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Animal production
Reproduction
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AID 590-7 (10-79)

SMALL RUMINANT

COLLABORATIVE RESEARCH
SUPPORT PROGRAM
(SR-CRSP)

ANNUAL REPORT

PROGRAM YEAR ONE

1980

INDIVIDUAL ANNUAL REPORTS

PART II B

Prepared by the Management Entity 1980

PART II B

INDIVIDUAL ANNUAL REPORTS

931-1328

TITLE XII

SMALL RUMINANT COLLABORATIVE RESEARCH SUPPORT PROGRAM

SMALL RUMINANT COLLABORATIVE RESEARCH PROGRAM (SR-CRSP)

TITLE XII

I. Face Sheet

Research Area: Reproduction

Report Title: Annual Report
October 1, 1978 - May 31, 1980

Sub-Grantee: Utah State University
Logan, Utah 84322

Funds: $99,800

Principal Investigator: Warren C. Foote

Annual Report

For the period October 1, 1978 to May 31, 1980

US/AID Title XII, Small Ruminant-CRSP

Improving Female Reproduction Performance of Small Ruminants in Least Developed Countries

March 27, 1980

Subgrantee: Utah State University

Principal Investigator: Warren C. Foote

Other Key Personnel: Darrell H. Matthews

Jay W. Call

Rex L. Hurst

A. Description of Problem.

Reproduction performance directly affects production traits. Reproduction capabilities of selected genotypes of small ruminants and the influence of climatic environmental factors such as photoperiod are being measured to provide methods of increasing production. Also research has been initiated to help explain the endocrine control of reproduction processes in an effort to minimize environmental influences. A more complete description of the problem is presented in the proposal.

B. Objectives.

Some work was initiated on all four objectives. Also a fifth objective was added to strengthen requested training programs. It is entitled: 5. To provide appropriate degree and non-degree training in reproduction and related areas to LDC and other scientists, graduate students, technicians and others involved in SR-CRSP activities.

C. Project Approach.

Experimental designs as outlined in the project proposal have been developed and research conducted accordingly for objectives 1 and 2. Objective 3 has been approached by developing a data form and identifying contributors from major geographic areas of the world. Work on objective 4 has included determining alternatives for importing animals and tissues and identifying limiting factors and initiating research aimed at removing them. An additional objective has been added to more adequately provide for training of LDC and other foreign personnel. At Utah State University this will be accomplished by developing and administering degree and non-degree programs to be conducted at both USU and at foreign work sites.

D. Conditions that indicate the objectives have been achieved.

1. Preliminary estimates of female reproduction potential is available on some genotypes.

2. Estimates not available.

3. Information solicited and some data obtained.

4. Alternative procedures for importing/having access to tissue identified; research underway on transmission of scrapie.

E. Assumptions that objectives can be met (externalities outside of control of P.I.).

1. Availability of AID funds were delayed which delayed initiation of project. This has been a serious limiting factor.

2. Utah State University resources have exceeded those budgeted.

3. Genotypes, facilities and management control appears adequate for research.

4. Capability of foreign work site personnel appear to be very adequate.

5. Preliminary support of Data Bank is adequate.

6. Willingness to investigate procedure for importation of animals exists.

F. Assumptions that achieving objectives will solve problems.

Work to date has shown assumptions to be valid.

G. Outputs of project.

Facilities and equipment were updated and expanded to increase the research capability using funds which were primarily non-Title XII funds in excess of that originally pledged as matching funds. These improvements include: (1) renovation of two large sheep barns (50' x 100' and 40' x 100') and construction of new pen and corral arrangements both inside and in surrounding areas outside to accommodate a total of approximately 300 sheep and goats (approximately $5,000 Title XII and $19,000 non-Title XII), (2) construction of in-barn lighting for increased photoperiod research to accommodate 100 animals (approximately $2,000 non-Title XII), (3) purchase and installation of individual electronic manger openers for small ruminants (36 animals) (approximately $16,000 non-Title XII), and (4) development of facilities for embryo handling and transfer research ($20,000). These improvements equal approximately $62,000 ($5,000 Title XII and $57,000 non-Title XII) and are now completed or will be completed and in use before May 30, 1980.

1. (a) Research underway at Utah State University not supported by Title XII SR-CRSP funds but which contribute directly to its objectives include measures of reproductive potential of Targhee and crosses of Finnsheep and Suffolk rams on Targhee ewes and backcrosses to Targhee rams. Reproduction and lamb production is calculated per year on the basis of fertility, prolificacy and efficiency (per ewe or as a proportion of ewe body weight). The Suffolk and Finnsheep Targhee crosses exceed the straightbred Targhee in prolificacy and weight of lamb weaned; Finnsheep cross ewes weaned heavier weight of lamb as proportion of body weight of dam than Suffolk cross and a higher proportion lambed first as yearlings (see Attachments 1 and 2 and Table 1).

(b) Research has been initiated under direct support of SR-CRSP on the following genotypes; St. Croix, Rambouillet, St. Croix x Rambouillet, Navajo, Karakul, Spanish meat goats and dairy goats (Saanen and Nubian) x Spanish meat goats. Reproduction is calculated per parturition on the basis of fertility and prolificacy. The St. Croix exceeds the Rambouillet in fertility, prolificacy, and has a shorter length of parturition interval. First offspring from Karakul and Navajo sheep will be born in the spring, 1980. No analysis available. Dairy x Spanish goat crosses are heavier at birth with faster growth rates than straightbred goats (see Tables 2 through 6).

(c) Endocrinology, physiology and behavior of reproduction studies in the female are underway (using non-Title XII funds) in which mechanisms of control of key endocrine functions are being studied. These include (1) the location and concentration of LH receptor sites in follicle cells in sheep (research initiated), (2) anterior pituitary and ovary response to GnRH in sheep where continuous intravenous infusion fails to elicit repeated LH release. These results along with other research finding suggest a short loop negative feed back system of LH to the median eminence (hypothalamus). Ovarian response (ovulation) is predictable

based on preovulatory LH release. (3) Endocrine profiles (LH and progesterone) during the estrous cycle, seasonal anestrus and late prepartum and early postpartum: seasonal anestrus levels confirm non-quiescent condition, LH and progesterone levels from parturition to approximately 3 weeks postpartum are low, progesterone increase prior to first postpartum estrus in most species confirms the phenomena of ovulation without estrus but some data suggest first postpartum ovulation is accompanied by estrus which might provide for earlier postpartum fertility in those breeds. (4) Research with use of hormones to induce fertile out-of-season mating indicate that in sheep (farm flocks in Utah) the level and efficiency of reproduction and lamb production can be increased.

(d) (1) SR-CRSP supported research dealing with endocrine control of reproduction show induction of fertile out-of-season matings in dairy goats (Laurelwood Acres Goat Dairy, California) can increase the uniformity and overall level of milk production. (2) The RIA laboratory at USU is serving as a center for RIA of hormones involved in reproduction for both Brazil and Peru. The laboratory is producing and validating antibodies to help standardize and facilitate analysis. Assistance will also be provided to establish laboratories as required in Brazil and Peru and to coordinate and supervise analysis. A center for both countries is being considered at the Escola de Veterinaria de universidade Federal de Minas Gerois, in Belo Horizonte, Brazil. Later a laboratory is planned for Peru. It is difficult or impossible to import blood from those countries to the U.S. for analysis.

2. Research was initiated in November, 1978 to measure the influence of increased photoperiod on reproduction in ewes. (A cooperative component with CSPU using rams was conducted in the same facilities.) Results from 1978-79 research indicate that abruptly increased light (20 hrs.) beginning in early December and continuing for 70 days has a limited effect compared to natural increased light beginning in late December (Figure 1). Results available to

date from additional research initiated in 1979-80 indicate that continuous light beginning in December 1979 induces early anestrous beginning March 1, 1980. Information on plasma progesterone levels as an indication of ovulation response is not yet available.

3. The following steps have been taken to establish a computerized data bank on production capabilities of sheep and goats.

(a) A data collection form has been developed for use in soliciting information in a standardized (see Attachment 3) manner and (b) a list of approximately 130 persons from over 40 different countries working with small ruminants have been identified and letters of explanation and solicitation mailed with copies of the data form for recording information. In addition the computerized data bank has been discussed personally with several of those persons during visits to their countries.

Work on this objective is being conducted cooperatively with CSPU. Some forms have been completed and returned.

4. (a) Contact has been continued with APHIS, USDA concerning import regulations for small ruminants and for their tissue, particularly blood and wool. The following points appear pertinent (1) the only disease limiting import of small ruminants is scrapie. With the completion of the Harry S. Truman Import Center at the Flaming Key Center in Florida, cattle are now being selected in Brazil for importation into the U.S. The importation of these animals will establish procedure and precedent for all diseases limiting import of small ruminants except scrapie. (2) Samples of grease wool can be imported under special permits for analysis but must be subsequently destroyed. We have obtained approval from APHIS to keep wool permanently that we have imported after treating by autoclaving for 30 minutes at 20 lbs pressure and 250°F. We have demonstrated that such treatment does not damage the wool fiber for use in developing standards for demonstration or most analytical procedures. We have imported and are keeping for permanent display samples from Iran, Iraq,

Syria, Israel, and Greece. (3) Blood or blood constituents can be imported after heat treatment or treatment with Betalactone preparations. We have treated serum with betalactone and imported for use in hormone assay and found it unsatisfactory. We have visited Plum Island Import facilities and obtained tentative approval to import tissue to that location to conduct many tissue analyses including hormone alalysis and tissue culture using their facilities and equipment. Reasonable charges would be made to cover use of facilities, equipment, etc.

(b) We are currently working with a private sheep producer in the U.S. on importation of rams from Australia.

(c) We have been invited by APHIS, USDA to cooperate with them in long term research to determine mode and time of vertical transmission of scrapie. The primary objective is to develop a procedure for movement of scrapie free sheep from scrapie infected areas. A feasibility study was successfully completed in 1979 which demonstrates the usefulness of embryo collection, handling and transfer as research tools. The research dealing with mode and time of vertical transmission was initiated in October 1979 and will be conducted at isolation locations at the Scrapie Field Trial facilities, Mission, Texas and Dugway Proving Ground, Dugway, Utah. Certain aspects of this research involving semen has also been initiated and includes the cooperation of CSU SR-CRSP component. (This research is financed by funds separate from Title XII, SR-CRSP but are reported here because of their direct bearing on this SR-CRSP objective for Utah).

Transport of sheep between countries is ofter restricted because of scrapie. Critical information on transmission of scrapie would greatly aid in reducing these restrictions.

5. Sufficient data not yet generated to initiate this output.

6. No training programs (degree or non-degree) have been initiated at USU but resources for such have been made available and plans have been completed for one graduate student from Brazil (Dr. Aurino A. Simplicio) to begin his graduate program this summer.

H. Technical Feasibility.

The conditions upon which technical feasibility was based appear valid.

I. Financial Plan.

Planning Grant.

Total budget allocation and expenditures for period October 1, 1978 to June 30, 1979.

Item	US/AID U.S.A.	Brazil	Peru	Total	U.S.U. matching	Total AID and U.S.U.
Salaries and wages					$ 9,431.34	$ 9,431.34
Travel Domestic	$ 480.67			$ 480.67	248.65	729.32
Travel International						
Supplies and expenses					4,243.95	4,243.95
Equipment	1,838.88			1,838.88	310.00	2,148.88
Other Staff benefits						
Total direct costs	2,319.55			2,319.55	14,233.94	16,553.49
Indirect costs	-0-			-0-	5,658.80	5,658.80
Total	2,319.55			2,319.55	19,892.74	22,212.29

Total budget allocation and expenditures for period June 1, 1979 to February 29, 1980.

Item	US/AID U.S.A.	Brazil	Peru	Total	U.S.U. matching	Total AID and U.S.U.
Salaries and wages	$14,184.57			$15,184.57	$32,290.18	$ 47,474.75
Travel Domestic	300.00			300.00	198.16	498.16
Travel International	-0-	$1,286.87	$1,286.86	2,573.73		2,573.73
Supplies and expenses	12,186.77	80.83		12,267.62	3,414.45	15,682.07
Equipment	5,358.52			5,358.52		5,358.52
Other Staff benefits	3,381.33			3,381.33	7,116.02	10,497.35
Total direct costs	36,411.19	1,367.72	1,286.86	39,065.77	43,018.81	82,084.58
Indirect costs	9,110.69			9,110.69	19,374.11	28,484.80
Total	$45,521.88	$1,367.72	$1,286.86	$48,176.46	$62,392.92	$110,569.38

J. Time phased scope of work.

Scope of work for each objective equals or is ahead of time schedule and scope to date.

K. Project monitoring.

All projects have been planned and those initiated done so by the principal investigator. Work will proceed under conditions of supervision and monitoring as outlined.

L. Annual review and planning processes.

Annual reviews have been conducted of personnel performance. Annual summaries and progress reports including summarization of results have been prepared and will be evaluated in terms of quantity and quality of work and compared to time schedules. Adequacy of resources have been accessed.

Attachment 1. Gebrelul

1980 72nd ANNUAL MEETING OF THE
AMERICAN SOCIETY OF ANIMAL SCIENCE
July 27-30, 1980, Cornell University, Ithaca, NY

terial only within the blue line box will be photocopied exactly as received. Arrange abstract in sample box before typing here. rect mistake by affixing correction typed on white paper over error with rubber cement or use liquid paper. Single space with no mar- s in the rectangle. Title without caps. For multiple authors designate presenter with * after name. Abbreviate only units of measure.

thors show first (1) and second (2) choices of sessions in ich they would like their paper scheduled:

Animal Behavior
Animal Breeding and Genetics
Animal Waste Management
Environment and Livestock Production
Meat Science and Technology
Non-ruminant Nutrition
Pastures and Forages
Physiology
Ruminant Nutrition
Teaching
Extension

Corresponding author S. W. Gebrelul

Address UMC 48 - ADV Sci. Dept.

I.S.G.I. - Utah State Univ.

Logan, UT 84322

List key words at end of abstract inside blue lines.

ould you be willing to present this aper in a poster session? no

ABSTRACT AND ABSTRACT HEADING (see example, end of instructions)

Lamb performance traits from Targhee and Targhee-cross ewes. S. W. Gebrelul*, D. H. Matthews, and W. C. Foote, Utah State University, Logan.

ata on birth (BW), weaning weight (WW), gain from birth to weaning (GBW), average daily ain (ADG), body type score (BTS), and body condition score (BCS) were collected from 5817 ambs and were analyzed by least square procedures. Lambs were scored from 1-5 where 1 was ost desirable. This research was conducted under modified range conditions at the Utah gricultural Experiment Station in southern Utah (Cedar City). Independent variables were ear, sex of lamb, type of birth, type of birth and rearing, ewe genotype, breed of sire nd regressions on linear and quadratic age of dam and age of lamb at weaning. The data easures production by the lamb as influenced by these independent variables. The lambs ere produced by crossing Border Leicester (B), Dorset (D), Finnsheep (F), Suffolk (S) and Targhee (T) sires on Targhee dams; Targhee sires crossed on F1 genotypes of dams (cross); and Suffolk sires crossed SxT dams. All independent variables had significant (P<.05) effects on all lamb traits. Lambs sired by Suffolk rams were heavier at birth (4.78±.111 kg), at weaning (41.52±.101 kg), greater GBW (38.73±.197 kg) and had more desirable BTS (2.14±.008) and BCS (2.46±.010). The corresponding least square means for the control (TxT) were, respectively, 4.52±.129 kg, 39.04±.114 kg, 36.52±.222 kg, 2.56±.009 and 2.72±.011. In the SxST cross the lambs were generally higher than TxT lambs, 0.26±.1[illegible] vs 4.56±.107 kg BW, 44.15±.126 vs 39.19±.369 kg WW, 39.89±.245 vs 35.15±.286 kg in GBW, .273±.002 vs .243±.002 kg ADG, 2.07±.010 vs 2.61±.011 BTS, and 2.43±.013 vs 2.79±.[illegible] BCS. Lambs from the FxT ewes were .39, 2.55, 1.61 and .011 kg lower at birth, weaning, GBW and ADG, respectively and .41 and .32 points higher in BTS and BCS than the control. Age of ewe had both linear and quadratic effects on all traits considered with peak production age of 4-7 years.

KEY WORDS performance traits, Targhee, genotype, crossbreeding, range.

Must be received by March 15th, edited and ready for photocopy. Mail original copy to D. C. England; three duplicate copies to Chairman of Session of first choice; one copy to Chairman listed at end of Instructions. Mail Preparation. If withdrawal of paper becomes necessary, notify D. C. England immediately.

Attachment 2.

Gebrelul

Last name of first author

1980 72nd ANNUAL MEETING OF THE AMERICAN SOCIETY OF ANIMAL SCIENCE

July 27–30, 1980, Cornell University, Ithaca, NY

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nimal Waste Management
nvironment and Livestock Production
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on-ruminant Nutrition
astures and Forages
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xtension

Corresponding author S. W. Gebrelul

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Logan, Utah 84322

List key words at end of abstract inside blue lines.

uld you be willing to present this paper in
oster session? ____ Yes __x__ No

ABSTRACT AND ABSTRACT HEADING (see example, end of instructions)

Reproduction and production per ewe from Targhee and Targhee-cross range ewes. S. W. Gebrelul*, W. C. Foote, and D. H. Matthews, Utah State University, Logan.

Data on 4372 ewes were collected to measure the reproductive traits and lamb production per ewe in straightbred Targhee (TxT, control), Border Leicester x Targhee (BxT), Dorset x Targhee (DxT), Finnsheep x Targhee (FxT) and Suffolk x Targhee (SxT) range ewes and were analyzed by least square method. The research was conducted under modified range conditions at the branch Utah Agricultural Experiment Station in southern Utah (Cedar City). The independent variables were ewe genotype, breed of sire, year and regressions of linear and quadratic age of dam. Sex and type of birth were considered on lambing date. The data measures the lamb production per ewe as influenced by these independent variables. Significant differences (P<.01) due to ewe genotype, age of dam and year were evident in prolificacy and weaning rate. Only age of dam difference (P<.01) was found in percent fertility. Breed of sire had a major influence only on the weight of lamb born per ewe. The FxT ewes were highest in all reproductive and production traits, bore 0.61 and 0.59, and weaned 0.36 and 0.35 more lambs; and weaned 6.59 and 5.64 more kilogram of lamb per ewe bred and per ewe lambing, respectively. The straightbred Targhee showed a slight (P<.05) advantage in survivability and DxT ewes in livability. Ewes bearing single lambs were 1.78 and 3.73 days later in lambing than twin and triplet bearing ewes. An average difference (P<.05) of .47 day was observed between male and female bearing ewes. In all traits studied, age of ewe had linear and curvilinear effects with peak production at age of 4-7 years.

KEY WORDS reproduction, ewe production, Targhee, genotype, range, crossbreeding.

Must be received by March 15, 1980, edited and ready for photocopy. Mail original and one copy to D. C. England, three duplicate copies to Chairman of Session of first choice, one copy to Chairman of second choice. Program Chairmen listed at end of Instructions for Abstract Preparation. If withdrawal of paper becomes necessary, notify D. C. England immediately.

Table 1. Ovulation rates of genotypes of sheep.

Genotype	No. of ewes	Ovulation rate[a)]
Finnsheep x Targhee	25	2.92
Targhee x Finnsheep-Targhee	25	2.31
Targhee	25	2.21
Targhee x Suffolk-Targhee	25	2.00
Suffolk x Targhee	25	2.38

a) No. C.L.

Table 2. Body weights of St. Croix, St. Croix x Rambouillet and Rambouillet lambs at birth and of mature St. Croix ewes and rams (in kg).

Genotype	Sex		Type of birth			
	Male	Female	1	2	3	4
St. Croix x St. Croix	2.97	3.52	3.19	2.82	2.64	2.12
Total No.	98	106	38	115	42	8
St. Croix x Rambouillet	4.29	3.94	4.51	4.01	-	-
Total No.	23	19	13	30	-	-
Rambouillet x Rambouillet	5.52	4.68	5.68	4.40	-	-
Total No.	13	22	14	21	-	-
F_2 St. Croix x Rambouillet	3.94	3.47	4.07	2.98	-	-
Total No	3	3	4	2	-	-

Table 3. Ability of St. Croix ewes to lamb repeatedly on a twice a year lambing schedule.

Time of first breeding	% consecutive lambings								
	No.[1]	[1][2]	(1/78)	No.[1]	[2][2]	(7/78)	No.[1]	[3][2]	(1/79)
1-2 years	17	(13)[3]	76%	8	(2)	25%	8	(0)	0%
2.5 years and older	46	(31)	67%	30	(14)	47%	11	(5)	36%

[1] No. of ewe observations.
[2] No. of consecutive lambings.
[3] No. responding.

Table 4. Body weights of St. Croix, St. Croix x Rambouillet and Rambouillet lambs at birth and of mature St. Croix ewes and rams (in kg).

Genotype	Sex		1	2	3	4
	Male	Female				
St. Croix x St. Croix (149)	76	73	27	81	33	8
Birth weight	2.95	2.43	3.11	2.81	2.66	2.12
Mature weight	72.73	5.91	-	-	-	-
St. Croix x Rambouillet (22)	11	10	8	14	-	-
Birth weight	4.54	3.71	4.45	4.06	-	-
Rambouillet x Rambouillet (19)	9	10	8	11	-	-
Birth weight	5.40	4.91	5.53	4.61	-	-

Table 5. Type of birth and birth weights (kgs) from Spanish goat does bred to Spanish goat and dairy goat bucks.

	Spanish goat sires							Dairy goat sires						
	Single		Twins		Overall			Single		Twins		Overall		
Sex	N	Wt	N	Wt	N	Wt	Sex	N	Wt	N	Wt	N	Wt	
Male	2	2.05	12	1.93	14	1.95	Male	4	2.97	10	2.09	14	2 35	
Female	5	2.36	6	2.04	11	2.19	Female	3	3.06	12	2.18	15	2.36	
Overall	7	2.27	18	2.03	25	2.05	Overall	7	3.00	22	1.82	29	2.35	

Table 6. Reproduction performance of Spanish goat does bred to Spanish goat and dairy goat bucks classified by age.

	Spanish goat sires						Dairy goat sires					
	Age of dam						Age of dam					
	Mature		Kids		Overall		Mature		Kids		Overall	
	N	%	N	%	N	%	N	%	N	%	N	%
Does exposed to buck	17	-	12	-	29	-	18	-	11	-	29	-
Does kidding/does exposed	13	76	3	25	16	55	14	78	4	36	18	62
Kidding rate/does kidding	22	169	3	100	25	156	24	171	5	125	29	161
Kids weaned/does kidding	12	92	3	100	15	94	15	107	4	100	19	106
Twins/does kidding	9	69	-	-	9	56	10	71	1	25	11	61
Singles/does kidding	4	31	3	100	7	44	4	29	3	75	7	39

Figure 1. Incidence of estrus in control and light treated ewes.

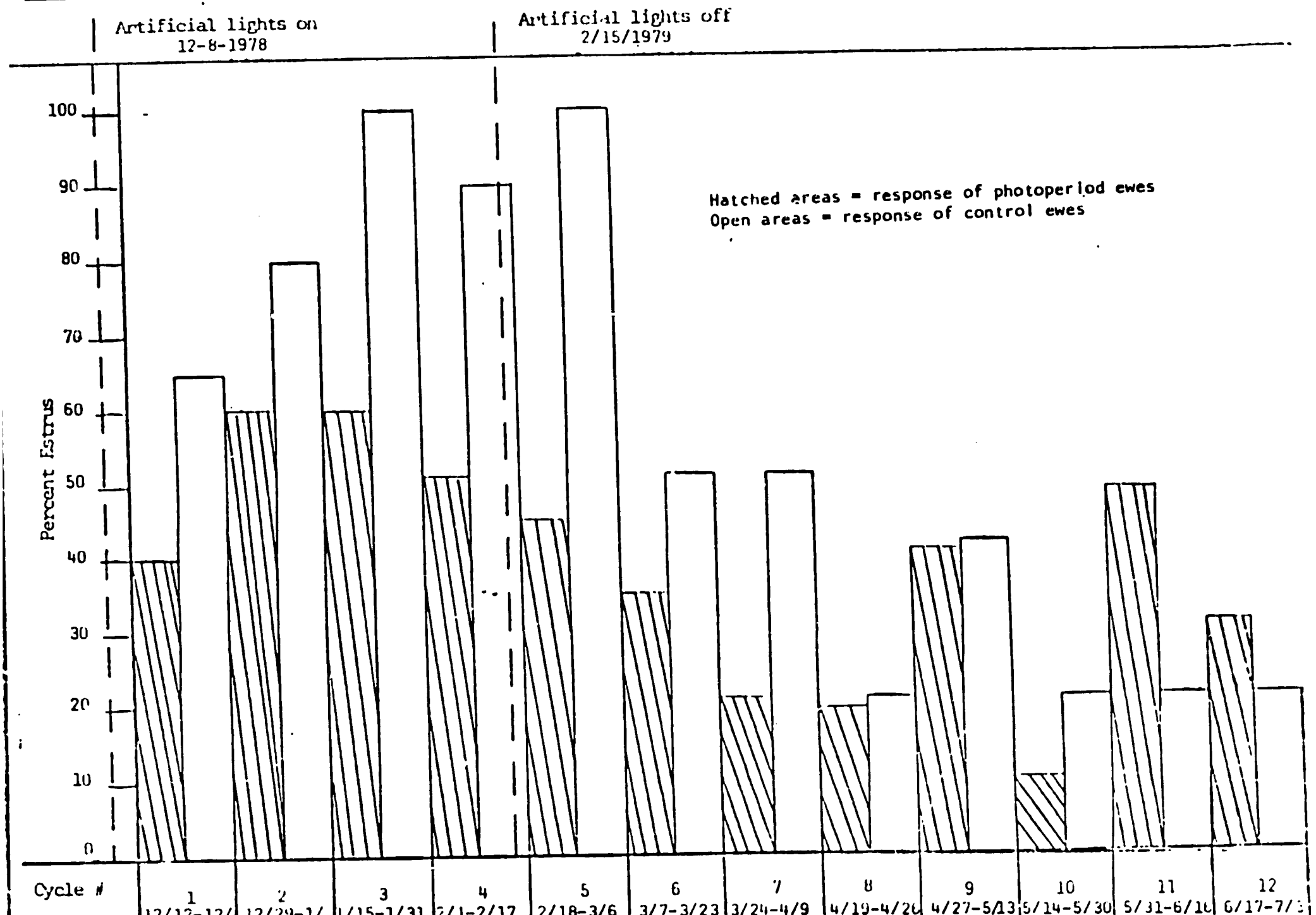
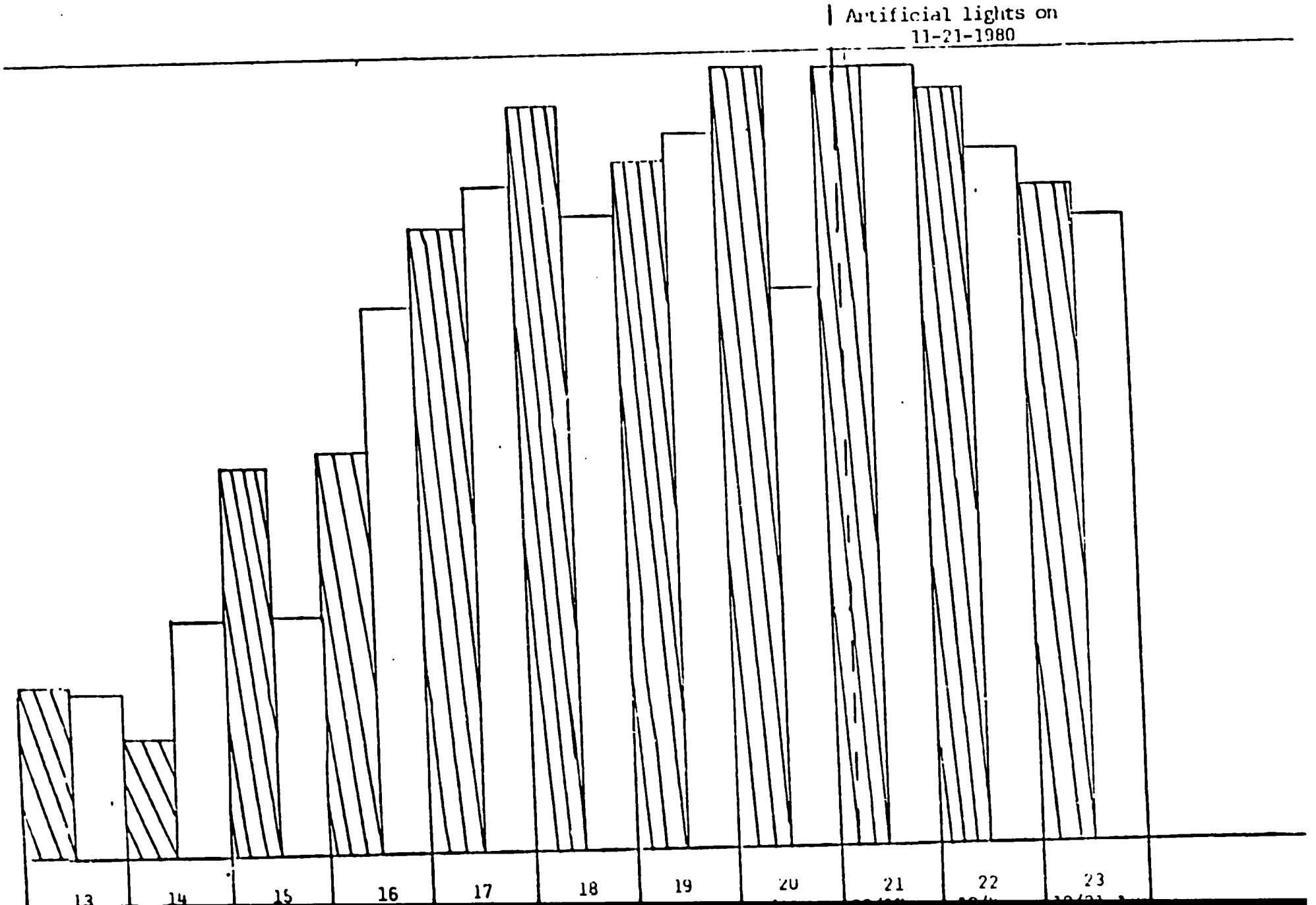


Figure 1 . Continued.



Attachment 3.

INTERNATIONAL SHEEP AND GOAT INSTITUTE

UTAH STATE UNIVERSITY
LOGAN, UTAH 84322

ISGI

(801) 750-2147
(801) 750-2149

DATE:

M E M O R A N D U M

TO: Persons involved in research and development of sheep and goats.

FROM: Warren C. Foote, Member Technical Committee, US/AID Title XII Small Ruminant CRSP, Director, International Sheep and Goat Institute, Utah State University.

SUBJECT: Development of a Computerized Data Bank on production capabilities of sheep and goats.

Sheep and goats are playing an increasingly important role in providing for the needs of mankind throughout the world.

An analysis of information available to us indicates that there are over 900 breeds or genetic types of sheep and 250 breeds or genetic types of goats recorded throughout the world. Although there is a great deal of similarity among many of these they constitute a remarkable gene pool of adaptation and capability for food and fiber production.

The extent to which these animals can be used to provide food and fiber is limited to the amount of reliable information about their adaptation and production capabilities. We have undertaken a program to gather, compile and make available for use valid, data based information. This will be available for use by all interested persons and organizations through both a Computerized Data Bank and published updateable materials.

We are asking for your cooperation in this effort. Attached are copies of a data form that we have prepared for the purpose of recording pertinent, valid information. We realize that this will require time and effort on your part but we hope that you share our opinion of the very significant role that sheep and goats play in food and fiber production and will be willing to help us.

To assure that we obtain valid information we have set forth the following criteria and guidelines.

1. All information provided be data based and not represent unsubstantiated opinions or general observation.

2. We prefer to have you interpret your data by completing the data form rather than sending information for us to interpret. However, we will appreciate receiving any appropriate information that you have, both published and unpublished materials.

3. We are interested in obtaining information from as many sources as possible on the same breeds and under similar and differing environments. Knowledge that someone else is providing information on a similar genotype should not cause anyone to hesitate to also respond.

4. The data form is intended to be comprehensive. We realize that only a part of the information requested may be available from any one source, but we ask for any information you have. No amount of information is too small to be included and we will appreciate your completing those parts of the form for which you have information.

5. Please provide fully the information requested concerning persons, organizations, their addresses and other information asked for. This is necessary for any followup and to properly give recognition for contributions.

6. Full credit and acknowledgement will be given to each contributor for his or her contribution. We consider this effort to be cooperative among all persons willing to respond and that the magnitude of the response will not only increase the amount of information obtained but also its reliability and acceptance.

This program to develop a Computerized Data Bank and relevant publications on sheep and goats is supported in part by the Small Ruminant Collaborative Research Support Program of US/AID Title XII and financed in part by that program.

We look forward to your favorable response. Any suggestions on how our procedures might be improved or information on other possible contributors will be appreciated.

ISGI,USU 12/79

SMALL RUMINANT DATA FORM

Description, adaptation, and reproduction and production capabilities of sheep and goats

il to: International Sheep and Goat Institute, Utah State University, Logan, Utah 84322

I. Source of information

Name _____

Organization _____

Address _____

Telephone _____

Background and training of person supplying information (attach sheet if necessary)

_____

_____

_____

Source of information (personal observations, records from private producers, extension or experimental work, etc., _____

_____

_____

II. Origin of genotype

Specie - Sheep _____ Goat _____ Others _____ (please list)

Name or names of genotype (breed, etc.) _____

Country _____ Area in country _____

Estimated date of origin _____

Purity of genotype being reported - Pure _____ Mixed _____

Genetic origin (parents or ancestral genotypes) _____

_____ Unknown _____

III. Physical description

a. Horns Description of drawing of horn

Male Horns _____ No horns _____ Scurs _____

Female Horns _____ No horns _____ Scurs _____

b. Color briefly describe) _____

_____

c. Tail Type (check most appropriate line)

	Tail length		
	Long	Medium	Short
Thin tail	____	____	____
Fat tail	____	____	____
Fat rump	____	____	____

Is tail usually removed (docked)? Yes ____ No ____

d. Size:

Body weight (kg)

Birth Male: No. observed ___ Average ____ Range _____ Unknown ___

Female: No. observed ___ Average ____ Range _____ Unknown ___

Mature Male: No. observed ___ Average ____ Range _____ Unknown ___

Female: No. observed ___ Average ____ Range _____ Unknown ___

IV. Reproduction traits

a. Female:

Length of estrous cycle (days)
No. observed ___ Average ____ Range _____ Unknown ___

Number of months females show estrous cycles _____

Month estrous cycles begin _____

Month estrous cycles end _____

Parturition interval (months between births)
No. observed ___ Average ____ Range _____ Unknown ___

Interval from parturition to first estrus (days)
Not including anestrous season
No. observed ___ Average ____ Range _____ Unknown ___

Including anestrous season
No. observed ___ Average ____ Range _____ Unknown ___

Age at puberty (days)
No. observed ___ Average ____ Range _____ Unknown ___

Ovulation rate No. observed ___ Average ____ Range _____ Unknown ___

Proportion of females exposed for breeding that produce young
No. observed ___ Average ____ Range _____ Unknown ___

Lambing or kidding rate (no. of offspring per female producing young)
No. observed ___ Average ____ Range _____ Unknown ___

Length of gestation (days)
No. observed ___ Average ____ Range _____ Unknown ___

Mothering ability (care of young) Excellent ___ Good ___ Fair ___ Poor ___ Unknown ___

b. Male

Age at puberty (days)
No. observed ___ Average _____ Range _____ Unknown ___

Period of sexual activity during the year
Month initiated _____ Month ended _____

Level of libido (sexual drive) Excellent ___ Good ___ Fair ___ Poor ___ Unknown ___

Semen characteristics

Volume (ml) No. observed ___ Average _____ Range _____ Unknown ___

Concentration (%) No. observed ___ Average _____ Range _____ Unknown ___

Motility (%) No. observed ___ Average _____ Range _____ Unknown ___

Length of reproductive life (years)
No. observed ___ Average _____ Range _____ Unknown ___

Is artificial insemination practiced? Yes ____ No ____ If yes, what percent _____

Type of semen used Fresh _____ Frozen _____

Behavior

Dominance among males High ___ Intermediate ___ Low ___ Unknown ___

Are males aggressive toward other genotypes of animals? Yes ____ No ____

If yes, please list genotypes of animals _____

_____

V. Production traits

a. Growth patterns

Vigor at birth Excellent ___ Good ___ Fair ___ Poor ___ Unknown ___

Rate of gain No. observed ___ Average _____ Range _____ Unknown ___

Age when gain was measured
Average _____ Range _____ Unknown ___

Were weights adjusted? Yes ____ No ____

If yes, how _____

Efficiency (kg of feed/kg of gain)
No. observed ___ Average _____ Range _____ Unknown ___

Type of ration on which feed efficiency was measured _____

_____

b. Meat production

Age at slaughter (months)
No. observed ___ Average _____ Range _____ Unknown ___

Live weight at slaughter (kg)
No. observed ___ Average _____ Range _____ Unknown ___

Carcass weight (without head, feet or pelt) (kg)
No. observed ___ Average _____ Range _____ Unknown ___

Fat thickness over 12th or 13th rib (cm)
No. observed ___ Average _____ Range _____ Unknown ___

Loin eye (longissimis dorsi) area (cm^2)
No. observed ___ Average _____ Range _____ Unknown ___

Carcass composition

Fat (%) No. observed ___ Average ____ Range _____ Unknown ___

Lean (%) No. observed ___ Average ____ Range _____ Unknown ___

Bone (%) No. observed ___ Average ____ Range _____ Unknown ___

Kidney fat (%) No. observed ___ Average ____ Range _____ Unknown ___

Melting point of fat (degrees centigrade)
No. observed ___ Average ____ Range _____ Unknown ___

c. Fiber production

Type of fiber Wool ___ Hair ___ Mohair ___ Cashmere ___ Other ___ Unknown ___

Is fiber removed from body? Yes ____ No ____

If yes, by natural shedding _____ Mechanically _____

Major use of fiber (list in order of importance)

1. _____ 2. _____ 3. _____

Weight of grease fleece produced per year (kgs)
No. observed ___ Average ____ Range _____ Unknown ___

Staple length (cm) No. observed ___ Average ____ Range _____ Unknown ___

Grade (fiber diameter)
No. observed ___ Average ____ Range _____ Unknown ___

Percent yield No. observed ___ Average ____ Range _____ Unknown ___

Wool classification Long _____ Fine _____ Coarse _____ Medium _____ Other _____

d. Milk

Is milk used for human consumption? Yes ____ No ____ Occasionally ____

If yes

Number of times milked per day _____

Kilograms of milk produced daily
No. observed ___ Average ____ Range _____ Unknown ___

Milk composition

Water content (%)
No. observed ___ Average ____ Range _____ Unknown ___

Butterfat content (%)
No. observed ___ Average ____ Range _____ Unknown ___

Lactose content (%)
No. observed ___ Average ____ Range _____ Unknown ___

Total protein content (%)
No. observed ___ Average ____ Range _____ Unknown ___

e. Major uses (products) (List in order of importance) 1. _____

2. _____ 3. _____ 4. _____

f. Length of life (years)
No. observed ___ Average ____ Range _____ Unknown ___

VI. Environment/management systems involved

Feeding habits Browsers___ Grazers ___ Both ___ Unknown ___

Areas/conditions where most commonly managed

High Altitudes ___ Low Altitudes ___Both ___Unknown ___

Arid regions ___ Wet regions ___ Both ___ Unknown ___

Cold temperatures ___ Hot temperatures ___ Moderate temperatures ___ All temperatures ___ Unknown ___

Intensive management ___ Extensive management ___ Both ___ Unknown ___

Social characteristics (gregariousness, using Spanish Merino as example of excellent)

Excellent ___ Good ___ Fair ___ Poor ___ Unknown ___

VII. Environment information

Source

Name and address of organization recording information _____

_____

Location of recording station _____

_____

Years during which data were collected _____

	Minimum temperatures (degrees celsius)		Maximum temperatures (degrees celsius)		Precipitation (cm)		Daylight length (hrs)	
	Average	Range	Average	Range	Average	Range	Average	Range
an.								
eb.								
ar.								
pr.								
ay								
une								
uly								
ug.								
ept.								
ct.								
ov.								
ec.								
verage nual):								

verage: Altitude _____ Latitude _____ Longitude _____

VIII. Other information where available and appropriate (cytogenetic, hemoglobins, transferrins, unique management program, references of published information, etc.). Also please provide photographs including adult male and female where possible.

Annual Report for Northeast Brazil

For the period October 1, 1978 to May 30, 1980

US/AID Title XII, Small Ruminant-CRSP

Improving Female Reproduction Performance of Small Ruminants in Least Developed Countries

Subgrantee: Utah State University

Personnel: Brazil (CNPCOT, EMBRAPA)
Aurino Alves Simplicio
Jose Ferreira Nunes (on leave in France working on Ph.D.)
Simon Reira

Utah State University
Warren C. Foote

March 31, 1980

A. The problem.

The solution to the problem of low reproduction performance in small ruminants has been undertaken by initiating research to measure reproduction capability in selected genotypes under existing and improved management conditions. Such information will provide alternative breeding and management programs for improved reproduction. In addition training programs have been initiated to strengthen the research capability of cooperating scientists and supporting personnel which in turn will increase the quantity and quality of research and related activities accomplished. CNPCOT, EMBRAPA has very good research credentials and outstanding working relationships have been established. The types of animals and the environment in northeast Brazil is common to several other key areas in the world and results obtained there will have useful application in those other areas.

B. Objectives.

Work under objectives 1, 4, 5 and 6 was initiated during the first year. Objective 1 in Brazil phase III work plan relates to objectives 1 and 2 in the overall proposal; objective 4 relates to objectives 1 and 2; objective 5 relates to objective 5; and objective 6 relates to objective 3, respectively.

C. Project approach.

Work to be conducted by Utah State University on female reproduction and California State Polytechnic University on male reproduction has been combined into one fully integrated, cooperative effort. This will facilitate the conduct of the total reproduction programs at foreign work sites, minimize cost and optimize expertise. However, the two projects will be accounted for separately (i.e. annual reports and budget requests).

The methodology used for programs initiated were generally those outlined in the work plan for northeast Brazil, Phase III.

A major limiting factor to low production from small ruminants in northeast Brazil is the low reproduction performance. The objectives of this project have been set up primarily to identify, measure and improve reproduction processes that limit production. The budget request reflects actual needs to provide for the necessary cooperative research in Brazil with supportive and related work at Utah State University. The major aspects of the methodology are outlined for each objective in the Brazil Phase III Work Plan. More detail is provided in this section for research to be conducted as a part of Objective 1 and also Objective 5 which deals with training because it will serve as research for the Ph.D. dissertation for Aurino A. Simplicio. Some details of the experimental design are as follows.

Experimental design for Objective 1.

Trial 1.

2x2 factorial

Genotypes	Pasture (non-suppl.)	Confined (Suppl.)	Total
SRD	12[1)]	24	36
Marota	12	24	36
Moxoto	12	24	36
Total	36	72	108

[1)] No. of animals.

Animals representative of each genotype will be selected from those now at the station and from producers - as many producers as possible will be sampled. Animals will be selected on the basis of health, uniformity and being typical of specific breed and age (3-5).

Measurements to be taken;

(1) Incidence of estrus during the year, (2) incidence and rate of ovulation during the year, and (3) hormone profiles (LH, progesterone) during (a) the estrous cycle, (b) anestrus, (c) early postpartum.

Trial 2.

Genotypes	Pasture (suppl.)
SRD	50[1)]
Moxoto	50
Maroto	50
Repartida	50
Caninde	50
Anglo Nubian	50
Buhj	50

[1)] No. of animals.

These animals will be from those already being measured in the Breed Evaluation Sub-project.

Measurements to be taken;

(1) Fertility, (2) prolificacy, (3) postpartum interval, (4) postnatal survival and development (measured by body weight and body weight changed and by age of cause of death), and (5) general mothering ability (adequacy of milk, care of young).

Results from this experiment will provide the following information;

(1) Provides practical information on goat production in northeast Brazil, (2) integrates well with other research at Sobral (CNPCOT), (3) Provides basic information on reproduction upon which research and management programs can be developed for reproduction, nutrition, genetics, animal health, and overall management, and (4) provides research appropriate for Ph.D. program including

training for a variety of useful techniques and fulfills requirements of Utah State University for the degree.

Short course outlines for Objective 5 are presented below.

Title: Management of Sheep and Goats for Reproduction Studies. (lectures and hands-on)

Subject outline: (1) Facilities, equipment, etc., (2) feed handling, distribution and storage; feeding and nutrient requirements, (3) responsibility for animal care, (4) identifying healthy and sick animals, grooming, aging, (5) animal behavior, handling and moving - identifying, (6) care of mother and young at parturition, and (7) scheduling management functions.

Title: Procedures and data collection for reproduction research.

Subject outline: Demonstrations and hands-on.

(1) Pregnancy diagnosis and estrus detection, (2) blood collection and handling, and (3) fertility evaluation in the male (semen evaluation and clinical exam)

Lecture-discussion topics.

(1) Reasons for conducting research, (2) expital design and measurements (making observations, controls, unchanging), (3) recording measurements, data collection (accuracy, consistency, dependability, honesty; data forms, missing information, data storage), and (4) anatomy and physiology of male and female reproduction.

Designed for technicians working in reproduction research. Give examination and present with certificate of completion.

D. Conditions that indicate objectives have been achieved (indicators).

1. Measurements have been initiated which will contribute to estimates.
2. No work initiated.
3. No work initiated.

4. Graduate program for one EMBRAPA scientist planned; short courses and seminars planned for late summer, 1980.

5. No work initiated.

6. No work Initiated.

E. Assumptions that objectives can be met (externalities outside control of P.I.).

1. AID funds were delayed and completion of MOU delayed.

2. All assumed resources, cooperation and personnel capabilities were fulfilled.

3. All assumed resources, cooperation and personnel capabilities were fulfilled.

4. All assumed resources, cooperation and personnel capabilities were fulfilled.

5 All assumed resources, cooperation and personnel capabilities were fulfilled.

F. Assumptions that achieving objectives will solve problem.

1. Work on Objective 1 has been initiated with indications that it can be completed and will help solve the problem.

2. A graduate training program has been planned and short courses have been scheduled indicating resources and cooperation is available and that successful programs can be completed.

3. Work on Objective 6 has been undertaken with assurance that it will be successful.

G. Outputs of project.

Objective 1. (Research under this objective relates to Objective 1 and 2 of the overall proposal.)

(a) A visit was made to Brazil in February, 1980 by Foote and Nelson during which a review of research planned or underway by CNPCOT, EMBRAPA, related to

reproduction in both the male and female was made. Several aspects of research dealing with the female already underway have been expanded or new research undertaken to initiate cooperative efforts between CNPCOT and Utah SR-CRSP reproduction component. These include: (b) effects of time of breeding and lambing during the wet and dry season on reproduction and lamb production performance of ewe. (c) Characterization (reproduction and related traits) of breeds of hair sheep (SRD,) and goats (SRD, Moroto, Moxoto, Caninde, Repartida, Anglo Nubian, Buhj) which are indigenous or introduced in northeast Brazil. (d) Reproduction capabilities of selected genotypes of goats in northeast Brazil. This research will serve as the dissertation research for the graduate program for Aurino A. Simplicio. Preliminary research is now underway comparing the SRD, Maroto, Moxoto under two levels of management. Detailed measurements of reproduction are being made. Breed characterization of reproduction and reproduction related traits are also included as a part of (c) above. (More information is provided in the attached revised Phase III Work Plan for northeast Brazil.)

Objectives 2 and 3. (Research under these objectives relate to Objective 2 in the overall proposal.) No research under these objectives were scheduled or conducted during the first year.

Objective 4. (Work under this objective relates to Objectives 1 and 2 in the overall objective.) Work on this objective was undertaken with general review of data collected from previous and current research conducted on reproduction and reproduction related areas.

Objective 5. (Work under this objective relates to Objective 5 of the overall proposal.) (a) A laparotomy procedure to observe the reproductive tract in sheep and goats was taught to Dr. Aurino A. Simplicio. This included the construction of a laparotomy cradle for contraining the animal under local

anesthesia, the surgical procedure, observations to be made of the reproductive tract, and post surgery care. This research technique is having immediate application in research underway as well as research planned for the future. (b) A training program, requested by CNPCOT, EMBRAPA has been planned for CNPCOT personnel with phases to be conducted during each of three visits planned for Brazil during the second year of the project (June 1, 1980 to September 30, 1981). The training programs include short courses for technicians working with reproduction research entitled (1) Management of sheep and goats for reproduction studies, (2) Research procedures and data collection for reproduction. (c) These training programs will be conducted jointly by scientists from CNPCOT and Utah State University and Cal Poly. Seminars have been planned for professional staff reporting research conducted at Utah and Cal Poly and in Brazil and discussing pertinent topics dealing with reproduction. (d) A Ph.D. program has been planned for Dr. Aurino A. Simplicio. Research for his dissertation entitled Reproduction capabilities of selected genotypes of goats in northeast Brazil, will be conducted in Brazil. Preliminary aspects of this research have been initiated and his dissertation research will begin in July, 1980. Course work and special training programs to be taken at USU has been outlined.

Objective 6. (Work under this objective relates to Objective 3 in the overall proposal.) Information already available in Brazil is being placed on the data forms and additional information will be added as it is generated.

H. Technical feasibility.

Preliminary involvement in cooperative program indicates that the project is technically feasible.

I. Financial plan.

Activities were planned so that work in both Brazil and Peru could be accomplished during one trip which substantially reduces travel costs.

Expenditures were listed through February 29 and reflect only a portion of the costs. Also very few costs were incurred in Brazil during the current reporting

period because of delay in initiating program. Costs for Brazil are itemized and included in the annual overall project report for USU.

Time phase and scope of work.

Work on Objectives 1, 4, 5 and 6 have been initiated as scheduled. Work on Objective 2 is scheduled for FY 1981 and Objective 3 is scheduled for FY 1982.

Project monitoring.

1. Work undertaken has been under supervision of P.I. and cooperating foreign work site scientists.

2 and 3. Not yet applicable.

Annual review and planning process.

1. Information available will be revised as outlined.

2 and 3. Too early to effectively apply.

Annual Report for Peru

For period October 1, 1978 to May 30, 1980

US/AID Titel XII Small Ruminant-CRSP

Improving Female Reproduction Performance of Small Ruminants in Least Developed Countries

Subgrantee: Utah State University

Personnel: Peru
Cesar Novoa, IVITA
Julio Sumar, IVITA
H. W. Vivanco, NAU
(coordinated through INIA)

Utah State University
Warren C. Foote

March 27, 1980

A. The problem.

Small ruminants in Peru include the new world cameloids as well as sheep and goats. Each species contributes in a unique way to resource utilization and the livestock industry of Peru and to other countries with areas of high altitude range lands. Under these conditions each species experiences low reproduction performance which contributes to the low production performance.

The constraints to increasing reproduction in these species, unique considerations, reproduction processes judged to be most limiting, and application of research results are outlined in the Phase III Work Plan for Peru.

B. Objectives.

No research was conducted during the first year but plans were made for research to be initiated in FY 81 under objectives 1, 2, 6 and 7. Objectives 1 and 3, Peru Phase III Work Plan relates to Objective 1 in the overall proposal, Objective 6 relates to Objective 5, and Objective 7 relates to Objective 3.

C. Project approach.

Work to be conducted by Utah State University on female reproduction and California State Polytechnic University on male reproduction has been combined into one fully integrated, cooperative effort. This will facilitate the conduct of the total reproduction programs at foreign work sites, minimize cost and optimize expertise. However, the two projects will be accounted for separately (i.e. annual reports and budget requests).

The methodology for research and related activities to achieve each objective is outlined in some detail in Phase III Work Plan. Selection and development of specific research projects and training programs were completed.

D. Conditions that indicate objectives have been achieved (indicators).

The conditions listed are considered valid indicators but no research was initiated during the report period.

E. Assumptions that objectives can be achieved (externalities outside control of P.I.).

AID funding was delayed and problems with MOU further delayed initiation of programs.

Other assumptions were fulfilled.

F. Assumptions that meeting objectives will solve the problem.

Assumptions appear valid.

G. Outputs of project.

A visit was made to Peru in February 1980, by Foote and Nelson to discuss the possibility of a reproduction component (both male and female) in the CRSP. Significant areas for cooperative research and cooperating Peruvian scientists at NAU and IVITA were identified. At the request of INIA necessary information was submitted to them for inclusion of a reproduction component in the MOU authorizing SR-CRSP work in Peru. During the visit information required for the Phase III Work Plan was developed cooperatively.

Research was planned for sheep, cameloids and goats for initiation in the first two species (Objectives 1 and 2) during FY 80 of the project (see Phase III Work Plan).

Objective 6. (a) Training programs (short courses) requested by INIA have been planned cooperatively with scientists from NAU and IVITA and will be conducted during three visits to Peru during the 16 month period of June 1, 1980 to September 30, 1981. These programs will be for technicians, extension personnel, ministry personnel and others involved in work with reproduction. Topics planned include (1) Management of sheep and goats for reproduction studies and (2) Procedures and data collection for reproduction research. (b) Seminars have been planned for each visit to Peru. These will be presented by Peruvian scientists and scientists from USU and CSPU and will report research already conducted, results of research underway and selected topics dealing with reproduction. (c) Two Peruvian scientists involved in the SR-CRSP have been identified as potential graduate students.

Research for advanced degrees for Peruvian scientists will be conducted in Peru as a part of the CRSP research.

Technical feasibility.

Factors appear valid.

Financial plan.

Only travel funds were available. Activities were planned so that work in both Brazil and Peru could be accomplished during one trip which substantially decreases travel costs. Expenditures through February 29, are included in Annual overall project report for USU.

Time phase and scope of work.

Same as outlined in Phase III Work Plan.

Project monitoring.

Aspects of project will be maintained as outlined in Phase III Work Plan.

Annual review and planning process.

These procedures will be completed as outlined in Phase III Work Plan.

SMALL RUMINANT COLLABORATIVE RESEARCH PROGRAM (SR-CRSP)

TITLE XII

I. Face Sheet

Research Area: Reproduction

Report Title: Annual Report
October 1, 1979 - May 31, 1980

Sub-Grantee: California State Polytechnic University
Pomona, California 91768

Funds: $60,000

Principal Investigator: Edward A. Nelson

Title XII Cooperative Research Project
by California State Polytechnic University, Pomona

Summary of research and budgeting activities

First report period 1 October 1978 - 31 May 1980

March 29, 1980

Title: Improving reproductive capablility of small ruminants in L. D. C.'s with emphasis on male reproductive physiology.

Principal Investigator: E. A. Nelson
Other key personnel: M. J. Burrill, A. C. Christensen

	Funding Status Total Project	Contribution US/AID	Contribution Cal Poly	Percentage Matching
Oct. 1, 1978-Feb. 29, 1980	114,882	24,161	93,821	80%

Summary of Title XII supported activities of California State Polytechnic University for the period 1 October 1978 - 31 May 1980.

California State Polytechnic University has committed its available resources to support the Title XII Small Ruminant CRSP. The office and storage area of the wool laboratory were designated as laboratory areas and remodeled to facilitate research on semen collection, processing and storage. Equipment was purchased from non-Title XII funds to equip the laboratory with the supplies and equipment necessary to initiate research in the fall of 1978. A graduate student was supported from State funds and with faculty support, research was initiated on physiology of reproduction with male sheep and goats.

A new facility to house male goats was constructed from non-Title XII funds. Male sheep and goats were acquired with University funds. Title XII funds have only been used thus far to provide part of the feed for these animals.

Title XII funds are being used to pay some of the salaries of three faculty persons (E. A. Nelson, M. J. Burrill and A. C. Christensen); one graduate student (Erma L. Drebnis); one technician (T. Y. Lin); and some undergraduate student labor. In addition, glassware, reagents and other supplies were purchased to facilitate research at Cal Poly Pomona and Laurelwood Acres, Ripon, California.

Description of the problem:

Reproductive performance in the male as measured by libido, male to female ratios, life time productivity, fertilizing capacity and freezability of semen all contribute to the effect of small ruminant males on flock productivity. Male reproductive physiology work has been initiated at Cal Poly and cooperating U.S. locations as well as in Northeastern Brazil (CNPCOT, EMBRAPA). Initial planning and cooperative agreements have been established in Peru (INIA-NAU-IVITA).

Objectives:

Some work was initiated on all four objectives. A fifth objective was added to provide requested training programs. The objectives remain as established in the project proposal submitted July 1979 with the addition of the following objective: to provide the opportunity for qualified scientists and technicians to continue their formal education or obtain specialized training.

Progress toward satisfying the objectives:

Objective 1. "To develop methods to improve the capability of collecting, processing, storing and transporting sheep and goat semen to selected L. D. C. locations. a) Research to develop techniques relative to washing semen before freezing to determine if it increases livability."

Extensive literature review has been made using computerized data banks and University inter-library loans. Through the cooperation efforts of W. C. Foote of the International Sheep and Goat Institute, Utah State University, Logan, Utah, we were able to contact J. Corteel of France and get his program for washing and freezing goat semen. In addition, a modification of Corteel's method was obtained from Mr. Claude Guillard of Switzerland. These programs,

in addition to modifications suggested in the literature, have been under investigation at the Cal Poly University Small Ruminant Research Center for 18 months. Some preliminary results have been recorded. Enclosed are abstracts of five research papers that are going to be presented at the Western Section ASAS Meetings in July 1980. A master's thesis is being finalized and will be appended to this report when it is available in June 1980.

Studies are continuing in the collection, processing and storage of semen. The effectiveness of the semen processing techniques is being tested by the insemination of both does and ewes. In addition, in our cooperative research project with Laurelwood Acres, University of Nevada, and Utah State University, we are inseminating one-half of the does synchronized for out-of-season matings. Of 50 does inseminated in April and May of 1979 with semen frozen in December 1978, 6 kidded producing 11 kids as compared to 17 does kidding and producing 41 kids from natural service.

Objective 1b. "Cooperate with Utah State University to develop procedures to facilitate the importation of germ plasm." (See Utah State Objective 4.)

W. C. Foote, Utah State University, has developed a research project with the Regional Health and Quarantine Station, Mission, Texas, to determine if scrapie is transmitted through the gamete (female initially and later male). If it is not transmitted, there is a possibility of using germ plasm as a means of importing exotic genotypes into the United States. The perfection of freezing techniques for sheep and goat semen along with the knowledge of disease transmission will allow a greater latitude in the movement of germ plasma to or from the United States. This project is now underway with Utah State working on the female and Cal Poly working cooperatively on male reproduction. Semen

has been collected and frozen (March 1980) from a ram that developed scrapie at the research center in Mission, Texas for later use in this research project.

Objective 2. "To measure the reproductive potential of selected small ruminant male genotypes in the United States and L. D. C.'s. To coordinate the relative importance of males as compared to females in solving reproductive problems in L. D. C.'s. These studies will be conducted in cooperation with Utah State University and other members of the consortium. a) Study selected genotypes at one or more locations."

Studies have been initiated at Cal Poly, Utah State and Laurelwood Acres to measure the reproductive potential of selected breeds of sheep and goats. Three breeds of sheep (Rambouillet, Suffolk, St. Croix) and five breeds of goats (Nubian, Saanin, Alpine, La Mancha and Togenburg) are being evaluated on the basis of puberty, seasonal variations in semen production, freezability of semen and variations in semen production as influenced by age.

A visit was made to EMBRAPA, CNPCOT Research Station, Sobral, Northeastern Brazil, in October 1979. A cooperative program between scientists at Sobral, Utah State University and Cal Poly was established.

A second visit was made to the Centro Nacional de Pesquisa de Caprinos e Ovinos Tropicanis (CNPCOT), Sobral, in February 1980 to develop cooperative programs and review on-going research in the area of reproductive physiology. The following objectives were accomplished:

1. Research was initiated on reproductive characteristics of Somali Sheep for one year, as a result of the visit in October 1979. Various measurements of testicles, body size and development, libido and semen characteristics are being taken.

2. The new semen research laboratory developed by CNPCOT is to

receive additional necessary equipment to expedite semen research more efficiently through Title XII funds as soon as the MOU has been signed.

3. Discussions regarding other research projects dealing with reproduction were initiated during the visits at CNPCOT and a mechanism for communication with scientists at Sobral was established. Review of these projects will be on-going during the effective period of our cooperative research effort.

A visit was made in February 1980 to INEA, Lima, Peru. During this visit a prospective cooperative research and training program was developed between scientists at INVITA and NAU in Peru, Utah State University and California State Polytechnic University, Pomona.

Objective 2b. "Cooperate with Utah State University in assessing the relative importance of male and female reproductive problems."

There are five cooperative programs that have been established to satisfy this objective. The cooperative studies on dairy goats at Laurelwood Acres with Utah State University, Laurelwood Acres, University of Nevada, Reno and Cal Poly Pomona are designed to modify the reproductive cycles of does to facilitate an increased amount of milk available for sale during the low milk-supply season. The influence of both males and females is being studied. A second study is being conducted at Utah State University on the influence of increased levels of light on the out-of-season mating of both female and male sheep. The third study is located at Cal Poly where frozen semen is being used to breed female sheep and goats. The fourth program that has been established is the cooperative studies with EMBRAPA scientists, Sobral, Brazil. Data are being collected on both male and female reproductive patterns. The fifth program has been established in Peru where reproductive performance in wool sheep and cameloids will be studies.

Objective 2c. "Cooperate with University of California, Davis, in conducting a progeny testing program for dairy goats."

This program is being initiated. Scientists at UC Davis have identified one buck to have semen collected for use in progeny testing. Cal Poly personnel have collected, processed and frozen semen for this project. Several private owners in the Southern California area have offered to cooperate in this effort to initiate a progeny testing program.

Objective 3. "To measure and examine seasonality and other related responses to the environment as they effect the reproductive ability of male sheep and goats.

a. Measure reproductive performance of selected genotypes for at least three years at different locations."

Studies to measure the seasonal cyclic reproductive activities of male sheep and goats have been initiated at Cal Poly. Rams of three different breeds of sheep (Rambouillet, Suffolk and St. Croix) are being collected on a semi-weekly basis and this will be continued to determine the cyclic reproductive patterns in male sheep. Five breeds of goats (Nubian, Saanen, Alpine, La Mancha, and Togenberg) are also being collected to measure the seasonal cyclic patterns of male goats.

In another related study raw jojoba meal has been fed to growing ram lambs for a five-month period to estimate the effect of a toxic substance in the meal on the reproductive patterns of growing male sheep.

The cooperative studies at Utah State University, Laurelwood Acres and at two foreign sites (Brazil and Peru) will also provide information relative to this objective.

Objective 3b. "Modify the environment and measure reproductive performance, i.e., level of nutrition, light-to-dark ratios, etc."

The studies outlined under objective 3a will provide information on this objective.

Objective 3c. "Develop management procedures to facilitate high levels of reproductive capacity of males."

Data now being collected will provide the information necessary to develop these programs and recommendations.

Objective 4. "Cooperate with Utah State University to establish a computerized data bank of valid reproductive information on sheep and goats from varied genetic sources and environments, world-wide. (Same as Utah State objective 3.)

A data collection form has been developed (Utah State University with cooperation from Cal Poly University). This form has been sent to selected individuals requesting information about breeds of sheep and goats. In addition, forms were taken to scientists at CNPCOT, Sobral, Brazil; Lima, Peru, and Asuncion, Paraguay with a request to complete as much information as is presently available and return these data to Utah State University. Names of additional appropriate scientists are being solicited to provide a wide source of information on as many genotypes as possible.

A copy of the data request form is attached.

Objective 5. Training component - SR/CRSP.

As requested by scientists and administrative personnel at CNPCOT, there has been a training objective emphasized as a part of overseas project proposals. This objective is a cooperative effort between Utah State University; California State Polytechnic University, Pomona and EMBRAPA. A graduate program is being

planned for Aurino Alves Simplico to assist him attain the Ph.D. degree. In addition, seminars are being planned to involve scientists of both the SR/CRSP and CNPCOT to provide for an effective exchange of information relating to reproduction from both the U.S. institutions and EMBRAPA. A series of short courses are being planned to train technicians and other appropriate personnel in managing small ruminants and conducting research as these practices relate to physiology of reproduction studies. Two such presentations were given during the February 1980 visit of E. A. Nelson and W. C. Foote to CNPCOT, Sobral. In addition, discussions were held relative to appropriate topics for future seminars and short courses. As a result of these discussions, plans are now being developed to present at least one seminar and one short course with supplementary technical demonstrations during the next visit of these two scientists (Nelson and Foote) during August 1980.

Conditions that indicate the objectives have been achieved.

a. Data has been collected on the reproductive characteristics of selected small ruminant males.

b. Technology to collect, process, evaluate and deep freeze small ruminant semen has been studied with five papers being presented at the Western Section of Animal Science (see attachments 1-5) at Hawaii in July, 1980.

c. Data collection forms have been developed and are in the process of being distributed to gather breed characteristic information for the data bank.

d. Short course material dealing with male reproductive physiology are being developed for use in L. D. C.'s.

Assumptions the objectives can be met.

a. Research is underway and data are being collected at Cal Poly University, Utah State University and Laurelwood Acres in the U.S. and at Sobral, Brazil. It is assumed that the MOU will be signed and that a research program will begin in Peru in the near future.

b. Personnel identified at each location (U.S. and overseas) will remain at their present location and cooperate in the research program as outlined.

Assumptions that achieving objectives will solve the problem.

Management plans developed using research data on male reproductive physiology will be implemented by producers in target L. D. C.'s.

Outputs of project.

1. Extenders for processing goat and sheep semen have been tested. Of those tested TEST-yolk seemed to maintain a higher quality of semen through deep freezing for both goats and sheep than other tested diluents.
2. Washing goat semen was shown to be important in maintaining quality. No advantage was shown for washing sheep semen.
3. The use of laboratory tests to estimate cell damage during processing and freezing have been undertaken. Glutamic oxalacetic transaminase (GOT) levels have been studied for sheep and goat semen at each processing stage during deep freezing.
4. Computerized data collection forms have been developed and are being distributed.

5. Cooperative research projects have been established with CNCPOT/ EMBRAPA. Tentative cooperative research has been outlined with Peruvian scientists.
6. Semen has been deep frozen from one dairy goat male identified by the breeding research study at the University of California, Davis for use in their dairy goat progney testing program.
7. Semen has been deep frozen from a ram having scrapie at Mission, Texas as a part of the effort to develop methods for the importation of small ruminants into the United States.

Technical Feasibility:

a) A semen research laboratory has been established at Cal Poly. Sheep and goat pens have been developed and target breeds of sheep and goats are in place.

b) Technical personnel have been hired and research studies are in progress.

c) Research scientists at both Cal Poly and Utah State are well trained for their respective research responsibilities.

d) Research scientists in both Brazil and Peru are committed to physiology of reproduction research. There are other technical personnel available at each research location.

Financial Plan:

Due to the delays encountered in the development of authorizing documents, funds used for the initiation and operation of the Cal Poly semen research studies indicate that the percentage contribution by Cal Poly is 80% of expenditures to date. Funds expended are shown both as that part of the authorized budget expended and as compared to the University contribution.

AID Budget Status
(2/29/80)

	BUDGET	EXPENDITURES	BALANCE IN BUDGET
alaries (regular)	23,412	6,274.58	17,137.42
alaries (student)	4,000	2,251.12	1,748.88
Subtotal	27,412	8,525.70	18,886.30
ringe benefits	4,987	1,316.33	3,670.67
upplies and expense	5,700	734.05	4,965.95
eed		1,500.00	< 1,500.00 >
quipment	2,500	584.00	1,916.00
nternational travel	4,200	4,512.00	< 312.00 >
omestic travel	4,300	2,432 00	1,868.00
irect costs	-	-	-
isc.	2,901	379.07	2,521.93
ndirect costs	8,000	4,177.59	3,822.41
Total	60,000	24,166.36	35,839.04

Budget expended October 1, 1978 to February 29, 1980

	AID		CONTRIBUTION	
	CAL POLY	OVERSEAS	CAL POLY	TOTAL
Salaries				
Scientists (regular)	3,275	3,000	25,052	31,327
Staff			8,054	8,054
Student	2,251		6,600	8,851
Subtotal	5,526	3,000	39,706	48,232
Fringe benefits	596	720	7,374	8,690
Supplies & expense	734		2,871	3,605
Feed	1,500		3,100	4,600
Equipment	584		18,491	19,075
International travel	4,512		750	5,262
Domestic travel	2,432		1,623	4,055
Miscellaneous	379			672
Indirect costs	4,178		19,456	23,634
Total	20,441	3,720	93,821	117,825
		24,161		80%

Time phase and scope of work

1. Breeds have been identified for initial research phase at U. S. institutions and in Northeastern Brazil.
2. Studies have been initiated in semen research at Cal Poly, Laurelwood Acres, Mission, Texas and CNPCOT/EMBRAPA.
3. Computerized data bank forms have been developed and are being distributed.

Project monitoring

1. Three visits to our research facility have been made by W. C. Foote as a part of developing our cooperative project.
2. Two visits have been made by the PI (Nelson) to Northeastern Brazil and one to Lima, Peru.
3. Detailed records are being kept for review by PI's, auditors and other persons.
4. Other standard procedures are being followed.

Annual review and planning processes

1. Data from research has been included.
2. Expenditures are available for audit.
3. Project plans for June 1, 1980 - September 30, 1981 have been developed.

DATA FORM

Description, adaptation, and reproduction and production capabilities of sheep and goats

): International Sheep and Goat Institute, Utah State University, Logan, Utah 84322

urce of information

me _____

ganization _____

dress _____

lephone _____

ckground and training of person supplying information (attach sheet if necessary)

_____

_____

_____

urce of information (personal observations, records from private producers, extension or perimental work, etc.) _____

_____

_____

Origin of genotype

Specie - Sheep _____ Goat _____ Others_____ (please list)

Name or names of genotype (breed, etc.) _____

Country _____ Area in country _____

Estimated date of origin _____

Purity of genotype being reported - Pure _____ Mixed _____

Genetic origin (parent or ancestral genotypes) _____

_____ Unknown _____

Physical description

a. Horns: Description or drawing of horn

Male Horns_____No horns_____Scurs_____

Female Horns_____No horns_____Scurs_____

Color (briefly describe): _____

_____

c. Tail Type: (check most appropriate line)

	Tail length		
	Long	Medium	Short
Thin tail	_____	_____	_____
Fat tail	_____	_____	_____
Fat rump	_____	_____	_____

Is tail usually removed (docked)? Yes _____ No _____

b. Size:

Body weight (kg)

Birth Male: Average _____ Range _____ Unknown ____

Female: Average _____ Range _____ Unknown ____

Mature Male: Average _____ Range _____ Unknown ____

Female: Average _____ Range _____ Unknown ____

Height at Withers (cm)

Mature Male: Average _____ Range _____ Unknown ____

Female: Average _____ Range _____ Unknown ____

d. What are strongest production traits? _____

_____

e. Length of life (years) Average _____ Range _____ Unknown ____

Reproduction traits:

a. Female

Length of estrous cycle (days) Average _____ Range _____ Unknown ____

Number of months females show estrous cycles _____

Month estrous cycles begin _____

Month estrous cycles end _____

Parturition interval (months between births)

Average _____ Range _____ Unknown ____

Interval from parturition to first estrus (days) (do not include anestrous season)

Average _____ Range _____ Unknown ____

Age at puberty (months) _____ Average _____ Range _____ Unknown ____

Ovulation rate _____ Average _____ Range _____ Unknown ____

Lambing or kidding rate _____ Average _____ Range _____ Unknown ____

Mothering ability (care of young)

Excellent ____ Good ____ Fair ____ Poor ____ Unknown ____

Length of reproductive life (no. of years from first to last parturition)

Average _____ Range _____ Unknown ____

Proportion of females exposed for breeding that produce young (%) _____

Length of gestation (days)____Average _____ Range _____ Unknown ____

Male

Age at puberty (months) _____Average _____ Range _____ Unknown ____

Period of sexual activity during the year

Month initiated _____

Month terminated _____

Level of libido (sexual drive)

Excellent ____ Good ____ Fair ____ Poor ____ Unknown ____

Semen characterisitcs

Volume (ml) Average _____ Range _____ Unknown ____

Concentration (%) Average _____ Range _____ Unknown ____

Motility (%) Average _____ Range _____ Unknown ____

Length of reproductive life (years)

Average _____ Range _____ Unknown ____

Is artificial insemination practiced? Yes _____ No _____

If so, what percent? Fresh _____ Frozen _____

Behavior

Dominance among males High ____ Intermediate ____ Low ____ Unknown ____

Are males aggressive toward other genotypes of animals? Yes _____ No _____

If yes, please list genotype of animals _____

_____

oduction traits:

Growth patterns

Vigor at birth Excellent____ Good ____ Fair ____ Poor ____ Unknown ____

Rate of gain Average _____ Range _____ Unknown ____

Age when gain was measured Average _____ Range _____ Unknown ____

Were weights adjusted? Yes _____ No _____

If yes, how: _____

Efficiency (kg of feed/kg of gain)

Average _____ Range _____ Unknown ____

Type of ration on which feed efficiency was measured _____

_____

Meat production

Age at slaughter (months) Average _____ Range _____ Unknown ____

Live weight at slaughter (kg) Average _____ Range _____ Unknown ____

Carcass weight (without head, feet or pelt) (kg)

Average _____ Range _____ Unknown ____

Fat thickness over 12th or 13th rib (cm)

Average _____ Range _____ Unknown ____

Loin eye (longissimis dorsi) area (cm^2)

Average _____ Range _____ Unknown ____

Carcass composition

Fat (%) Average _____ Range _____ Unknown ____

Lean (%) Average _____ Range _____ Unknown ____

Bone (%) Average _____ Range _____ Unknown ____

Kidney fat (%) Average _____ Range _____ Unknown ____

Melting point of fat (degrees centigrade)

Average _____ Range _____ Unknown ____

Fiber

Type of fiber Wool ____ Hair ____ Mohair ____ Cashmere ____ Other ____

Is fiber removed from body? Yes _____ No _____

If so, by natural shedding _____ mechanically _____

Major use of fiber (list in order of importance)

1. _____ 2. _____ 3 _____

Weight of grease fleece per year (kgs)

Average _____ Range _____ Unknown ___

Staple length (cm) Average _____ Range _____ Unknown ___

Grade (fiber diameter) Average _____ Range _____ Unknown ___

Percent yield Average _____ Range _____ Unknown ___

Wool classification Long _____ Fine _____ Coarse _____

Color (describe) _____

d. Milk

Is milk used for human consumption? Yes _____ No _____ Occasionally _____

If so:

Number of times milked per day _____

Kilograms of milk produced daily

Average _____ Range _____ Unknown ___

Milk composition

Water content (%) Average _____ Range _____ Unknown ___

Butterfat content (%) Average _____ Range _____ Unknown ___

Lactose content (%) Average _____ Range _____ Unknown ___

Total protein content (%)

Average _____ Range _____ Unknown ___

Length of lactation period (days)

Average _____ Range _____ Unknown ___

Environment/management systems involved:

Feeding habits Browsers _____ Grazers _____ Both _____ Unknown ___

Areas/conditions where most commonly managed

High Altitudes ___ Low Altitudes ___ Both ___ Unknown ___

Arid regions ___ Wet regions ___ Both ___ Unknown ___

Cold temperatures ___ Hot temperatures ___ Intermediat

temperatures ___ All temperatures ___ Unknown ___

Intensive management ___ Extensive management ___

Both ___ Unknown ___

ial characteristics (gregariousness)

Excellent ____ Good ____ Fair ____ Poor ____ Unknown ____

ironment Information:

rce

Name and address of organization recording information _____

_____

Location of recording station _____

_____ _____

Years during which data were collected _____

Minimal temperatures (degrees celsius)		Maximal temperatures (degrees celsius)		Precipitation (cm)		Daylight length (hrs)	
Average	Range	Average	Range	Average	Range	Average	Range

ge: Altitude _____ Latitude _____ Longitude _____

Other information where available and appropriate (cytogenetic, hemoglobins, transferrins, unique management program, references of published information, etc.). Also please provide photographs including adult male and female where possible.

Annual Report (Brazil component)
for the period October 1, 1978 to May 30, 1980
US/AID Title XII Small Ruminant CRSP

Improving reproductive capability of small ruminants in L.D.C.'s with emphasis on male reproductive physiology.

Submitted by

California State Polytechnic University
Pomona, California
28 March, 1980

Description of problem

Reproductive performance in small ruminant males as measured by libido, female to male ratios, lifetime production, freezability and fertilizing capacity of semen contribute to the relative productivity of each flock or herd. The reproductive performance of indigenous breeds will be evaluated under natural and improved management, nutritional and health conditions and when necessary superior germ plasm will be introduced to increase their productivity.

Objectives

Research being conducted at CNPCOT/EMBRAPA corresponds to objectives 1, 2 and 3 of the overall proposal. Objective 4 of the overall proposal was pursued during the trip by Nelson and Foote to Sobral, Brazil in February, 1980. Objectives 3 and 4 of the phase III work plan for Brazil relating to (4) the accumulation, interpretation and dissemination of research data and the training component (3) were both implimented during the February, 1980 visit to Brazil.

Project approach

Two trips have been made to Sobral, Ceara, Northeastern Brazil. Co-operative research projects were identified to satisfy objectives 1 and 2 of the phase III work plan for Brazil. These include: effects of time of breeding and lambing during wet and dry seasons, male to female ratios, age and weight at puberty, evaluation of sexual behaviors of males in service and its relationship to clinical observations and sperm production of sheep and goats. Target breeds have been identified and a breed characterization program is underway. Breeds of goats included in the study include SRD, Marota, Moxoto, Carride, Repartida, Buhj, Moshatel, and Anglo Nubian. Four breeds of

hair sheep are being studied they include: Santa Inez, Samali, Moroto Nova and SRD.

Objective 3 - Phase III - Agreements have been established with other components of the CRSP Research team in Brazil to cooperate in the collection and evaluation of reproductive data. No information has been accumulated this project year.

Objective 4 - Phase III - Data collection forms have been distributed.

Objective 5 - Phase III - Short courses and seminars have been planned for the August 1980 trip to Brazil. Some instruction occurred during both of the previous trips to Brazil. A Brazilian scientist has been identified for graduate study at Utah State University. Brazilian scientists have requested that the reproductive component identify a graduate student that could spend a year in Brazil.

Conditions that objectives have been achieved

Estimates of reproductive potential of the various target breeds of sheep and goats will be available.

Management plans will have been developed coordinating recommendations of male reproduction with other components of the CRSP.

At least one short course and seminar will be held per year at CNPCOT/ EMBRAPA.

Assumptions that the objectives can be met are as follows:

A. The objectives listed have been discussed with CNPCOT/EMBRAPA scientists and administrative personnel. Their input was requested and obtained.

The objectives are in harmony with the overall objectives of the CNP Ovino, Caprino Research Center, Sobral, Ceara, Brazil. Experimental animals are now assigned to ongoing reproductive studies. Space and available animals make it necessary to correlate the studies to other related breeding, nutrition, disease control and seasonal studies. The need to defer specific phases of these studies to subsequent fiscal years will not endanger the success of the project. Cooperative complementary studies with other Project Investigators of the CRSP have been discussed and pursued.

B. Computerization of records will occur, thus allowing for the rapid recall and analysis of experimental data.

C. Facilities, including a physiology of reproduction laboratory now under construction, will be completed and equipment should be on hand by the start of the next fiscal year. Augmentation of equipment will occur through Title XII resources.

Assumptions that meeting the objectives will solve the problem.

A. The research data and production plans will be used by sheep and goat producers, particularly the underprivileged owners who do not have adequate land ownership.

B. The various programs of the CRSP are able to provide adequate data relating to nutrition and disease control.

Project outputs and indicators that objectives have been achieved.

A. Reproductive data will have been collected, evaluated and related to harvested kg of young per female bred.

B. Management plans will have been developed for use by producers at various levels of production potential.

C. Outstanding male and female sheep and goats will be identified and available for use by the producers of Northeastern Brazil.

D. At least one EMBRAPA scientist will be assisted in attaining an advanced degree (Ph.D.). Short courses will be held (one per year) for training EMBRAPA scientists and disseminating acquired data and recommendations.

E. Papers will have been published summarizing the research data obtained.

Technical Feasibility

A. The Scientists involved with this project are well-trained. The facilities at the U. S. universities and at EMBRAPA (Sobral) are adequate for the research planned. The cooperative effort with EMBRAPA has the full support of administrators at U. S. universities and EMBRAPA (Sobral) CNP Ovino and Caprino Research Center.

B. Technical assistance is available at each of the above locations to facilitate the conduct of the experimental program.

Inputs

Personnel:

EMBRAPA

Aurino Alves Simplicio--scientist--other technical personnel.

United States Universities

W. C. Foote, Utah State University, Logan, Utah.

E. A. Nelson, California State Polytechnic University, Pomona, California.

Various technical personnel at both U. S. universities.

Financial Plan

Expenditures of funds for the Brazilian site have been limited to two trips by the PI. The total International travel for both overseas sites was $4,512. PI time assigned for approximately five weeks amounted to $3,720. The total $8,232 should be divided 2/3 to Brazil and 1/3 to Peru.

Total expended in Brazil $8,232 x .67 = $5515. This does not include time, effort and travel expended in the U. S. in support of the Brazilian component of the CRSP.

Time Phase Scope of Work

Two visits have been made - cooperative research has been initiated to fulfill the objectives.

Project monitoring

Standard procedures have been followed.

Annual Review and Planning Process

Standard procedures have been followed as outlined in the overall project plan.

Annual Report (Peru Component)
for the period October 1, 1978 to May 30, 1980
US/AID TITLE XII Small Ruminant CRSP

Improving reproductive capability of small ruminants in L.D.C.'s with emphasis on male reproductive physiology.

Submitted by

California State Polytechnic University
Pomona, California
28 March, 1980

Statement of the Problem - (See attached Phase III Work Plan)

Low reproductive performance and early termination of reproductive life of male sheep contributes to overall low productivity of sheep in Peru. A major limiting factor in developing genetic-management and related programs to improve production is the lack of information on the reproductive capability of sheep and goats as influenced by the genotypes available and the environment in Peru.

Reproductive performance in cameloids is very low. Many studies have been conducted but ovulation delay following copulation can result in a marked reduction in sperm fertility. The identification of factors which limit the reproductive process is necessary for the development of procedures to increase reproductive performance of cameloids under the existing environmental conditions in Peru.

Objectives:

They are in harmony with the objectives of the overall Reproduction Physiology project plan. There is a need to measure the reproductive capabilities of small ruminant males including cameloids in Peru. Also needed are studies to develop management programs consistent with available resources to increase the reproductive efficiency of small ruminant and cameloid males in Peru. Assistance will be given the Peruvian scientists, technicians and administrative personnel to increase their capabilities in reproductive physiology research.

Project Approach

Plans have been developed and discussed with cooperating scientists and administrators of INIA, IVITA and NAU.

Conditions that indicate objectives have been achieved

Management plans to improve male reproductive performance consistent with available resources will be developed and tested.

At least one short course per year will be presented in Peru.

Assumptions that objectives can be met.

The above objectives were discussed with both the scientists and responsible administrators at INIA, INVITA and NAU. As outlined they agree with the objectives of these agencies relative to improving the productivity of small ruminants including cameloids in Peru.

Animals are available from both research agencies as well as from regional cooperative flocks in the area. Research facilities in the State of Puno (La Raya station) have been identified where livestock handling and laboratory space is available. Augmentation of research facilities and equipment from Title XII funds is contemplated.

Assumptions that meeting objectives will solve the problem

The resolution of problems related to low productivity are complex. Basic information regarding reproductive parameters will permit more meaningful management recommendations to be made by scientists. Correlation between segments of the CRSP and phases of the management cycle will be more meaningful when cause and effect relationships have been established for basic reproductive characteristics.

It is also assumed that recommended management programs would be accepted by small ruminant producers in Peru.

Project outputs and indicators that objectives have been achieved

No data has yet been collected for inclusion in this report.

Technical feasibility

The scientists involved with this project are well-trained. The facilities at the U. S. universities are adequate for the research planned. The proposed site (La Raya Station) in the State of Puno has padlocks and other physical facilities that can be modified and used for this project.

Technical assistance is available at all the above locations to facilitate conduct of experimental procedures.

Inputs

Personnel·

Peru: La Molina (NAU)--H. William Vivanco

IVITA (San Marios University, Veterinary Institute)--Cesar Nova, Julio Sumar

U. S. Universities: W. C. Foote, Utah State University, Logan, Utah; E. A. Nelson, California State Polytechnic University, Pomona, California.

Various technical personnel at both U. S. universities.

Financial Plan

One trip was made by the PI (Nelson) to Lima, Peru. This trip was in conjunction with the second trip to Brazil. The estimated cost of this trip is $2717. (see annual report Brazil Component)

Time phase and scope of work

One planning trip has been made. Phase III work plans have been developed (see attached document)

Project monitoring

Standard procedures have been followed.

Annual Review and Planning Process

Standard procedures have been followed.

SMALL RUMINANT COLLABORATIVE RESEARCH PROGRAM (SR-CRSP)

TITLE XII

I. Face Sheet

Research Area: Animal Health

Report Title: Annual Report
October 1, 1978 - May 31, 1980

Sub-Grantee: University of California, Davis
Davis, California 95616

Funds: $196,145

Principal Investigator: Blaine McGowan

SMALL RUMINANT COLLABORATIVE RESEARCH PROGRAM (SR-CRSP)

TITLE XII

I. Face Sheet

Research Area: Animal Health

Report Title: Annual Report
October 1, 1978 - May 31, 1980

Sub-Grantee: Colorado State University
Fort Collins, Colorado 80523

Funds: $150,000

Principal Investigator: James DeMartini

Annual Report

1 October 1978 - 31 May 1980

SR-CRSP

Colorado State University

Principal Investigators:

C. V. Kimberling

L. H. Lauerman

J. DeMartini

Introduction

This progress report is related to the Animal Health component of CRSP small ruminants program in Peru, as described in the Phase III First Year Work Plan submitted in revised form on 15 February, 1980 by Colorado State University. The format of the report is to summarize the work performed related to each Phase III objective during the indicated time frame.

OBJECTIVES

PHASE III

First Year Work Plan

State Objectives	Action
1. Establish a small ruminant collaborative research program between Colorado State University scientists and Peruvian scientists.	1. A collaborative research program has been established between Peruvian scientists from IVITA and scientists from Colorado State University. This collaboration was mutually agreed upon during a visit to IVITA by Dean Robert Phemister, Prof. Arch Alexander, a member of the Board of Institution representatives, and Dr. Cleon V. Kimberling, principal investigator.
2. Review disease morbidity and mortality in the small ruminant population of Peru with consideration of the socioeconomic impact of these conditions on Peruvians who depend on small ruminants for food, fiber and cash income.	2. Disease mortality reports were reviewed at the IVITA stations of Huancayo, LaRaya and San Marcos plus the Tupac Amaru Sheep Station. Scientists at each of these locations were interviewed for disease prevalence and its economic impact on the small producer. Reports from the University Nac. M. San Marcos IVITA

State Objectives	Action
	such as the Enfermedades Infecciosas de Los Ovinos de La Sierra central del Peru were reviewed. A personal visit and study of the records at the Institute De Zoonosis E Investigacion was conducted to determine disease prevalence and possible preventive measures.
3. Improve the diagnostic capabilities for small ruminant diseases.	3. A survey of current diagnostic facilities, available equipment, personnel and financial support for diagnostic work was conducted during the August 1979 site visit. Diagnostic tests currently under development at CSU that can be applied to Peruvian livestock were identified and research on these tests was performed. These include tests for Clostridial toxins, B. ovis, Johne's disease, contagious ecthyma, mastitis and copper toxicity.
4. Following a review of the causes of morbidity and mortality in small ruminants, conduct further epizootiological studies to determine priorities for research consideration.	4. Chronic progressive pneumonia was identified as a major problem in Peru requiring further epizootiologic studies.

State Objective	Action
5. Develop new knowledge about immunologic reactions in small ruminants to selected viral and bacterial agents.	5. A Brucella ovis vaccine was produced and is currently under evaluation in clinical studies. An antitoxin was produced against alpha and enterotoxins of Clostridium perfringens type A and is being evaluated in a field study. Studies on cytotoxic responses of lymphocytes to virus-infected cells and the role of the macrophage in lymphocyte transformation in virus-infected sheep have been conducted.
6. Provide Peruvian scientists and other interested personnel with research findings through timely technical reports thus facilitating the dissemination of new knowledge in an understandable and meaningful fashion to the small ruminant producer.	6. No progress.
7. With currently available knowledge, assist the small holder and the principal investigators of CRSP in designing herd health programs to maximize production of small ruminants and cameloids.	7. No progress.

State objective	Action
8. Assist Peruvian scientists in the development of new diagnostic tests for internal parasites. (Liver flukes and others.)	8. Two Peruvian scientists have been identified to collaborate with CSU scientists in research activities and have been invited to spend time at various laboratories recieving training in research and diagnostic techniques.
9. Assist Peruvian scientists with evaluating new anthelmintics in the control of liver flukes and other internal parasites.	9. No progress.
10. Cooperate with the appropriate Peruvian regulatory agencies in identifying disease control policies which will aid in preventing diseases among the small ruminants.	10. No progress.
11. Establish a program whereby Peruvian scientists will visit CSU, and other laboratoratories such as National Animal Disease Laboratory as deemed necessary, for education and training.	11. Peruvian scientists have been identified to collaborate with CSU scientists in research activities and have been invited to spend time at various laboratories receiving training in research and diagnostic techniques.

State objective	Action
11. Continued. These visits will be of sufficient time and breadth to train the Peruvian scientist in research and diagnostic techniques.	
12. As the Title XII program continues we will strive to work on disease problems in the small ruminants that have a major socioeconmic impact on the Peruvian small holder.	12. During the period of 1 October 1978 - 31 May 1980 CSU scientists on the CR-CRSP have investigated: 1. Enterotoxemia due to Cl. perfringens type A prevelant in lambs. 2. Reproductive diseases due to B.ucella ovis. 3. Prevention of mastitis by treatment during the dry period. 4. Development of diagnostic techniques for diagnosing Johne's in sheep. 5. The effect of Vit. E on immune stimulation. 6. Colostral antibody transfer. 7. Diagnostic techniques in copper toxicity.

SMALL RUMINANT COLLABORATIVE RESEARCH PROGRAM (SR-CRSP)

TITLE XII

I. Face Sheet

Research Area: Animal Health

Report Title: Annual Report
October 1, 1978 - May 31, 1980

Sub-Grantee: Washington State University
Pullman, Washington 99164

Funds: $200,000

Principal Investigator: William G. Huber

Report of 01 Year Activities

2.(a) Description of Problem in Kenya

There is a shortage of protein from animal sources in the diet of many small farmer families in Kenya. Their farm income is also small. The dual purpose goat would appear to be a resource which can address these two problems. Diseases, acute and chronic, however, are a limiting factor to achieving an economically viable goat husbandry program. While the native goat population is subject to disease ravages, this problem will be greatly exacerbated with the necessary introduction of foreign, high milk producing goats. Information on diseases of goats in Kenya, as well as in other parts of the world, is quite meager. This is particularly true when considering the geographic distribution of even such well defined infections as brucellosis. It is therefore necessary to determine the spectrum of disease conditions in the geographic areas where the Kenyan government wishes to increase emphasis on dual purpose goat husbandry. Such a survey is imperative as a first step in developing therapeutic and preventive veterinary programs to limit or prevent losses due to disease.

2.(b) Objectives of Project

1. The major objective during the 01 year has been to initiate the first stage of the survey to determine the prevalence and incidence of infectious, non-infectious and parasitic diseases in the goat populations of: 1) the general vicinity of the city of Kisumu in the western part of Kenya; and 2) areas to the south and north of the city of Mombasa in the coastal region of Kenya. To accomplish these objectives Washington State University (WSU) has secured the services of Dr. Paul Sayer, a veterinarian

with an excellent background in veterinary medicine as well as being thoroughly familiar with the country, its people and their major language, Swahili. Dr. Sayer's responsibilities on this project are stated in Appendix B and a copy of his curriculum vitae is also included in this report.

2. Work with officials of the Ministry of Livestock Development to start the process of identifying training needs for veterinary personnel and making preliminary arrangements for study at Washington State University.

2.(c) Project Approach

Objective One:

The "Methods" described in Appendix A, Objective One, of the WSU Plan of Work for Year One have been followed with the following changes:

1) After consultation with Kenyan government officials and other components of the Kenya SR-CRSP the two areas described under 2(b) will be used in the project rather than the three mentioned in our Plan of Work.

2) Initiation of the proposed program has been materially delayed because of unforeseen administrative problems at the Kenya site, hence only a start on the first time period of observation (Section A, Methods) has been initiated as stated in number three below.

3) Two hundred goats in the Busia area have been examined and tested during March and April 1980. This operation was conducted exactly as described in Methods (A), Appendix A of Objective One.

4) Part of the Laboratory Examination, Section C of the Methods has been completed (examination of fecal specimens and blood smears).

5) Abattior Examinations. This part of the program, described under (B) of Methods, has just been initiated in the region south of the city of Mombasa.

Objective Two:

This objective will be addressed following completion of the animal health survey.

Objective Three:

Washington State University professionals are working with other SR-CRSP professionals in the design and implementation of animal health aspects of their studies to be conducted at research station(s) designated by the Kenyan Ministry of Livestock Development. Field survey forms are being developed in collaboration with the economic component from Winrock International so that the economic impact of the animal health program can be quantified.

Objective Four:

1) Dr. Francis R. Abinanti has been in Kenya during the months of February and March conferring with Kenyan officials and other members of the SR-CRSP. A detailed report of his activities is given in Attachment A.

2) Have consulted with officials in Kenya's Ministry of Livestock Development, most specifically Dr. Chema, Director of Research, on manpower training needs. The following are the presently identified training areas for Kenyans:

a. Short-term technical training for individuals in newer diagnostic procedures and updating field investigation practices.

b. Training not to exceed the Master's degree level, specifically in the area of herd health. Academic training to be conducted at the College of Veterinary Medicine, Washington State University. Master's degree candidates will conduct their field research projects in Kenya during second year under the guidance of a

local professional. Master's degree to be conferred by Washington State University.

Objective Five:

This objective will be held in abeyance until a clearer picture develops on these needs.

Objective Six:

Delays in implementing the animal health survey will result in initiation of this objective no sooner than the end of the second year.

2.(d) Conditions Indicating Achievement of Objectives

1. Progress on this objective has only started. Two hundred goats in Busia district have been tested and information from this material is not yet developed.

2.(e) Assumptions on Achievement of Objectives

4.(a) Dr. Paul Sayer has been recruited in Kenya as the veterinarian to conduct the Washington State University (WSU) activities in that country. For details of his responsibilities see Appendix B.

4.(b) Dr. Richard Wescott and his staff at the WSU Veterinary College are developing and validating an ELISA test for serologic detection of livestock infected with fasciola. To expedite generation of this information a piece of equipment was purchased with funds from this project. Fascioliasis is a problem in ruminants in Kenya.

Dr. Dieter Burger of the WSU Veterinary College is conducting research on better methods of detecting contagious ecthyma (orf) virus infections in sheep and goats. One of his graduate students has been supported half-time on funds from this project to help with these studies.

This condition is diagnosed in sheep and goats in Kenya.

Dr. Francis Abinanti was in Kenya during February and March of 1980. Details of his activities are seen under 2(c), Attachment A.

5. In discussions with officials of the Kenyan Ministry of Livestock Development, most specifically Dr. Chema, Director of Research, three areas of training have so far been identified:

a. Short time training in specific new laboratory diagnostic procedures (example: ELISA test).

b. Short time training in clinical diagnostic procedures for persons now district veterinarians in Kenya.

c. The need to develop a herd health Master's degree program at WSU. Trainees to spend one year at WSU in academic training and the next year in Kenya conducting the research for their thesis.

2.(f) Assumptions that Achieving Objectives Will Solve Problems

Information not available at this stage of the project.

2.(g) Outputs of Project

Information not available at this stage of the project.

APPENDIX A

Progress Report of Activities in Kenya (Abinanti)
Months of February and March 1980

I arrived in Nairobi, Kenya on Saturday, February 2. The following week I had meetings with Dr. Walter Masiga, Director of the Veterinary Research Laboratories at Maguga to discuss his studies on contagious caprine pleuropneumonia (CCPP). During this week I also had discussions with Mr. Owiro, Deputy Chief of Livestock Development, and Dr. Chema, Director of Livestock Research. These latter meetings were in the company of the other SR-CRSP principal investigators.

Sunday, February 10, I traveled to Mombasa with other SR-CRSP members to investigate potential for conducting SR-CRSP activities in the coastal region. Upon returning from the coast all of the PIs but myself toured the western region of Kenya.

In the ensuing two weeks from February 10-29 the SR-CRSP PIs in Kenya had meetings amongst themselves to discuss strategy and had continuing meetings with the Ministry of Livestock Development personnel, exchanging views and attempting to get the Memorandum of Understanding signed. During this period Dr. Paul Sayer and I met with Mr. Charles Hash of U.S. AID to apprise him of our progress. We also had discussions with various professional personnel at the laboratories of the Division of Veterinary Services in Kabete, learning of resources available for laboratory support of field activities. I met with Dr. Chema, then Director of Laboratories for the Division of Veterinary Services, to arrive at a consensus on tests which would be needed in the health survey and for which they had laboratory competence. We also participated in a meeting with the ILCA group which is working here in Kenya with sheep and goats to see where the activities of the various groups working on sheep and goats interface.

On the 29th of February Dr. John Gorham arrived and that afternoon participated in a meeting with all of the principal investigators in Dr. Chema's office, where overall strategy, especially relating to locations of research stations where controlled applied research could be conducted, was discussed. Dr. Gorham also had conversations with Dr. Chema as well as with young veterinarians working on the UNDP sheep and goat project relative to their interest in training in the U.S.

Dr. Gorham and I then started on a tour to investigate sites where farm studies could be conducted. We were joined by Dr. Sayer at Navasha and visited the District Veterinary Laboratory at Kericho to learn what goat diseases were present in this area. We then proceeded to Kisumu at Lake Victoria, meeting there with the provincial livestock officer, Mr. Mburu; the provincial veterinary officer, Dr. Mwangi; and the district veterinary officer, Dr. Otiomo. Here we discussed the possibilities of farm studies in the area as well as investigating the possibilities of using the research farms at Mesana.

The next day, March 5, we met with district veterinary officer, Dr. Kimani, and the livestock officer at Busia. Here we visited the bomas where goats are being raised under zero and semi-zero grazing conditions, and we also looked at the proposed research station at Alupe next to the Uganda border. The following day we traveled to Kakamega, which is the provincial headquarters for this region, and there held discussions with the provincial livestock officer, Mr. Gacheru, and the provincial veterinary officer, Dr. Mwangi (no relation to the provincial veterinary officer in Kisumu). While we were able to make preliminary arrangements to identify cooperating flocks during this visit, these plans have had to be abandoned as the other SR-CRSP members did not want us to go to farms not selected

by all members of the consortium. We also made arrangements to use the laboratory facilities of the Division of Veterinary Services at Kakamega for conducting field investigations such as examining blood smears for blood parasites and processing specimens prior to shipping to Kabete. While there we also visited a diploma granting demonstration farm at Bukero where sheep and goats are kept and which would be a good place to demonstrate health delivery systems.

As the other PIs did not want Dr. Sayer and I to start active field studies, the time from our return from the west, March 8 to the 21st, was spent making contacts with the dean of the Veterinary School at the University of Nairobi, Dr. Gerald Mugera and various faculty members, such as Dr. J. M. Gathuma, who is the chairman of the Department of Public Health and Pharmacology and Toxicology. I also met a Dr. P.N. Nyaga, who is the virologist in the Department of Veterinary Microbiology and Pathology; also a Dr. James Kaminnola and a Dr. Peter Waiyaki who is head of the Department of Bacteriology. We acquainted them with the SR-CRSP program and WSU's role in the project. We also discussed opportunities for training. Dr. Sayer and I had extensive conversations with Dr. Chema, arriving at plan[illegible] having specific tests conducted on various specimens collected fro[illegible]s. This information is in the Phase III document.

We have also had ongoing discussions with Dr. S. Weghala, who is director of the bacteriology laboratories of the Division of Veterinary Services at Kabete on strategies for brucella investigations as well as for studies on control of contagious caprine pleuropneumonia (CCP). Ongoing with these activities we have been accumulating information on equipment and learning of the difficulties of securing these items in Kenya.

It was decided we would not harm the SR-CRSP if we tested the goats in the Busia district that are cooperating with the UNDP-FAO goat project. Hence, we proceeded to buy and collect materials needed and to make arrangements for helpers for handling the animals. Dr. Sayer made all of the local contacts and set specific dates for conducting the tests in the west. Dr. Sayer, the crew and myself left Nairobi on Monday, March 24, proceeding to Kericho where we borrowed equipment for conducting the blood studies and then proceeded to Kisumu. The next day we conducted thorough examinations and testing on 100 goats which were located on three different premises and housed in bomas. The bomas are structures which are fly-proof and therefore used to prevent trypanasome infection from the bite of tsete flies.

On Wednesday, March 26, we started back to Nairobi by way of Eldoret, where we met with the director of the Provincial Veterinary Laboratories, Dr. Barazza. He's also the veterinarian in charge in the Eldoret area. The reason for our visit was several-fold. First we wanted to inform him of the SR-CRSP program and our role in this project since one of the problems that we find is that most of these people have not been informed of the program. We find people are suspicious of us when we arrive, and if it were not for Dr. Sayer's background at the University and his fluency with their language, we would really be in trouble. We also wished to inform Dr. Barazza of our activities in the Busia district as it is part of his territory. We also discussed the goat diseases being seen at Eldoret Diagnostic Laboratory.

The next day, Thursday, provided insights into the amount of work and planning Dr. Sayer will have to do to conduct studies when he returns from the field. This will entail seeing that the blood specimens are processed, which took us all day for the hundred specimens. It is a tremendous amount of work and of course adequate equipment is not available.

Dr. Sayer had to examine the blood smears for blood parasites and make arrangements for the testing of the fecal specimens as well as for conducting serologic tests.

Dr. Sayer and I spent the week of March 31st in the Mombasa area. We first met with Dr. M. Fazil, Provincial Livestock and Veterinary Officer for this district. Dr. Fazil is very supportive of SR-CRSP activities and is especially anxious to further this program in his district. We therefore discussed with him personnel and laboratory support for field studies as well as possibilities for conducting an abbatoir survey. Dr. Sayer arranged manpower support through Dr. Fazil and visited small local slaughter establishments to enlist their cooperation for starting sampling of locally procured goats as a mechanism for developing immediate information on the prevalence of disease conditions in the areas surrounding the collecting stations. Here again Dr. Sayer's fluency with Swahili made contact with owners of these small slaughter establishments possible.

The week of April 14th Dr. Sayer returned to the Busia area to collect another 100 samples from goats in this region. Dr. Sayer will be overseeing the processing and testing of these specimens as well as returning to the Mombasa area to continue the survey at the local slaughtering establishments.

APPENDIX B

Dr. Paul Sayer's Responsibilities as WSU Small Ruminant CRSP Representative in Kenya

It will be Dr. Sayer's responsibility to:

1. Make contact with flocks selected by Drs. Fitzhugh, DeBoer and others, once they have made their farm selections.
2. Schedule visits for testing and for the conduct of field activities in general.
3. Establish and maintain liaison with the Ministry of Livestock Development in Nairobi as well as the provincial and district livestock and veterinary officers.
4. Work out all of the logistics for conducting field activities such as:
    a. Equipment needed (that which is available or which must be procured).
    b. Recruitment of personnel to conduct field activities.
    c. Arrange transportation, both for equipment, himself, and field personnel.
5. Effectively and efficiently conduct field testing of selected flocks of small ruminants.
6. Conduct examination of field-collected capillary tube and blood smears for presence of blood parasites.
7. To see that the field specimens get to the laboratory in Kabete or to other locations in Kenya for testing and for storage. This will mean

he will have to conduct liaison with the laboratory directors to assure that the various evaluations are carried out.

8. Conduct abattior survey and oversee testing of samples collected from this source.

9. Arrange and supervise data storage of field and laboratory data.

10. Arrange for retrieval of the computer information and to send this data on to Washington State University from the computers for evaluation by WSU staff.

11. Coordinate our health activities with those of the other SR-CRSP components.

12. Act as WSU representative for the design and the conduct of the health aspects of all of the collaborative activities, both in the field and in the research stations with the other CRSP components.

13. Work in consort with the WSU faculty in designing health delivery strategies and ensuring their implementation.

14. Implementing the health delivery services at the farm level, working with the farmers on these programs, as well as with district veterinary officers and livestock officers.

15. Providing expertise and implementing preventive and therapeutic programs for SR-CRSP-associated research projects.

16. Maintaining ongoing liaison with cooperating farms.

17. Being our liaison with the Ministry of Livestock Development and the lifeline to our programs at WSU.

18. Helping in the selection process for trainees and coordinating such details as travel arrangements, etc.