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Interim Report

Collaborative Research Support Program on Small Ruminants

by

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Prepared for

Joint Research Committee
Board for International Food and Agricultural Development
United States Agency for International Development

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Interim Report on the Collaborative Research Support Program on Small Ruminants

This report was prepared for the use of the Joint Research Committee, meeting on March 15, 1978 in Arlington, Virginia. The enclosed tables contain most of the relevant information and are supplemented to a limited degree by the text and information provided by the authors at the meeting. The final report for this project will include an expanded version of this paper.

1. Project Status Report

Table 1 contains the schedule of events for this project. All proposals from eligible universities have been evaluated and used to develop a proposed research program on small ruminants. The time remaining in the project will be used primarily for documentation. The Research Triangle Institute will be able to undertake a limited amount of additional work under this contract if requested by the Joint Research Committee.

Table 1
Schedule for Planning a Small Ruminant CRSP

September 30	Project authorized
October 13	Ad Hoc committee met
October 25	Letter sent to eligible U.S. universities
December 30	Integrated Report sent to U.S. universities
February 14	Proposals received at RTI
February 27, 28, March 1	Evaluation panel reviewed proposals
March 15	Presentation of proposed program to JRC
April 30	Project completed

2. Analysis of Proposals

A total of 60 proposals was received from 23 institutions. Of this number, two were exclusively devoted to administration of the CRSP in small ruminants. The remaining 58 were focused on various substantive disciplines of sheep and goat production/utilization.

Table 2 shows the distribution of proposals received by institution, disciplines, and Title XII support requested.

Table 3 shows the number of proposals categorized by discipline and the ecozone in which the proposed research would be carried out. A number of proposals are listed twice in this table in accordance with the multidisciplinary nature of some of the proposals.

Examining the discipline breakdown, health and breeding received the largest number of proposals, followed by range management. The humid/subhumid tropics is the most frequently selected target ecozone, due in part to the large number of health projects proposed for that area. Surprisingly, none of the proposed health projects in the humid zone focussed on the tsetse fly. More than the other disciplines, breeding projects tend to be worldwide in focus. Range management proposals, as one might expect, cluster in the arid/semi-arid region. The Highlands (principally South American Highlands) do not seem to be the focus of any particular discipline but rather have an even, and uniformly low, frequency of selection.

Table 4 shows the budget requests by discipline. Proposed breeding projects tend to be the most expensive on a per proposal basis, followed by range management and health. The high unit cost coupled with the large number of proposals submitted in these three areas gives these areas the bulk of the budget requests.

3. Evaluation of Proposals

The 60 proposals received by RTI have been evaluated by an 18-person review panel assembled specifically for the purpose of reviewing the proposals. A list of the panel members and areas of specialization is provided in appendix A.

All proposals were evaluated by all panel members and numerically rated on the following criteria:

Table 2. Proposals received classified by institution and discipline.

Institution	Number of Proposals	Disciplines	Total Title XII Budget Requested (Annual)
A	6	Health, Information dissemination, laboratory animals management, cuniculiculture, socio-economic, range management.	$ 790,269.80
B	2	Range management and breeding, milk processing	$ 526,420.00
C	1	Health	$ 495,693.80
D	1	Range management and breeding	$ 830,000.00
E	4	Health (4)	$ 163,794.00
F	13	Health, systems analysis, socio-economic factors, range management (2), crop/livestock systems (2), breeding (2), CRSP administration, feed conversion efficiency, meat processing, fibre/pelt production	$ 909,100.00
G	1	Breeding	$1,330,600.00
H	3	Health (2), systems analysis	$ 638,869.60
I	10	Health, socio-economic factors, systems analysis, breeding, range management, CRSP administration, milk/meat processing (2), program evaluation	$1,180,816.20
J	5	Breeding, crop/livestock system, health, socio-economic factors, goat shelter design	$ 739,680.00

Table 2. Continued

Institution	Number of Proposals	Disciplines	Total Title XII Budget Requested (Annual)
K	1	Breeding	$ 195,800.00
L	1	Breeding	173,700.00
M	1	Crop/livestock systems	181,594.20
N	1	Breeding	1,100,000.00
O	1	Breeding	252,740.00
P	2	Total small ruminant production systems (2)	1,000,000.00
Q	1	Health	1,828,880.00
R	1	Health	73,600.00
S	1	Information dissemination and training	38,400.00
T	1	Breeding	92,000.00
U	1	Mineral supplementation	20,820.00
V	1	Total CRSP	1,877,791.00
W	1	Training	166,206.00

Table 3.

Categorization of Proposals by Discipline and Ecozone.[1/]

Discipline	Arid/ Semiarid	High- lands	Humid/ Subhumid	Worldwide or Not Specified	Totals
Range Management	5	1	1	1	8
Breeding	4	1	3	5	13
Crop/Livestock Systems[2/]	0	1	6	0	7
Health	1	3	10	1	15
Socio/Economic Factors[3/]	1	1	2	1	5
Systems Analysis	2	0	0	1	3
Other[4/]	5	1	5	9	20[1/]
Totals	18	8	27	18	71

[1/] A number of proposals fell into more than one category.

[2/] Includes nonrange feeding/nutrition proposals.

[3/] Includes sociological factors analysis, marketing and economic analysis.

[4/] Includes general management, food processing, information dissemination, nondiscipline specific proposals, and CRSP coordination proposals.

Table 4. Total Title XII funds requested by discipline.

Range Management	-	$1,857,016.00
Breeding	-	3,310,192.76
Crop/Livestock Systems	-	637,983.10
Health	-	3,580,289.67
Socio/Economic Factors	-	793,394.40
Systems Analysis	-	438,007.00
Other	-	4,239,891.67
Total		$14,856,774.60

- Appropriateness and significance of topic to LDC smallholders
- Institutional experience in area; logical extention of domestic programs
- Demonstrated capacity to establish LDC institutional linkages
- Soundness of the technical approach; probability and timeliness of payoff
- Expertise and adequacy of proposed staffing.

Panel members were brought together at RTI for a 3-day working session February 27 - March 1. Each proposal was discussed by the panel in session and given a summary ranking as one of the following:

(1) Outstanding; (2) Good; (3) Marginal; or (4) Inappropriate. The distribution by ranking is as follows:

Outstanding	9 proposals
Good	14 proposals
Marginal	9 proposals
Inappropriate	27 proposals
Total	58[1/]

The 23 Good and Outstanding proposals were submitted from 15 institutions. This group constitutes the starting point for the recommended CRSP. Table 5 presents the 23 proposals by discipline and institution.

A total of 27 proposals were judged inappropriate. The most frequently listed reasons for judging proposals inappropriate include:

(1) Proposed topic is not a problem area for LDCs;
(2) Proposed topic already being sufficiently studied;
(3) Proposal lacks specific focus or objectives;
(4) Proposed methodology is unsound;
(5) Proposed activity is not research, but service.

4. Recommended Program

a. Requirements

The intention of the Joint Research Committee and Title XII legislation was to establish a collaborative research support program on small ruminants with certain characteristics. The RTI interpretation was that the program should be worldwide in terms of locations and expected effects. The program also should have some balance in terms of the aspects of livestock production and products. Both sheep and goats should be parts of the program. All the major relevant disciplines should be included, social sciences as well as life sciences.

[1/] Two CRSP Administrative proposals omitted.

Table 5.

Proposals Rated Good and Outstanding Grouped by Discipline and Submitting Institution

Discipline	Number of Proposals	Institution
Range Management[1/]	4	A,B,D,G
Breeding[2/]	9	D,F(2),G,K,L,M.N.O
Crop/Livestock[3/]	3	F(2),L
Health	4	C,E,H,I
Socioeconomic	2	A,F
Systems	2	F,H
Other	2	I,P

[1/] Two proposals double-counted in range management and breeding.

[2/] Two proposals double-counted in range management and breeding; one proposal double-counted in breeding and crop/livestock.

[3/] One proposal double-counted in breeding and crop/livestock.

American universities with expertise in this field should be included insofar as they expressed an interest, had the capability, and submitted a responsive proposal that met the needs of the developing countries as well as the needs of American agriculture. A willingness to contribute in a significant manner to the support of this program also was required. The review panel did not eliminate any proposals due to lack of significant university inputs, though such difficiencies were noted.

The recommended program includes projects in the area of range management, breeding, integrated crop-livestock systems, animal health, systems analysis, economics, and sociology. Projects are located in Africa, Asia, and Latin America. Ecological zones include arid and semiarid conditions, humid and subhumid conditions, and the highlands. The projects will be concerned with both sheep and goats. Thus, the recommended program will meet the requirements for a worldwide collaborative research support program.

b. The Ideal Program

The RTI project staff, its consultants, and the Proposal Review Panel derived an ideal program based on perceived needs and the capabilities found in the proposing institutions. The proposals that were received did have an influence on the shape of the program, but they did not dictate the program that was recommended. Substantial modifications will have to be made to some proposals in order to fill the gaps between the ideal program and the proposals received. The term "ideal" probably is too strong because the size of the program was constrained by expectations of the available funds. The program is an appropriate one based on the proposals received, but it does not address all the problems that prevent greater benefits from sheep and goat production in the developing world.

Table 6 contains in outline form the components of the ideal program. This program consists of 14 projects in the three major areas of the developing world; 13 American institutions would be involved. The projects are related to one another and probably would require not more than eight foreign locations; most of the work would be done in five or six locations. A very short description of each project is listed below.

Based primarily on proposals received, but not entirely.

Table 6

Ideal Small Ruminant CRSP

	Discipline	Location	Institution	Title XII Scientific Man Years
Range Management (Extensive management)				
1.	First Location	Africa		
	Grazing Management	(Sudan, Mali)	G,D	3
	Range Improvement	Possibly satellite	F	.5
	Supplemental Feed Source	activity in Asia	B	.5
	Socioeconomic Component	(Pakistan)		
2.	Second Location	Latin America (Bolivia, Peru)	Same	4
Breeding				
3.	Component of Range Management	Africa	G,D	2
4.	Component of Range Management	Latin America	G,D	2
5.	Germ Plasm Bank and U.S. Herd	Worldwide (located in U.S.)	K F	2 2
Crop/Livestock (Intensive production systems - small owners)				
6.	Smallholder Production System	Asia and Latin America	J,X	1
	Utilization of Crop Residues	(Caribbean, Central America)	L	1
	Local Breeding	Same	--	1.5
	Yearround Forage and Feed Supply	Same Same	-- --	1
7.	Smallholder Production System	Africa Humid areas	J,X	.5
	Crop Residue	Same	F	.5
	Forage and Feed	Same	F,A	.5
Health				
8.	Herd/Flock Health Project	Latin America (Peru)	I	2

Table 6. Continued

	Discipline	Location	Institution	Title XII Scientific Man Years
9.	Mycoplasmal Diseases	Africa (Mali)	E	1
10.	Herd/Flock Health Project	Asia (Pakistan)	C	4
	Socioeconomic Factors			
11.	Characterization of Socioeconomic Factors	Worldwide	A,I	2.5
12.	Benefit/Cost Analysis	Worldwide	I	.5
	Systems Analysis			
13.	Intensive Systems	Worldwide	F	1.7
14.	Extensive Systems	Worldwide	H	3
	Other			
15.	CRSP Administration	Worldwide	--	2.5

36.5 SMY's

$106,000/SMY

(1) Range Management in Africa. This project would be devoted to increasing the output of animal products from the rangelands of Africa. The project would include several components based on individual proposals. The major portion is a project to improve grazing practices. Supplementary projects would be directed at ways to improve the range itself, which is the resource base, and to provide supplemental feed by perhaps in some instances silage, haying and other methods to reduce the seasonality in the feed supply. It might be possible for the universities involved to establish a satellite activity in Pakistan that would be financed largely through PL-480 funds.

(2) Range Management in Latin America. This project would be similar to the African range project in its objectives and components, but would be located in Latin America, most likely in the highlands. The same institutions that staff the African project would staff this project.

(3) Breeding Component of Range Management, Africa. This project would be carried out in conjunction with the African range management project. The objective would be to improve the local genetic stock through selective breeding and crosses with other breeds. The U.S. universities responsible for this project include two be involved in the grazing management task. Their proposals included both components.

(4) Breeding Component of Range Management, Latin America. This project would be similar to the African breeding project; it also would be done in conjunction with the Latin American range management project.

(5) Germ Plasm Bank and U.S. Herds. The objective of this project is to provide semen from superior breeding stock of the breeds found in developing countries. This semen could then be used to improve the genetic material found in these countries. A corollary activity is the establishment of a U.S. herd of most promising LDC breeds for supplying germ plasm for crossbreeding and for U.S. based research.

(6) Crop/Livestock Production Systems, Asia and Latin America. This project is directed at improving the productivity of smallholders and landless peasants who own just a few goats or sheep in humid and subhumid areas of Asia and Latin America. This type of operation can

fit very well in a system of intensive crop production. This project includes components to improve management practices, utilize crop residues, improve the genetic material, and produce a yearround feed supply. Two institutions submitted proposals for the last component, but they do not fully satisfy the needs of the subarea with its explicit focus on smallholders/landless peasants. The project in Asia should be designed to utilize the very substantial expertise that exists in India.

(7) Smallholder Production System, Africa. This project will be quite similar to those in Asia and Latin America. There will not be a specific breeding component, however. Because of economies of scale, the cost of this project will be significantly less than the project in Asia and Latin America.

(8) Herd/Flock Health Project, Latin America. This project takes a comprehensive approach to the problem of maintaining the health of small ruminants. Emphasis will be on good management practices and the utilization of current knowledge to avoid disease and other health problems before they start. The payoff from this type of management practice is expected to be very high, based on experience in the United States.

(9) Mycoplasmal Diseases. This particular type of disease affects sheep and goats in the United States as well as in the developing countries. The work probably would be done in Mali but the findings would have application worldwide. The planned work builds on current research in the United States, but adds a significant international dimension.

(10) Herd/Flock Health Project, Asia. This project would be very similar to the Herd Health project in Latin America. Conditions are quite different in Asia, however, so an additional project of this type is required. A different institution would undertake this project.

(11) Characterization of Socioeconomic Factors. This project is designed to complement the other major projects of this program. The objectives of the project are to understand the social, political, economic, and institutional framework within which the smallholder operates so that any suggested changes will be acceptable. Personnel from this project will characterize the socioeconomic factors and analyze

the economic conditions in the areas where the range and crop/ livestock projects will operate.

(12) Benefit/Cost Analysis. The purposes of this project are to develop appropriate techniques and to provide data to evaluate the projects underway; it would complement the systems analysis projects (13 and 14, below).

(13) Intensive Systems Analysis. The purpose of this project is to develop mathematical models of goat and sheep production systems under intensive conditions. These models will simulate the effects of feed resources and management inputs and thus be a tool for examining research needs and priorities. The production models will interface with the economics models in Project No. 12 and will incorporate data generated in the other projects.

(14) Extensive Systems Analysis. This project would concentrate on developing models of sheep and goat production under extensive (range) systems of production. The work would be coordinated very closely with the intensive systems analysis. The models would integrate available information on ruminant production and utilization, identify constraints, and evaluate methods to overcome these constraints. The work also would incorporate data from the other projects.

(15) CRSP Administration. The purpose of this component is to administer the total program. The administrative entity that is selected by the consortium would carry out this function and assume responsibility for the total program.

c. The Minimum Program

In the event that sufficient resources are not available to fund the ideal program, RTI and its panel have put together a minimum program. This program represents the minimum number of projects that are necessary to constitute a comprehensive approach to small ruminants in the developing countries. The three major geographic areas are still covered, though each of the major production systems in each area are not addressed. A reduction in the scope of the CRSP below this minimum would result in a group of projects that do not form a coherent program.

Table 7 contains the projects that comprise the minimum program for a small ruminant CRSP. All of these projects are contained in the ideal

Table 7

Minimum Program for a Small Ruminant CRSP

Subject	Location	Institutions	Title XII Scientific Man Years
Range Management (one location)			
Grazing Management	Africa (Sudan, Mali)	G,D	3
Range Improvement	Possibly satellite	F	.5
Supplemental Feed	activity in Asia	B	.5
Breeding			
Component of Range Management Project	Africa (Sudan, Mali)	G,D	2
Germ Plasm Bank and U.S. Herd	Worldwide (U.S.)	K,F	4
Crop/Livestock System			
Smallholder Production	Asia and Latin	J,X	1
Local Breeding	America (Caribbean and Central America)	--	1.5
Crop Residue Utilization		L	1
Yearround Feed Supply		--	1
Health			
Herd/Flock Health Project	Latin America (Peru)	I	2
Mycoplasmal Diseases	Africa (Mali)	E	1
Socioeconomic Factors			
Characterization of These Factors	Worldwide	A,I	2.5
Benefit/Cost Analysis	Worldwide	I	.5
Systems Analysis			
Intensive Systems	Worldwide	F	1.7
Extensive Systems	Worldwide	H	1.3
Administration of CRSP	Worldwide	--	1.5

25.0 SMY's

$95,000/SMY

program though some have been modified. In the minimum program there is only one range management project (in Africa) and the breeding component that goes with it. The U.S. herd/germ plasm bank is still a part of the minimum program. There is only one crop/livestock system project, which is located in Asia with a satellite activity in Latin America. There is one herd/flock health project, which is located in South America. The project to investigate mycoplasmal diseases also is in the minimum program. The project to characterize socioeconomic factors still remains, though at a smaller scale because there are fewer project locations. The benefit/cost analysis and systems analysis projects also remain and are necessary for a comprehensive approach to small ruminants in developing countries. The range systems analysis project is reduced in scale. Administration of the CRSP still is required, but the size of the effort has been reduced. These projects thus constitute a viable coherent program, but the geogrpahical coverage is substantially less than in the ideal program. The minimum program contains 12 institutions, which is one less than the ideal program.

d. Omissions from the Ideal and Minimum Programs

Four institutions submitted proposals that were judged to be either good or outstanding by the evaluation panel, but these proposals were not included in either of the recommended programs for a number of reasons. Most of the proposals not included were in disciplines where a number of stronger proposals were received -- breeding and range management. The proposals that best fit the ideal program were selected. In addition, there were specific problems with some of the highly ranked proposals that kept them from being included in the recommended program. The proposal of institution N was relatively weak in its breeding components. The full panel felt the potential for success was very low. Institution M's proposal was oriented toward holders of large numbers of animals. In addition, the project was very long, very expensive, and probably could be funded from local sources. Institution O's proposal was well designed, but had no foreign component and implementation possibilities were obscure. Institution P's proposal did not include the people on their staff with significant expertise in the proposed

topic area. Furthermore, similar research is already underway at the proposed collaborating university and could be assisted with PL-480 funds.

There were other proposals that were good that were not included in the program, but these institutions also had some projects that were selected.

5. Budget Analyses

Budget requests for the 60 proposals reviewed total $14,856,774 (table 8). This is matched by a proposed $6,279,821 in university contributions which constitutes 30 percent of the total research budgets proposed (Title XII and university contribution).

The proportion of university contribution to total project cost varied by proposal from 0 to 50 percent. In no proposal did the proposed university contribution exceed the Title XII request. From the budget summaries provided, no accurate estimation of the Title XII funds to be passed through the LDC collaborating institutions can be made.

The total budget requested for the Good/Outstanding proposals is $7,261,075 for an average of $322,227 per proposal -- somewhat higher than the average request for all 60 proposals.

The recommended program budgets (ideal and minimum) are presented in table 9. In both programs, approximately one-third of the Title XII budget is proposed to be spent by LDC institutions.

While the proportion of university contributions should be allowed to vary with the nature of the individual project work (since some work requires more capital expenditure than others), the average of 30 percent university contribution proposed in the 60 proposals might be taken as a reasonable starting point.

6. Recommendations

RTI is still formulating its recommendations for the small ruminant CRSP, but tentative recommendations are listed below. These are primarily recommendations made by members of the Proposal Review Panel in the course of the 3-day evaluation session at RTI.

a. Major Recommendation of the Review Panel. It is strongly recommended that a planning grant be awarded to the proposed consortium for small ruminants. This is especially important since we recommend

Table 8. Average annual budgets, based on a five-year period, in all proposals on research on small ruminants in developing countries.

Proposal Number	Avg. Annual Title XII (AID)	Avg. Annual Other (Univ. Cont.)	Proposal Number	Avg. Annual Title XII (AID)	Avg. Annual Other (Univ. Cont.)	Propcsal Number	Avg. Annual Title XII (AID)	Avg. Annual Other (Univ. Cont.)
1	$244,514.00	$ 45,013.00	21	$116,000.00	$ 45,280.00	41	$173,700.00	$136,300.00
2	222,288.60	196,864.80	22	24,332.00	11,477.00	42	88,400.00	88,400.00
3	252,740.00	71,740.00	23	110,443.00	39,630.40	43	830,000.00	242,000.00
4	158,500.00	10,000.00	24	169,040.00	None	44	195,800.00	151,400.00
5	69,100.00	59,000.00	25	54,320.00[2/]	19,449.00[2/]	45	101,624.60	None
6	32,000.00	6,500.00	26	15,600.00	2,942.00	46	78,900.00	None
7	88,000.00	45,000.00	27	1,877,791.00	1,634,960.00	47	307,789.20	None
8	49,800.00	9,600.00	28	143,596.00	22,041.60	48	22,500.00	None
9	28,800.00	5,700.00	29	161,828.00	31,508.80	49	259,400.00	22,000.00
10	98,000.00	71,206.00	30	136,720.00	19,712.00	50	495,693.80	320,085.80
11	59,400.00	43,620.00	31	154,940.00	25,984.00	51	220,056.00	None
12	50,000.00	41,000.00	32	142,596.00	22,041.60	52	25,716.00	4,484.00
13	35,500.00	27,500.00	33	1,100,000.00	150,000.00	53	37,000.00	6,600.00
14	85,000.00	75,000.00	34	1,330,600.00	1,286,800.00	54	78,240.00	17,438.00
15	75,000.00	75,000.00	35	20,820.00	None	55	22,838.00	13,324.00
16	80,000.00	82,250.00	36	166,206.00	50,000.00	56	345,640.00	66,718.40
17	[1/]	[1/]	37	500,000.00	100,000.00	57	180,780.00	39,270.00
18	184,232.00	97,981.40	38	500,000.00	100,000.00	58	181,594.20	128,003.40
19	196,840.00	None	39	73,600.00	20,772.00	59	1,828,880.00	313,340.00
20	310,009.20	128,716.60	40	92,000.00	[3/]	60	172,067.00	55,167.80
						Total	14,856,774.60	6,278,821.60
						Average	251,809.73	106,420.70

[1/] Includes total of all Colorado State University proposals and is not included in project total.

[2/] Four-year budget.

[3/] Facilities, land, barn and in-kind support.

Table 9

Proposed Budgets for Ideal and Minimum Programs

	Title XII Funds ($1000's)							
	Domestic	Foreign	Total	(%)	Domestic	Foreign	Total	(%)
Crop/Small Ruminant	285	165	450	19	385	215	600	15
Health	280	50	330	14	630	70	700	18
Range	150	250	400	17	300	500	800	21
Breeding								
Worldwide	300	100	400	17	300	100	400	10
Range Management	150	50	200	8	300	100	400	10
Systems	100	55	155	6	185	55	240	6
Socioeconomics	175	125	300	13	300	200	500	13
Administrative Entity	150	0	150	6	250	0	250	6
Total	1590 (66%)	795 (33%)	$2385 (100%)		2650 (68%)	1240 (32%)	$3890 (100%)	

that the consortium representative should fill in some gaps not provided for in the original 60 proposals. In the original projects there are a number of overlapping areas of research proposed by the various Universities in the Consortium. These need to be discussed and changes made in the areas to be undertaken by each university. This will require some effort as well as give and take by each university. The ties overseas need to be definitely established by the universities selected for the consortium. Due to some changes in projects undertaken by each university, this requires some re-evaluation and final selection of cooperating institutions overseas. Moreover, it is important that the consortium do some visitation overseas to (1) establish ties with cooperators; (2) become familiar with information available and present activities of FAO, International Centers and other Centers with Small Ruminant research underway; and (3) establish a well coordinated worldwide effort to improve sheep and goat production in the LDCs. This consortium will recommend a management entity, a proposed budget, a detailed outline of responsibility for each cooperating entity and a detailed CRSP program for the entire worldwide effort.

b. Other Recommendations

- The consortium of selected universities should be allowed to select its own administrative entity. RTI believes that the lead university concept is more desirable than establishing a separately incorporated consortium.
- The administrative entity should have oversight responsibility for the technical performance of the individual projects.
- A fulltime program manager is desirable.
- An advisory panel composed of foreign scientists and U.S. scientists not involved in the project should be established to review CRSP progress at least yearly.
- There should be provisions for review of each individual project by the peers of the principal investigator (not the other principal investigators in the program).
- The project staffing should be flexible enough to include non-consortium specialists with expertise not found at the member institutions.

A single principal investigator should be responsible for each project, even though the project may be done in collaboration with other domestic and foreign institutions.

APPENDIX A

Panel Members

Panel A

Name	Affiliation	Specialty
R. Temple	International Livestock Center, Africa	Animal Science
S. Baca	University of Mexico City	Animal Health
H. Stonaker	Consultant	Genetics, Reproduction
H. Glimp	Consultant	Animal Science
K. Preston	Consultant	Animal Health
D. Hedrick	Humboldt State University	Range Management
T. Cunha	Joint Research Committee	Animal Science
I. Long	AID	Research Administration
A. David	RTI	Agricultural Economics
J. McCullough	RTI	Rural Development

Panel B

C. Devendra	Malaysian Agricultural R & D Institute	Animal Nutrition
V. Oyenuga	University of Ibadan	Animal Science
T. Byerly	Consultant	Research Administration
T. Marlowe	Virginia Polytechnic University	Animal Science
R. Evans	USDA, Reno, Nevada	Range Management
W. Moulton	USDA, APHIS	Animal Health
G. Beck	BIFAD	Animal Science
N. Raun	AID	Animal Science
P. Mulligan	RTI	Economics
L. Zivetz	RTI	Human Health, Nutrition