PN-ABS-479

SMALL RUMINANT

COLLABORATIVE RESEARCH SUPPORT PROGRAM

AND

RESEARCH INSTITUTE FOR ANIMAL PRODUCTION

INDONESIA

SUMMARY OF ACTIVITIES OF 1986/87

WORK PLANS 1987/88

PREPARED BY :

LUIS INIGUEZ, PROJECT LIAISON OFFICER
ANDI DJAJANEGARA, PROGRAM COORDINATOR

SR-CRSP

P.O. BOX 210

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PARTICIPANT INSTITUTIONS

INDONESIA

BALAI PENELITIAN TERNAK (BALITNAK)

U.S.A.

University of California, Davis	Animal Breeding
University of Missouri, Columbia	Sociology
North Carolina State University	Animal Nutrition
Winrock International	Economics

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Eric Bradford, Principal Investigator (UC Davis)
Luis Iniguez, SR-CRSP Resident Scientist (UC Davis)

Benny Gunawan, Co-PI (BPT)

Ismeth Inounu, BPT
A. Djoko Pitono, BPT
Bambang Setiadi, BPT
P. Sitorus, BPT
Subandriyo,BPT
Ketut Sutama, BPT
Bess Tiesnamurti, BPT
Endang Triwulanningsih, BPT
Sri Wening Handayani,BPT

II. SUMMARY OF 1986/87 ACTIVITIES

II.1. Title : FIRST EVALUATION OF VIRGIN ISLAND, SUMATRA AND F1 CROSSES IN NORTH SUMATRA

Presented by : A. Djoko Pitono

Data from the first crop of Sumatra (S) x Virgin Island (VI) and purebred lambs was analyzed. Virgin Island sheep averaged smaller litter size (1.09) compared to Sumatran carrying F1 (S x VI) or S lambs: 1.25 and 1.40, respectively. While no mortality was recorded among VI lambs only 88% of VI x S lambs and 58% of S lambs survived to weaning. VI ewes weaned an average of 11 kg of singles lamb weight while Sumatran ewes only 8 (those carrying F1 lambs) and 6 kg (those carrying pure S lambs).

II.2. Title : EFFECTS OF HEAT STRESS OF HAIR SHEEP, LOCAL SHEEP AND F1 CROSSES, UNDER SUB-HUMID TROPICAL CONDITION

Presented by : Sri Wening Handayani

Title : Research on heat budgets of hair sheep, Sumatran sheep and crosses is part of the studies on sheep adaptation in North Sumatra. Data collection on heat budgets started in August 1987. Heat budgets of weaned lambs of three genotypes grazing under rubber and of pregnant hair sheep and pregnant Sumatran ewes raised under confinement, were recorded during 24 and 12 days, respectively. The next measurements and samples were obtained:

a. physiological measurements: respiration, rectal temperature, coat surface temperature, skin temperature, and net radiation
b. physical measurements: wet and dry bulk temperatures, solar radiation and black globe temperature
c. 200 blood samples for T3 and T4 analysis

II.3. Title : ASPECTS ON THE GENETICS OF PROLIFICACY OF JAVANESE SHEEP

Presented by : Bess Tiesnamurti

New data from matings among JTT at the Cicadas sheep station, support the hypothesis of a major gene regulating the prolificacy in this population. Two new categories have been reclassified on the basis of this new information. Progeny test of possible carriers of the gene will require more number of ewes to be mated. Two new techniques: FSH level in ewe lambs and PMSG response of weaned lambs are in process to be tested. Preliminary results showed that carriers of the prolificacy gene could be identified at an earlier age.

II.4. Title : PERFORMANCE RESULTS IN THE CICADAS RESEARCH STATION

Presented by : Ismeth Inounu

Efforts were put to increase the productivity in the Cicadas sheep flock, seriously affected by irregular management and feeding due to budgetary cuts, personnel movement, etc. Due to this efforts, the 1987 lamb crop averaged 1.55 litter size, 9.88 kg of weaning weights and the mortality was dropped to 29%. All this values were superior to the projected targets and showed a net flock improvement regarding to previous 3 years.

II.5. Title : GENETIC VARIATION IN JAVANESE SHEEP POPULATION

Presented by : Ismeth Inounu

Sampling of individual blood samples started on May, 1987. Three hundred samples in East Java and 100 samples in Central Java were collected in different locations. Samples per location/province were defined to be not less than 20. Every sample consisted on a tube with hemolyzed blood and a tube with serum.

Dr. Budi Tangendjaja is presently adapting electrophretic techniques to analyze the samples. Visits to other two projected sampling sites will occur in the following months.

III. WORK PLAN 1987/88

Project No.	Short Title	Project Manager(s)
B 88-1	Inheritance of prolificacy in Javanese Sheep	Bess, Iniguez
B 88-2	FSH Levels and PMSG Response in Ewe Lambs	Bess
B 88-3	Performance of High and Low Prolificacy Lines	Ismeth
B 88-4	Effects of Wool on Heat Stress and Performance	Iniguez, Ismeth
B 88-5	Genetic Variation in Populations of Indonesian Sheep	Iniguez
B 88-6	Evaluation of Hair Sheep Grazing Under Rubber	Djoko
B 88-7	Environmental Physiology of Hair Sheep, Local Sheep and Crosses	Djoko
B 88-8	Behavior of Hair Sheep, Local Sheep and Crosses	Djoko
B 88-9	Improvement of Breeding Performance in OPP Flocks	Bambang
B 88-10	Nucleus Breeding Program for West Java Goats	Iniguez, Endang, Bambang

III.1. SR-CRSP Breeding Project B 88-1

Title: INHERITANCE OF PROLIFICACY IN JAVANESE SHEEP

Personnel: Bess Tiesnamurti, Luis Iniguez, Benny Gunawan, Ismeth Inounu, Eric Bradford, BPT and University of California

This project is a continuation of the Breeding project's long term investigation of the inheritance of prolificacy in Javanese sheep.

Objectives:

1. To obtain definitive evidence relative to the hypothesis that a gene (FJ) with large effect on ovulation rate is segregating in Javanese sheep.

2. To develop lines with high and moderate levels of prolificacy.

Planned Work

The general plan is to develop a high prolificacy line (assumed genotypes FJFJ and FJ+) and a low or moderate prolificacy line (++) in the nucleus breeding flock, and to progeny test rams from these lines in a tester (++) flock. The latter step is needed to provide definitive evidence on the major gene hypothesis.

Nucleus flock

To date the work has all been done at the Cicadas Station. Recurring feed shortages have resulted in very poor performance of the sheep with very few lambs successfully raised in 1985 or 1986. Survival of the 1987 lamb crop was improved, but 47 ewes died during the year, reducing seriously the size of the breeding flock. Currently due to the drought, no forage is being produced on the station.

Continuation of the project at a level which will provide useful research data requires a more abundant and reliable feed supply. Possibilities for achieving this include the following:

1) Installation of an irrigation system at Cicadas
2) Moving the flock to a location with an adequate feed supply and appropriate housing.

A decision on this question needs to be made and implemented promptly if the remaining animals in the Cicadas flock, on which we have two generations of information are not to be lost. The goal is a breeding flock of 120 to 150 well-managed, well-fed ewes.

Assuming an adequate feed supply, the ewes currently in the flock will lamb in January and February, and will be remated in May and June. Ewe lambs from the January/February lambings will be used in studies of FSH levels and response to PMSG (Project B 88-2), to determine similarities between this population and populations segregating for the Booroola (FB) gene.

Sheep from this flock are also scheduled to provide information on association between prolificacy and other performance traits (projects 88-3 and 88-4).

Test flock:

An adequate test of the hypothesis of a major gene for prolificacy will require progeny testing rams assumed to carry the gene (FJ FJ or FJ+) and those assumed not to carry it (++), by mating them to ++ ewes. If the hypothesis is correct, daughters of FJ - rams from ++ dams should be either all highly prolific (FJFJ sire, all FJ+ daughters) or 50% highly prolific (FJ+ sire, FJ+ and ++ daughters). Daughters from ++ sires should all have low to moderate prolificacy (singles or twins). Failure to observe such a segregation pattern, with adequate numbers of daughters (at least 20) per sire, would refute the hypothesis.

We have rams of the postulated genotypes in the Cicadas flock. However, the relatively small number of presumed ++ ewes in the flock is quite inadequate to progeny test the required numbers of rams.

It is therefore proposed to obtain a test flock of non-prolific ewes to use as testers for rams from the nucleus (Cicadas) flocks. The design would be as follows:

- at least 8 rams from the high prolificacy line ($F^{J}_{\ ?}$);
- at least 6 rams from the low prolificacy line (++?)

Each ram should be mated to 25 test ewes for each of two mating seasons. This should produce the desired 20-25 daughters per sire. All daughters would be examined for ovulation rate following PMSG injection prepuberally (< 6 months), and again at 12-15 months (when at least 90% have reached puberty), with the data examined for segregation as described above.

The schedule for this would depend on numbers of test ewes available. With 100 test ewes, 4 rams could be tested at one time, and with 2 mating seasons at 9-month intervals for each set of 4 rams, it would take approximately 5.1 years to complete the matings. With 200 ewes, 8 rams at a time could be tested, reducing the time to about 2.5 years, and with 400 ewes, the matings could be completed in 2 seasons (9 months). In each case gestation plus rearing the daughters to past puberty would add approximately another 20 months.

Test ewes might be maintained at Sei Putih or possibility arranged for a station such as Margawati. The project should only be undetaken where there is good assurance of control of the mating and management of the animals for the duration of the project.

Benefits of the research

Knowing for sure that a major gene is involved is essential to designing efficient breeding programs to control prolificacy of Indonesia sheep at desired levels. SR-CRSP and BPT have invested substantial time and money in collecting the data which suggested the major gene hypothesis, and with an additional investment of similar magnitude it should be possible to answer the question conclusively. If we do not do it now, the benefits of the research to date will not be realized, and a much larger investment will be required to re-initiate the work at a later date.

III.2.SR-CRSP BREEDING PROJECT B 88-2

Title: TEST FOR THE PRESENCE OF A BOOROOLA TYPE GENE IN JAVANESE SHEEP USING FSH LEVELS IN EWE LAMBS AND RESPONSE TO SUPEROVULATION USING PMSG

Personnel : Bess Tiesnamurti (BPT)
Luis Iniquez, Eric Bradford (SR-CRSP, University of California, Davis)

Introduction

Recent studies on the variability of litter size of Javanese thin-tail sheep (JTT) suggested the possibility of a major gene regulating this reproductive trait (Bradford, et al., 1986). The hypothesis states that ewes carrying the gene will consistently have high ovulation rate and, usually, litter size. On the other hand, those that do not carry the gene will be consistently lower in performance. A similar major gene has been reported in Merino sheep (Binden and Piper, 1982; Piper and Bindon, 1985).

One of the main difficulties in identifying and following the segregation of this major gene is to identify the carriers. The gene itself may not have complete penetrance and environmental fluctuation could eventually complicate the classifications, in spite of high estimates of repeatability and litter fertility size found in the JTT sheep population. Recently, some techniques have been devised for earlier detection of carriers of the Booroola gene. Bindon, et al. (1985) reported higher levels of FSH among 30-45 days lambs carrying the Booroola gene relative to non carriers. In addition, other researchers found higher ovulation rates of adult as well as prepubertal lambs among carriers of the gene F, after PMSG induction (Davis and Johnstone, 1985; Oldham, et al., 1984). Prompted by the necessity to identify, as early as possible, sires and dams carrying the F gene in the JTT sheep population of Cicadas, a two phase experiment is proposed in order to:

1. test the levels of FSH among lambs of the high (H) and low (L) prolificacy lines

2. test the ovulation responses to PMSG among prepubertal lambs classified as H and L.

The objective of this study is to obtain evidence to test the hypothesis of a single gene for ovulation rate in Javanese sheep by means of an early detection, in ewe lambs, of carriers of the gene.

Materials and Methods

FSH levels of preweaned lambs

Blood samples of 15-20 three weeks old ewe lambs from each of the high and low lines will be collected at weekly intervals, until the lambs will reach 8 weeks, to analyze FSH levels. Blood serum will be separated after centrifuging at 2500 rpm for 25 minutes, and stored at -70oC until assayed.

All samples will be collected from Javanese thin tail sheep at Cicadas Breeding Station (BPT). Samples will be obtained from two consecutive lamb crops: the first to be born January/February, 1987 and the second in January/February 1988. Rabbit anti FSH will be used in the assays.

2. Ovulation response to PMSG

Mean FSH concentrations and distributions for each week for the two lines will be compared. Means and distributions of values for each of the sire progeny groups will also be examined. Repeatability of the FSH levels will be calculated for samples from the first two weks, first three weeks, etc.

Superovulation with single intramuscular injection of PMSG will be induced among 5-6 months ewe lambs born in two consecutive years 1987 and 1988. A dosage of 300 i.u. PMSG will be used. Laparoscopies will be performed 3-4 days following the PMSG injection.

Duration

1. FSH levels of preweaned lambs: February-March, 1987
   January-February 1988

2. Ovulation response to PMSG: August, 1987
   July, 1988

Budget

		US$	
1. FSH assays:	500 samples a $2.50	= 1,250	
	tubes, venoject, etc	= 200	
	overtime	= 100	
			1,550
2. Response to PMSG:	PMSG	=	1,250
	overtime	=	50
	Total		2,100

References

1. Bindon, B.M. and L.R. Piper 1982. Genetic Segregation for Fecundity in Booroola Merino Sheep. Proc. World Congr. Sheep and Beef Cattle Breeding. I:395.

2. Bindon , B.M., L.R. Piper, L.J. Cummins, T.O Shea, M.A. Hillard, J.K.Finlay, D.M. Robertson. 1985. Repproductive Endocrinology of Prolific Sheep: Studies of the Booroola Merino. In: R.B. Land and D.W. Robinson, Eds. Genetics of Reproduction in Sheep, Butterworths, London, p. 217

3. Bradford, G.E., J.F. Quirke, P.Sitorus, Ismeth Inounu, Bess Tiesnamurti, F.L.Bell and D.T. Torell. 1986. Reproduction in Javanese Sheep: Evidence For a Gene With Large Effect on Ovulation Rate and Litter Size. J.Anim.Sci. 63:418-431.

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5. Kelly, R.W.,J.L.Owens,S.F. Crosbie,K.P. Mc Natty and N.Hudson. 1983. Influence of Booroola Merino Genotypes on the Responsiveness of Ewe to Pregnant Mare's serum Gonadotrophin, luteal tissue weights and peripheral progesterone concentrations. Anim. Repr. Sci. 6:199-207.

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III.3. SR-CRSP BREEDING PROJECT B 88-3

Title : PERFORMANCE EVALUATION OF HIGH AND LOW PROLIFICACY LINES IN JAVANESE SHEEP

Personnel : Luis Iniguez, Eric Bradford (SR-CRSP, University of California, Davis)
Ismeth Inounu, Bess Tiesnamurti (BPT)

Introduction

Levels of high and low prolificacy have been reported as a characteristic of Javanese sheep (Inounu, et al., 1984). Furthermore, studies on the genetic control of high prolificacy strongly substantiate the hypothesis of at least one mendelian gene regulating this reproductive trait (Bradford, et al., 1986). Genetic studies supporting this hypothesis were based on rigorous identification of pedigrees and lines that are classified as prolific (H) or non prolific (L), in the Cicadas BPT sheep research station.

It is not known, presently, the lifetime performance of highly prolific animals as the ones in the H line, particularly in contrast to the non prolific line (L).

This experiment is designed to evaluate the lifetime performance of H and L females subjected to minimal, if any, environmental effects in a way to test differences due to levels of prolificacy which are assumed here to be also due to genetic differences. Environmental variation is mainly attributed to nutritional causes which are intended to be minimized in this rather long term experiment. Traits that this evaluation will involve are: lamb growth, ages at different life events, reproductive performance and lamb survival.

Methods

This experiment will be conducted in the Cicadas Sheep Research Station (BPT). The 1987 lamb crop will be used for this experiment.

a) Growth

Forty weaned lambs of the 1987 crop will be allocated into two constrasting groups according to their prolificacy classification; i.e. groups H and L. Animals will be blocked by sex and will, as much as possible, be homogenous with regard to weight and litter size at weaning. Groups will be managed similarly and fed with a diet that guarantees increments of body

weight of at least 80 g/day. This diet was already tried on a monitored group of growing animals and formulated as a minimum cost diet with also minimum content of grass. Weights are to be taken on a weekly basis during 4 months after weaning.

b) Lifetime female performance

Evaluation of age at puberty will be done by using vasectomized rams to be introduced daily as the female lambs begin their fourth month of age.

Fifteen contemporary females each from groups H and L will be monitored for their lifetime production performance in terms of lambing intervals, total number and weight of lambs born and weaned.

Further evaluation of other production events will take place according to the management policies of the Cicadas sheep production system.

Duration

Starting : July, 1987
End : July, 1989 (selection of lifetime production performance will continue beyond this date).

Budget

Part of regular funds involving Cicadas management.

References

Bradford, G.E., J.F. Quirke, P. Sitorus, Ismeth Inounu, Boss Tiesnamurti, F.L. Bell, I.C. Fletcher and D.T. Torell. 1996. Reproduction in Javanese Sheep: Evidence for a Gene with Large Effect on Ovulation Rate and Litter Size. J. Anim. Sci. 63, 418-431.

Inounu, I., N.T. Thomas, P. Sitorus and Monte Bell. 1984. Lambing Characteristics of Javanese Thin-tail Ewes at Cicadas Experiment Station and Under Village Conditions. Working Paper No. 41. Oct. SR-CRSP/DPT, Bogor.

III.4. SR-CRSP BREEDING PROJECT B 88-4

Title : EFFECT OF WOOL ON HEAT STRESS AND PERFORMANCE IN JAVANESE SHEEP

Personnel : Luis Iniguez, Eric Bradford (SR-CRSP University of California)
Ismeth Inounu, Sri Wening Handayani (BPT)

Introduction

The question of whether the presence of wool is a disadvantage for total sheep production in humid tropics is a topic subjected to some research in Indonesia during the past 5 years (Inounu and Sitorus, 1983; Martawidjaja, et al., 1986, and Gatenby, et al., 1986). Intuitively wool covered animals should be favoured in cool environments while, conversely, hair animals may be subject to less environmental stress in hot and humid climates.

The present trial attempts to test the effect of wool cover on growing animals and on the lifetime performance of adult sheep. The evaluation intends to determine the influence of the wool cover after exclusion of environmental interference by providing standardized environmental conditions to permit good performance.

Methods

a) Growth

Thirty weaned lambs will be allocated to 2 experimental treatment groups, consisting each of 15 lambs. Female and male lambs will be used in this trial. Animals will be blocked by sex and will be chosen from single litters to avoid effect due to litter size and type of rearing until weaning. Animals in the first group will be shorn whenever necessary to maintain a minimum wool cover (< 2 cm), while animals in the second group will be kept unshorn, as the control group.

All lambs will receive similar treatment and will be fed with a diet that guarantees good levels of production/growth.

Weights are to be recorded every two weeks

Records of heat budgets will be performed and T3 and T4 profiles will also be obtained among all experiment animals.

b) Age at puberty and lifetime performance

Age at puberty will be evaluated among female lambs by using vasectomized rams as they reach an average age of 4 months.

Lifetime production of the ewe lambs in the growth/puberty study and of other ewes from the same lmb crop will be followed after they reach adult weights.

Lifetime production will be monitored on the basis of Cicadas sheep station management policies.

Budget

Temporary barn	Rp 60,000	US$ 36
Blood tubes	50,000	30
T3 & T4 Kits (200 samples)	500,000	300
Total	Rp 610,000	US$ 366

Duration

Starting : July, 1987
End : July, 1989, with continuation to get lifetime production

References

Inounu, I. and P. Sitorus. 1983. Hubungan Antara Wool Penutup Tubuh Induk dengan Berat Litter dan Total Berat Sapih pada Domba Ekor Tipis. Proc. Domba dan Kambing di Indonesia, Puslitbangnak. Badan Litbang Pertanian, Bogor, Indonesia.

Gatenby, R., Sri Wening H. and A. Djoko Pitono. 1996. Heat Budgets of Virgin Island and Sumatra Rams at Sungei Putih, North Sumatra. Working Paper No. 81, SR-CRSP/BPT, Bogor.

III.5. SR-CRSP BREEDING PROJECT B 88-5

Title : POPULATIONAL VARIATION FOR SOME GENETIC (BLOOD) TRAITS IN JAVANESE SHEEP

Personnel: Luis Iniguez, Eric Bradford (SR-CRSP Univ. of California, Davis)
Ismeth Inounu, Bess Tiesnamurti, Muryanto and Budi Tangendjaja (BPT)

Introduction

The characterization and evaluation of the potential productivity of Javanese sheep has involved, during the last decade, a common effort of the Indonesian Research Institute for Animal Production (BPT) and that of the Small Ruminant-Collaborative Research Support Program (SR-CRSP) (SR-CRSP report, 1985-1986). Remarkably a non seasonal breeding pattern associated with rather high prolificacy has been consistently recorded in the experimental population of this type of sheep kept at the Ciawian sheep research station and in monitored farm units (Bell and Inounu, 1987 and Subandriyo, et al., 1991).

These two traits offer interesting alternative to maximize, in the context of a multidisciplinary approach, the intensive production system that are also peculiar to Java. Attempts to determine the genetic control regulating production traits of Javanese sheep have been reported recently in the literature (Subandriyo, et al., 1985). The intrinsic basis of non-seasonality and its manipulation under accelerated intensive systems of lamb production is not very well known. Some evidence on the other hand has supported at least a working hypothesis to explain the genetic control of prolificacy (Bradford, et al., 1986).

Basically two well contrasted sheep populations apparently coexist in Java: the fat-tailed and thin-tailed sheep, prevalent in East Java and Central/West Java, respectively. Presently only phenotypic differences could help to characterize these two sheep types.

As part of the characterization and evaluation research, the present study attempts to search the populational genetic variation of Javanese sheep in different areas of the country. Specifically, the plan is to examine variation in haemoglobin (Hb) types as well as in some blood enzymes.

Methods

Collection of blood samples will be obtained in the following sites:

1) East Java (about 300 samples)
2) Central Java (" " ")
3) West Java (" " ")

Selection of animals will be at random in this flocks and based on availability of individuals. Two samples will be taken per animal: heparinized and serum samples. Hemolysis and serum separation will follow a traditional protocol. Phenotypic characteristics of the sampled animals will also be recorded.

Samples will be analyzed by electrophoretic techniques to characterize haemoglobin and protein serum patterns.

Duration

Starting : May 1987
End : May 1988

Budget

Trip East and Central Java (10 days per diem)	Rp. 1,270,000	US$ 770
Trip West Java	264,000	161
500 blood tubes	250,000	152
Distilled water, saline solution, ice	150,000	92
Chemicals for electrophoresis (approximate cost)	1,000,000	610
Fuel for vehicle	200,000	120
Total	Rp 3,134,000	US$ 1,905

References

Bell, Monte and Ismeth Inounu. 1982. Sheep Reproduction Parameters from Sixteen Farmers in Sukawargi Village, District of Garut, West Java. Working Paper No. 8, SR-CRSP/BPT, Bogor.

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Subandriyo, P. Sitorus, G.E. Bradford and R.L. Blackwell. 1985. Growth Characteristics of Indonesian Sheep. Working Paper No. 44. February 1985. Small Ruminant-CRSP/BPT, Bogor.

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III.6. SR-CRSP Breeding Project B 88-6

Title: EVALUATION OF ST. CROIX HAIR SHEEP, LOCAL AND F1 CROSSES GRAZED UNDER RUBBER TREES

Personnel: A. Djoko Pitono, Luis Iniguez, Manuel Sanchez and Eric Bradford

Objectives

To compare the growth, reproduction and total performance of imported hair sheep and hair sheep by local crossbreds with those of local North Sumatran sheep when grazed under rubber tress.

Work Plan

SBBPT/SP flock-Mating Plan

The plan is to produce contemporary hair sheep, F1's and local sheep in numbers adequate to evaluate their performance, as promptly as possible. The goal is to have at least 40 comparable ewes of each of the 3 types and to evaluate their viability, reproduction and lamb production through at least 3 lamb crops. Because of the limited number of pure hair sheep available numbers of that group will be less than the target figures for some time.

The numbers of ewes in each group on hand and expected are as follows (the imported ewes are not included because they are not comparable):

Birth group		St. Croix	F1	Local
I. Early 1987		6	16	20
II. Late 1987	(est.)	4	15	15
III. April/May 1988	(est.)	3	15	15
IV. Sept. 1988	(est.)	6	15	15

Groups I, II and IV (F1 and local) represent 3 consecutive lamb crops from the original group of local ewes assinged to the project; production of group 3 requires the addition of approximately 60 local ewes to be mated late 1987.

Groups I, II and III will provide the target numbers of F1 and local ewes for the initial phase of the project. They should be mated when the local ewes have reached a mean body weight of 13-14 kg, and at 8-month intervals therefore until all have had an opportunity to produce 3 lamb crops. This will take until mid 1991, for group III.

F1 and local ewes of group IV will potentially be available for nutrition or other trials, as will the ewes from groups I-III, after weaning their third lamb crop.

Mating plan for the young ewes, at least for 1988, is as follows:

Rams	Ewes		
	St. Croix	F1	Local
St. Croix	x	x	x
Local	-	-	x

i.e. the plan is to use all St. Croix ewes to produce St. croix lambs, to produce 3/4 St. Croix lambs from the F1 ewes, and to continue to produce contemporary F1 and local lambs from the local dams. To have sufficient local ewes to divide between the breeds of rams, the ewes added to produce group III should be mated contemporarily with group I ewes after weaning their lambs in 1988. Projected numbers of ewes to be mated in the project are therefore as follows:

Date	Group	Total nos. of ewes
Nov/Dec '87	Dams of group III	60
Jan/Feb '88	Group I, 1st mating	42
Sep/Oct '88	Group I, 2nd mating (+ dams of group III)	100
May '88	Group I, 3rd mating, Groups II and III	150

Management

F1 and local sheep, and hair sheep born at the Sei Putih Station, are to be grazed under rubber except for a few days of confinement at lambing. Supplements are to be fed as required to permit satisfactory reproduction (8-month lambing interval, lamb mortality <20%, litter size ≥ 1.5 on mature ewes) and mean 90-day weaning weight of local twin lambs ≥ 6 kg.

The original hair sheep are to be fed and managed separately, either in confinement with adequate forage and supplement or with good grazing separate from other flocks. An exception is of course transfer of males to the other flocks for mating; such rams are to be carefully examined, and not transferred if there is any sign of abscesses or undiagnosed illness.

It is suggested that all flocks be mated at one of three times each year (35-40 days) mating period), suggested to begin in January, May and September. This is to provide more uniform aged lamb crops, and to facilitate management. Under this system, most ewes should have an 8-month lambing interval, and the remainder 12-month.

Data to be recorded; all groups:

Reproduction and viability:
- mating date
- lambing date
- numbers of lambs born and weaned
- date and cause of death (where known)
- any health problems

Growth: - birth and monthly weights

Other:
- coat cover score at weaning, 9 months, one year and at each parturition and weaning
- estimates of parasite load from fecal egg counts (and other measures which may be recommended by veterinarians)

Data on heat budgets, response to heat stress and on behavior wil be collected as part of other projects (88-7 and 88-8).

Availability of sheep for other projects

Male lambs from all groups (except pure hair sheep) will be available at weaning. Breeding project personnel would like to have data on comparative postweaning performance of F1 and local animals where this is available, and are willing to participate in collaborative trials with these animals.

Ewes will be available after their third lambing, and some ewe lambs should be available at the end of 1989 (Group IV).

Hair sheep and local rams will be available for breeding ewes, for example for the OPP project. At present no extra local ewes are available from the breeding project for such projects, but the breeding project may be able to assist in acquiring such ewes.

Release of Hair Sheep

No hair sheep or semen from them should be sold or released until data are available on reproduction of the pure hair sheep and F1's produced at the Sei Putih Station. At present the imported sheep are not doing well, and it may be that they are

not well adapted to the Indonesian production environment. Unless future results show that these sheep have advantages in performance over the local sheep, they should not be released.

By mid 1989, we should have data on three crops of F1, lambs and on several more locally raised hair sheep, and on the reproduction of the first crop of F1 ewes. If these results favor the hair sheep, controlled releases should be possible at that time.

III.7. SR-CRSP BREEDING PROJECT B 88-7

Title : HEAT STRESS OF HAIR SHEEP, LOCAL SHEEP, AND F1 CROSSES, GRAZING UNDER RUBBER TREES

Personnel : A. Djoko Pitono, Sri Wening Handayani (BPT)
Luis Iniguez, D. Robertshaw and Eric Bradford
(SR-CRSP, University of California)

Introduction

In 1985, by a common effort in research among the Research Institute For Animal Production (BPT) and the Small Ruminant Collaborative Research Support Program (SR-CRSP), Virgin Island (VI) Sheep were imported from USA in order to asses their potential as an improving breed, if suitable and adapted to the Indonesian tropics. VI sheep are well adapted to humid tropical conditions and are known particularly for their hair coats, rusticity, prolificacy and above average growth rates among breeds of hair sheep (Fitzhugh and Bradford, 1983).

Since their introduction into Indonesia the adaptation and performance of VI sheep has been monitored through a research program conducted at the Sub-Research Institute for Animal Production in Sungei Putih (SBPT-SP). As a part of this research program, the comparison of the heat budgets of the VI and Sumatran sheep was designed to evaluate the adaptative performance of hair sheep relative to the local wool coated sheep. A first exploratory study suggested that hair coats, due to their less absorption of short-wave radiation compared to wool coats, could be more advantageous for animals raised in tropical areas as in North Sumatra (Gatenby, et al., 1986).

Prompted by the results of above exploratory study, this experiment is designed to :

1. Compare the heat budget of hair sheep, local sheep, F1 crosses born in Sungei Putih, under condition of Sub-humid tropics.

2. Compare the heat budget of pregnant hair sheep and local ewes (shorn and unshorn); pregnant ewes have a higher metabolic rate.

3. Compare production performance of three different genotypes : hair sheep, local sheep, F1 crosses.

Methods:

The experiment will be conducted at Sub-Research Institute for Animal Production, Sungei Putih, Medan, and will include three evaluations.

Evaluation 1 :

Twenty-four animals consisting of 4 males and 4 non pregnant ewes per breed type will be used in the comparison of heat budgets in this evaluation. The animals will be monitored and recorded through different lifetime events. The animals of this trial will be grouped and managed under similar condition in the rubber plantation.

Evaluation 2 :

Eighteen pregnant ewes, consisting of 6 hair sheep, 6 local sheep shorn and 6 local sheep unshorn will be used in evaluating heat budget of pregnant sheep. During evaluation 1 and 2 measurements will be made early in the morning, and at noon time under the sun. Blood samples will be taken to measure blood hormones, particularly P3 and T4. Pregnant ewes of this evaluation will be kept under confinement. This confinement condition is rather imposed by security policies regarding to the imported Virgin Island sheep.

Evaluation 3 :

Lifetime records of three genotypes kept at similar conditions will be monitored and obtained as a routine work in the SBPT. These records will be used to compare production performance.

The next is a summary table containing details of the three evaluation.

Evaluations: 1 & 3	Hair sheep	F1	Local unshorn	Local shorn
Males	4	4	4	
Females	4	4	4	
Total	8	8	8	
Management condition [1]	GUR	GUR	GUR	
Evaluation 2				
Pregnant females	6	-	6	6
Management condition [2]	C	-	C	C

[1] GUR : Grazing Under Rubber

[2] C : Confinement

Measurements:

a. Physiological measurements : respiration rate, rectal temperature , coat surface temperature, skin temperature, and net radiation above the coat surface.

b. Physical measurements : wet and dry bulb temperatures, solar radiation and black globe temperature.

Lab Analysis :

Total no. of samples : 200
Analysis required : blood hormones T3 and T4

Time schedule :

1. Breed comparison
   - Growing stage : August 1987 (14 days)
   - Post puberty stage : Nov/Dec 1987 (14 days)

2. Breed comparison of pregnant ewes : Sept/Oct 1987 (14 days)

Equipment :

1. Blood tubes
2. String, buckets
3. Animal holders
4. Thermometers

Budget

1. Travel 2 trips Jkt-Medan-Jkt	US $ 300
2. Per diem 10 days	US $ 180
3. Preparation for animal holder	US $ 18
4. Thermometers	US $ 12
5. Chemicals (approx)	US $ 250
6. Labour (1 person)	US $ 50

References

Fitzhugh, H.A., G.E. Bradford (eds.) 1983. Hair Sheep of Western Africa and the Americas: A Genetic Resource for the Tropics. Westview Press, Boulder, Colorado, USA.

Gatenby, R.M., S.W. Handayani, A. Djoko Pitono 1986. Heat Budget of Virgin Island and Sumatra Rams at Sungei Putih, North Sumatra. Working Paper No. 81. SR-CRSP/BPT, Bogor.

III.8. SR-CRSP BREEDING PROJECT B 88-8

Title: BEHAVIOR OF TWO BREEDS OF SHEEP AND THEIR F1 CROSS

Personnel: A. Djoko Pitono (SBPT Sei Putih)
Manuel Sanchez, Luis Iniguez (SR-CRSP)

Research Objective

To evaluate behaviorial differences between two breeds of sheep and their F1 cross (Sumatran sheep; F1 (St. Croix x Sumatran sheep); St. Croix) in a Grazing Area.

Experimental Procedures

The experiment will be conducted in Sukadamai grazing area (under rubber trees) approximately 6 km from SRIAP-SP Headquarters.

Twelve ewes 1 to 1.5 years old (4 per breed) will be marked by different colored tags or side brands. They will be monitored for behaviorial traits by continuous observation from 09:00 - 16:00 in a grazing area, for -- days per week over a -- week period.

Items to be measured:

A. Time spent grazing :
Time spent drinking :
Time spent lying down :
Time spent in shade :
Flocking tendency (by scoring) :

B. Air temperature (wet and dry bulb temperature), solar radiation and black globe temperature at 09:00, 13:00 and 16:00.

Budget

1. Materials:

stop watch (watch)
Identification materials

2. Labors

Total

III.9. SR-CRSP BREEDING PROJECT B 88-9

Title: GOAT BREEDING PROJECT

Authors: Luis Iniguez, Eric Bradford (SR-CRSP, Univ. of California, Davis)
Bambang Setiadi, Endang Triwulanningsih (BPT)

Introduction

The present Indonesian goat population amounts to approximately 7.5 million head distributed over the whole archipelago, with the highest concentration of animals in the Island of Java (62.6%). Only in some sections of Java, sheep are as important as goats and eventually raised under similar conditions of management. In the remaining part of the country goats are the predominant type of domestic small ruminants, mainly integrating the production systems of small farmers where crops represent usually the basic source of income. It has been estimated that 25% small farmer families are associated with the production of small ruminants, which contribute at least 14% of their net income (Knipscheer, et al., 1983).

Typically the Indonesian goat production units consist of low number of animals, usually 1-5, kept under systems of semi or total confinement on the basis of a combination of partial grazing and cut-and-carry feeding practices. This situation is conditioned by land availability and use in the farmer's production system, primarily oriented to the production of crops for human consumption (SR-CRSP Annual Report, 1985-86).

Although the Indonesian goat production is not clearly specialized with regard to market demands, goats are usually destined to satisfy the demands in meats and skins. During the last decade some attempts were made to diversify the Indonesian goat production through dairy breeding programs. The impact and extension of these programs is, however, not very well documented and evaluated.

Two types of goats are found in Indonesia: the Etawah and the Kacang goats. Kacang goats are known by their rusticity, small size, and average prolificacy while Etawah have their larger mature size, low prolificacy and higher potential for milk production. These populations consist mainly of unselected animals, characterized by their wide variability in most performance traits.

Different improvement programs for goat production exist in Indonesia. However they are not integrated into a multidisciplinary approach in the context of a research/extension

program. The Small Ruminant-Collaborative Research Support Program (SR-CRSP), with a main research component in sheep production, has played only a limited role in research on goat production in Indonesia.

This proposal is an attempt by the SR-CRSP to integrate a multidisciplinary research approach at the level of farmers. The proposal is based on a definition of market demands, which should define the direction of the production system of Indonesia.

Objective

To develop a research/extension multidisplinary program oriented to improve the production of goats under intensive production systems at the level of:

- OPP farmers
- transmigration area
- multiplication centers, and
- farmers operating at an industrial scale

Strategies

The program will be based on two units: the research unit at Cilebut and Ciawi and the OPP project expanded. The first unit will constitute the central nucleus where well-defined breeding and management programs will be developed. The OPP unit will receive information based on findings at the nucleus level.

Considering the present market demands and the intensive production systems characterizing goat production, the following are basic considerations for the program:

a. Reproduction

The target of the program is to improve the present goat production systems towards an accelerated kidding system by maximizing the number of kiddings and the number of kids per goat per year, and permitting the producer to market a more uniform supply of kids over the year.

Since Indonesian goats do not have reproductive seasonality they could fit very well into reproductive schedules that output 3 kiddings every two years. This could be achieved if for instances only one breeding season is defined to occur during odd years and 2 breeding seasons during even years. Thus, animals will breed thrice every 3 years. Breeding seasons should be established such that kidding seasons will occur during months of good food availibility. One choice could be as it follows:

Year	Month, Year		Months, Year kidding + lactancy	
M 1	March	Y 1	Aug, Sep, Oct, Nov	Y 1
M 2	December	Y 1	May, Jun, Jul, Aug	Y 2
M 3	September	Y 2	Feb, Mar, Apr, May	Y 3

where M represent matings and Y years.
1

According to this system, females should be weaned 3 months after kidding and exposed to the buck for one month, immediately after weaning.

b. Breeding

The two existing breeds of goats: Kacang and Etawah are highly valued for their meat. In fact, prices of these animals are higher than those of sheep (about Rp 50,000 = US$ 30) and increase considerably during religious ceremonies (up to Rp 100,000 = US$ 60). Both breeds are naturally meat producers and constitute mainly the Indonesian goat breeds.

Production improvement of these two breeds which differ in their size and requirements could very well suit, with the appropriate type of animal, environments that contrast in food availability. Improved Kacang goats could be used to improve the production in harsh and dry conditions whereas Etawah goats in those with better rainfall or with better supply of forage. Based on these aspects, it is proposed to develop a genetic improvement structure based on a central nucleus with superior animals of the two well defined breeds: Kacang (CNK) and Etawah (CNE) and receptor modules (RM) integrated by goat farmers, multiplication centers and eventually large scale operating industrial farmers.

b.1. Central Nucleus

The foundation stocks for CNK and CNE should consist on a rigorous selection for superior animals. Bradford et al. (1986), presented a list of suggestions for selecting within local stocks. This preliminary selection could result in a net increase of 10-15% in productivity to which continued selection could add further increases. Thus, a flock of at least 100-150 females per

breed (CNK and CNE) should be concentrated in the goat research station of Cilebut (BPT) and Ciawi. Identification and recording of data should follow the modalities of the existing SR-CRSP sheep project.

A selection program will be imposed on the CN population. Criteria for selection based on production records will be:

among kids:

For female replacements and bucks, a three trait selection, selecting

- S1. From mothers with higher total weight of kids weaned (total doe performance)

- S2. Higher rates of growth post weaning or higher weight at one year of age

- S3. Absence of scabies

among adult does

- cull if females do not bred in 2 consecutive periods
- cull females with poor weaning performance
- cull females with incidence of scabies

The CN will produce and distribute young bucks to the receptor module (RM), in addition can also distribute some young selected surplus females. Males representing 5% of the total number of females per bred will all come from selected males in the same CN. In order to keep low the levels of inbreeding some proportion of young females from the RM should be returned into the CN. The basis for this returning should be contractual.

b.2. Receptor Modules

The OPP project, multiplication centers and private industrial farmers will constitute the receptors of this improvement scheme. A contract must be observed in the execution of the project by both the NC and RM's. Such a contract is already implemented at the level of OPP's which agreed too give in return a specified number of animals every year.

Animals in the RM's should be identified in order to allow record evaluations.

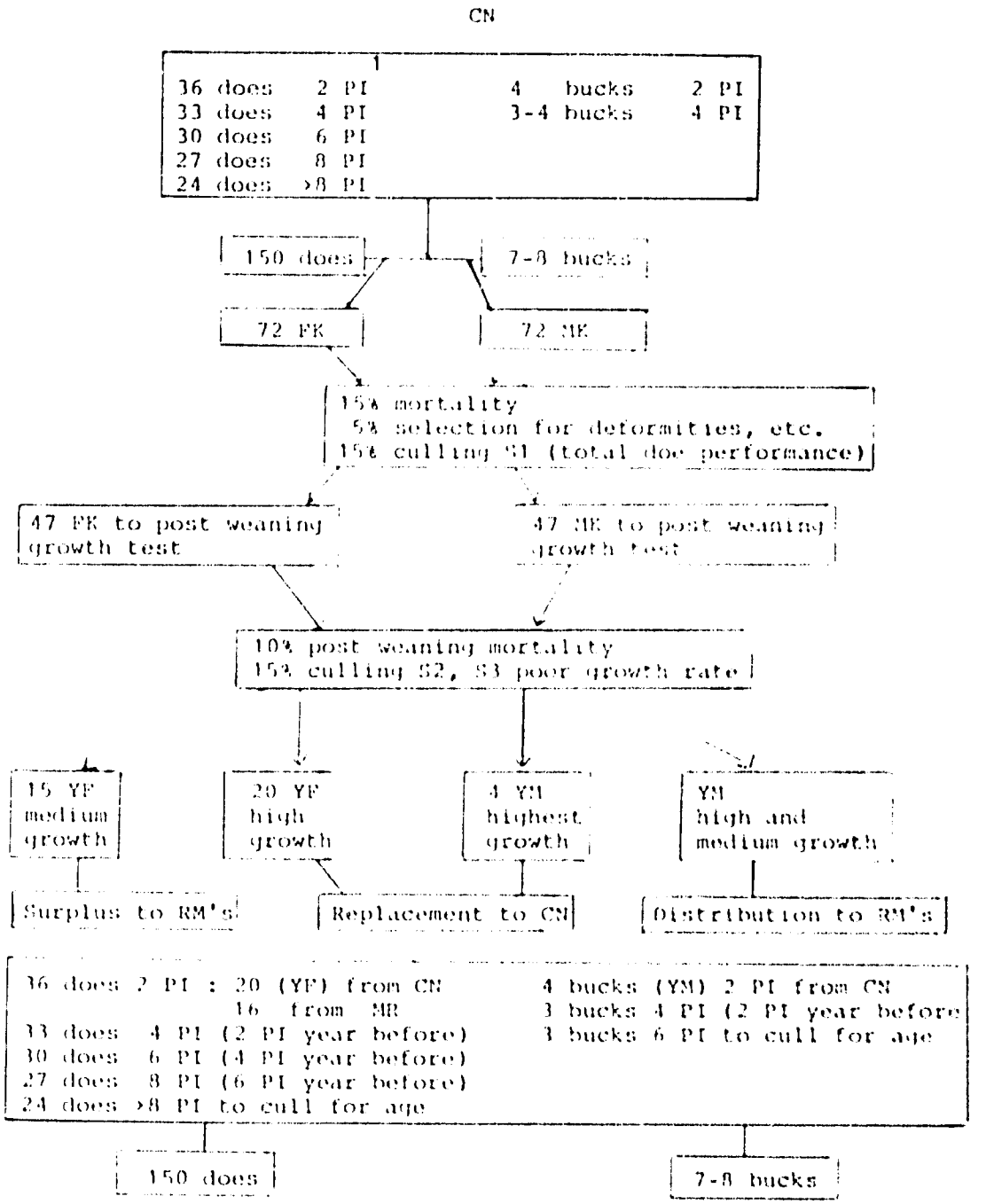
Example

Briefly an hypothetical flock of 150 does is described under the proposed scheme:

Let us define as cycle the period covering from mating to weaning in each of the 3 matings/weaning occuring in 2 years.

Also FK and MK as female and male kids, respectively, and YF and YM as female and male yearlings, respectively.

Flock size	= 150 does
Bucks (5%)	= 7-8
fertility (80%)	
Litter size	= 1.2
Kid mortality	= 15%
Post weaning mortality	= 10%



1
PI Permanent pair of incisors

If the number of animals in each receptor module is about 6 (5 does and 1 buck), the above's schematic procedure would have the potential to replace a minimum of one buck in each of 31 RM's, per year. Thirty-one remaining bucks from 3rd two-year parturition could be distributed among other RM's to be organized, used for research purposes or sold. RM's should give in return a total of 16 females per year to replace females in the CN. This will imply a rate of one female per farm or RM, every other year. The CN will also produce an additional 35 surplus yearling improved females in a period of 2 years (2 cycles at the rate of 15 females per cycle) for distribution among RM's or other purposes.

c. Nutrition, health, and socioeconomics

It is intended to integrate this program into a multidisplinary effort involving the nutrition, health and socioeconomical aspects of goat production. All information provided by the sheep project at the research level, at the OPP's and field programs should be capitalized such that the actual genetic improvement will be part of a general improvement program of production.

Duration

Start	: January, 1988
First global evaluation	: January, 1990

Budget

150 does Etawah Rp 35,000 each)	Rp 5,250,000	US$ 3,200
150 does Kacang (Rp 30,000 each)	Rp 4,500,000	US$ 2,750
Total	Rp 9,750,000	US$ 5,950

Infrastructure

Facilities already available at Cilebut and Ciawi.

References

Knipscheer, H.C., J. de Boer, M. Sabrani and T. Soedjana 1983. The Economic Role of Sheep and Goats in Indonesia: A Case of West Java. Bulletin of Indonesian Economic Studies XIX (3), 74-91.

SR-CRSP Annual Report 1985-86 Program Year Seven. Small Ruminant-CRSP. University of California, Davis. Mimeo.

SR-CRSP NUTRITION PROJECT INDONESIA 1987/88

I. PERSONNEL

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Budi Haryanto (*), BPT

(*) On study leave

II. SUMMARY OF 1986/87 ACTIVITIES

II.1. Title : POTENTIAL DEGRADABILITY OF DRY MATTER IN COMMON INDONESIAN FEEDSTUFFS

Presented by : H.Pulungan

The present study intends to evaluate the nutritional charachteristics of 13 grasses and 8 shrub/tree legumes obtained from several farms at Ciburuy - Bogor - West Java during the wet season (March - April 1987).

The nylon bag technique was used to evaluate the digestion rates of each feedstuff using fistulated Peranakan Ongole bulls. The animals were given a standard ration consisting of napier grass ad lib, glricidia 0.4 % BW, rice bran, molasses and mineral fed at 0.6 % BW. Samples were incubated in the rumen for 0, 2, 4, 8, 12, 24, 48, 72 and 96 h and the nutrient content of

the incubated residues was analyzed. Preliminary results of this on-going research showed that there is a wide variability in the potential degradability within and between forage species (see Table).

Potential degradability of various grasses and legume species obtained form Ciburuy - West Java

No.	Botanical name	Local name	% DM	DMD[a]
		GRASSES		
1.	Panicum barbatum, LAMK	R. Jamarak	16.7	84.11
2.	Ischaemum timorence, KUNTH	R.Tatambangan	21.0	75.50
3.	Eleusin indica	R.Jampang munding	22.37	75.45
4.	Panicum montanum, ROXB	R. Aawian	20.70	71.98
5.	Axonopus compressus, BEAUV	R.Pait ranting	16.1	71.61
6.	P. Purpureum	R. Gajah	21.1	71.43
7.	Cyperus rotundus, LINN	R. Teki	29.0	71.21
8.	Native grass (mix)	R.Lapangan (mix)	23.5	71.00
9.	Andropogon caricosus	R. Lamuran	26.60	69.99
10.	Paspalum conjugatum, LINN	R.Pait Lembaran	19.8	69.36
11.	Imperata cylindrica	R.Alang-alang	32.1	65.20
12.	Paspalum serobiculatum	R.Pimping kasir	19.4	64.26
13.	Cynodim dactylon PERS	R. Grinting	26.0	63.99
14.	Panicum repens	R.Jajahean	18.9	61.91
		FOLIAGE		
1.	Ageratus conyzoides	Babadotan	13.2	85.31
2.	Artocarpus heterophyllus	D. Nangka	51.3	74.42
3.	Gliricidia maculata	Kihujan	26.4	73.86
4.	Bohaemia sp	D.Kupu-kupu	25.4	69.32
5.	Samania saman	Trembesi	31.3	62.44
6.	Diopterus cridus	Papakuan	23.9	40.12
7.	(Albizia foliage)	D. Jinjing	41.10	40.07
8.	Musa paradisiaca	D. pisang	18.6	30.38

[a] Potential degradability (96 h incubation)

II.2. Title : INVESTIGATION ON THE EFFECT OF SULFUR IN SHEEP DIETS CONTAINING CASSAVA LEAVES

Presented by : Bambang Sudaryanto

The use of cassava leaves (Manihot esculenta, Crantz) in small ruminants diets is a common practise. Nevertheless, the use of this plant as an animal feed component is limited because of the cyanide content in the leaves. The use of sulfur to detoxify cyanide has been recommended, but in the reaction between sulfur and cyanide another toxic compound (thio cyanide) is produced which may reduce the activity of the thyroid gland.

Two trials were carried out to investigate the addition of sodium thiosulfat into diets containing cassava leaves fed to sheep. The diets were composed to contain 13 % crude protein and 70 % TDN and pelleted.

In exp. 1. 9 growing sheep were randomly assigned to 3 dietary treatments (A : control ; B : 20 % cassava leaves or C : 30 % cassava leaves). The intake of cyanide from the cassava leaves were well above the lethal dose (4 mg/kg LD) reported by Montgomery (1969). However, it was found that the inclusion of cassava leaves upto 30 % of the diet dry matter (or 15 mg HCN/kg LD) did not affect intake, digestibility and liveweight gain.

In exp. 2. The same diet in treatment C was supplemented with sodium thiosulfat. The levels of sodium thiosulfat supplements applied were based on the CN concentration to obtain CN : S ratios of 1:1 and 1:2. No differences were obtained between DM intake, digestibility, HCN intake and sulfur concentration in blood. However, the concentration of T3 and T4 in blood serum were lower when sodium thiosulfat was included, suggesting that the activity of the thyroid gland was indeed affected. The results indicate that the inclusion of cassava leaves up to 30 % in pelleted diets for sheep had no detrimental effect. However, further studies are required to clarify the problems of high cassava leaves utilization in rations for sheep and the effect on the activity of the thyroid gland.

II.3. Title : FIBRE UTILIZATION BY NATIVE GOATS FED WITH MIXED NATIVE GRASSES AND SUPPLEMENTED WITH ZINC AND NITROGEN

Budi Haryanto's thesis (Not Presented)

Preliminary examinations of data suggests that both zinc and nitrogen supplements have positive effects on the growth performance of native "Kacang" goats fed with native grasses. Data collected will be presented on growth, intake or digestibility of dietary fractions, rumen ammonia, VFA's passage rates and retention times for particular or lignins fractions of digesta and rumen bial production rates.

II.4. Title : UTILIZATION OF KAPOK SEED OIL CAKE WITH GROWING SHEEP

Presented by : Muchji Martawidjaja

Abstract

An experiment was designed to evaluate, for 12 weeks, the effect of supplementation of kapok seed oil cake (KSOC) to elephant grass (EG), as a sheep diet. Eighteen young male lambs, (5-6 months old) with an initial weight of 11.1± 1.25 kg were used, and were randomized into 6 groups of equal weight. A randomized block design was used with 6 blocks and 3 feeding treatments. The treatments were: A = elephant grass (control); B = elephant grass + 100 g KSOC and C = elephant grass + KSOC ad lib. Variables measured were feed consumption (FC), growth rate (GR) and feed digestibility. The results (see Table) showed that KSOC increased FC (DM, Pr, E and NDF), GR and protein (Pr) digestibility (P < 0.001). However the different levels of KSOC had no significant effect on GR and Pr digestibility (P > 0.05). At lib level of KSOC decreased NDF digestibility (P < 0.05).

Intake and digestion of KSOC supplemented sheep diets

Measurement	Control	Control of 100 g KSOC	Control of KSOC ad lib
Total DMI g/d	360 [b]	424 [a]	537 [a]
CP digestibilities (g/d)	63.1 [a]	70.3 [a]	75.5 [a]
NDF digestibilities (%)	61.3 [a]	56.4 [a]	51.9 [b]
ADG g/d	13 [a]	19 [a]	23 [a]

a,b Different supercripts (P<0.05).

II.5. Title : SUPPLEMENTATION OF COTTON SEED MEAL TO ELEPHANT GRASS BASED DIET WITH GROWING SHEEP

Presented by : Dwi Yulistiani

For 8 weeks, growing sheep were subject to experimental treatments as it follows: two groups of sheep were fed with elephant grass (3% BW), and one group was given cotton seed meal *ad lib*. Preliminary results of this trial were :

1. cotton seed meal dry matter intake (DMI) was 126 g/d contributing about 25% of the total dry matter intake.

1. elephant grass and cotton seed meal dry matter digestibility were 0.39 and 0.50, respectively. By difference the dry matter digestibility of cotton seed meal was about 0.92.

3. Supplementation of elephant grass with cotton seed meal resulted in an increased daily gain of about 41 g/day.

II.6. Title : BANANA PLANT PARTS AS FEED FOR SHEEP AND GOATS

Presented by : Andi Djajanegara

An experiments was designed to evaluate : 1. intake and digestibility of banana leaves, and 2. intake and digestibility of banana stems. The banana leaf intake by sheep was 2069 g/day in fresh basis or 482 g DM/day, which was about 2.88 g/kg BW. The dry matter digestibility of banana leaves was about 62% and the ADG 48 g/day.

Banana stem was fed to sheep and goats with various supplements and the results are shown next.

Nutritional values of banana stem fed to sheep and goats[a]

Measurement	Supplement (fresh basis) gliricidia (470 g/day)		rice bran (275 g/day)		banana leaf (1000 g/day)	
	sheep	goat	sheep	goat	sheep	goat
DM intake						
banana stem (g/day)	311	225	221	141	287	223
total (g/day)	496	439	546	431	488	445
($g/BW^{0.75}$)	50	50	54	53	48	59
DM digestibility	62.1	63.2	65.1	69.9	63.6	62.0
average daily gain	41	14	55	36	20	13
rumen pH	6.8	6.7	6.5	6.6	6.8	6.9

[a] Banana stem must be chopped to fed the animals because of its low palatability.

II. 7. Title : LEAST COST SHEEP DIETS ORIENTED TO MINIMIZE THE PARTICIPATION OF THE GRASS COMPONENT

Presented by : Dwi Yulistiani

A least cost concentrate diet has been formulated applying the linear programming computer package. The concentrate diet has been fed as the major component to raise sheep at our sheep breeding station at Cicadas.

The experiment reported here was carried out for several reasons, which were :

(1) to investigate the nutritive value of the concentrate diet (biological evaluation).

(2) to determine the optimum contribution of roughage in addition to the concentrate to maintain normal rumen function.

In addition, the lambs used in this experiment were obtained from different lines and their efficiency to utilize feed was also compared.

The three dietary treatments compared were :

Diet A. Concentrate : roughage ratio = 85 : 15
Diet B. Concentrate : roughage ratio = 50 : 50
Diet C. Concentrate ad lib and roughage fed ad lib.

Diets A and B were fed at 4 % of the lambs liveweight measured at weekly intervals, while diet C serves as a control to obtain information of maximum intake response of the animals on the concentrate diet. At present, the experiment has been going on for 10 weeks and the digestibility of the diets were measured during week 7 and 8 over 10 days. Rumen fluid samples were taken at the end of the digestibility measurement.

Preliminary results (see Table) indicate that there was no adverse effect of feeding the concentrate based diets to lambs. Dry matter (DM) intake of roughage by lambs on treatment C was only 5 % of the total DM intake. It appears that there is little effect of the different diets treatments on DM digestibility and rumen pH levels ranged from 4.5 to 5.5. It is not clear whether the performance of the lambs was at their maximum.

Liveweight, dry matter intake, digestibility and weight gains 10 weeks after weaning

Measurement	A	B	C	11 L	11 H	22 L	22 H
Initial WT	11.6	10.2	11.2	11.3	14.4	7.2	11.0
Final WT	18.7	17.8	21.4	19.3	23.1	15.5	19.2
WG	7.1	7.6	10.2	8.0	8.7	8.3	8.2
ADG g/d	102	110	127	114	124	119	117
DMI	702	734	876	770	884	720	723
Digesti-bility	59.9	59.8	62.1	59.0	59.9	63.3	60.3
DDM I	402	439	543	454	530	456	436
Gain/kg DM	0.234	0.251	0.234	0.251	0.234	0.261	0.208

11 L, 11 H : Lambs born and weaned as singles with low (L) and high (H) initial weights.

22 L, 22 H : Lambs born and weaned as twins with low (L) and high (H) initial weights.

A, B and C diets as specified in the text.

III. WORK PLAN 1987/88

This workplan was designed under the assumption that the host SR-CRSP's institution (Balitnak) will be provided with an additional research supporting (non-CRSP) budget in the next 3-6 months.

III.1. AREA 1 FEEDING SYSTEMS FOR SMALLHOLDER SHEEP AND GOAT PRODUCTION IN WEST JAVA

ACTIVITIES	LEADER(S)	PROJECT NO.
1. Summarize and integrate growth trial data, 1980-87	Andi D., Darwin, Sorta S.	N 88-1
2. Analyze village monitoring feeding data, Year 2	Manuel S. and Wayan M.	N 88-2
3. Summarize feed composition and nutritive value data	Budi T., Andi D.	N 88-3
4. Review, summarize, synthesize and publish research results from 1980-1987	Nutrition group (Editors: Andi D., Manuel S., Bill J.)	N 88-4

III.2. AREA 2 NUTRITIVE EVALUATION AND ANIMAL UTILIZATION OF FEED RESOURCES FOR SMALL RUMINANTS IN THE HUMID TROPICS

ACTIVITIES	LEADER(S)	PROJECT NO.
1. Native and cultivated grasses		
- Setaria	Sorta S., Budi T.	N 88-5
- Native grass	Hamzah P.	N 88-6
2. Tree legumes		
- Gliricidia	Rangkuti	N 88-7
3. Crop foliages		
- Cassava leaves	Bambang S.	N 88-8
- Sweet potato leaves	Darwin	N 88-9
4. Industrial by-products		
- Macademia nut and castor oil cake	Sorta S.	N 88-10
- Whole cotton seed and lint	Dwi Y.	N 88-11
- Rubberseed meal, palm oil sludge, cocoa by-products, molasses blocks	Leo B., Manuel S., Mursal B.	N 88-12

III.3. AREA 3 IMPROVING THE EFFICIENCY OF UTILIZATION OF BALANCED DIETS FOR SMALL RUMINANTS

ACTIVITIES	LEADER(S)	PROJECT NO.
1. Fat levels in finishing diets for lambs	Darwin	N 88-13
2. Optimizing rumen microbial protein production with tropical grass-based diets	Budi H. (tentative)	N 88-14
3. Evaluating mineral requirements for small ruminants	Thamrin C. (tentative)	N 88-15

III.4. AREA 4 GRAZING SYSTEMS FOR SHEEP WITH ESTATE TREE CROPS

ACTIVITIES	LEADER(S)	PROJECT NO.
1. Coconut plantations - preliminary studies of the grazing of native ground cover species by sheep (Bogor) a. intake and digestibility of native forage b. pasture productivity	Thamrin C., Andi D., Masud P., Winugroho, Muchji	N 88-16
- preliminary study of grazing small ruminants with dwarf hybrid coconut trees	S. Putih staff	N 88-17
2. rubber plantations (Sei Putih)		
a. evaluation of native ground cover species	S. Putih staff	N 88-18
b. grass and legume introductions - pure stands - associations	 Tatang I., Masud P. Tatang I., Masud P.	 N 88-19
c. pasture management and grazing systems	Manuel S., Leo B. Tatang I.	N 88-20
d. supplementation strategies	Mursal B., Manuel S., Leo B.	N 88-21

III.5. AREA 5 OUTREACH PILOT PROJECT (Multidisciplinary activity)

III.1. AREA 1 FEEDING SYSTEMS FOR SMALL HOLDER SHEEP AND GOAT PRODUCTION IN WEST JAVA

During the last 6-7 years, many nutritional studies and experiments with small ruminants were carried out. Results obtained from those experiments need to be combined into an integrated evaluation in order to develop feasible technology packages to be introduced and/or tested under village conditions.

N 88-1 Title : SUMMARIZATION AND INTEGRATION OF GROWTH TRIAL DATA, 1980-87

Personnel : Andi Djajanegara, Dariwnsyah Lubis, Sorta Sitorus (BPT)

This activity will compile all data from all available growth experiments at BPT and, if necessary, from other institutions.

The first and major task in this activity is to create a complete data bank for which the use of available data base computer programs, such as R-base, would be an essential asset.

The data will be analyzed to draw response curves and/or relationships between type of feed in relation with the nutrient's availability and animal responses. For example :

- animal responses' curves to the provision of a nutrient or a combination of nutrients

- relationship between digestibility and fibre fractions in feed and/or intake

- relationship between growth and protoinn/energy ratios

- etc.

N 88-2 Title : ANALYSIS OF VILLAGE MONITORING FEEDING DATA, YEAR 2

Personnel : Wayan Mathius (BPT)
Manuel Sanchez (SR-CRSP)

A village monitoring activity was conducted over 2 consecutive years in three villages in West Java : Cirebon, Garut and Ciburuy. Data corresponding to the first monitoring year was already analyzed and conclusions reported. It is proposed to complete the analysis/report with the evaluation of the second monitoring year.

N 88-3 Title : SUMMARIZATION OF FEED COMPOSITION AND NUTRITIVE VALUE DATA

Personnel : Budi Tangendjaja, Andi Djajanegara (BPT)

Feed composition data will be provided by scientists working with small ruminants in Indonesia. The information will be integrated into a computer data base and generate the INDOFIC tables.

N 88-4 Title : REVIEW, SUMMARY, SYNTHESIS AND PUBLICATION OF RESEARCH RESULTS FROM 1980-1987

Personnel : Nutrition group (BPT)
Editors : Andi Djajanegara (BPT)
Manuel Sanchez and Bill Johnson (SR-CRSP)

III.2. AREA 2 NUTRITIVE EVALUATION AND ANIMAL UTILIZATION OF FEED RESOURCES FOR SMALL RUMINANTS

N 88-5 Title : THE UTILIZATION OF SETARIA GRASS IN FEEDING SMALL RUMINANTS

Personnel : Sorta Sitorus, Budi Tangendjaja (BPT)

Background

Setaria sp., is a tropical grass in process to be widely distributed in Indonesia for feeding small ruminants.

This study proposes to study potential oxalate toxicity problems due to Setaria based feeding.

Objectives

- To define if Setaria based feeding conditions oxalate toxicity in Indonesian small ruminants

- To measure maximum level of oxalate which can be tolerated by small ruminants

- To evaluate the local animals in their ability to metabolise oxalate

Experiments

1. Survey of oxalate levels in Setaria regarding to different stages of plant maturity

2. In vitro/in vivo studies regarding to oxalate metabolism

Total budget : Rp 6,700,000

N 88-6 Title : RELATIONSHIP BETWEEN DEGRADABILITIES AND ANIMAL CONTENT OF NATIVE GRASSES AND LEGUME'S FOLIAGE

Personnel : Hamzah Pulungan (BPT)

This is a continuation of an on-going experiment that intends to characterize the nutritional aspects of 13 grasses and 8 shrub/tree legumes collected in West Java.

N 88-7 Title : FURTHER NUTRITIONAL STUDIES WITH GLIRICIDIA

Personnel : M. Rangkuti, Dwi Yulistiani and Andi Djajanegara

Background

Previous studies have shown that gliricidia is a valuable protein supplement for sheep or goats. However, it is also reported that certain adaptation period is needed for the animals to accept the fodder. Wilting and drying appear to reduce this adaptation period. It was suggested that gliricidia contains some alkaloids which may be associated with its palatability. In fact, anti quality factors may also be present, varying with genotypes, plant parts, season and age. A large variation in palatability and voluntary intake has been observed, possibly due to genotype variation, specific odors and/or coumarins.

The following studies are aimed to study problems concerning palatability of leaves during introduction.

Objectives

1. To increase the utilization of gliricidia as a supplement in diets for sheep and goats.

2. To investigate the problem in palatability or acceptance of gliricidia leaves.

Experiments

Exp. 1. Will evaluate changes in nutrient and alkaloid content of gliricidia leaves affected by storage method. Gliricidia leaves of different ages will also evaluated on their nutrient composition and alkaloid content. In addition, the effect of drying on nutrient composition and alkaloid content will be investigated.

Exp. 2. Will evaluate the effect of various storage methods of gliricidia leaves on intake and digestion with sheep or goats. 12 sheep or 12 goats will be used for 3 - 4 weeks. Intake will be monitored throughout, and digestibility will be measured when intake is constant. Silage, fresh, wilted and dried gliricidia will be fed ad lib in addition to a fixed amount of goats.

Exp. 3. Will evaluate the effect of gliricidia "flavour" on intake of grass. Juice of gliricidia leaves will be extrated and mixed at varioues cations with grass. Its effect on intake will be recorded.

Budget : Rp 4,000,000

N 88-8. Title : DETOXICATION OF CASSAVA LEAF IN SHEEP DIETS

Personnel : B. Sudaryanto

Introduction

Cassava leaf is an important crop residue in the feeding of small ruminants in Indonesia (with a production of about 1.5 million hectares). The leaves are rich in protein and could potentially be used as a protein supplement (Lebdosoeko)o and Reksodiprodjo, 1982). Nevertheless, this crop residue is also known for its high cyanide content with also potential intoxication effects (Sudaryanto, 1987).

Attempting to maximize the utilization of this feedstuff to a level with no detrimental effects, two experiments are proposed in this proposal:

Experiment I. To determine toxicity levels of cassava leaves in sheep diets.

Experiment II. Based on results of experiment I, to detoxicate with sultur the cyanide content of cassava leaves and test the feasibility of its increased participation as ingredient of sheep diets.

Methods

a) Design

Experiment I : Sheep will be stratified on body weight basis and allocated into a randomized block design with four treatment diets :

1. Basal diet
2. 20 % cassava leaf in the basal diet
3. 40 % cassava leaf in the basal diet
4. 60 % cassava leaf in the basal diet

The basal diet will have 13% crude protein and 70% TDN.

Experiment II : Sheep will be stratified on body weight basis and allocated to Randomized Complete Block design with treatment diets :

1. One of the diet in experiment A
2. as 1 + Natrium thiosulfat (1 : 3)
3. as 1 + Natrium thiosulfat (1 : 6)
4. as 1 + Natrium thiosulfat (1 : 9)

All diets will contain 13% crude protein and 70% TDN.

b. Requirements

- 24 males with an initial body weight 16 kg
- fresh cassava leaves (9920 kg)
- Urea 32 kg
- Corn 1006 kg
- Rice bran 578 kg
- Elephant grass 3378 kg
- Onggok (cassava waste) 356 kg
- Mechanically extracted soybean meal 224 kg
- Plastic bags
- Laboratory equipment and chemicals for analysis
- Natrium thiosulfat 500 gram
- One kit T3 (triioditironin)

c. Measurements

- Daily intake
- Average daily gain (animals will be weight weekly during the feeding trial).
- Digestibility of DM, OM, Energy, CP, NDF and retention of nitrogen, Sol N, By pass N.
- Hormon T3 (triiodotironin)
- Level of methionin, cystine, sulfur, vit B12, iodine, copper and iron.

d. Number of samples

a) Proximate analysis

- feed stuffs	7	
- ration	4	complete
- faeces	24	
- urine	24	(only N)
b) HCN	1	
c) T3	24	
d) Methionine, cystine, sulfur, vit B12, iodine, copper and iron.	24	

Budget

$ 2000.-

References

Sudaryanto 1987. Master thesis (In press).

Activities	Month										Cumulative Percentage
	Sep	Okt	Nov	Des	Jan	Peb	Mar	Apr	May	Jun	
Project statement	---										15
Preliminary Trial		-----									20
Collecting Data			---------								70
Sample Analysis					------						80
Data Processing						-------					85
Preliminary Report							-------				90
Scientific Report									---		95
Publication											100

Budget details

a) Analysis :

1. Approximate 35 x Rp. 20.000,-	= Rp. 700.000,-
Nitrogen 24 x Rp. 2.500,-	= Rp. 60.000,-
2. T3/Trioditironin	= Rp. 150.000,-
3. Amino Acid	= Rp. 75.000,-
	Rp. 985.000,-

b) Material

1. Sheep 24 x Rp. 30.000,-	= Rp. 760.000,-
2. Cassava leaves 1000 kg x Rp. 100,-	= Rp.1000.000,-
3. U r e a 32 x Rp. 100,-	= Rp. 3.200,-
4. Rice bran 580 x Rp. 150,-	= Rp. 87.000,-
5. Elephant grass 3400 x Rp. 10,-	= Rp. 34.000,-
6. Cassava waste product 360 x Rp.225,-	= Rp. 81.000,-
7. Mechanically extracted soybean meal 225 x Rp. 450,-	= Rp. 101.250,-
8. Na2S2O3 5H2O 1/2 kg x Rp.10.000,-	= Rp. 5.000,-
	Rp. 2.172.450

N 88-9 Title : SWEET POTATO LEAVES AS A PROTEIN SOURCE IN ALL GREEN FEEDING FOR SHEEP AND GOATS

Personnel : Darwinsyah Lubis

Background

1. All green feeding is a common feeding system for ruminants in Indonesia rural area.

2. Sweet potato leaves contains relatively high crude protein.

3. Sweet potato is a common foodcrop in farming systems in Indonesia generally and in Bogor district especially.

Experiment Management

1. Animals : Sheep and goats (30 each)

2. Design : Randomized block design (proposed) or incomplete block design (if unbalanced number of animals)

3. Feed and additives :
   - Native grass
   - Sweet potato leaves
   - Commercial concentrate mix (will be used as control diet)
   - Sodium Chloride

4. Duration of exp : April 1988 - June 1989

5. Measurements :
   - Liveweight gain
   - Nutrients digestibility (in vivo) and degradability (in situ)
   - Proximate analysis of feed samples
   - Rumen pH, NH3-N and VFA's

   (4 treatment diet - Rate are concentrate).

Budget :

I t e m	Cost * Rp.	US $
Animals : 60 x Rp. 30.000 =	1.800.000	1.098
Native grass : 60 x 90 x 3 kg x Rp. 25 =	405.000	247
Sweet potato leaves : 40 x 90 x 2 kg x Rp. 100 =	720.000	439
Concentrate mix : 40 x 90 x 0.5 kg x Rp.250=	450.000	275
Salt : 60 x 90 x 0.005 kg x Rp. 50 =	1.350	1
Chemicals analyses :		
- Crude protein : 225 x Rp. 1.350 =	303.750	186
- Gross energy : 225 x Rp. 120 =	27.000	17
- N D F : 225 x Rp. 1.700 =	382,500	234
- A D F : 225 x Rp. 3.700 =	832.500	508
- ADIN : 225 x Rp. 1.350 =	303.750	186
- NH3-N : 225 x Rp. 2.000 =	450.000	275
- VFA's : 225 x Rp. 15.000 =	3.375.000	2.058
T o t a l =	9.050.850	5.524

* US $ 1 = Rp. 1.640

N 88-10 Title : AGRO INDUSTRIAL BY-PRODUCTS IN SMALL RUMINANT FEEDING

Personnel : Sorta Silitonga

Background

Due to the low SR growth rates conditioned by the poor quality of forages in Indonesia certain level of supplementation based on local by-products deserve investigation.

The agro-industrial by- products: caster seed cake and Macademian nut cake both with contents of 24% and 23% crud protein in the dry matter, respectively are a potential important resource of protein. These two products are available and are vastly produced in Indonesia.

Due to the lack information about the potential of these two by-products as ruminant feed, this research proposes to determine the nutritive values, acceptability and performance of sheep consuming by-product supplemented napier grass.

Methods

40 sheep and 40 goats fed napier grass ad libitum and different level of caster seeds cake and Macademian nuts cake.

a) Treatment :

R1 : napier grass ad libitum
R2 : R1 + 0.5% caster seed cake
R3 : R1 + 1% caster seed cake
R4 : R1 + 2% caster seed cake
R5 : R1 + 0.5% Macademian nut cake
R6 : R1 + 1% Macademian nut cake
R7 : R1 + 2% Macademian nut cake
R8 : R1 + 1% caster seed cake + 1% Macadomian nut cake

- 2 weeks adaptation trial
- 12 weeks feeding trial
- 1 week digestion trial

b) Measurement

a. feed intake
b. fecal output
c. digestibility
d. weekly live weight
e. in vitro digestibility

c) Lab analysis

Total no. of samples : 50
Analyses required : DM, OM, N, NDF, EE, Energy, Ca and P

Requirements

1. Feed : 20 ton napier grass
          600 kg caster seed
          600 kg Macademian nut cake
2. animals : 40 sheep and 40 goats

Budget

N 88-11 Title : THE UTILIZATION OF COTTONSEED LINT AS A FIBER RESOURCE

Personnel : Dwi Yulistiani

Background

Cottonseed lint is a textile waste product available in Indonesia. This product consists primarily on cellulose which can be digested by rumen microorganisms and provide with energy to low energy SR diets, particularly in dry areas of the country.

Objective

- To study the utilization of cottonseed lint in diets for small ruminants

Methods

Experiment 1 Will study the maximum intake of cottonseed hulls/lint by sheep

Experiment 2 Cottonseed lint will be supplemented to elephant grass and evaluated against fish meal. The dietary treatments are :

- elephant grass + cottonseed lint
- elephant grass + cottonseed lint + fish meal
- elephant grass + fish meal

Requirements

24 mature lambs
feedstuffs : fish meal, elephant grass, cottonseed lint, mollases and plastic bags

Measurement

Daily intake, average daily gain, digestibility (protein, extract ether, ash, energy, NDF)

Samples

33 (feedstuff + faecal)

Budget

Feed	Rp 300,000
Chemical analysis	Rp 330,000
Miscellaneous	Rp 50,000
Total	Rp 680,000

N 88-12 Title : SUPPLEMENTATION TRIALS WITH RUBBER SEED MEAL, PALM OIL SLUDGES, COCOA BY-PRODUCTS, MOLASSES BLOCKS

Personnel : Leo Batubara, Manuel Sanchez and Mursal Boer

Sheep grazing under rubber plantations will be given various amounts of the supplements. The intake, digestibility and growth responses of the sheep will be measured.

III.3. AREA 3 IMPROVING THE EFFICIENCY OF UTILIZATION OF BALANCED DIETS FOR SMALL RUMINANTS

N 88-13 Title : HIGH FAT DIETS FOR SHEEP AND GOATS

Personnel : Darwinsyah Lubis, A. Djajanegara, W.L. Johnson

Introduction

The population of ruminants in tropical countries is large but their productivity generally low. The low productivity, especially in humid areas, is mostly conditioned by inadequate feed supply which is expressed in undernutrition. In Java, for example, both protein and energy are reported to be inadequate in diets for small ruminants (Sabrani et al., 1982).

The incorporation of fats and oils in diets for ruminants has received considerable attention in recent years. Fats are the most concentrated supplemental source of calories, since they contain over twice as many calories than other nutrients. While monogastries can utilize fat well, ruminants offer a challenge to nutritionists. Fat is well digested, however it can influence rumen fermentation. Consequently, the dynamic effects associated with added fat are often not obtained in ruminant diets.

The following experiments are designed to characterize the nutritive value of "crude palm oil" (CPO). Further, calcium-chloride or magnesium-sulfate will be used as a source of metal cations to reduce the anti bacterial effect of fat hydrolyses in the rumen.

Hyphothesis

1. High fat levels in diets for ruminants depress cellulolytic activity in the rumen.

2. Addition of metal cations to high fat diets, e.g. calcium, magnesium, may improve fibre digestion.

Objectives

1. To improve the productivity of small ruminants by adding fat in diets to increase its energy density for sheep or goat.

2. To evaluate rumen fermentation patterns in animals on high fat diets as affected by the addition of metal cations.

3. To investigate the associative effects on the digestion of fibre.

III.4. AREA 4 GRAZING SYSTEMS FOR SHEEP WITH ESTATE TREE CROPS

N 88-16 Title : INTEGRATED SMALL RUMINANT PRODUCTION UNDER COCONUT PLANTATION AT PAKUWON, WEST JAVA

Personnel : Thamrin D. Chaniago, Muchji M., A. Djayanegara, M. Pangabean and M. Winugroho

Introduction

Background

3.01 million hectares of land (95% kept by small holders) are under coconut cultivation in Indonesia (Tarigans, 1985). The coconut plantation consists of tall, dwarf and hybrid palms with planting space ranging from 7 x 7 m (for small trees) to 9 x 9 m (for taller trees). It takes 4 - 7 years for the trees to bear marketable fruit yielding about 1 to 2 tons of copra/ha/year. The area between trees is generally covered with local grass or planted with a legume cover crop offering a great potential for the development of a small ruminant industry through an integrated system with coconuts.

Pasture under coconut

There are a number of pasture species that grow naturally under coconut plantations (UCP). According to Ericksen (1977) the most shade tolerant grasses are guinea and Brachiaria spp. Some of these pastures, however, have limitants regarding their use. In fact, outbreaks of photosensitization toxicity have been reported in association to grazing Brachiaria spp (Chaniago, unpublished data ; Murdiati and Lowry, 1983).

Pastures UCP could easily be improved by the inclusion of tree legumes (such as gliricidia) planted in the external and internal boundary or divisional fences of the plantation. The leaves of these trees could provide an excellent protein supplement for livestock.

Choice of animal

Sheep and goats represent a convenient low-risk marketable package aspect that makes them be favoured by the small farmer. Cattle and buffaloes on the contrary have a much slower turnover time and require a larger initial investment.

Optimum stocking rates will vary from region to region and from time to time, however a stocking rate of 1 to 2 animal units/ha (see Rika et al., 1981) can be used as a guideline. Studies on grazing small ruminants under coconut in the

Research activities

Exp. 1a. Intake and digestion of diets contaning various levels of CPO by sheep or goats. Twenty one growing sheep or goats will be used and divided into 3 groups. Two groups will be fed, the dietary CPO (10%) with and without Ca, while the third group serves as control.
Intake and digestibility measurements will be made and liveweight gain will be recorded over 12 weeks.

b. As exp 1a but added with Mg.

Exp. 2. Rumen fermentation studies with sheep fed a high fat ration with or without addition of Ca or Mg.
Cannulated animals will be used the optimun level of CPO will be used as a standard diet, and this will be treated or untreated with metal-cations (Calcium or magnesium).
Parameters measured : pH, NH3N, VFA, Insoluble Ca and Mg-soaps, saturated and unsaturated
fatty acids. A standard fibre (cotton thread) will be incubated in the rumen at various times to study cellulolytic activity.

Exp. 3. Biological evaluation will be made using results of exp 1 & 2 (fat diposition, body composition).

Duration : 3 Years.

Budget : $ 10.000.-

Philippines, showed that average daily gains of 39.2 and 36.8 g/head/day, can be achieved by sheep and goats, respectively and that the carrying capacity of the coconut farms under different cropping system ranged from 14 to 17 heads/ha/ annum (Parawan and Ovalo, 1986).

An experiment has been set up at Pakuwon, West Java, in collaboration with The Coconut Research Institute in 1986. Preliminary studies showed that the productivity of sheep either raised by grazing under coconut or the cut and carry system given the roughage obtained from the same source were very low with high lamb mortality.

It is proposed to continue this study under an improved system that will be evaluated against a control.

Materials and Methods

1. The land area under coconuts that will be used is about 6 ha which will be divided into three block treatments. The treatments will be :

   a. Traditional management system where the animals graze the roughage under coconut.

   b. Improved management system.
      Animals also graze the same roughage but additional input will be given, such as concentrate, drenching, etc.

   c. The third block serves as a control.
      No animals will be raised under the coconuts.

2. No treatment will be applied on the pastures, but the productivity of the pasture will be measured. Intake studies will be carried out using oesophageal cannulated sheep and the botanical composition of the roughage consumed will be determined.

3. Measurements
   - production of coconut nut from each block
   - production of pasture and botanical composition from each block
   - liveweight of all animals
   - litter size, sex and birth weight
   - mortality and the cause if possible
   - production per unit land area
   - lambing intervals

Estimated Budget

1. 100 heads of sheep each Rp.50.000.	Rp.	5.000.000.
2. Two units of animal houses each Rp.750.000		1.500.000.
3. New fencing and repair of existing fencing		
300 m new fencing Rp.2.500/m		750.000.
100 m repair		100.000.
4. Concentrate for two years		
50 x 0.25 kg x 730 days x Rp.200.		1.825.000.
5. Medicine for two years		
50 x Rp. 5.000.		250.000.
6. Minerals and salt for two years		200.000.
7. Equipments		
feed bin, scales, plastics etc.		750.000.
8. Labours (3 man days for 2 years)		
3 x 24 x Rp. 30.000.		2.160.000.
9. Transport for scientists and technicians		
two times per week		
- petrols 210 x 30 l x Rp.385.		2.425.500.
- expenses for two years		
scientist 420 x Rp. 7.500.		3.150.000.
driver 210 x Rp.5.000.		1.050.000.
10.Miscellenous		
data analyses etc.		500.000.
Total budget	Rp.	19.660.500

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III.5. AREA 5 OUTREACH PILOT PROJECT (OPP)

N 88-22 Title : A SEMI-COMMERCIAL PRODUCTION MODEL FOR THE DEVELOPMENT OF THE SMALL RUMINANT INDUSTRY IN INDONESIA

Personnel : A. Djajanegara, L. Iniguez, A. Priyanti, T. Chaniago, D. Lubis and S. Mawi

Introduction

The present small ruminant production in Indonesia is mainly based on small holder farms and on only a few recently operated large farms. The development of small-holder farms as efficient and profitable production systems depends upon the implementation of new technology which often requires additional inputs, far to be met by the rather low farmer's income.

Technology transfer programs for small ruminants have been implemented in some Indonesian villages in the past. These programs included dissemination of research results via extension personnel, pilot projects with direct farmer-researcher participation, etc. ; all designed on the basis of a low profile of technological changes to implement. Furthermore, these programs, eventhough multidisciplinary by design were not directly demonstrating a particular technology that unifies the isolated achievements of disciplines such as breeding, nutrition, health, etc. Instead they were operating on the basis of recollection/evaluation of information by every participating discipline.

It appeared that little progress was achieved by the above stated strategy as the farmer often return to their traditional management practices, once the programs were terminated. Presumably, the introduced changes did not condition an attractive motivation for them to be adopted as the main components of the production system or the strategy of a low profile of changes was not the most suitable at all.

We should recognize that it is not possible to increase the size of the farm to the size of a large scale operation aimed to establish an industrial production system, however, its production could be regulated and managed as to provide a significant income for the farmer. Although the output from small ruminants may not contribute as the major proportion of the farmer's source of income, it could be more attractive, that it actually is, to motivate an increase in the production level. The alternatives to produce a more uniform supply of lambs over the year seem to be the natural choice in this regard. In fact, the farmers' yearly income from small ruminants is not regular nor is the marketing of their animals, the latter usually dictated by the farmer's needs and/or the level of market prices.

While it is not possible for the small ruminant bussiness to generate a daily cash income like that by lactating dairy cows, it may still be feasible to generate a regularly "period" cash income ; i.e. a better distribution of the cash flow over the year. "Period" in this context represents a given number of months of the year such that the year could be divided into 6 to 12 periods.

A new strategy exploiting the non-reproductive seasonality of the Indonesian sheep or goats cold then be formulated as to provide with an attractive motivation for the small holder to improve their production system.

Objectives

1. To increase the production of small ruminants under village conditions.
2. To provide an attractive motivation for the farmers to produce small ruminants.
3. To test new technologies obtained from laboratory studies under village conditions.
4. To investigate the social and economic impacts of implementing the production system.

The Strategy

This proposal contains a unified strategy for the development of a small ruminant bussiness based on the small-holder farming system as the unity of the industry. The main target of this strategy is to develop a system that will output marketable lambs of about 20 kg of liveweight at an age of 8 months regularly over several periods of the year. The latter oriented to offer a more uniform level of income over the year. All available information regarding nutrition, breeding, health, and economics will be unified into a technological procedure to guarantee the intended production at minimum cost and at maximum benefit. Such a procedure will include :

a) Nutrition

Least cost supplementation to forages in order to overcome constraints due to forage availability, will be part of the feeding strategies. Supplementation (based on legume crops or rice bran) will be offered to ewes particularly during the last third of pregnancy and during lactation. Postweaned lambs will receive supplementation during the growth phase, as well. Introduction of legume trees such as gliricidia should also be initiated.

b) Breeding

Strong emphasis will be put on this aspect since it is intended to produce lambs with minimum interlambing interval. Animals will be exposed to the ram as soon as the lambs are weaned in order to obtain an average of three lambings in two

years. For mating purposes the year will be divided into 6 periods of mating as follows:

	Mating	Lambing	Weaning	Mating
Period I	J F	J A	N D	S O
Period II	M A	S O	J F	N D
Period III	M J	N D	M A	J F
Period IV	J A	J F	M J	M A
Period V	S O	M A	J A	M J
Period VI	N D	M J	S O	J A etc.

Adult females will be allocated to periods such that the number of ewes in all periods are the same or nearly the same.

Future Projections

If succesfull, this model of production of small ruminants could be extended to villages or other small ruminant production centres in Indonesia. It is foreseeable that the availability of uniform (age and size) animals in the market would attract the establishment of a small ruminant fattening bussiness.

In the future, the small ruminant industry will require that a close relationship should be maintained between the KUD (Village Cooperative Unit) for the collection of animals, and the fattening bussiness.

Activities

1. A survey will initially be conducted to select 30 (thirty) farmers in one village as cooperative farmers, who are already experienced in raising samll ruminants. The number of farmers involved is based upon the most efficient way of transporting small ruminants, for marketing purposes, which is about 30 to 35 animals per truck-load.

2. Each farmer will be provided with additional adult animals to meet the minimal farm size (8 females and 1 male) .

3. It may be neccessary to provide additional supply of feed during pregnancy and lactation. The offsprings are expected to reach market weight (20 to 25 kg) at 8 months of age

4. Monitoring will be done once a month.

5. All inputs and outputs of the individual farms will be monitored as the offsprings will be for the farmer and only those animals that are provided at the start will be returned .

6. It is neccessary to include persons that are involved in the marketing of animals within the existing channels.

7. It is necessary to obtain a base data of the socio-economic condition of the cooperative farmers which will be used as a starting point for later evaluation. The socio-economic changes

will be monitored at regular intervals, in order to solve the problems that may be encountered during the process. It is of major interest to follow the change in attitude of the farmers towards the change in production system and to understand whether the motivation provided has any benefecial impact .

Duration : 3 Years (1987/1988 to 1990/1991).

Budget

- The number of animals that has to be provided is not known, but based on the assumption that the average number of animals per farm is 4 (3 to 5 animals), then it is expected that about 120 animals will be bought.

- Feed supplemements

- The major cost will be transportation cost during the monitoring phase.

- Miscelaneous items.

Expected budget for 3 years : US $ 24,000 to 28,000.00

SR-CRSP SOCIOLOGY/ECONOMICS PROJECT INDONESIA 1987/88

I. PERSONNEL

Mike Nolan, Principal Investigator Sociology (Univ. of Missouri)

Henk Knipscheer, Principal Investigator Economics (Winrock)

Patrick Ludgate, Resident Scientist (Winrock)

M. Rangkuti, Co-Pi (BPT)
Atien Priyanti, BPT
Sri Wahyuni, BPT
S. Mawi, BPT
Elianor Sembiring, SBPT Sei Putih
Kedi (*), BPT
Agus M. (*), BPT
S. Karo-Karo (*), BPT

Multidisciplinary support
Bambang Setiadi, support Breeding/OPP, BPT
Dwi Yulistiani, support Nutrition/OPP, BPT
Darwinsyah Lubis, support Nutrition/OPP, BPT
Leo Batubara, support Nutrition/ORP, SBPT Sei Putih
Mursal Boer, support Nutrition/ORP,
A. Djoko Pitono, support Breeding/ORP, SBPT Sei Putih

(*) On study leave

II. SUMMARY OF 1986/87 ACTIVITIES

THE OUTREACH PILOT PROJECT (OPP)

In August 1987, a survey was designed and conducted in order to evaluate 3 years of contribution of the OPP to the 42 participant farmers of the project.

The aim of this survey was to collect information that would allow to quantify :

- Breeding aspects
- Nutrition aspects
- Sociological aspects

II.1. BREEDING ASPECTS

1.a. Title: OPP'S SURVEY EVALUATION : BREEDING AND MANAGEMENT PRACTICES

Presented by : Sri Wening Handayani

A survey to evaluate the breeding aspects and management practices in the Outreach Pilot Project was conducted in August, 1987. A summary of results of the evaluation follows :

1) The farmer's most important factors in raising sheep or goat

For most of the farmers feeding represented the most relevant factor in raising their animals as is shown in the following distribution of answers:

Relevant factor	Frequency of farmers (%)
Feeding	93
Prolificacy	2
No answer	5

As one expected, they expressed that better feeding will condition better growth, health and higher marketing prices.

2) Characteristics and type of animal preferred by the farmers

Farmer expressed their preferences as:

Trait	Expressed preference	Frequency of farmers (%)	Main reasons
a. Body size	Large males	86	Progeny's better performance (52%), higher price (33%) and higher fertility (5%)
	Large females	74	
b. Coat cover	Wool covered	50	
	Hair coat	50	
c. Coat colour	Coloured	43	
	White	9	Appearance
	No preference	45	
d. Ears	Long size	57*	*Better appearance (59%)
	Medium	24*	*Better price (19%)
	Earless	12	
e. Prolificacy	Twins	67	
	Singles	26	
	Triplets	5	

As it can be seen from the previous figures, large animals rather than small or average, were preferred by farmers. Reasons for this preference were: large size progeny's better performance (52%), higher prices (33%) and high fertility (5%).

Preferences regarding to the coat cover and color where approximately divided whereas the majority prefered animals with medium to long ears because of their better appearance (50%) and higher prices (19%).

Twins are preferred to both singles and triplets.

3) Procedence of rams/bucks used by the farmers and male fertility

Procedence	Frequency of farmers (%)
Borrowed from other farmers	71
Own males	29

As seen from the previous distribution, males were mostly used on a sharing basis.

Few of the respondents that used their own males (5%) indicated to have infertile males. This proportion is lower than that of last year (before September 1986), since some efforts were made to replace infertile males.

4) Female reproductive aspects

Aspects	Frequency of farmers (%)
a. Farmer's ability to recognize estrus	98
b. Remating period after parturition:	
2-3 months	43
4-5 months	33
6-8 months	17
c. Frequency of farmers with infertile females	17

Almost all farmers expressed knowledge regarding estrus occurrence. Major signs that they recognized as estrus signs were, nervousness and lack of appetite.

Still a considerable number of farmers (50%) bred their females long after they lambed. This is a potential cause of a reduction of the number of lambs per ewe per year due to longer interlambing intervals. Efforts should be done to encourage to breed just within 2-3 or 3-4 months after lambing/kidding.

In spite of efforts made to reduce the number of infertile females, still they occurred in 17% of the farmers. Further checks will be done in this order to discriminate real infertility from age and time of mating. Infertile females were sold (57%) rather than exchanged (30%) or kept in the farm (14%).

5) Lamb mortality

Causes of preweaning mortality reported by the farmer's were:

Cause	Frequency of respondents (%)
Lack of milk	36
Low birth weight	18
Diarrhoea	7
Mother ability	4
Other	35

As the list reflects, lamb mortality was primarily a consequence of weakness and poor lamb weights. The majority of the interviewed farmers (87%) expressed that mortality is closely associated with the wet season in contrast with the dry season.

Extra care during early parturition/lactation is described in the following list:

Care	Frequency of farmers (%)	Reason
Isolating mother and progeny after parturition)	81	
Providing supplement (concentrate)	5	
Do not isolate mother and progeny	14	Unavailable supplement (60%) Ignoring isolation advantage (40%)

6) Culling causes

Most of the farmers expressed that culling usually occurs whenever money is needed and/or the flocks are too overcrowded. Other reasons for culling animals were:

Reasons for culling	Frequency of farmers (%)
Age (>6 years of age)	32
Poor condition	31
Deformities, sickness	11
Infertility	14
No answer	11

7) Animal health

In the opinion of the interviewed farmers, the next are the most frequent diseases that affect sheep and goats:

Disease	Frequency of farmers (%)
Bloat and diarrhoea	52
Scabies (goats)	12
Eye infection	5
Respiratory problem	5
Others (accident, etc)	10
Weakness in large litters	2
No answered	19

Twenty-four percent of the respondents believe that contaminated food containing toxins was the main cause of diseases.

Only 43% of the respondents indicated that treat their sick animals mainly by means of traditional medicine. The remaining farmers did not treat their sick animals at all.

8) Management practices

Shearing and foot trimming are not commonly practiced among the interviewed farmers. Frequency of shearing and foot trimming were variable and did not seem to follow a regular pattern. Sixty-tree percent of the farmers shorn their animals at different intervals while only 45% trim them.

Conclusions

This survey was conducted as to orient and adjust the direction of the work at the OPP.

More information on the benefits of some management practices, which are simple, costless and non time consuming seems to be needed. Leaflets containing the needed information could be distributed to help the farmers to improve their flock conditions. The leaflets should contain information relative to:

- the feasibility to share males
- how to recognize females on estrus
- why and when to mate after lambing/kidding; particularly the disadvantages to mate long after parturition
- advantages of isolating females and progeny after parturition (at least during the first week). Treatment of lambs' navels with iodine, etc.
- how and why to trim animals

The farmer's preference for larger animals, twins and his awareness regarding to nutrition implies to emphasize more in the later aspect with new profitable alternatives.

1.b. Title : OPP'S PERFORMANCE EVALUATION : BREEDING AND MANAGEMENT

Presented by : Bambang Setiadi

The next table summarizes the results of the performance evaluation:

Farm No.	Spec.	Ewes available2	Partu-ritions3	Lamb. Inter.	Lambs born3	Lambs weaned3,4	Litter size Born	Litter size Weaned	Lambs died3	Lamb Morta-lity	Ewes died3	Of ewes available Partu-ritions	Of ewes available Lambs born	Of ewes available Lambs weaned
		--- number ----		anth.	----------	number	----------			- % -	-n-	------- %	-------	
19	2	5.0	8.4	8.9	16.8	12.0	2.00	1.43	4.8	28.6	0.0	168	336	240
07	2	3.5	7.2	11.0	8.4	8.4	1.17	1.17	0.0	0.0	0.0	206	240	240
05	2	5.0	7.2	9.9	12.0	10.8	1.67	1.52	1.2	10.0	1.2	144	240	216
12	2	4.8	7.2	8.0	10.8	9.6	1.50	1.33	1.2	11.1	0.0	150	225	200
11	2	5.0	8.4	10.2	12.0	9.6	1.43	1.14	2.4	20.0	0.0	168	240	192
24	2	2.0	2.4		3.6	3.6	1.50	1.50	0.0	0.0	1.2	120	180	180
14	2	4.0	4.8	11.2	7.2	7.2	1.50	1.50	0.0	0.0	0.0	120	180	180
16	2	6.4	7.2	10.8	9.6	9.6	1.33	1.33	0.0	0.0	0.0	113	150	150
20	2	5.0	6.0	7.0	6.0	6.0	1.00	1.00	0.0	0.0	0.0	120	120	120
06	2	5.5	4.8	7.4	6.0	6.0	1.25	1.25	0.0	0.0	0.0	91	113	113
13	2	5.4	4.8		6.0	6.0	1.25	1.25	0.0	0.0	0.0	89	111	111
09	2	6.4	8.4	9.5	8.4	6.0	1.00	0.71	2.4	28.6	1.2	131	131	94
22	2	1.3	2.4	10.3	2.4	1.2	1.00	0.50	1.2	50.0	0.0	185	185	92
23	2	4.0	3.6	8.1	3.6	3.6	1.00	1.00	0.0	0.0	0.0	90	90	90
15	2	4.0	2.4	14.7	2.4	2.4	1.00	1.00	0.0	0.0	0.0	60	60	60
18	2	4.4	2.4		2.4	2.4	1.00	1.00	0.0	0.0	0.0	55	55	55
17	2	5.0	2.4		3.6	2.4	1.50	1.00	1.2	33.3	0.0	48	72	48
10	2	7.0	2.4	11.7	3.6	2.4	1.50	1.00	1.2	33.3	0.0	34	51	34
08	2	5.0	2.4	12.3	2.4	1.2	1.00	0.50	1.2	50.0	0.0	48	48	24
21	2	3.6	3.6	8.8	4.8	0.0	1.33	0.00	4.8	100.0	1.2	100	133	0
03	1	4.0	4.8	9.2	4.8	4.8	1.00	1.00	0.0	0.0	0.0	120	120	120
04	1	3.7	4.8	7.5	8.4	3.6	1.75	0.75	4.8	57.1	1.2	130	227	97
02	1	1.9	1.2		1.2	1.2	1.00	1.00	0.0	0.0	1.2	63	63	63
01	1	2.0	1.2		2.4	1.2	2.00	1.00	1.2	50.0	0.0	60	120	60
Total		103.7	110.0		148.8	121.0	-		27.6		7.2	-	-	-
% of tot.							1.35	1.10		18.5	6.9	106.0	143.5	116.6
Mean		4.3	4.6	9.8	6.2	5.1	1.32	1.04	1.2	19.7	0.3	108.8	145.4	115.7
SD		1.6	2.3	1.9	3.9	3.6	0.32	0.36	1.6	26.3	0.5	45.9	76.3	68.1

1. The data are adjusted to a 12 month basis
2. Calculated from the sum of the monthly inventory count divided by the number of months.
3. Parturitions, lambs borns, lambs weaned, lambs died, ewes died = (total number recorded : number of months x 12 months.)
4. Lambs were considered weaned after 3 months of age whether separated from the ewes or not.
5. Species: 1 = goat ; 2 = sheep

2. NUTRITION ASPECTS

2.a. Title : MINERAL BLOCK SUPPLEMENTATION

Presented by : Dwi Yulistiani, M. Rangkuti, A. Wilson, H. Pulungan and W.L. Johnson

The effects of block mineral supplementation on sheep productivity were tested during the first and second operation year of the OPP, as a potential technology to transfer to sheep production systems. Three types of mineral block were tested among 17 OPP farmers: 0 = control; A = control + phosphorus and B = control + phosphorus + trace minerals. The composition of such mineral blocks is shown in Table 1.

Table 1. Composition of mineral blocks

Items	Treatment		
	0	A	B
Rice bran	35	35	35
Mollases	40	40	40
Urea	7.5	7.5	7.5
Salt	5	5	5
CaO	10	10	10
TSP Fertilizer	-	2.5	2.5
Mineral mix	-	-	5

The distribution of blocks were based on three contrasting different sites with regard to the predominant type of land use : 1 = areas with mainly rice field; 2 = dry areas and 3 = rubber plantations.

The effects of mineral supplementation on lamb weight gains during their preweaning period (0-90 days) and during their post weaning period (90 - 180 days) were compared. The effects were also compared on the basis of litter size and sex, as additional information.

The next is a summary of average results of this trial, stratified by some possible sources of change. The lector may recognize potential interactions among particular effects. Indeed, and unfortunately, this trial involves a very confounded set of responses. Further analysis oriented to include, all potential causes of variation - if biologically and realistically permisible - will be assessed.

Table 2. Average daily gains (ADG), preweaning period (0-90 days)

Effects	Treatments			Marginal means
	O	A	B	
Between location :				
Rice field	80	79	61	76
Dry field	76	63	93	82
Plantation	65	42	90	68
Between litter size :				
1	80	90	83	84
2	61	44	81	60
Between Sex :				
male	78	65	79	74
Female	69	67	85	73
Marginal means	73	66	82	

Table 3. Average daily gains (ADG), post weaning period (90-180 days)

Effects	Treatment			Marginal means
	O	A	B	
Between location:				
Rice field	51	61	46	53.6
Dry field	56	45	60	53.6
Rubber plants	36	30	63	43
Between sexes:				
Female	43	49	49	47
Male	49	61	66	59
Marginal means	47	54	57	

2b. Calendar Feeding

In order to improve the small ruminant feeding conditions among the farmers associated with the OPP, a set of feeding strategies were introduced into some selected participant farmers. The strategies were based in rather simple feeding schemes for utilization of available crop by-products and foliage tree legumes. It was intended, in doing so, to supplement the low quality of feedstuffs usually utilized by the SR farmers in West Java.

Based on the previous considerations, the calendar feeding strategy was defined to be a monthly recommendation of alternatives to supplement the SR diets. The suggested feedstuffs to be included in the SR rations were proposed and discussed with the farmers, on the basis of feedstuffs availability at that time. The farmers were let to freely decide the feeds that they would provide to their animals.

A table summarization, as a preliminary report, is provided in Tables 1, 2 and 3.

Table 1. OPP calendar feeding supplementation results among participating OPP's members

Location	Sragal						Gabang									
Farmers	Ajun		Hamsa		Tito		Suganda		Marjuki		Asnar		Hadtani		Average	
	a	b														
Supplement	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)	S (%)	A (%)
Crop by product																
Cassava leaves	19	50	16	31	24	26	19	21	20	16	14	16	21	11	19	24
Sweet potatoes	16	16	3	2	0	0	0	0	9	11	14	14	2	2	6	6
Corn Stover	13	11	10	20	0	0	10	0	6	2	9	9	0	1	7	6
Peanut Straw	12	4	7	4	0	0	2	2	6	11	11	8	0	0	5	3
Rice bran	5	4	4	7	6	15	5	14	3	11	2	4	5	25	4	11
Legume tree																
Gliricidia	12	0	19	10	27	28	22	21	19	17	15	18	21	21	19	16
Kaliandra	9	1	16	3	21	16	19	24	16	14	12	13	19	20	16	13
Albizia	14	16	15	13	22	17	20	19	14	5	13	12	17	8	16	13
Leucaena	2	0	0	0	0	0	2	0	0	2	2	1	0	0	1	0
tree leaves																
banana leaves	0	0	3	1	0	0	0	0	6	7	4	8	9	6	3	2
Jack fruit	0	0	8	11	0	0	2	0	4	7	4	1	5	7	3	4

aSuggested as calendar feeding.

b Accepted by farmers.

Table 2. Average post weaning daily gain in the calendar feeding project

Farmers	Villages	ADG (gram)	No of animals reared	DMI (%) BW	% Refusal
1	Gobang	42.0	15	4.1	47
2	Gobang	36.6	14	14.0	7
3	Gobang	34.6	17	7.4	16
4	Gobang	35.0	15	4.7	4
5	Srogol	67.0	17	4.5	15
6	Srogol	66.0	8	2.6	15
7	Srogol	78.0	10	3.3	21

Table 3. Feed supplement that the farmer provided with no project's suggestions

Village	Cidereum[a]	Karehkel[a]
Supplement	Madtani[b]	Midi[b]
Crop by product		
Cassava leaves	30	36
Sweet potatoes	61	2
Corn Stover	9	26
Peanut Straw	0	17
Rice bran	0	0
Legume tree		
Gliricidia	0	14
Kaliandra	0	0
Albizia	0	2
Leucaena	0	0
Tree leaves		
banana leaves	0	0
Jack fruit	0	2

[a] Selected sites

[b] Selected farmers/sites

II.3. SOCIOLOGICAL ASPECTS

SUMMARY OF RESULTS ON THE OUTREACH PILOT PROJECT

Presented by : Atien Priyanti

Introduction

Fourty two OPP farmers were interviewed about their opinions regarding to the project; the results were as follows :

1) Farmers' perception of the OPP

62% of the OPP farmers considered the OPP as a positive effort of farm assistance. Farmers were mainly (61%) satisfied with the project because they felt that the distribution and incorporation of animals into their farms generated new opportunities for economic improvement either as family savings (50%) or as profit from animal's sales (31%). Only 19% of this group of farmers associated the project's positive contribution with a better performance of the farm.

16/42 OPP farmers (38%) expressed dissatisfaction with the project. 50% of farmers in this group felt that the inclusion of new animals introduced extra costs for feed and labor, while 31% were unsatisfied because they didn't have yet opportunities to sell their animals and enjoy the profit.

2) Farmers' attitude to extend the project beyond the 5th year

As a direct consequence of the farmer's perception of the OPP, a similar proportion of farmer who were satisfied with the project expressed their willingness to extend it upon its completion (64%). Farmer's opinions were divided regarding whether the project should be extended with (55%) or without (44%) contributing money for building a new barn.

3) Farmers' suggestions to improve the performance of the OPP animals

Most of the farmers (43%) were satisfied with the present performance of their animals. The remaining interviewed respondents (47%) requested the project, primarily, to pay more assistance to animal health, and also authorization to sell animals (12%) whenever necessary, to improve productivity. The next significant fraction of the respondents (12%) suggested that extra skill labor could eventually improve productivity.

4) Farmers' view regarding the OPP and local sharing strategies

Most of the respondents (88%) considered the OPP's sharing strategy better than that of the traditional system. Farmers favored the OPP's strategy because it will transfer the ownership of the original animals (65%) during all the period covered by the contract, or just they don't find practical difficulties in returning animals to the project according to the agreement terms (27%).

5) Effects of raising OPP small ruminant in the job distribution and economy.

Most of the participant farmers (83%) explained that incorporated farming activities of the OPP didn't modify nor affected the distribution and time allocation to other jobs.

III. WORK PLAN 1987/88 : PROJECT PROPOSALS

Project	Short Title	Project Leader
SE 88-1	Impact of SR-CRSP in Garut Village	Mawi
SE 88-2	Testing Methods for SR Technology Transfer	Kedi
SE 88-3	Village Research in Garut	Mawi, Ludgate
SE 88-4	Characteristics of High and Low Performing Farmers in the OPP	Atien
SE 88-5	SR Technology Diffusion in OPP	Kedi
SE 88-6	Group Dynamics in the OPP	Sri Wahyuni
SE 88-7	Sharing Contract in the OPP	Sri Wahyuni
SE 88-8	Standards for Animal Performance in the OPP	Dambang S.
SE 88-9	Constraints to Smallholder of Sheep Under Rubber Systems	Elianor

III.1. TITLE : IMPACT OF SR-CRSP IN GARUT VILLAGES (SE 88-01)

Scientist: Leader: Syahrir Mawi
Collaborators: Bambang S., Muchji Martawidjaja,
Luis Iniguez, H.C. Knipscheer

Problem

The SR-CRSP has been active in the Garut area since 1980 by (1) monitoring of animals, (2), surveys, (3) trials, (4) technology discussions (RRFH) and (5) excursions. The impact of these activities is still unknown.

Objective

Measurements of the impact of the SR-CRSP in the Garut village (Tenjonegara and Sindangratu).

Method

One visit survey to collect information on animal performance parameters and socio-economic parameters among SR-CRSP farms and non-SR-CRSP farm. Two type of comparisons:

(a) between SR-CRSP farms and non-SR-CRSP farm
(b) between baseline data and recent survey data

Budget

Data are already collected. Desk study only.
Costs of report: $100.00 (Winrock).

III.2. TITLE : TESTING METHODS FOR SR TECHNOLOGY TRANSFER (SE 88-02)

Scientists: Leader : Kedi Suradisastra
Collaborators: M. Rangkuti, Syahrir Mawi,
P. Ludgate, task force

Problem

Presently there is a lack of appropriate extension testing materials for farmers.

Objective

Development of tested SR materials and/or technology transfer strategies.

Method

(1) inventory of technologies by (a) review of Working papers and (b) technology task force

(2) development of alternative visual and other materials and best their effectiveness, examples:

- leaflets
- workshops
- newsletters
- farmers' meetings
- etc.

Budget

US$5,000 (Winrock)

III.3. TITLE : SOCIO-ECONOMIC ANALYSES OF IMPLEMENTING DIFFERENT MATING PRACTICES INTRODUCED FOR SMALL RUMINANT IN GARUT

Scientists: Syahrir Mawi, Andi Djajanegara and P. Ludgate
2 village staff

Workplan

About 20 to 25 farm units will be established and each unit will consist of 8 ewes and one ram. These units will be divided into 3 following mating systems :

A. Free Choice -- the ewes will be mated according to the farmers choice. This group will be the control group.

B. Synchronized -- the ewes will be mated at the same period and re-mated after 3 months of parturition.

C. Periodic -- the ewes will be mated according to a time schedule as proposed by Djajanegara et al. (1987).

It is aimed that the offsprings of ewes of group B + C will be sold at 8 to 12 month of age. The implementation of the different systems will consequently provide three patterns of income. The study will include the changes of these different production system on the socio-economic condition and the farmers welfare. Monitoring of these farms will be carried out by the village staff once a month and regular meetings will be held. The duration of this study will be about 3 years.

Method

Budget

US$ 300.00 (Winrock)

III.4. TITLE : CHARACTERISTICS OF HIGH AND LOW PERFORMING FARMERS IN OPP VILLAGES (SE 88-04)

Scientists: Project Leader: Atien Priyanti
Collaborators: Bambang S.
Sri Wening Handayani
Sri Wahyuni
Patrick Ludgate

Problem

OPP production data indicates considerable variance in animal performance and productivity among collaborating farmers despite all farmers being given the same package. Such variation could be due to knowledge, motivation, resources (e.g. capital, labor) or some other factor,or combination there of. Determining the extent to which the poorer performing farmers could improve to the level of the top producers mainly through improved management would have a major impact on overall productivity.

Objective

Determine the difference in management techniques between the 10 best and 10 worst OPP farmers and, to the extent, possible the factors which cause these differences to exist.

Methods

1. Analysis of existing survey data via cross-tabulation
2. Structured interviews with 20 farmers

Budget

Per diem 45 days x 2 scientists @ Rp 7,500	= Rp 225,000	
Fuel	= Rp 95,000	
Total	Rp 320,000	= US$ 200
Supplies & Report		US$ 100
Project Total		US$ 300 (Missouri)

III.5. TITLE : DIFFUSION OF SR TECHNOLOGY IN OPP VILLAGES (SE 88-05)

Scientists : Project Leader : Kedi Suradisastra
Collaborators : BPT, BPPH & SR-CRSP staff

Problem

Cooperating OPP farmers have had the opportunity to be to be expanded to improved SR technology but to date no effort has been made to diffuse this technology within their villages, which would project SR production well beyond the core group of OPP farmers. This core group can effectively serve as "result demonstration" farms which are useful vehicles for an expanded outreach effort.

Objective

Develop methodologies for extending technology to non OPP farmers residing in the same village as OPP farmers.

Method

Organize and evaluate farmers meetings in the cooperating OPP villages.

Budget

1 meeting/3 months = 4/year
15 villages x 4 meetings = 60 mts/year

60 x 5 person x Rp 21,500	=	Rp 2,250,000
Fuel		Rp 570,000
		Rp 2,820,000
Supplies		Rp 380,000
Total		Rp 3,200,000 = US$ 2,000

III.6. TITLE : GROUP DYNAMICS IN OPP VILLAGES (SE 88-06)

Scientists: Project Leader : Sri Wayhuni
Collaborators : Bambang S.
Sri Wening Handayani
Patrick Ludgate

Problem Statement

Distribution of animals has been a traditional means by which extension has sought to improve techniques of animal management. However, by distributing animals to individual farmers extension's ability to impact significant numbers of produces is necessarily limited. By contrast, if extension works with farmer's group then the same effort can result in a several fold increase in impact. Working with group is difficult for a number of reasons including ownership of animals, task distribution, allocation of benefits etc.

Objective

To describe effective collaborating relationships of farmer's groups in OPP in order to ascertain if some of these can serve an example for other groups.

Method

In depth interviews with group members individually and collectively.

Budget

Per diem: 3 persons x 20 groups x 1 day/group = 60 days x Rp 7,500	=	Rp 450,000	
Fuel	=	Rp 190,000	
Total	=	Rp 640,000	= US$400
Supplies			US$100
Project total			US$500 (Missouri)

III.7. TITLE : ADAPTABILITY OF OPP SHARING CONTRACT IN OPP VILLAGES (SE 88-07)

Scientists : Leader : Sri Wahyuni
Collaborators: Tjeppy Soedjana, Syahrir Mawi, New staff, P. Ludgate

Problem

The present traditional animal sharing contract is patron-client oriented and may be exploitative. Surveys show that OPP farmers are very satisfied with OPP contract. Can the OPP contract replace the traditional contract?

Objective

Analyzing the adaptability of the OPP sharing contract.

Method

Group discussions by village. OPP farmers will explain OPP contract to animal owners and animal shareholders. Various alternative contract will be presented. Advantage and disadvantage of each of the contracts will be listed.

Costs

Travel will as much as possible combined with other OPP studies. Added for this study:

15 villages x 1 days x 3 persons (driver + 2 staff) x Rp 7,500	=	Rp 337,500
Fuel	=	Rp 62,500
Sub total	=	Rp 400,000
Report	=	Rp 80,000
Grand total	=	Rp 480,000 ($300) (Missouri)

III.8. TITLE : IMPACT OF FARMERS' STANDARDS FOR ANIMAL PERFORMANCE ON ACTUAL ANIMAL PERFORMANCE (SE 88-08)

Scientists : Leader : Bambang S.
Collaborators: Sri Wening, new staff, P. Ludgate

Problem

Animal performance (parturition interval, mortality) is difficult to perceive by farmers who keep small herds as births occur as infrequent events. How do farmers' judge the performance of their animals?

Objective

Analysis of relationship between farmers' perception of animal performance and actual animal performance.

Method

(1) description of farmers' standards of evaluation of animal performance.

(2) actual measurement of animal performance

- growth rate
- intervals
- mortality
- others (?)

Budget

Travel to be combined with other OPP travel. Most data already collected.

III.9. TITLE : SOCIOECONOMIC CONSTRAINTS TO SMALLHOLDERS SHEEP UNDER RUBBER SYSTEMSS IN SEI PUTIH (SE 88-09)

Scientists: Leader : Elianor Sembiring
Scientists: Leo Batubara, Manuel Sanchez, P. Ludgate, Luis Iniguez, others

Problem

Sheep under rubber systems have great economic potential but the socioeconomic problems of sheep raising under rubber are still largely unknown.

Objective

Identification of socio-economic constraints limiting the grazing of sheep under rubber.

Method

Surveys possibly in combination with on-farm testing of new technologies.

Budget

60 days at Rp 7,500	= Rp 450,000	
Fuel	= Rp 150,000	
Other supplies	= Rp 200,000	
Sub total	= Rp 800,000	(= US$ 500.00)
Ludgate 4 trips Medan		
Elianor 1 trip Bogor		
5 trips at Rp 320,000	= Rp 1,600,000	(= US$ 1,000.00)
Other costs	Rp 800,000	(= US$ 500.00)
	Total	US$ 1,500.00)

(US$ 500 from IRC; US$ 1,000 from Winrock)

88-1 Title : WORKSHOP ON INSTITUTIONS DEVELOPING ACTIVITIES IN SMALL RUMINANT PRODUCTION

Personnel : Luis Iniguez (SR-CRSP, University of California)
Andi Djajanegara (BPT)

Introduction

Different Indonesian organizations develop activities that involve the production of small ruminants. The Research Institute for Animal Production (BPT) and the SR-CRSP, for instance, are involved in laboratory research and "on-farm" projects emphasizing the sheep production of West Java and North Sumatra. Academic institutions also support research projects, and government agencies support multiplication centers for sheep/goat improvement, distribution of animals for improvement, etc. Most of these organizations, however, do not have a formal link or a coordinating organization, which results in a complete lack of information of the nature of their work and objectives, in a poor utilization of resources, in duplication of efforts that involve expensive resources, etc.

It is proposed to organize a workshop with the participation of all Indonesian institutions working in small ruminants in order to promote a coordination and inventory of resources.

Procedure

A workshop will be organized in BPT Ciawi. Participants of this workshop will be members of all, if possible, institutions that develop work in small ruminants. Main aspects of the seminar will be :

1) Institution information on :

- type of program
- objectives
- infrastructure supporting the program

2) Organizing a coordinating committee in order to :

- issue a regular newsletter to update Institution information and "who is who in small ruminants in Indonesia"
- coordinate common efforts to maximize utilization of resources

Duration

2 days, October, 1988

Budget

Estimated number of participants (15)	
Per diems 2 days	US$ 550
Estimated travel expenses	US$ 1,500
Contingency for other expenses	US$ 500
Total	US$ 2,550

M 88-2 Title : REFERENCE DATA BANK ON SR-RESEARCH IN SOUTH EAST ASIA

Personnel : Luis Iniguez (SR-CRSP)
M. Rangkuti (BPT)
Andi Djajanegara (BPT)

Introduction

There is a clear necessity to quantify the information of research results and literature outputs on small ruminants in Indonesia and South East Asia. In fact, this type of quantification is a basic resource that supports research, surveys, plans for development, etc.

In order to provide with this kind of support, it is proposed to organize a computerizeddata base bank that will include literature references on small ruminant research in Indonesia. Through the interaction with South East Asian research institutions involved with small ruminant research, it is also intended to project the data bank into a network of users with a very well defined strategy of system updating.

Procedure

1. A computer data base will be developed in order to handle all literature references associated with the SR-CRSP in Indonesia and expanded to references involving work of other institutions.

2. Entries per country will be opened in the above's data base. Available references will be entered.

3. Research institutions from South East Asian countries will be contacted and invited to be a part of a reference network. Diskettes with the program and data bank available will be sent to every Institution requiring from them to update the system with pertinent references. Copies of the updated diskettes will be again recollected appending the information of all institutions. Remail of the complete-updated data base will end a year cycle. This cycle will be organized at fixed due dates.

Budget

High speed computer 640K and 30 MB hard disk	US$	3,000
Typist for entering data (2 months)	US$	600
Materials	US$	100
Total	US$	3,700