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9. ABSTRACT
The Paraguay Livestock Development Project is an institution building activity whose ultimate goal is to improve livestock production. Paraguay is heavily dependent on livestock exports for foreign exchange earnings, while the livestock industry is of great domestic import to the domestic economy and the nutrition of the people.

This purpose is to be met through three primary types of outputs:

Training. Two major training outputs are sought: (1) Training of personnel to staff PRONIEGA, FAV and the extension service with sufficient numbers of high quality personnel to build a self-sustaining institutional base, and (2) A steady expansion of FAV graduates to meet the demand for professionals in both public and private sectors.

Research. Performance of a series of studies on animal nutrition, management, breeding, sanitation, and pasture improvement to provide valuable information on new practices applicable to local livestock conditions.

Extension. The establishment of a group of qualified livestock extensionists, assisting ranchers through field demonstrations, short courses and advice, publication of research and extension bulletins, and development of a corps of cooperating ranchers participating in research and demonstration activities.

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REPORT

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FINAL REPORT
of an Evaluation of

Livestock Development Project (526-51-110-050.3)

Evaluation Team:

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I - INTRODUCTION

A. The Evaluation Team

A five man team was organized jointly by USAID/Paraguay and AID/W for purposes of (1) evaluating the 1969-73 activities under the Paraguay Livestock Development project, and (2) making recommendations for revision of the project.

The evaluation team included the following members:

1. Boyd T. Whittle, LA/DR/RD, Team Coordinator
2. Michael Galli, TA/AGR, Livestock Development Specialist
3. Joseph R. Crockett, ATAC Consultant, Livestock Research Specialist
4. Fred L. Mann, ATAC Consultant, Agricultural Economist
5. Lee Twentyman, USAID/Paraguay, Agricultural Economist

The team spent approximately three weeks in Paraguay in September reviewing project documents related to project scope and progress, visiting field sites of project activities, and interviewing COP officials and technicians as well as USAID and NMSU staff concerned with this project.

B. The Scope of Work

The scope of work provided the team follows:

"A. Evaluation of 1969-73 activities:

1. Appropriateness of and effect on project goal.
2. Achievement of project purpose and reasonableness, relevance, and adequacy of conditions expected at end of project (EOPS).
3. Adequacy of outputs in achieving projected purpose and goals.
4. Availability and adequacy of statistics and other means of measurement to ascertain achievement of targets at output/purpose and goal levels.
5. Examination of linkage between various levels of project and original "rationale" to ascertain appropriateness of original project design.
6. Basic assumptions underlying project and extent to which these have or have not, proved valid. The team would expect to examine, among others, the following:

- (a) Appropriateness of research projects in terms of needs of livestock producers.
- (b) Transfer of technology resulting from short courses and field demonstrations.
- (c) Appropriateness and use of research and extension bulletins and leaflets.
- (d) Utilization of skills acquired by participant trainees
- (e) Appropriateness of technician - participant - commodity mix.
- (f) Participation and leadership demonstrated by private sector in project activities.

"B. Project Revision

In light of 1969-73 project experience and taking into consideration current AID areas of concentration, revise project with special emphasis on:

1. Current AID directions.
2. Identification of indicators, targets, and appropriate baseline data for revised project, taking into consideration realistic availability of data.
3. Identification of specific methods proposed to treat problems encountered in the 1969-73 implementation of the project.
4. Key assumptions underlying revised project and their examination in light of past experience.

Among points which might specifically be addressed are the following:

- (a) Rationale for and projection of number of job opportunities resulting from estimated increase in livestock production.
- (b) Areas of assistance which could be undertaken by other international organizations.
- (c) Relationship of project with other USAID activities in agricultural sector."

C. Summary Description of Project

The Paraguay Livestock Development Project is an institution building activity whose ultimate goal is to improve livestock production. Paraguay is heavily dependent on livestock exports for foreign exchange earnings,

while the livestock industry is of great domestic import to the domestic economy and the nutrition of the people.

"This project will continue to develop within the Ministry of Agriculture and Livestock (MAG) a National Program of Livestock Research and Extension (PRONIEGA) ... capable of providing the rancher with the research data and modern technology necessary for the development of the livestock industry. The project will also continue to develop within the National University's Faculty of Agronomy and Veterinary Sciences (FAV) an institutional capacity that will provide well trained manpower for the livestock as well as other agricultural sectors." Statement of the Purpose, 1974 PROP.*

This purpose is to be met through three primary types of outputs:

- o Training. Two major training outputs are sought: (1) Training of personnel to staff PRONIEGA, FAV and the extension service with sufficient numbers of high quality personnel to build a self-sustaining institutional base, and (2) A Steady expansion of FAV graduates to meet the demand for professionals in both public and private sectors.
- o Research. Performance of a series of studies on animal nutrition, management, breeding, sanitation, and pasture improvement to provide valuable information on new practices applicable to local livestock conditions.
- o Extension. The establishment of a group of qualified livestock extensionists, assisting ranchers through field demonstrations, short courses and advice, publication of research and extension bulletins, and development of a corps of cooperating ranchers participating in research and demonstration activities.

The principal inputs to the project have been the technical services of a team of New Mexico State University livestock specialists, extensive participant training in the U.S. and third countries, commodities for research and demonstration purposes, and some local costs.

* Language from the 1974 rather than the 1969 PROP is used because it is more descriptive of the project as it has developed.

II - CONCLUSIONS

The evaluation team has attempted to address the specific points of the scope of work, as well as additional points that came to light in the course of the evaluation. The Conclusions and Recommendations sections of the report have generally been organized to follow the format of the PROP to facilitate their use in revision of that document.

FINDINGS

A. General Findings

1. We find the project to be appropriate to Paraguay, as the object of substantial and continuing AID assistance for the following reasons: (a) The livestock sub-sector which this project supports is important to the Paraguayan economy. (b) The potential contribution of project output, in applied research and more effective information dissemination, is needed to improve efficiency of resource use, not only in the livestock sub-sector, but also in complementary aspects of the crops sub-sector. (c) The project has a significant potential impact upon a target group that includes a large proportion of the rural on-farm poor of Paraguay. (d) The project is positively supportive of an equity goal of maintaining an adequate supply of foodstuffs to middle and lower income urban and rural nonfarm consumers.

2. To realize the above potentials, substantial adjustments are required in project emphasis and priority within the present design parameters of (a) the livestock sub-sector, (b) applied research, (c) information dissemination, (d) target group, and (e) institutional development.

3. A necessary condition to satisfactory progress within these parameters is substantially increased budgetary commitment by the COP to the major institutions and activities involved.

In this respect, it is encouraging to note the sizeable mid-year regular budget allocation provided by COP in July, 1974. The COP and the Minister of Agriculture are to be commended for their efforts to provide required budget support during a year when fiscal constraints reached a critical level. For the project to realize its potential contribution to production and equity goals, sufficient priority must be given to budgetary allocations for this project.

4. Continuation of the project is feasible only if a clear agreement is reached between USAID and the COP of its relative priority, with a concomitant commitment to the level of funding required each year during the period to be covered by the revised PROP.

B. Findings of Progress Toward Achievement of Project (PROP) Targets

1. The team considers the original project design and rationale, in terms of inputs provided, outputs expected and project purpose to be generally satisfactory. We do not consider the stated goals nor the establishment of evaluation targets at the goal level to be realistic in relation to the size and nature of the inputs. Given the dominance of intervening variables external to the project, it is difficult to establish a cause and effect relationship between project outputs and the goal indicators.

2. With regard to lowering unit costs of production through efficient utilization of selected inputs, no base line was established at the beginning of the project period by which progress toward this goal can be measured. Further, the goal statement appears to refer to a measurable lowering of average national unit production costs. We consider such a project goal to be unrealistic when the time span, inherent lags between introduction of improved practices and other widespread adoption, and the magnitude of inputs under this project are compared to the magnitudes of the production efficiency problems of the Paraguayan livestock sub-sector. Any positive results from this project would probably not overcome the margins of error in aggregate statistics in Paraguay.

We conclude that any impact estimate related to this goal would be all but meaningless; accordingly, we have not attempted to make such an estimate.

3. With regard to the goal of increased beef animal production, the team again concludes that such an aggregate measurement, with the relatively minor input of this project, viewed against the entire livestock sub-sector and the independent variables involved, is unrealistic.

4. We further conclude that the more specific goal targets established in the PROP (reduce marketing age from 5 to 3 years; increase calving rate from 40 to 80%, and increase annual beef production from 140,000 M.T. to 160,000 M.T. -- all by 1976) are unrealistic aggregate level indicators of the success of this project, and inappropriate for application to a project of this nature and scope.

5. The lack of base line data for on-ranch production, costs, and incomes, and lack of provision for generating such data in an adequately stratified form (together with periodic progress data), combined with the inappropriateness of project goal targets, makes it impossible to measure project progress in those terms at this time. At the best, intermediate outputs (i.e., number of staff trained, number of buildings built, etc.) can be measured. However, the team feels that these are not sufficient for determining the degree to which the project purpose has been achieved.

6. The 1969 PROP specified six institutions to be essential to the development of a self-sustaining institutional capacity in the Ministry of Agriculture (MAG) and the Faculty of Agronomy and Veterinary Medicine (FAV):

- o National Livestock Center at San Lorenzo
- o Livestock Experimental and Demonstration facility at Barrerito Ranch
- o Livestock Experimental and Demonstration Station in the Chaco
- o Agricultural Economics Research Center at FAV
- o Animal Nutrition Laboratory at FAV
- o Animal Husbandry major in FAV

These six institutions are in existence and substantial physical facilities have been constructed. We do not find that these institutions have yet developed sufficiently to meet the continuing research and extension requirements of Paraguayan producers. The expectation of such development within the initial project period was unrealistic.

7. The team considers that the project plan of action has been satisfactorily accomplished to date, in terms of both quantity and quality of USAID inputs (funding, and technical assistance through NMSU). However, in our recommendations, we suggest significant shifts in emphasis in the future course of action. These will require adjustments in input makeup.

8. GOP inputs of PL-480 funds and certain in-kind contributions of FAV and MAG, have been satisfactory. The GOP increased the FAV FY-73 budget from \$33,725,300 to \$36,463,200 for FY-74. However, we feel that GOP regular budget allocations through MAG have not been adequate. From what we can

ascertain, little or no new regular budget allocations were made to the program by MAG through mid-1974. However, as stated earlier, the substantial mid-year regular budget allocations in 1974 seem to signal a renewed commitment by the GOP to the purposes of this project.

9. It appears that the GOP has not formulated and adopted a precise and coherent livestock production and marketing policy. This is stated as a major requirement for self-help action in the PROP. Apparently, the assistance provided under USAID's Institutional Development Project (as called for in the PROP) failed to satisfy this requirement.

10. Ranchers and their rural associations have not become adequately involved in the activities of the program. Aside from establishing demonstration activities (largely financed by the project) on some 25 large ranches and 4 or 5 medium-sized dairy farms, little rancher cooperation has been achieved. Some recent progress has been made in working through local branches of the Rural Association to encourage member participation in some extension meetings and demonstration visits. However, this has been limited and is ad hoc rather than the result of an organized effort supported and promoted by Rural Association headquarters. We do not consider the contribution of a few head of cattle to the Chaco Experiment Station by some large ranchers to be an indication of substantial progress in securing private sector participation.

11. Although some improvement in coordination can be noted in the period under review, the degree to which the MAG and FAV work together to realize project objectives remains limited and somewhat erratic. The basic problem appears to be a lack of regular budget allocations, or rather continuing sources of funding, to permit financing research contracts between MAG and FAV.

12. Almost exclusive reliance on PL-480 and external funds for growing GOP salary and logistic support costs under the project has resulted in delay and perhaps critical endangerment of the establishment of livestock research and extension as a stable institutionalized activity. Hopefully, the mid-1974 allocations of regular GOP budget supplements signal a new trend.

C. Project Accomplishments in Selected Areas

1. Research

On-going research projects are generally well-conceived in terms of their project purpose, and many treat priority areas of improved nutrition and pasture management. However, research projects appear to have been developed on a somewhat ad hoc basis. Proposed projects are approved or rejected by PRONTECA and NMSU without the benefit of an overall written program of work that specifies policies, priorities, and research strategies for accelerating development of the livestock sector. We were unable to find a comprehensive COP or other research plan or program statement for the project.

There is no evidence of a clearly defined target group which the research is designed to assist. Such a target group must be defined by income level, range of size of operating unit (hectares and/or number of animal units), by geographic location, and other characteristics. A rational development policy requires that the target group also be defined on the basis of growth potential, and that income distribution aspects, and social rate of return from development investments be considered in their selection.

There has been limited utilization of international network research activities and backstopping resources. It appears that CIAT, because of budget and personnel limitations, is in no position to provide much research assistance to Paraguay.*

Although the PROP specifically mentions generation of policy information, we could find no evidence that this very important research area is

* A recent visit to Paraguay by two senior members of the CIAT livestock research staff, N.S. Raun and J.H. Maner, was reported. Problem areas needing research were discussed with MAG personnel and the desire of CIAT to participate in outreach programs was mentioned, yet the lack of CIAT budget and resource personnel was given as a major problem confronted by CIAT in actually accomplishing such a program. No plans for MAG funding research activities which might be performed in cooperation with CIAT were discussed.

being dealt with or even contemplated by PRONIEGA or FAV. Such research is needed to provide the orientation required for confident GOP decisions related to research priorities and target groups, and to establish the priorities among multiple objectives with regard to such target groups.

On-going research projects generally have not provided adequately for economic analysis of data generated. The project also lacks research activities related to economics of ranch management and profitability of adopting alternative technologies. The technician-participant-commodity mix appears to have been generally satisfactory, except that little progress has been made in research and extension of production economics, economics of ranch management, and livestock policy research, due in part to absence of properly oriented project strategy and technical assistance in these areas, as well as limited numbers of participant trainees.

2. Extension

A significant number of field days and training courses have been held, and demonstration plots established. However, orientation of extension strategy should be improved, to increase the multiplier effect of disseminating research output, and to reach the small and medium rancher and mixed farmer.

Several research and extension bulletins have been prepared and distributed by PRONIEGA. However, since research output only now is beginning to be generated from research projects initiated under this project, most of these bulletins are generalized in coverage and based on observations and experience rather than research output. While many of these bulletins provide useful general knowledge of the subject matter, more research data must be generated and analyzed that is applicable to specific environmental conditions and of practical use to producers.

3. Education

Curriculum changes designed to improve the quality of training at FAV have been partially introduced. If adequate numbers of FAV staff can be trained to the MS level and returned to FAV full or half-time by the fourth year of curriculum changeover (1975), this aspect of the project should prove highly successful.

The significant increase in full and half-time faculty at FAV (from 28 in 1969 to 41 in 1974) is highly beneficial in implementing the curriculum change, upgrading the quality of teaching and building a capability to contribute to research and extension needs of the livestock sub-sector. The numbers of such faculty should continue to be increased. However, FAV will not achieve full staff strength or efficiency until institutional and budget arrangements are made to provide for specific contract or regular budget funding of FAV research and extension training activities. This funding should include payment of research and extension salaries to professors (in addition to teaching salaries) and provide operating costs as specified in the recommendations section.

4. Participant Training

A significant number of participants from both the Ministry and FAV have been sent abroad for training in a wide range of specialities related to livestock development. Although considerably more participant training is necessary to achieve viable levels of staff capability, progress to date has been good, especially in FAV. Some changes in subject matter emphasis are desirable.

Participant trainees have returned primarily to PRONIEGA and the FAV as programmed. These institutions have the potential for utilizing the skills of participants. However, budget difficulties have impeded their most efficient utilization, due to lack of logistic support and instability of salary payment.

5. Other Institutional Aspects

The overall GOP organizational and institutional structure within which the project operates suffers from many of the weaknesses of administration, coordination, programming and planning common to most developing government institutions. Since PRONIEGA is a unit of the Integrated Agricultural Development Project (PIDAP), it is conceptually integrated by the GOP into a functional system for servicing the sector. However, some confusion and duplication of function appears to exist in extension, and in some pilot testing aspects of applied research. Although a Livestock Advisory

Council was established, with representation from the various institutions concerned with the livestock sub-sector, it has not functioned as intended.

The project has been almost exclusively oriented toward beef cattle production, with some dairy extension. There will be a need to expand into other areas of animal production research, such as swine, sheep, and poultry as multiple goals of the project are defined and a primary target group identified.

The project scope and implicit objectives appear to be consistent with and complementary to other USAID assisted projects in the agricultural sector and to agricultural programs of other donors. Although some improvement in communication among the various program participants might be achieved, the degree to which time and effort should be allocated to stimulating such coordination must be left to the criteria of USAID management.

III - RECOMMENDATIONS

These recommendations are based on conclusions drawn from our findings. We have attempted to organize them in a format consistent with that of the PROP, and where relevant, relate them to the revised PROP of 4/22/74.

A. General Recommendations

1. The basic activities of the project should be continued but with significant adjustments in orientation, goals, achievement measurement, purpose and course of action, as detailed in the specific recommendations.
2. In order for AID to expect specific GOP commitments, this project must be realistic in terms of the inputs to be provided and the achievements to be realized. Further, the project life span must reflect the time required for a project dealing with animal biological cycles to move in successive stages from (1) initiation of applied research, to (2) achievement of acceptable minimum research results and experience to permit valid extension recommendations, through (3) execution of the minimum extension activity needed to transmit the information to the producer, for (4) adoption of the recommended practice by enough producers for a sufficient period of time to permit measurable change in the production and income impacts of the practice(s). Once an institutionalized research base has become an established function of the public sector, these steps appear to occur simultaneously because of the many new practices in the established system. However, for any given practices, there is still a lag from the time research generates useful information until the producers realize economic and production gains from their adoption.

This project has had to cope with an in-country research base which was extremely limited in 1969. To be sure, the most urgently required research is of an adaptive nature and the time lag can be condensed. Further, considerable empirical information had been obtained from the operation of the Barreritos Demonstration Ranch since 1943. Some research had also been conducted by the National Agricultural Institute (IAN) on forages but the volume of documented research was small and the institutional capacity for producing more was limited.

The team estimates that a time lag from 1969 to stage (4), above, will require a minimum of 8 to 10 years, and that development of the institutional strength needed to adequately fulfill a research or teaching function cannot be expected in less time. Therefore, we recommend that the planning horizon for this project be extended to 1979. It must also be recognized that achievement can be measured only incrementally in the intervening period; and that the institutional development cannot be measured in terms of national livestock production aggregates until some considerable time after 1979.

B. Recommendations Related to Project Goal and Purpose

1. The project must be recognized as affecting multiple national goals or subgoals, with potentially high impact on some but only a slight contributory effect on others. For example, a goal of increased foreign exchange earnings as specified in the PROP proposal of 4/22/74 is neither realistic nor meaningful in terms of measuring project accomplishments because of the remote cause-effect relationship, and the high incidence of intervening and overriding variables external to the project.

To carry this example one more step, the foreign exchange goal does not discriminate by target group nor by positive impact on additional multiple goals. In other words, one might expect to achieve such a goal by working exclusively with large ranchers, thereby probably impacting negatively on goals of improved income distribution and positive social rates of return. Such a result would be inconsistent with AID assistance policy and GOP development policy.

A more directly causal relationship is needed if measurement of achievement against such a goal is to be feasible. Further, because of the time lag involved, even under optimum conditions, in realizing intermediate input impact on the project universe (i.e., the livestock production subsector or the target group), accurate direct measurement of goal achievement cannot be attained at the national aggregate level either during or at the end of the project period.

As a practical matter, only two types of measurements realistically can be made during the life of the project:

- a. Key economic and production variables, e.g., income, calving percentage, on those producer units that adopt one or more of the recommended practices resulting from research and extension activities.
- b. Estimated aggregate impact of such recommended practices (on the target group, and/or national aggregate production), projected from rate of adoption of these practices during the period being evaluated.

The primary goal to which the project is to make a major contribution must be formulated in a way that assures consideration of impacts on other multiple goals, and, at the same time, reflects a causal relationship to project purpose.

There are two generally recognized strategies available for achieving development:

- a. Expand the primary resource base. In the case of the livestock sub-sector in Paraguay, this means mainly expanding the grazing area and the breeding herd.
- b. Improve the efficiency of use of existing primary resource base. For the Paraguay livestock sub-sector, this means improving the carrying capacity of the existing grazing area, improved management of the existing breeding herd, as well as improvement of quality of existing breeding herd. It may involve actual reduction in total grazing area, depending upon the rate at which the demand situation can absorb expanded production. In any event, this strategy will result in more efficient production, i.e., fewer total resources used per unit produced, whether or not aggregate production increases. As a result, those who produce and those who consume the production will be better off (assuming that efficiency savings are passed along).

This project is designed to make a significant contribution to development through improving efficiency, even though both options are available in Paraguay, and, undoubtedly, both will occur.

Based on the rationale of the foregoing discussion, we recommend that the overall goal specified for this project be stated in resource use efficiency terms:

To improve resource use efficiency on livestock production units of the primary target group.

Stated in this way, it is practical to link into measurable subgoals that are not neutralized by unrealistic assumptions.

In order to specify measurable subgoals, we can now ask ourselves what, in efficiency terms, do we really expect to achieve with the application to the primary target group of output from the project:

a. Improve target group producer incomes. This is a basic measure of goal achievement. It recognizes that if a producer cannot make more money (or achieve an equivalent positive impact such as stabilize income, or reduce his labor and/or capital input), he will not adopt (at least for long) an "improved" practice.

b. Increase target group producer production by reducing unit production costs. In some cases, the producer may not increase his production, and may in fact decrease it, if such a move nevertheless increases his income. In general, however, the project subgoal would be oriented to increasing the production on units affected.

c. Increase equity capitalization on target group production units. A useful measure of viability is whether or not a producer is able to increase his equity participation in the productive enterprise. Such a trend also is indicative of a stable and expanding industry.

d. Increase employment on the target group production units. Improved practices to be researched and recommended are expected to take into account the high unemployment and underemployment conditions in many areas. Improved practices complementary to intensive labor use will result in reduced underemployment of the target group families and also can be expected to generate some employment for part-time farmers and rural laborers on medium-sized units.*

* A multiplier effect on employment can also be expected in supporting industries (inputs, processing, etc.)

It should be pointed out that this project is not inconsistent with (and in fact may be highly complementary to) national goals of increasing foreign exchange earnings and increased aggregate production of livestock products. However, the causal relationship of the project to these aggregate goals is so remote as to make attempts at measurement impractical, both because of intervening independent variables and because of lack of reliability in aggregate statistics.

Specific contributory goals should include: (1) intensification, through livestock (swine, poultry, dairy, etc.) enterprises, for small farmer areas with little possibility of expansion in farm size, and (2) stimulation of the feed-grains sector by increasing effective demand for grain and concentrates in intensified livestock production on small and medium farms and ranches.

2. The project purpose should remain basically the same as that specified in the 1974 PROP. The producer to whom the extension effort is directed - the target group - should be more specifically defined. That primary target group must include not only livestock producers, but mixed farming producers, as well. Further, as the course of action recommendations clarify, the FAV will develop an institutional capacity, not only for student academic training, but also for adult education directed primarily at extension agents of banks, producer organizations and the National Agriculture and Livestock Extension Service (SEAC), who are working with members of the target group.

Some target group orientation also can be applied to the PRONIEGA research program, but there is much less target group sensitivity in applied research, as compared to extension. Specific recommendations to this effect will be made below.

We recommend the following project purpose: "(1) To further develop within the Ministry of Agriculture and Livestock (MAC) a national program of Livestock Research (PRONIEGA) and Extension (SEAC) Specialists. The PRONIEGA program will generate practical research information and specialist

backstopping capability for use by institutions (especially SEAG) performing extension activities directed at the target group. (2) To continue to develop within the National University's Faculty of Agronomy and Veterinary Sciences (FAV) an institutional capacity that will provide qualified professionals for the livestock, as well as other agricultural sub-sectors, and in collaboration with SEAG (with PRONIEGA backstopping), provide adult education for upgrading the capabilities and technical knowledge of SEAG and other extension personnel working with the target group.

3. A sample survey of livestock producers should be carried out with multiple objectives:

- a. To define a target group for focusing the project. This target group cannot be described reliably by herds or farm size. Intensity of operation and income per animal unit or per land unit varies considerably depending on the type of livestock involved (i.e., beef, dairy, swine, etc.). These efficiency indicators also vary considerably from one region of Paraguay to another because of the variability in climatic conditions and soil types, infrastructure and intensity of capitalization, population density, and resource-to-man ratios. Thus, the target group must be defined primarily on the basis of family income level, capitalization, or some combination thereof.

Once defined in these terms and sub-divided by more or less homogeneous regions, it may be possible to make regional identification on the basis of cattle numbers, land areas, etc.

Definition of the exact parameters of the target group is at best tentative until the data becomes available from the sample survey of livestock producers. Furthermore, it should be kept in mind that precise exclusive definition of the target group, i.e., with precise lower and upper quantified cutoffs, is not required in the case of the project whose product is information and not credit or some other physical product.

Thus, for this project we have attempted to define a primary target group. Nevertheless, the information generated by the project, and the system for getting that information into the hands of producers, will benefit not only the primary target group but also those on both sides.

The definition of a primary target group does not exclude any livestock producer but does identify a group that is to be concentrated on by the project institutions. Project resources will aim at the target group, and any spin-off that accrues to the benefit of others is windfall.

As a preliminary definition, the following target group may be useful:

1. In the case of mixed farming areas, where the livestock enterprise(s) constitutes a significant, but not a major portion, of a viable production unit, the net income potential for the livestock enterprise(s) must be at least \$500 annually.
2. In the case of livestock farming areas, where livestock is the major activity of the production unit, the net income potential for the total production unit must be at least \$1000 annually but not more than \$20,000 annually.

As soon as possible after sample survey data are available, these parameters should be redefined, not only in terms of potential net income but also in terms of potential animal units of off-take per year, based on production budgets constructed for beef, swine, dairy (and, where appropriate, poultry, sheep and goats), by reasonably homogeneous region. Such production budgets should be based on improved practices known to be profitable for the particular region.

- b. To provide basic economic production, costs, income, and management data on Paraguayan livestock producers, stratified by location, size, etc., as a data base for PRONIEGA and FAV production economics and ranch management economics analysis projects. The sample survey serves to generate research data for the agricultural economist, just as a forage trials research project generates data for the forage and nutrition specialist.

- c. To provide analytical information for the sector assessment,
- d. To provide a base line for measuring achievement in evaluating project results. The sample survey will generate information on birth rate, weaning and marketing ages and weights, amount of improved and cultivated pasture and other variables related to the production efficiency and level of technology on production units for major classes of livestock. Cost and income data also will be obtained. All of these variables can be stratified to permit a comparison among producers of different characteristics and to allow a longitudinal comparison by surveying a statistically equivalent group in the future. In such a comparison, one can measure the changes in key economic and production variables in function of adoption of recommended practices and "packages of practices".

One can also determine a level of adoption of new practices and, with a second restudy, a rate of adoption. If it is desirable to know the potential effect on national level indicators of these changes, the data can be projected to that level.

We recommend that progress be measured, from the baseline, in a restudy three years later (1978) and again at the end of five years (1980). The following are some examples of the types of objectively verifiable indicators which the survey can generate. Note: The figures underscored and in parenthesis (10%) are for guidance only. The target figure should be developed in discussions with project operators after the baseline figures have been generated.

- (1) Number of target group producers reached with an extension program of recommended practices be increased by (50%) annually for the life of the project.
- (2) The proportion of producers adopting a recommended practice or package of practices, as compared to no recommended practices be increased respectively by (30%) annually during the life of project.
- (3) A variety of economic and production indicators can be devised to measure the achievement of individual farmers and which can then be correlated with specific practices adopted:

- a. Average increase in adjusted gross income of (10%) annually.
- b. Average increase in producer net worth of (15%) annually.
- c. Average increase in off-take of animal product (including home consumption) per producing female of (10%) annually.

Other specific targets can be elaborated for certain livestock species. For example, in beef production, targets can be cast in terms of annual percentage increase in calving, percentage decrease in slaughter age, increase in female productive life, etc. With the sample survey data in hand, the appropriate project specialists can fix a set of targets for each livestock species.

A reasonable estimate for the cost of the survey would be \$100,000 for the original baseline survey of 750 farmers plus two resurveys, including accompanying processing and analysis costs. The team considers the benefits to be derived to be well worth that price. If the information is properly utilized, it can do much to improve program design and management and COP livestock policy development. It is recommended that the institutionalization of surveys of this type be sought as an end-of-project status condition.

C. Recommendations Related to Course of Action

1. PRONIEGA Institutional Functions

a. PRONIEGA, as a part of the PIDAP structure, should have primary ministerial responsibility for livestock production-related research. This means all animal production, as well as related production economics, economics of farm management and livestock development policy analysis.*

This is not to say that PRONIEGA must execute all such research itself. In fact, a close collaborative relationship with the FAV is an important means of maximizing use of available research capability. This is especially true of agricultural economics research, since the FAV has established an

* We were told by the Director of Coordinación Técnica that the MAG looks to PRONIEGA for livestock development policy related analysis, and that the planning office, based on such analysis and other information, is responsible for policy recommendations.

Agricultural Economics Research Center and two MS level professors, whereas PRONIEGA does not have an agricultural economist on its staff.

The Minister indicated a willingness to finance contract research with the FAV.

The FAV and PRONIEGA jointly should review FAV staff capability and availability, draw up a MAG/FAV initial (3-5 year) research program, by specific project, with human and physical resource requirements, budget inputs by the FAV and the MAG. Each institution should submit budget requests for financing their respective shares of this program in the next budget submission.

b. PRONIEGA should also negotiate with other institutions interested in livestock research in order to promote collaboration and financing of research. PRONIEGA should actively seek to enter into collaborative agreements with institutions such as The World Bank Project (Fondo Ganadero), cooperative organizations, Banco Nacional de Fomento (BNF), etc., for joint financing of mutually desirable research activities. PRONIEGA should have a specific budget item allocation for financial participation in such agreements.

c. PRONIEGA's extension function should be limited to backstopping of subject matter specialists and participation as specialist lecturers in short-courses and seminars for extension personnel working with the target group (i.e. extension personnel and technicians of SEAG, Fondo Ganadero, BNF, banks, cooperatives, private sector input supply and output purchasing firms, etc.). Additionally PRONIEGA should cooperate with SEAG and/or other institutions in holding periodic field days at the research stations.

PRONIEGA should be responsible for preparing interim and final technical bulletins on research as soon as research results become available. SEAG and the FAV should be responsible for converting this technical information into proper forms for extension communication.

d. In order to achieve better coordination and efficiency of the MAG resources and personnel engaged in livestock research and closely related adaptive experimentation, testing, and trial under ranch conditions, PRONIEGA and Desarrollo Ganadero should be combined into a single administrative unit with one director and a combined budget, as a subdivision of the Dirección de Investigación y Extensión Agropecuaria y Forestal.

A review of the long range goals and purposes of the Barreritos Ranch and the Artificial Insemination Center should be undertaken to determine how these may relate to the MAG research and testing function, as opposed to their function as a commercial ranching and semen sales operation, or a public service input supply activity. The review should consider these alternatives in light of the anticipated development of private sector capability in the area of breeding stock and semen supply. For example, some 25 private commercial breeding ranches are to be financed with credit from the recently signed Fourth Livestock Credit Project loan from the World Bank to Fondo Ganadero.

e. The research obligations of the Director of PRONIEGA should be assumed by another range management specialist, freeing the Director to concentrate on planning, budgeting and management functions. Because of the importance of range management research, another participant should be sent for MS training in this area as soon as possible, and a short-term NMSU specialist should be programmed for 3 months/year for providing backstopping in range management research.

2. PRONIEGA Research

a. Within one year PRONIEGA should develop a long term (10 year) plan of research which shows priorities and policies, institutional development strategy based on those priorities, and staffing and training requirements by year with a timetable of research project initiation by research subject matter (animal type and special field), and an estimated output by years of research recommendations. This plan should also include the preparation of packages of practices for use by extension personnel in assisting producers to establish efficient production and management systems.

This will require identification of interrelationships among the various research areas. Long-term development plans for the two research stations should be a part of this plan. The plan should include specific and realistic budget projections.

To assist in accomplishing this recommendation, a senior research planning advisor should be programmed for three months in 1975, with an additional month of these services planned for subsequent years.

b. Funds for technical publications should be budgeted for PRONIEGA. This should be a specific budget commitment by the MAG in the Pro-Ag. If useful and reliable results have been obtained from the six research projects already terminated, these results should be published as quickly as possible as technical bulletins.

c. PRONIEGA should enter into a joint research agreement through FAV with the Agricultural Economics Research Center. The agreement would be based on a joint research proposal elaborated as recommended above. The regular budget of the MAG should provide for financing such a contract, including payment for overhead, research stipends (sobre-sueldos) for faculty (on a percent of time dedicated basis), student research assistants, contracted computer time where necessary, and other logistic support costs. This should be a specific budget commitment by the MAG in the Pro-Ag.

USAID should provide a senior long-term position in livestock production economics and economics of ranch management (one position) to assist in development and supervision of execution of the agricultural economics research program. The selection of this person is critical. He must speak Spanish and have a proven track record in practical applications of production economics and farm management analysis to small and medium production unit situations. He should have experience in organizing and supervising ranch management, ranch and mixed farming records programs, and, above all, he must have a technical assistance philosophy of operating through advice to host country research counterparts in the execution of the research program.

In addition, short-term technical assistance will be required in livestock policy analysis, as specified elsewhere in these recommendations.

d. In order to provide for economic analysis of experimental data generated from the subject matter research projects, PRONIEGA should have one MS agricultural economist on its staff. This specialist also would collaborate with the FAV in developing and backstopping PRONIEGA contracted agricultural economics research with the Agricultural Economics Research Center of FAV. This participant should be identified and sent for training as soon as possible. In the meantime, PRONIEGA should attempt to temporarily staff an agricultural economics position, at least half-time.

e. PRONIEGA needs to strengthen its research in pasture management. As specified in another recommendation, a full-time PRONIEGA pasture management specialist should be assigned the research projects now under the PRONIEGA director, thereby relieving the director for full-time planning, budgeting, and administration. A short-term NMSU range management specialist should be programmed for 3 months per year to advise and assist the PRONIEGA specialist.

f. In order to provide for minimum institutional capability to conduct research relevant to the two major climatic divisions of Paraguay, represented by the Barrerito and Chaco research stations, and the time and distance involved between San Lorenzo and these two stations, the assignment of additional permanent professional staff at the two stations is essential. Quality research and satisfactory feed-back cannot otherwise be expected from these stations. One range management specialist and one animal nutrition specialist should be resident at each station, increasing resident professional staff at Barrerito from none to two, and in the Chaco from one to two.

3. SEAG Extension (PRONIEGA Role)

As soon as practical, all activities related to the 25 or so cooperating ranchers should be turned over to SEAG and/or the Fondo Ganadero technical assistance office (or perhaps to the Rural Association). PRONIEGA

should limit its extension to a personnel training role as recommended under C.1. PRONIEGA institutional functions, above. SEAG would fulfill the live-stock extension responsibility both at the specialist and producer levels.

4. FAV Institutional Functions

FAV has a primary responsibility to provide quality academic training for Ingenieros Agrónomos and Veterinarians. However, it has a major role to play, as well, in both research and extension education. Both the Dean of FAV and the Minister of Agriculture agree on this, and the Minister, in an interview, indicated willingness to provide Ministry budget support to finance FAV execution of these functions.

5. FAV Teaching

With the new curriculum in its second year of adoption, it is imperative to project trained faculty requirements through the fifth year of change-over.

MS level training for professors in all specialized areas becomes crucial in the fifth year. For example, in the specialization area of agricultural economics, given certain levels of agricultural economics research specified in another recommendation, the full time teaching staff must be increased from the present three (1 full and 2 half-time) to six full-time in order to be able to carry the teaching load in 1977. The D. will still need to use hourly professors to teach several of the under-class courses in economics. Additionally, this department has teaching responsibility in rural sociology and extension. Thus, at least one staff member should be trained to the MS level in these fields (extension major -- sociology minor).

M.S. (and PH.D.) trained staff requirements should be projected as soon as possible, considering research and extension responsibilities (e.g., not more than two courses per full-time professors). MS training should be required for all advanced courses, and the participant training program reformulated on this basis.

Participants should be selected from among the more outstanding summer scholarship students, and an agreement reached with the Consejo Superior to budget them upon their return to campus. These recommendations should become commitments of the FAV in the Pro-Ag.

6. FAV Research and Extension

a. It is time for the FAV and the MAG to commit themselves financially and in program plans to the concept of a major role of the Faculty in research and extension. Another recommendation details the arrangements that should be made jointly by the FAV and PRONIEGA (MAG) for a planned research program.

As indicated in another recommendation, the Dean of FAV and the Minister agree on the extension training function of FAV. A joint plan should be agreed upon between SEAG and the FAV for MAG contract financing of an in-service short course and seminar training program to be organized and executed by FAV, with PRONIEGA backstopping assistance in staffing the courses.

A similar contract should be sought with the Fondo Ganadero, Rural Association, and perhaps others. The MAG should budget funds to finance extension personnel, travel, living expenses (and registration fees) for such short courses, and SEAG should encourage personnel to attend through consideration of such training in personnel evaluation for pay raises and promotions.

b. Technical assistance should be provided to SEAG and FAV by one NMSU long-term Livestock Extension Advisor. This specialist should be housed with SEAG and work with an assigned SEAG counterpart. The SEAG livestock extension specialist, with advice and assistance from his advisor, would work with an FAV counterpart (appointed by the FAV as the extension training coordinator), in planning and organizing short courses in livestock production and ranch management for extension agents. Additionally, the SEAG livestock extension specialist, with assistance from the NMSU advisor, would provide only limited backstopping to the SEAG extension methods specialist in assisting extension field offices to organize and carry out various extension activities with livestock producers in groups (e.g. field days, demonstration visits, training meetings). Emphasis would be on working with groups, either informal or formal

(i.e. cooperatives, rancher organizations, etc.)

SEAG should develop a long-term plan and strategy for improving the capability of extension personnel, and the ability of field offices to cope with extension needs within their geographic area. SEAG should consider a general strategy of concentrating sufficient capability and resources in selected areas where an impact might be achieved, instead of attempting to generally blanket much of the country with skeleton staff. In important livestock regions, area livestock specialists should be assigned as soon as manpower and budget programming allow. Advice and assistance in developing this long-term plan and strategy will be the initial major activity of the livestock extension advisor.

7. Other Recommendations

a. The use of U.S. graduate students as research associates should be phased out unless clearly justified on a case by case basis, e.g., on grounds that the proposed research is an essential component of a high priority area of the research program, and that such component is temporarily not covered by a Paraguayan professional because he is out of the country for M.S. or Ph.D. training.

b. Participants should be sent to other universities in addition to NMSU in order to avoid in-breeding. There are Spanish language training alternatives to the NMSU program that can be utilized to overcome the language problem, e.g. University of Florida, and for Agricultural Economics, the Economics Institute Program at Boulder, Colorado.

c. Expand arrangements for FAV students to work with FAV and PRONIECA researchers, not only in summer, but as part-time research assistants during the school year.

8. Recommended NMSU Staffing Pattern

- Long Term -

	FY				
	74	75	76	77	78
a. Chief of Party	x	x	x	x	x
b. Animal Production Specialist	x	x			
c. Animal Nutrition Specialist	x	x			
d. Animal Nutrition/Production Specialist			x	x	
e. Livestock Extension Specialist	x	x	x	x	
f. Livestock Economist (Production and Farm Management)		x	x	x	x
g. Graduate Students	(only as individually justified as per Recommendation 7.a.)				

- Short Term -

a. Pasture Management	2mm	2mm	2mm
b. Swine Extension Specialist	2mm	2mm	2mm
c. Dairy Extension Specialist	2mm	2mm	2mm
d. Agriculture Economist (Economic Policy & Analysis)	3mm	1mm	1mm
e. Research Planning Advisor (Research Administration)	3mm	1mm	1mm

9. PRESENT AND RECOMMENDED GO-P PROJECT PERSONNEL, AREAS OF SPECIALIZATION, LEVEL OF TRAINING, AND PROJECTED PARTICIPANT TRAINING SCHEDULE

a. PRONIEGA

Unit	Specialization	Present Degree(s)	Projected Participant Training Schedule		
			ETD CY	ETA CY	Degree
(1) <u>Office of Project Direction</u>					
Director	Range Management	Ing.Agr./M.S.	75	78	Ph.D.
(2) <u>Cattle Nutrition and Management</u>					
Head ¹	Animal Nutrition	Ing.Agr./M.S.			
Technician	Animal Production	Ing.Agr.	72	74	M.S.
Technician	Animal Production	Ing.Agr.			
Projected	Animal Nutrition		76	78	M.S.
(3) <u>Pasture, Forage Crops Production and Management</u>					
Head ²	Range Management	Ing.Agr./M.S.			
Technician	Cultivated Pastures	Ing.Agr.	72	74	M.S.
Projected	Range Management		76	78	M.S.
(4) <u>Livestock Breeding and Sanitation</u>					
Head	Animal Genetics	D.V.M./M.S.	76	79	Ph.D.
Technician	Reproductive Pathology	D.V.M.	74	76	M.S.
Technician	Laboratory	D.V.M.			
Projected	Animal Genetics		77	79	M.S.
(5) <u>Livestock Economics</u>					
Head ³	General Agri. Economics	Ing.Agr./M.S.			
Projected	Livestock Produc. "		75	77	M.S.
Projected	Statistics		76	78	M.S.

¹ Leave of absence

² Also Director of PRONIEGA

³ Employed by PRONIEGA 1/2 time

Unit	Specialization	Present Degree(s)	Projected Participant Training Schedule		
			ETD CY	ETA CY	Degree
(6) Livestock Extension (SEAG)					
Head	Animal Production	Ing. Agr. /M.S.			
Technician	Pasture & Forage Crops	Ing. Agr.	73	75	M.S.
Technician	Livestock Extension (swine)	Ing. Agr.	73	75	M.S.
Technician	Livestock Extension (beef)	D.V.M.	73	75	M.S.
Projected	Livestock (dairy)		77	79	M.S.
Projected	Livestock economics and management		75	77	M.S.
(7) Barrerito Experiment Station					
Head	Range Management	Ing. Agr.	74	76	M.S.
Technician	Animal Nutrition	Ing. Agr. /M.S.			
(8) Chaco Experiment Station					
Head	Animal Nutrition	Ing. Agr.	74	76	M.S.
Technician	Pasture & Forage Crops	Ing. Agr.	75	77	M.S.
b. FAV (includes only full and half time professors collaborating in the project)					
(1) Administrative					
Dean	Animal Clinician	D.V.M.			
(2) Crop Production					
Head	Horticulture	Ing. Agr.			
Professor	Entomology	Ing. Agr.			
Professor	Entomology	Ing. Agr. /M.S. *	72	74	Ph.D.
Professor	Plant Breeding	Ing. Agr. /M.S. *			
Professor	Crop Production	Ing. Agr. /M.S.			
(3) Soils					
Head	Soil Chemistry	Ing. Agr.			
Professor	Soil Fertility	Ing. Agr.	72	75	Ph.D. *
Professor	Soil Fertility	Ing. Agr. /M.S.			
(4) Plant Pathology					
Head	Plant Pathology	Ing. Agr. /M.S. *			
Professor	Plant Pathology	Ing. Agr. /M.S.			

*Advanced Training non-AID financed

Unit	Specialization	Present Degree(s)	Projected Participant Training Schedule		
			ETD CY	ETA CY	Degree
(5) <u>Agricultural Engineering</u>					
Head	Farm Mechanics	Ing.Agr./M.S.*			
Professor	Farm Construction	Ing.Agr./B.S.			
Projected	Hydraulics				
(6) <u>Agricultural Economics</u>					
Head	Agricultural Economist	Ing.Agr./M.S.			
Professor	General Economist	B.S.			
Professor	Statistics & Prod.Econ.	Ing.Agr.	72	74	M.S.
Projected	Marketing		75	77	M.S.
Projected	Economic Policy & Analysis		75	77	Ph.D.
Projected	Farm Management		75	77	M.S.
(7) <u>Animal Science</u>					
Head	Animal Production	D.V.M./M.S.*			
Professor	Swine Production	D.V.M.	74	76	M.S.
Professor	Reproductive Physiology	D.V.M.	73	75	M.S.
Professor	Animal Nutrition	D.V.M.	75	77	M.S.
Professor	Dairy Production	D.V.M.	74	76	M.S.
Projected	Poultry Production		76	78	M.S.
Projected	Animal Genetics		77	79	M.S.
(8) <u>Pasture and Forage Crops</u>					
Head	Range Management	Ing.Agr./M.S.	75	78	Ph.D.
Projected	Cultivated Pastures		77	79	M.S.
(9) <u>Microbiology and Parasitology</u>					
Head	Parasitology	M.D.			
Professor	Parasitology	D.V.M./M.S.	72	75	Ph.D.*
Professor	Microbiology	D.V.M./M.S.*			
(10) <u>Animal Pathology</u>					
Head	Medical Pathology	M.D.			
Professor	Medical Pathology	D.V.M.			
Professor	Reproductive Pathology		73	75	M.S.
Professor	Poultry Pathology	D.V.M./M.S.			

*Advanced Training non-AID financed.

Unit	Specialization	Present Degree(s)	Projected Participant Training Schedule		
			ETD CY	ETA CY	Degree
(11) <u>Anatomy</u>					
Head Professor	Anatomy Anatomy	D.V.M. D.V.M.			
(12) <u>Physiology</u>					
Professor	General Physiology	D.V.M.	72	74	M.S.
(13) <u>Hospital Clinic</u>					
Head Professor	Chemical Diagnosis	D.V.M.			
Professor	Surgery	D.V.M.			
Professor	Obatetrics	D.V.M.			
Professor	Clinical Analysis	D.V.M.			
Professor	Pharmacology		73	75	M.S.
(14) <u>Library</u>					
Head	Library Science	B.S.	74	76	M.S.

c. Summary of Projected Participant Training Schedule

	Number of New Participants per Year					
	73	74	75	76	77	78
PROMIEGA	1	3	4	4	2	0
FAV	3	3	5	1	2	0
SEAG	2					
TOTAL	6	6	9	5	4	0