research in less developed countries.

APPENDIX II

Basis for Budget Estimates for Option I

ME Cost Increment Due to PSP

	$ p.a.		over 5 years
Director Travel	10,000		
Assistant Director Travel			
Staff salaries and benefits	18,000		
Evaluation Panel			
5 x 200 x 5	12,000		
Communications, etc.	5,000		
Subtotal	$45,000		
Contingency (15%)	6,750		
Total	$51,750		
	(say $52,000)	x 5 =	$260,000

PI Expenses

Salary Estimate: 8 PIs each at 10% time, $40,000 p.a., plus 25% benefits

	$ p.a.		
PI Salaries	$40,000		
Overseas Trips			
2 x 2500 x 8	40,000		
Per diem			
35 days x $50 x 8	14,000		
Total	$94,000	x 5 =	470,000

Research Assistance (US)

Based on 1/4 FTD x $20,000 = $5,000

5 years x 7 subprojects

35 x 5 $175,000

Equipment

Based on total 5-year SR-CRSP budget for equipment for use in US and overseas.

Approximately $380,000 (+ $90,000 of matching funds) for 5 countries (i.e., average $470,000/5 = $94,000 each over entire 4 years).

Pro rate for 5 years	$118,000

Site Office Running Costs

Based on SR-CRSP costs. These vary widely depending on country, hence averages may not be very meaningful.

Vehicles	$100,000
Office	90,000
Travel	60,000
Total, 5 years @	$250,000

Expatriate Residents (Senior Investigators)

Say 5 out of 8 components have full-time resident for 5 years.

Cost for 5 years		
Salary, 5 x $20,000 x 5	$500,000	
Benefits @ 25%	125,000	
Post Differential (say 10%)	50,000	
Housing, 5 x 5 x 5,000	125,000	
Transport, 2,500 x 8 x 2	40,000	
(allow change of personnel 1 x		
allow 3 of 5 married/no children		
Air fare @ 2,500 round trip		
Household transport,		
2,000 x 5 x 2	20,000	
		$860,00

Host Country Counterpart PIs and Assistance

PI Salaries:

½FTE x 8 components x $6,000 = $24,000 for 5 yrs. = $120,000

Assistance

2 FTE x 8 x $1,500 = $24,000 for 5 years = $120,000

Project Manager

	$ p.a.		
Salary (15 years post doctoral)			
5 x 35,000	175,000		
Benefits @ 32%	58,600		
Admin. Stipend @ 3,000 pa x 5	15,000		
Post Differential (say 10%)	17,500		
Transport household	48,000		
4 x 12,000 (allow for change of manager)			
Housing, 5 x 8,000	40,000		
Schooling, 5 x 5,000	25,000		
Fares, 2 family round trips	15,000		
	$78,820	x 5 =	$394,180

Overseas Training

4 @ ½year

4 @ ¼year (Total 36 months)

8 return airfares @ 2,000 ea.	$16,000	
Housing allowance, 36 months		
@ $500/month	18,000	
Stipend (av. $1,200/month)	43,000	
Tuition feed @ $500/m.	18,000	
Supplies	4,000	
Local Travel	4,000	
Total, 5 years		$103,000

Overheads

UCD overhead for subgrants			
= $5,000 x 8	$40,000		
33-1/3% on			
PI	470,000		
Research Assistance	175,000		
Project Manager	395,000		
Office Running Costs	250,000		
Resident SI	860,000		
Overseas Training	103,000		
33-1/3% x	$2,530,000	= $751,000	
20% on ME costs	$262,000	= 52,000	
Total, 5 years			$843,000

Matching Funds

Total US contribution		$4,162,000
Less: ME	262,000	
Site Office	250,000	
Project Manager	395,000	
Subtotal	$907,000	-907,000
Total US Funds		$3,255,00

If matching funds are 10% of research costs, 10% of $3,255,000 = $325,000 over life of project.

LDC Contribution

Facilities	$100,000	
PIs counterpart	120,000	
Other salaries	120,000	
Total for Project		$340,000