ALL INDIA CO-ORDINATED RESEARCH PROJECT ON GOATS FOR MILK

ANNUAL PROGRESS REPORT 1979

KERALA AGRICULTURAL UNIVERSITY
MANNUTHY
VELLANIKKARA.

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EXPLANATORY NOTE

1. BACKGROUND

The All India Co-ordinated Research Project on Goats for Milk Production was commissioned at the Kerala Agricultural University in the year 1972 with the object of evolving a new breed of milch goats suitable for the agro-climatic condition of Kerala and capable of yielding 300 Kg. of milk in a lactation period of 150 days. The new breed of goats would be evolved by crossing the local Malabari breed with exotic breeds, Saanen and Alpine.

By the end of December 1979 the total flock strength was 563 goats, comprising of 49 breedable Saanen x Malabari (F_1), and 87 Alpine x Malabari (F_1) does. Out of the SxM does, 44 have kidded so far and 40 have completed the first lactation. In the case of AxM, 39 have kidded so far and 19 have completed the first lactation.

The project studied in the progeny included, birth weight, body weight, gains at 3, 6 and 12 months and body measurements like length, height and heart girth etc. for the different genetic groups, according to sex and type of birth. Alpine x Malabari (F_1) goats were found superior to Malabari.

Data were recorded for distribution of sire-wise matings, kiddings, abortions and for breeding efficiency like age at first service, age at first kidding, post partum interval, service period and kidding interval. Age at first service and age at first kidding were considerably lowered in crossbred groups in comparison to those in Malabari. But the post partum interval was lengthier in Saanen x Malabari and lower in Alpine x Malabari than in Malabari. Service period was lengthier in crossbreds, probably due to comparatively lengthier lactation period.

Sixty females in Alpine x Malabari were in the age group of 4-12 months and 23, below 4 months. Triple crosses combining Malabari and the two exotic breeds were only few in number and hence were not sufficient to evaluate the performance. Four

females in Malabari breed were in the age group of 0-3 months and one female in the age group of 4-12 months. In addition to this unit has in stock, 178 breedable Malabari females 49 breedable SxM females and 87 Alpine x Malabari breedable females.

In the villages around this unit, the farmer's goats were bred to the crossbred bucks of this centre by artificial insemination of goats. In addition, the above facility was made available at the college of Agriculture, Vellayani also.

Average lactation yield for the first 150 days as well as the lactation length in crossbred groups (Saanen x Malabari (F_1) and Alpine x Malabari F_1) were higher comparied to Malabari. Highest first lactation yield and length observed in Saanen x Malabari (F_1) was 138.5 Kg. in 128 days and for Alpine x Malabari (F_1) was 195.3 Kg. in 215 days, whereas the same for Malabari was 141.1 Kg. in 287 days.

A significant achievement of the unit which gave an impact on the public was the distribution of crossbred bucks for breeding purpose. So far 240 bucks have been distributed to individual farmers, developmental agencies and charitable institutions. In spite of the fact that the sale price of crossbred adult bucks was Rs.400/- and sales tax, individual farmers came forward to purchase them. The follow up showed that most of the bucks were well maintained by the farmers and were being used for service to does belonging to neighbouring farmers.

So far 2334 artificial inseminations have been done. Large number of crossbred goats were born in the locality and performance of those crossbred goats appeared much better than those of local goats. It is proposed to introduce artificial insemination facilities in few more artificial centres attached to the University.

ii) JUSTIFICATION FOR CONTINUING THE PROGRAMME

The brief report of this unit on goat breeding would show that there is great scope for developing the goat as a profitable farm animal for the small farmers and agricultural labourers. A great deal of research and extension work is required in this area to exploit fully the potential of the goat for the welfare of the rural people. By applying suitable technology and inputs

the goats can be made a dairy animal as cattle or buffalo. The cross breeding programme utilising exotic germ plasm of Saanen and Alpine and other studies connected with it must continue for a period of at least 7 years and by that time it is expected to draw valid conclusions.

During the year under report, two Saanen bucks in the age group of 4-12 months were procured from Rural Agricultural Institute, Narayangaon, Maharashtra. As soon as those bucks will be ready for breeding it is expected that a good number of SxM cross-bred animals will be produced.

iii) Date of sanction of goat unit 1-7-1971

iv) Date of functioning of the project 7-9-1972

v) Infrastructure facilities available/sheds/lab equipments/ Farm equipments.

The infrastructure facilities for the project were almost complete with respect to sheds/laboratory equipments and farm equipments. Apart from the sheds constructed, utilising ICAR funds, for accommodating adults and kids, with a total capacity of 300 adult females + 20 bucks + 60 growing kids + 60 suckling kids; 7 sheds which could accommodate a total of 220-250 growing and adult goats were provided by the University. The construction of the new shed was completed in October 1977 and was provided with individual feeding facilities for about 200 animals. The shed is completely covered and with raised platform, throughout, taking into consideration the heavy monsoon months in the area. Milking barn, isolation wards and labour change rooms, toilets were not constructed due to lack of sufficient funds.

(vi) Total expenditure from the beginning till 31-12-1979

Year	Recurring	Non-Recurring	Total
a) 1974-1975	2,27,730.88	13,793.10	2,41,523.98
b) 1975-1976	3,57,123.25	24,930.36	3,82,053.61
c) 1-4-1976 to 31-12-1976	2,06,548.51	55,251.67	2,61,800.18
d) 1-1-1977 to 31-12-1977	4,08,769.15	1,47,453.76	5,56,222.91
e) 1-1-1978 to 31-12-1978	4,37,645.67	1,85,776.98	6,23,422.65
f) 1-1-1979 to 31-12-1979	4,37,868.75	2,140.52	4,40,009.27

RECEIPTS

	Rs. Ps.
1974-1975	5,069.75
1975-1976	8,227.88
1-4-1976 to 31-12-1976	11,659.40
1-1-1977 to 31-12-1977	28,909.00
1-1-1978 to 31-12-1978	18,448.50
1-1-1979 to 31-12-1979	47,288.60

2. ACTION ON THE RECOMMENDATION OF THE LAST GOAT WORKSHOP

a) BREEDING PROGRAMME

The workshop recommendation regarding breeding programme was to resort to interse - mating of 2/3 of F_1, SxM and to cross the remaining 1/3 to Alpine. This was followed strictly. The Alpine x Malabari F_1 goats were bred interse during the period. A mating plan was prepared. Since no Saanen buck was available, F_1, Alpine x Malabari could not be crossed to Saanen. But within a few weeks the Saanen buck will be ready for breeding and hence the programme will be implemented. Interse mating of AxM is going on.

b) OVER CROWDING

With the completion and occupation of new sheds, over crowding was practically reduced at present.

c) MORTALITY

Mortality which happens to be the most dreaded aspect in every Livestock undertaking has been a matter of concern in this unit also. The adult mortality has been very low within the limits. The over all adult mortality during 1979 was 10.11%. The adult mortality was higher as there was an outbreak of viral pneumonia among goats and some adults succumbred to that attack.

KID MORTALITY

During 1979, kids born were 394, out of which 114 have died giving a percentage of 28.93. Before the outbreak of viral pneumonia the kid mortality was on 16.85% which was within the maximum limit of 25%. But during the last two months, due to the outbreak of viral pneumonia the over all kid mortality taking into account the kids carried over from 1978 to 1979 raised to 27.94%.

The scientists succeeded in bringing down the kid mortality considerably due to the preventive and control measures and improvement in management practices. But an outbreak of incurable viral pneumonia among kids with onset of vwinter lead to mortality among kids and all the attempts made to bring down kid mortality during the earlier periods nullified.

Kid mortality upto the outbreak of pneumonia - 16.85%
-do- after the outbreak of pneumonia - 27.94%

STEPTS TAKEN TO BRING DOWN KID MORTALITY

a) The difficulties with respect to over crowding was solved to a certain extent by the occupation of new goat sheds constructed. In addition another building has been allotted by the University for the goat project.

b) The practice of weaning kids immediately after birth was discontinued and substituted with the new system of allowing kids to suckle upto three months of age and subsequent weaning.

c) The mating programme has been adjusted to avoid kidding during rainy season.

d) Rotation of kidding pens was practised to a limited extent but this has not been fully implemented due to operational difficulties with a large flock so as to avoid excessive over crowding.

e) Pens where kids were located were cleaned and disinfected three times a day.

f) The premises of the pens were disinfected by sprinkling lime. This place was left unoccupied for two weeks to destroy oocyst of coccidia.

g) Infra red lamps were installed to provide warmth and reduce humidity in the pens.

h) Prompt and regular examination of faecal samples of kids and timely administration of coccidiostat reduced mortality.

i) Pathology, Bacteriology and preventive medicine departments of the faculty also helped in the treatment and prevention of diseases.

Division of Virology, I.V.R.I. has deputed a Scientist for investigation and have reported that no mycoplasma could be identified. However a strain of Cornebacterium pyogenes could be isolated from lung of one animal. For further studies the materials were sent by them to the division of Virology at Muktheswar.

With the corrective step to reduce the kid mortality this unit succeeded in bringing down the percentage of mortality from 31% to 16%. It appeared that the mortality rate has been substantively reduced and was within the maximum limit prescribed.

d) TRIBAL DEVELOPMENT

So far 8 crossbred bucks were earmarked for distribution to Tribal Development Blocks. But only 6 were lifted by the authorities of Tribal Development Blocks and 2 more will be distributed, free of cost.

In the present rate of progress a minimum period of 10 years more will be required to arrive at a definite conclusion regarding performance of different genetic groups.

NUTRITION

Challenge feeding and ad libitum feeding of a few of the high yielding animals of each genetic group were suggested in the previous workshops. Accordingly, a few of the animals of the SxM cross were subjected for the programme. The milk yield of the animals after challenge feeding was compared with the yield in the previous lactation. The results are given below.

Number of the animal	Milk yield in Kg. for the first 3 months in the previous lactation	Milk yield in Kg. for the first 3 months after challenge feeding
772	25.100	61.950
620	34.300	53.750
623	45.200	54.600
656	61.650	70.100
665	62.500	51.850
670	30.150	75.750
686	41.500	69.050
704	48.300	48.650

It can be seen that most of the animals have responded very much to challenge feeding. Perusal of the season of kidding of these animals revealed that the difference in milk yield of some of the animals is mainly because of the difference in season of kidding. The animals kidding in rainy season generally produced more milk due to the better quality of fodder available during the season. Hence the experiment is proposed to be continued on more number of animals of all the genetic groups to evaluate the effect of challenge feeding for the exploitation of the milk production potential of the goats.

3. Title of the project : All India Co-ordinated Research Project on Goats for Milk Production

4. Period covered by the report : 1-1-1979 to 31-12-1979

5. Staff position as on 31-12-1979

Sl. No.	Name	Designation	Qualification	Scale of pay	Date of joining
1	2	3	4	5	6
1.	Dr. B.R. Krishnan Nair	Geneticist	M.V.Sc. (Animal Genetics & Breeding)	1125-1725	10-3-1977
2.	Dr. N. Kunjikutty	Associate Professor	M.Sc. (Nutrition) (F.R.V.A.C.)	1125-1725	17-3-1977
3.	Dr. T. Sreekumaran	Junior Pathologist	M.V.Sc. (Pathology)	800-1600	11-5-1979
4.	Dr. B. Nandakumaran	Assistant Professor (F.M.)	M.V.Sc. (A.B. & G.)	800-1600	9-5-1979
5.	Dr. Joseph Mathew	Junior Physiologist	M.V.Sc. (Gynaecology)	800-1600	During 9/79
6.	. . Vacant	Asst. Professor of Statistics		800-1600	-
7.	Dr. Annamma Kurian	Jr. Assistant Professor	B.V.Sc.	600-1270	11-1-1977
8.	Dr. K.C. Raghavan	-do-	B.V.Sc.	600-1270	2-6-1979
9.	Dr. V.L. Somanathan	-do-	B.V.Sc.	600-1270	15-10-1979
10.	Smt. U. Narayanikutty	Technical Assistant	M.Sc. (Maths)	535-950	21-10-1978
11.	Sri. K. Krishnankutty	Senior Computor	K.G.T.E. (Agri.) L.S.A. Training	420-720	11-9-1978
12.	Sri. P.K. Vijayamoni	Laboratory Technician	L.S.A. Training	-do-	13-1-1978
13.	Smt. K.G. Kamalamma	-do-	L.S.A. Training	-do-	24-1-1974
14.	Smt. P.C. Mary	-do-	P.U.C., L.S.A. Training	-do-	8-11-1973

1	2	3	4	5	6
15.	Smt. M. Baby	Ist Gr. Assistant	B.A. (Economics)	420-720	1-8-1978
16.	Sri. P.K. Manikutty	-do-	M.A. (Economics)	-do-	1-6-1977
17.	Sri. V.S. Skandakumar	-do-	M.A. (History)	-do-	3-12-1978
18.	Smt. S. Rajalakshmy Amma	IInd Gr. Assistant	B.Sc.	350-580	12-9-1979
19.	Smt. K.B. Girija	-do-	K.G.T.E. Typewriting (Eng.) Higher Shorthand (Eng) Lower	-do-	23-11-1978
20.	Sri. C.T. Louis	Driver	IInd Form, Driving Licence (Light Motor)	350-580	14-8-1979
21.	Sri. V.R. Parameswaran	Stockman	VIth Std.	280-400	27-12-1973
22.	Sri. K. Radhakrishnan	-do-	Vth Std.	-do-	28-6-1978
23.	Sri. K. Manukuttan	-do-	--	-do-	29-6-1977
		2 posts of Stockman are vacant.			
		2 posts of Messenger are vacant.			
24.	Sri. M. Jabbar	Chowkidar	VIIIth Std.	280-400	15-10-1979
25.		2 posts of Chowkidar are vacant.			
25.	Sri. K.K. Chandran	Animal Attendant	S.S.L.C.	280-400	12-10-1979
26.	Sri. A.P. Augusthy	-do-	S.S.L.C.	-do-	16-10-1979
27.	Sri. V. Ponnappan	-do-	S.S.L.C. failed	-do-	18-10-1979
28.	Sri. N. Appu	-do-	VIIIth Std.	-do-	22-10-1979
29.	Sri. K. Sankaran Nair	-do-	Nil	-do-	25-6-1977
		5 posts of Animal Attendant are vacant.			
		3 posts of Sweeper are vacant.			

Against the sanctioned post of 23 Class IV employees, only 9 were filled up at present. Therefore to carry out the routine work of the goat farm permanent and casual labourers were engaged according to necessity.

6. OBJECTIVES

a) To evolve a new breed/breeds of milch goats, suitable for different agroclimatic condition, and capable of yielding more milk. The genetic potential of breed to be developed will be such that, they yield at least 300 Kg. of milk in a lactation period of 150 days. It is intended that the type of milch goat developed should meet the requirements of milk of landless labour and weaker sectors of the community and also provide additional income for such families.

b) To produce different combinations of crosses of the local breeds with exotic breeds and to test their performance in respect of total milk production and economics of feed conversion.

c) To take up ancillary studies in Nutrition, Physiology, Management and disease control to support the above programme.

d) To study the goats evolved for adaptability under rural conditions of housing and management.

e) To take up studies on chemical and bacteriological quality of goat milk.

f) To undertake studies on processing and technology of goat milk.

7. TECHNICAL PROGRAMME

The technical programme laid out in the first workshop held at N.D.R.I. Karnal from 19th to 21st September 1972 and approved by the ICAR was as follows:

BREEDING PR GRAMME FOR MILK UNITS - EXOTIC BREEDS

Two exotic breeds - Saanen and Alpine - were included in the cross breeding programme. The minimum standard of performance

for male/female were laid as follows:

Breed	Age	Sex	Dam's lactation performance in 240 days of lactation	Individual Ist lactation performance in 240 days
Saanen	1 month & over	Male	1000 litres of milk	
	1-2 year	Female	1000 litres	850 litres or 4 Kg/day
Alpine	1 month & over	Male	900 litres	
	1-2 years	Doe		700 litres or 3.5 Kg/day

INDIAN BREEDS

Centre	Local Breed	Minimum standard
Trichur Unit	Tellichery/Malabari	After having completed Ist lactation yield at least $\frac{1}{2}$ Kg/day in 24 hrs. (In 3 consecutive milkings) preference being given for does with multiple birth.

BREEDING PROGRAMME

Original:

Six hundred breedable does of native breed would form the foundation population. They should generate three hundred breedable half bred females of each of two exotic breeds in 3 ♂ crops which in turn would generate four hundred kids of 3/4 of each of the exotic groups in the three crops in the following mating plan.

Male	Local (L)	Saanen (S)	Alpine (A)
Female $\frac{1}{2}$S + $\frac{1}{2}$L $\frac{1}{2}$A + $\frac{1}{2}$L	Local (L)	$\frac{1}{2}$S $\frac{1}{2}$L $\frac{3}{4}$S $\frac{1}{4}$L $\frac{1}{2}$S $\frac{1}{4}$A $\frac{1}{4}$L	$\frac{1}{2}$A $\frac{1}{2}$L $\frac{1}{4}$S $\frac{1}{2}$A $\frac{1}{4}$L $\frac{3}{4}$A $\frac{1}{4}$L

At each stage fifty females at breedable age belonging to local breed would be bred to a native bucks of same breed to produce contemporary native stock maintained under the same feeding and management regime.

As it was felt later that the foundation population envisaged was of higher magnitude and no unit could achieve that due to inadequate infrastructural facilities, the breeding programme was later modified.

MODIFICATIONS IN THE IInd AND IIIrd WORKSHOP

The breeding programme envisaged a flock of 350 breedable females of local breed in two groups of 150, does to be crossed to Saanen and Alpine respectively, the third group of 50 being retained to provide pure bred contemporaries. Breedable local females will be 350 each year and this can be maintained by 10% replacement every year. 2/3 of the half breds (F_1) will be bred interse and remaining 1/3 bred to the alternate breed to create three bred cross.

8. FLOCK STATISTICS AS ON 31-12-1979

Breed	Class of animals (age)	Initial strength on 31-12-78		ADDITIONS						DELETIONS										Final strength on 31-12-1979	
				Kidding		Purchase		Transfer from other age group		Mortality		Sale		Slaughter		Transfer to other dept.		Transfer to other age group			
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Malabari	0--3	-	-	6	7	-	-	-	-	1	2	-	-	-	-	-	-	2	1	3	4
	4-12	1	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	1	-	2	1
	Adult	14	223	-	-	-	-	1	-	-	19	6	9	2	17	-	-	-	-	7	178
Saanen x Malabari	Adult	10	56	-	-	-	-	-	-	2	6	-	-	-	1	-	-	-	-	8	49
AxM	0--3	46	31	131	137	-	-	-	-	27	30	-	-	-	-	1	-	135	115	14	23
	4-12	24	37	-	-	-	-	135	115	20	21	92	-	6	11	2	-	7	60	32	60
	Adult	16	31	-	-	-	-	7	60	1	2	14	1	2	1	-	-	-	-	6	87
$^{D}M(F_2)$	0--3	1	-	14	17	-	-	-	-	3	-	-	-	-	-	-	-	12	15	-	2
	4-12	1	-	-	-	-	-	12	15	5	-	7	-	-	1	-	1	1	-	-	13
	Adult	2	2	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	1	2
AxAxM	0--3	1	-	15	24	-	-	-	-	2	2	-	-	-	-	-	-	6	14	8	8
	4-12	-	1	-	-	-	-	6	14	4	4	1	-	-	1	-	-	-	1	1	9
	Adult	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
A_xSxM	0--3	4	3	13	18	-	-	-	-	2	2	-	-	-	-	1	-	11	13	3	6
	4-12	8	4	-	-	-	-	11	13	-	3	13	-	1	-	-	-	4	7	1	7
	Adult	-	-	-	-	-	-	4	7	1	1	-	-	-	-	-	-	-	-	3	6
SxSxM	0--3	2	1	-	4	-	-	-	-	-	1	-	-	-	-	-	-	2	2	-	2
	4-12	-	-	-	-	-	-	2	2	-	-	1	1	-	-	-	-	1	1	-	1
	Adult	-	4	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	5
F_2A	0--3	1	-	3	3	-	-	-	-	3	-	-	-	-	-	-	-	1	2	-	1
	4-12	-	-	-	-	-	-	1	2	-	1	-	-	-	-	-	-	1	-	-	1
	Adult	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-

F_3S	0--3	-	-	-	2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	4-12	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Alpine	Adult	4	-	-		-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	1	-
Saanen	4-12	-	-	-		-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Total		136	393	182		212	2	-	184	233	73	94	136	10	12	32	4	1	184	233	95	468	

Total Flock Strength = 563

9(i) AVERAGE BODY WEIGHT OF THE ANIMALS BORN DURING 1979 ACCORDING TO BREEDS, TYPE OF BIRTH AND SEX

Age	Type of birth	Sex	Malabari		AxM		AxAxM		AxSxM		SM(F_2)	
			Average body weight	No.	Average Body weight	No.	Average body weight	No.	Average body weight	No.	Average body weight	No.
1.	2	3	4	5	6	7	8	9	10	11	12	13
Birth	Single	M	2.25	2	2.20	29	2.15	8	2.00	3	2.33	3
		F	2.06	3	2.04	25	1.97	11	2.10	3	2.30	3
	Twin	M	1.37	4	1.86	47	2.00	4	2.45	7	2.55	7
		F	2.00	1	1.75	54	1.75	8	1.92	9	2.10	13
	Triplet	M	-	-	1.75	11	-	-	-	-	1.80	1
		F	-	-	1.55	15	-	-	-	-	2.00	2
2 Week	Single	M	3.00	1	2.99	29	3.22	7	5.30	2	2.80	3
		F	2.76	3	2.71	25	2.73	9	2.56	3	3.00	3
	Twin	M	2.10	2	2.67	47	3.26	3	3.58	7	3.55	7
		F	2.80	1	2.59	54	2.62	7	2.71	9	3.05	13
	Triplet	M	-	-	2.72	11	-	-	-	-	4.00	1
		F	-	-	2.26	15	-	-	-	-	4.10	2
4 Week	Single	M	3.20	1	3.68	29	4.20	7	7.05	2	3.26	3
		F	3.53	3	3.39	25	3.67	8	3.53	3	4.03	3
	Twin	M	2.10	2	3.50	47	4.10	4	4.74	5	4.11	7
		F	-	-	3.45	54	3.38	7	3.36	8	4.16	13
	Triplet	M	-	-	3.55	11	-	-	-	-	6,50	1
		F	-	-	2.77	15	-	-	-	-	6.50	2

1.	2	3	4	5	6	7	8	9	10	11	12	13
6 Week	Single	M	-	-	4.43	29	4.60	3	8.65	2	5.33	3
		F	4.30	1	4.11	25	4.53	8	4.73	3	5.66	3
	Twin	M	2.75	2	4.16	47	4.60	1	5.30	5	4.17	7
		F	-	-	4.12	52	4.05	7	4.40	8	4.63	13
	Triplet	M	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		F	[illegible]	[illegible]	[illegible]	15	[illegible]	-	-	[illegible]	6.70	2
8 Week	Single	M	-	-	5.[illegible]	29	5.06	3	9.55	2	5.93	3
		F	5.20	1	5.00	24	5.01	7	5.46	3	7.06	3
	Twin	M	3.60	3	4.78	47	5.00	1	5.86	5	5.60	7
		F	-	-	4.84	51	4.53	6	4.88	8	5.63	13
	Triplet	M	-	-	4.69	11	-	-	-	-	7.20	1
		F	[illegible]	-	4.18	15	-	-	-	-	7.55	2
10 Week	Single	M	-	-	6.12	29	5.85	2	11.00	2	5.33	3
		F	6.50	1	5.60	24	6.00	5	6.26	3	7.93	3
	Twin	M	4.60	2	5.49	45	5.80	1	6.84	5	6.34	7
		F	5.00	1	5.08	50	5.32	4	5.40	7	6.58	11
	Triplet	M	-	-	5.46	10	-	-	-	-	8.00	1
		F	-	-	4.89	13	-	-	-	-	8.15	2
12 Week	Single	M	-	-	6.70	29	6.30	2	11.55	2	6.46	3
		F	7.80	1	6.34	23	6.52	5	7.06	3	8.80	3
	Twin	M	5.10	2	6.23	45	6.00	1	7.24	5	7.20	7
		F	5.40	1	6.38	47	5.65	4	6.00	7	7.53	10
	Triplet	M	-	-	5.71	10	-	-	-	-	8.10	1
		F	-	-	5.60	13	-	-	-	-	8.50	2
14 Week	Single	M	-	-	7.26	28	6.50	2	12.50	2	7.40	3
		M	8.00	1	7.14	22	7.20	5	7.83	3	10.03	3
	Twin	M	4.50	2	6.89	43	6.40	1	7.96	5	8.07	7
		F	6.00	1	7.07	47	6.72	4	6.68	7	7.96	10

1	2	3	4	5	6	7	8	9	10	11	12	13
	Triplet	M	-	-	6.78	8	-	-	-		8.20	1
		F	-	-	6.32	11	-	-	-	-	9.06	2
4 Month Single		M	-	-	7.95	23	7.50	1	12.70	2	7.40	3
		F	8.50	1	7.87	18	8.32	4	8.40	3	10.33	3
	Twin	M	5.15	2	7.48	38	7.80	1	8.88	5	8.94	5
		F	-	-	7.87	43	7.80	4	7.40	7	8.60	10
	Triplet	M	-	-	7.60	8	-	-	-	-	8.80	1
		F	-	-	6.99	10	-	-	-	-	9.60	2
5 Month Single		M	-	-	9.72	17	-	-	13.40	1	9.00	3
		F	-	-	9.38	15	9.50	3	9.10	2	12.43	3
	Twin	M	7.00	1	8.66	23	10.00	1	10.75	4	11.00	3
		F	-	-	8.97	38	9.70	3	8.86	6	10.13	9
	Tripletq	M	-	-	9.12	5	-	-	-	-	10.00	1
		F	-	-	8.18	9	-	-	-	-	10.10	2
6 Month Single		M	-	-	10.24	9	-	-	15.00	1	10.00	3
		F	-	-	11.17	11	10.46	3	11.00	1	14.00	2
	Twin	M	-	-	9.80	17	11.00	1	12.20	1	11.83	3
		F	-	-	10.23	32	10.50	3	10.03	3	10.85	8
	Triplet	M	-	-	10-20	4	-	-	-	-	11.20	1
		F	-	-	10.66	3	-	-	-	-	11.00	2
7 Month Single		M	-	-	11.36	6	-	-	13.00	1	-	-
		F	-	-	12.06	9	12.00	2	12.00	1	15.00	2
	Twin	M	-	-	10.41	14	14.00	1	14.00	1	13.00	1
		F	-	-	11.21	28	11.55	2	11.00	3	12.08	8
	Triplet	M	-	-	11.00	3	-	-	-	-	12.00	1
		F	-	-	12.00	2	-	-	-	-	12.50	2
8 Month Single		M	-	-	13.66	3		-	13.00	1	-	-
		F	-	-	13.53	6	14.0	2	13.00	1	-	-
	Twin	M	-	-	10.57	7	-	-	15.00	1	-	-
		F	-	-	13.01	17	-	-	14.86	3	11.88	5

1	2	3	4	5	6	7	8	9	10	11	12	13
	Triplet	M	-	-	11.00	1	-	-	-	-	13.00	1
		F	-	-	12.90	2	-	-	-	-	13.60	2
9 Month	Single	M	-	-	-	-	-	-	14.10	1	-	-
		F	-	-	14.00	1	-	-	14.00	1	-	-
	Twin	M	-	-	-	-	-	-	16.00	1	-	-
		F	-	-	13.50	5	-	-	15.00	1	12.37	4
	Triplet	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	-	-	-	-	-	-	14.00	2
10 Month	Single	M	-	-	-	-	-	-	15.00	1	-	-
		F	-	-	15.00	1	-	-	15.20	1	-	-
	Twin	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	13.20	1	-	-	16.00	1	-	-
	Triplet	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	-	-	-	-	-	-	-	-
11 Month	Single	M	-	-	-	-	-	-	16.00	1	-	-
		F	-	-	-	-	-	-	16.00	1	-	-
	Twin	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	-	-	-	-	17.00	1	-	-
	Triplet	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	-	-	-	-	-	-	-	-
12 Month	Single	M	-	-	-	-	-	-	-	-	-	-
		F	-	-	-	-	-	-	-	-	-	-
	Twin	M	-	-	-	-	-	-	18.00	1	-	-
		F	-	-	-	-	-	-	-	-	-	-

9(ii) BODY MEASUREMENTS (Average values in Cms.)

Breed	Age	Type of birth	Sex	Length	Height at weathers	Heart girth	No. of animals
Malabari	Birth	Single	M	30.00	34.00	29.66	3
			F	27.00	29.48	29.14	21
	6 months	Single	F	40.33	47.33	47.66	3
	9 months	Single	F	44.50	52.50	52.00	2
	Birth	Twin	M	28.00	32.50	33.50	2
			F	26.38	29.00	28.50	28
	6 months	Twin	F	39.00	43.00	46.66	3
	9 months	Twin	F	40.50	46.50	47.00	2
Saanen x Malabari	Birth	Single	M	29.00	27.60	29.60	5
			F	30.05	31.10	31.50	20
		Twin	M	29.25	29.50	29.75	4
			F	28.48	29.00	30.24	21
	6 months	Twin	F	45.67	42.33	55.00	3
	1 year	Twin	F	57.00	52.00	62.00	1
Alpine x Malabari	Birth	Single	M	28.77	35.00	34.33	9
			F	30.53	35.67	33.00	15
		Twin	M	26.00	31.40	28.10	5
			F	27.00	32.17	29.58	12
		Triplet	F	25.00	31.00	30.00	1
	6 months	Single	F	45.50	54.00	57.50	2
		Twin	F	44.00	48.00	50.00	1
SM(F_2)	Birth	Twin	M	34.00	41.00	34.00	1
			F	31.00	37.00	33.00	1
SxSxM	Birth	Single	F	31.00	28.25	29.75	4

9(iii) REPRODUCTION

a) The number of does bred from 1-1-1979 to 30-6-1979 — 389

b) The number of does kidded out of above matings — 111

Percentage does kidded — 28.53

c) Total number of breedable does on
1-1-1979 — 316
30-6-1979 — 323
31-12-1979 — 328

The number of does bred from 1-7-1979 to 31-12-1979 — 537

d) Monthly distribution of does bred and does kidded (Actually kidded out of number of bred upto July 1979)

Month	No. of does bred	Month	No. of does kidded	Still births	Abortions
January	65	June	17	2	1
February	57	July	19	2	1
March	56	August	20	1	1
April	65	September	18	-	2
May	76	October	22	-	-
June	70	November	18	-	-
July	100	December	19	-	-

e) Distribution of matings over different sire groups

Experimental matings

Doe Breed	SIRE BREED					
	Malabari	Alpine	SxM	AxM	SM(F_2)	AxSxM
Malabari	160	409	-	-	-	-
SxM	-	85	79	-	-	-
AxM	-	154	-	34	-	-
SxSxM	-	-	2	-	-	-
AxSxM	-	-	-	-	-	1
SM(F_2)	-	-	1	-	1	-

Since pure Saanen bucks were not available during the period three way crossing could not be carried out with the AxM females. These animals were either crossed with AxM bucks (Interse mating) or with pure Alpine bucks to produce 75% Alpine inheritance.

f) Distribution of Matings Sire-wise

Breed of sire	Tag No. of sire	Breed of does bred total number						No. of does bred upto 30-6-'79	2nd half year 31-12-1979.	No. of does kidded out of bred 1st half year.
		Mala-bari	SxM	AxM	SxSxM	SM(F_2)	AxSxM			
Alpine	A58	54	11	13	-	-	-	78	-	27
	A59	147	34	57	-	-	-	130	108	43
	A62	164	34	74	-	-	-	88	184	20
	A75	44	6	10	-	-	-	38	22	7
Malabari	364	26	—	—	-	-	-	1	25	-
	402	134	-	—	-	-	-	27	107	5
SxM	502	—	4	—	-	-	-	2	2	1
	625	-	3	—	-	-	-	3	-	-
	679	-	1	—	-	-	-	1	-	-
	691	-	4	—	-	-	-	1	3	1
	751	-	46	—	2	1	-	3	46	-
	778	-	7	—	-	-	-	4	3	1
	820	-	8	—	-	-	-	-	8	-
	848	-	6	—	-	-	-	1	5	-
AxM	6007	-	-	1	-	-	-	1	-	-
	6004	-	-	10	-	-	-	-	10	-
	6031	-	-	22	-	-	-	8	14	3
	6316	-	-	1	—	-	-	1	-	1
AxSxM	ASM15	-	-	-	-	-	1	1	-	1
SM(F_2)	F_2S30	-	-	-	-	1	—	1	-	1
Total		569	164	188	2	2	1	389	537	111

(g) Abortions

Breed	Doe No.	Date of Service	Date of Abortions	Cause
Malabari	A 85	19-3-1979	17-7-1979	
"	A 22	20-1-1979	7-6-1979	
Sannen x Malabari	611	25-6-1979	16-9-1979	Non specific eliology
"	779	10-7-1979	21-11-1979	
Alpine x Malabari	6265	15-6-1979	2-9-1979	
A x S x M	ASM 18	7-4-1979	1-8-1979	

(h) Breeding efficiency of does

	No	Malabari	No	SXM	No	A_xM	No	SxSxM	No	SM(F2)
1. Age at first service (days)	116	499.48	47	446.32	51	440.15	1	473.00	2	382.50
2. Age at first kidding (days)	97	705.93	63	676.38	43	548.44	3	684.00	2	531.00
3. Post partum interval (days)	473	85.70	48	149.77	20	70.75	1	53.00	1	95.00
4. Service period (days)	688	159.34	37	234.97	7	224.42	2	143.00	1	95.00
5. Inter kidding interval (days)	730	289.14	47	390.31	8	390.75	2	289.50	1	238.00

Breeding efficiency of female goats of different genetic combination

Breed of doe	Age at first puberty (days)	No.	Age at first conception (days)	No.	No. of does kidded								Kidding interval	No.	Kids per kidding	Type of kidding			
					Once	%	Twice	%	Thrice	%	More than thrice	%				Single	Twin	Triplet	Quadruplet
Malabari	499.48	116	594.23	100	34	20.48	40	24.09	21	12.65	71	42.77	209.14	730	1.60	692	455	36	3
SxM	446.32	47	473.90	60	16	36.36	13	29.54	11	25.00	4	9.09	390.31	47	1.62	82	34	2	-
AxM	440.15	51	445.36	36	35	89.74	2	5.12	1	2.56	1	2.56	390.75	8	1.21	35	14	-	--
SxSxM	473.00	1	611.33	3	3	75.00	-	-	1	25.00	-	-	289.50	2	1.33	3	2	-	-
$SMCF_2$	382.50	2	382.50	2	1	50.00	1	50.00	-	--	-	-	238.00	1	1.33	2	2	-	-

(i) Observations of kiddings and kids born

Breed of doe	Kiddings (No. of does kidded from 1-1-79 to 31-12-79)	Kids born		Total
		Male	Female	
Malabari	175	137	144	281
SXM	35	24	33	57
AxM	37	18	27	45
SM (F_2)	3	-	4	4
AxSxM	2	3	-	3
SxSxM	3	-	4	4
	255	182	212	394

(j) Percent incidence of multiple birth - 32.15

Breed of dove	No. of kiddings			Total	Total multiple birth
	Single	Twin	Triplet		
Malabari	76 (43.42%)	87 (49.71%)	12 (6.85%)	175	56.57%
SxM	14 (40%)	20 (57.14%)	1 (2.85%)	35	60.00%
AxM	28 (75.67%)	9 (24.32%)	-	37	24.32%
SMCF$_2$	2 (66.66%)	1 (33.33%)	-	3	33.33%
AxSxM	-	2 (100%)	-	2	100.00%
SxSxM	2 (66.66%)	1 (33.33%)	-	3	33.33%
	122	120	13	255	

Figures in parenthesis indicates percentage.

9. (iii) KIDDING RATE

No. of live kids born per 100 breedable does available for the year was fixed as 110 in the IIIrd Workshop.

During 1979 the number of kids born per 100 breedable does was only 102.33. The breeding efficiency of does could not reach the minimum target, due to the presence of certain does with poor reproductive efficiency during the early part of the year. But subsiquently they were culled.

(1) ARTIFICIAL INSEMINATION

Artificial Insemination is practised for routine breeding operation in the project. Four Adult Alpine bucks in the project were regularly made use for Semen collection. About three collections were made from each buck per week. The quality of each sample collected was evaluated regularly. The samples having satisfactory qualities were diluted in goat milk extender. The average sperm mortality observed was 70% or above. The dilution rate ranged from 1:3 to 1:10. The does in heat were detected with the help of a teaser buck. All the routine inseminations were carried out by speculam method.

In addition the cross bred bucks were used for Semen Collection and the extended semen was utilised for inseminating cross bred does and does brought by the farmers residing in local areas around he project area. Studies were being continued to evolve a suitable diluent for goat milk.

(m) BREEDING PROGRAMME

350 breedable females of local breed would be devided into three groups of 150, 150 and 50. Each of 150 will be crossed with one of the exotic breeds viz. Sanen and Alpine. 50 will be bred to create pure bred contemporaries. Breedable local females will be 350 each and this can be maintained by 10% replacement every year. 2/3 of the half breds (F1) will be bred interse and remaining 1/3 bred to the alternate exotic bred to create a three bred cross.

9(iii) (n) Gestation length (in days) pertaining to sex and type of birth of the does kidded during 1979.

Breed of doe	Type of birth						Inter-kidding interval (days)
	Single		Twin		Triplet		
	M	F	M	F	M	F	
Malabari	146.97	146.20	146.11	146.55	146.25	145.55	289.14
Saanen x Malabari	151.00	149.22	150.06	150.05	-	-	390.31
Alpine x Malabari	147.77	149.82	152.60	149.50	-	-	390.75
SxSxM	-	155.50	-	145.00	-	-	289.50
SM(F_2)	-	148.50	-	143.00	-	-	238.00

Statistics on pre-mature births, still births, retained placenta

Breed of doe	Premature births & still births	Retained placenta
Malabari	5 (2.77%)	Nil
SxM	2 (5.40%)	
AxM	1 (2.63%)	

9 (iv) MILK PRODUCTION

a) Milk Yield

Breed	No. of animals.	Average lactation yield in 150 days	Total milk yield in full lactation length for all animals	Average lactation length (days)
Malabari	387	52.800	43.360	123.02
SxM	66	76.800	128.010	249.72
AxM	13	83.850	94.310	168.53
SxSxM	2	127.500	141.620	166.50

b) Reproduction

The lactation yield and the lactation length were higher in crossbreds than in Malabari.

The production and reproduction performance of the does in this unit were optimum if not higher. With the available germ plasm from exotic bucks, with only limited genetic potential we were able to keep the production and reproduction performance of does to a satisfactory level.

9. (vii) FEED AND FODDER PRODUCTION

(a) Grazing Schedule - Grazing has been limited to a few months only viz. from November to April. During the summer months, the animals were let out in groups and each group was allowed to graze for a period of two hours. In the rainy season, the animals were let out for some time so that they got access to sunlight.

(b) Land development, irrigation etc.

(c) Feeding Schedule, concentrate and fodder fed age wise.

FEEDING SCHEDULE

Category of animal	Concentrate mixture (g)	Roughage * (kg)	Remarks
Kids **			*Quantity provided apart from grazing. When poor quality grass forms the roughage, the quantity is increased.
0-15 days of age	--	..	
16-30 "	50	..	
31-60 "	100	0.25	
61-90 "	150	0.50	
91-120 "	200		
5-6 months	250	0.75	**Kidsupto 4 months of age are fed on milk as per the recommendations from the Head, Nutrition Division, N.D.R.I.
7-12 "	300-400	1.0-1.5	
Adults			
Males	500	2.0	
Females	400	2.0	
Pregnant animals			
4th month of gestation	600	3.0	
5th month of gestation	700	3.0	
Breeding bucks	500-1000	3.0	According to body weight.

For milking animals, apart from the maintenance ration of 3.0 kg of roughage and 400 g of concentrate mixture, for every 1 litre of milk, 400 g of concentrate mixture is given extra.

9. vii (d) Composition of concentrate mixture

Adult goats were fed on Godrej EMR pellets instead of farm mixed concentrate mixture. For feeding of kids the kid starter was compounded daily, the composition of which was as given below:

Composition of kid starter:

Deoiled coconut cake	30%
Horse gram	25%
Yellow maize	32%
Rice bran	10%
Mineral mixture	2%
Salt	1%

Vitablend AB_2D_3 was added at the rate of 25 g per 100 kg of the mixture.

(e) Total quantity of concentrates and fodder fed to goats during the entire period of the year (1979)

Concentrates (kg)	92913.35 kg
Mineral mixture (kg)	284.7 kg
Salt (kg)	181.65 kg
Vitamin supplement (Vitablend AB_2D_3)	1.143 kg
Fodder (Grass/leaves (kg)	371070 kg

(f) Total amount spent on concentrates and fodder (Details given in table below).

Concentrates (Rs.)	108947.22
Mineral Mixture (Rs.)	896.81
Vitamin supplement (Vitablend AB_2D_3) (Rs.)	270.49
Salt (Rs.)	54.95
Fodder (Rs.)	55660.50

Total quantity and cost of feeds and fodder fed during the year 1979.

Ingredients	Quantity fed in 1979 (kg)	Total cost * (Rs.)
Groundnut cake	393.30	784.76
Coconut cake	4188.50	5500.37
Horse gram	3549.25	5466.83
Rice bran	1449.00	604.15
Yellow maize	4563.30	6739.63
Godrej EMR pellets	78770.00	89851.48
Total	92913.35	108947.22
Mineral mixture	284.7	896.81
Salt	181.65	54.95
Vitablend AB_2D_3	1.143	270.49
Fodder	371070.00	55660 .50
GRAND TOTAL		165829. 97

* Cost per 100 kg of the various ingredients is not given since short term tenders for every 3 months were fixed instead of an annual tender.

9 (viii) HEALTH

Preventive measures and treatments

Prevention against Coccidiosis	297
Prevention against respiratory infection	866
Prevention against internal parasites	1326
Prevention against Diarrhoe	115
Prevention against Bronchitis	1118
Prevention against external parasites	370

9 (IX) MORTALITY

(a) Kid Mortality

Breed of kids	Sex	No. of birds born in 1979	No. of kids died out of kids born in 1979	Percentage mortality.
Malabari	M	6	1	16.66
	F	7	2	28.57
Alpine x Malabari	M	131	38	29.00
	F	137	41	29.92
SM(F_2)	M	14	8	57.14
	F	17	-	—
AxAxM	M	15	6	40.00
	F	24	6	25.00
AxSxM	M	13	2	15.38
	F	18	5	27.77
SxSM	F	4	1	25.00
F_2A	M	3	3	100.00
	F	3	1	33.33
F_3S	F	2	-	—
TOTAL		394	114	28.93

(b) Adult Mortality

Breed	Sex	No. of adult animals *	No. of adult animals died	Per cent Mortality.
Malabari	F	200.66	19	9.46
Saanen X Malabari	M	9.25	2	21.62
	F	51.58	6	11.63
Alpine x Malabari	M	5.91	1	16.92
	F	57.41	2	3.48
AxSxM	M	4.66	1	21.45
	F	3.33	1	30.03
Alpine	M	3.16	2	63.29

* This number is based on adding up the adult strength on last day of each month and then dividing it by 12.

Overall adult mortality - 10.11%.

NUTRITION

The animals of the various groups and classes, in general, were fed according to the directions received from the Head, Nutrition Division; N.D.R.I., Karnal as well as the decision taken in the last workshops on goat research with slight modifications to suit the conditions prevailing in Kerala. For feeding of adult goats, Godrej EMR pellets were used as the concentrates, while for feeding of kids, kid starter was compounded daily. As roughage, during the rainy season, different varieties of grasses such as guinea, napier, para, anjan etc. were fed while during summer months, different types of tree leaves available in the University campus were provided.

Apart from the routine analytical work on feeds and fodders given to animals, work on the followingaspects was also taken up by the Nutrition Wing.

EVALUATION OF THE NUTRITIVE VALUE OF LOCALLY AVAILABLE TREE LEAVES THAT ARE COMMONLY FED TO GOATS.

Samples of twenty three varieties of tree leaves that are commonly fed to goats, collected during the summer months, were analysed for their proximate principles. The results are presented in Table 1. It was found that the tree leaves in general have higher crude protein and calcium contents than thecommonly available roughages like grasses. But they have a wide calcium phosphorus ratio since they are poor sources of phosphorus. Tree leaves also have a variable content of tannic acid ranging from 1.75 -11.2%. Feeding trials to determine the digestible nutrients in venga (Pterocarpus marsupium, Roxb) leaves using four adult Malabari bucks indicated that the leaves are quite palatable with a fair content of digestible nutrients. The digestibility coefficient of crude protein is found to be low and this may be due to the presence of tannic acid in these leaves.

Table-1. Percentage chemical composition on dry matter basis of locally available tree leaves that are commonly fed to goats.

Name of the leaf	Crude protein %	Ether extract %	Crude fibre %	Nitrogen free extract %	Total ash %	Calcium %	Phosphorus %	Total Tannins %
1. Venthekke (Layer strocmia Lanceolata wall)	8.76	2.49	17.12	65.54	6.09	1.03	0.08	
2. Kirni (Manilkhara hexandron	9.80	6.9	22.41	52.39	8.5	1.3	0.15	
3. Chakka thekke	6.22	5.00	54.68	27.97	6.13	0.97	0.19	2.99
4. Peral	13.54	3.28	28.78	49.72	4.68	1.24	0.08	
5. Pariya	12.72	3.84	8.68	57.23	17.53	1.75	0.14	1.75
6. Irumulla	11.83	1.67	26.87	51.93	7.70	0.71	0.23	2.01
7. Kallal	8.[illegible]	1.92	20.08	63.15	6.06	0.76	0.14	3.18
8. Thanni (Terminalia belerica)	7.65	6.6	20.22	56.32	9.21	2.01	0.15	
9. Arampali	19.26	2.52	35.25	35.41	7.56	1.97	0.29	
10. Mayil allu	8.23	2.04	28.57	54.99	6.17	0.67	0.22	
11. Pathiri	9.76	1.90	20.69	54.00	13.65	0.85	0.18	
12. Jack Tree (Artocaspus heterophyllus)	12.8	4.1	19.7	53.8	9.6	1.96	0.57	5.2
13. Eetty	18.30	3.17	30.46	44.30	3.77	0.33	0.44	4.8
14. Marulhu (Terminalia panicultu)	8.86	1.9	14.9	68.10	6.24	1.42	0.23	3.7
15. Pala mavu	10.82	2.52	19.0	59.45	8.21	0.41	0.34	1.01
16. Star apple (Chrysophyllum cainito)	7.82	4.29	20.08	61.86	5.95	1.22	0.36	2.31
17. Kora	13.77	4.0	13.63	63.49	5.11	1.35	0.09	4.17
18. Venga (Pterocarpus Massupisum roxb)	8.29	2.92	26.09	56.32	6.38	1.59	8.15	4.68
19. Leucaenu Leucocephala	18.2	6.2	13.2	54.0	8.4	2.2	0.25	4.8
20. Loranthus Sp	8.5	3.1	20.6	48.7	11.1	1.5	0.2	6.8
21. Sapota (Achras.zapota	8.2	3.8	27.2	50.4	10.4	1.2	0.12	4.7
22. Kaini Bridelia rhetusae	10.4	7.5	21.5	55.5	5.1	1.2	0.1	3.8
23. Mangostein (Garcinia Mangostana)	7.8	7.2	14.8	60.8	9.4	1.2	0.1	11.2

Studies on dry matter consumption of various classes of goats

The dry matter consumption of goats is reported to be highly variable viz. 3.0 - 8.0% of the body weight of the animals. Hence an attempt was made to determine the dry matter consumed by the various classes of goats on the project. Earlier work (Progress report for the year 1978) indicated that the average quantity of dry matter consumed by adult males is to the extent of 4.11 kg per 100 kg body weight while that of milking goats from 3.63-4.23% of their body weight. The other classes studied included:

Dry females goats

The dry matter consumed by seven adult goats fed on Godrej EMR pellets and ad - libitum guinea grass was estimated for a period of 13 days. The details are presented in the Table given below:

Animal number	Body weight (kg)	Intake of dry matter from concentrates (kg)	Intake of dry matter from fodder (kg)	Total intake of dry matter (kg)	Intake per day (g)	Dry matter consumption kg/100 kg body wt.
6312	22.9	4.68	5.75	10.43	802	3.5
6263	29.7	4.68	7.43	12.11	930	3.1
ASM 31	17.9	4.68	5.55	10.23	786	4.0
K22	18.8	4.68	5.25	9.93	764	4.0
6308	21.6	4.68	5.83	10.51	808	3.7
6252	27.8	4.68	6.55	11.23	864	3.1
6269	29.2	4.68	7.30	11.98	92[illegible]	3.1
				Average		3.5

The intake of dry matter came to 3.50% of the body weight of the animals.

Growing females

Eight growing females of the age group of 8-10 months were fed on Godrej EMR pellets and ad libitum green grass for a period of 13 days and their dry matter consumption was measured. The details are given below:

Total number of animals on experiment	8
Dry matter consumed from concentrates for 13 days	37.44 kg
Dry matter consumed from fodder for 13 days	37.00 kg
Total dry matter consumed during the experimental period	74.44 kg.
Average quantity of dry matter consumed per animal per day	0.72 k
Average body weight of the animals in the group	16.25
Dry matter consumption as percentage of body weight	4.40

The animals consumed feed to the extent of 4.4% of their body weight.

Growing males

The consumption of dry matter of 8 growing males was also estimated on the same feeding regime for a period of 10 days. The data are set out in the table given below:

Animal number	Body weight	D.M. intake from concentrates (kg)	D.M. intake ffom fodder (Kg)	Total D.M. intake (kg)	D.M. intake per day (g)	D.M. intake as % of body wt.
6354	18.3	3.69	5.5	9.19	919	5.02
SSM23	16.7	3.69	.4	8.09	809	4.86
ASM35	22.1	3.69	4.95	8.69	869	3.91
ASM 42	18.9	3.69	6.03	9.72	972	5.15
6378	22.1	3.69	6.30	9.99	999	4.51
6474	15.1	3.51	5.90	9.41	941	6.23
F_2S54	19.4	3.69	6.95	10.64	1064	5.48
ASM38	17.5	3.42	6.63	10.05	1005	5.74
			Average			5.84

The animals are dry matter to the extent of 5.84% of their body weight.

Studies on feeding of kids

The experiment on kid starters incorporating different ingredients such as alfa meal and dried fish which was started (progress report for the year 1978) had to be discontinued due to lack of facilities for individual feeding of kids and later due to attack of pneumonia in experimental kids. The experiment is proposed to be taken up from March 1980, after the kids recover from the disease.

ESTABLISHMENT OF FEEDING STANDARDS FOR GOATS

a) Nutrient requirements for maintenance

Studies were carried out on 12 adult female and 12 adult male goats to determine the nutrient requirements for maintenance by the feeding trial method. The details of feeding regime, duration of feeding trial, body weights and ~~xxxx~~ blood values of experimental animals have already been reported (Annual progress report for the year 1978). The data collected during the feeding trial and during the digestion cum metabolism trial carried out at the end of the feeding trial were used to calculate the digestible crude protein and energy requirements of the animals for maintenance. The utilisation of digestible crude protein for maintenance. was found to be 0.79 g and 0.83 g per Kg body weight in females and males respectively. The figures are less than that of Mackenzie standard. The requirement of energy in terms of total digestible nutrients and starch equivalent for maintenance as calculated from the data obtained in the present feeding trial was found to be 8.78 g and 7.66 g per Kg body weight for females and 14.69 g and 12.77 g per Kg body weight for males respectively. as detailed in Tables 2 and 3. The requirement of energy for maintenance of males is found to be considerably higher than that of females, as reported by many workers.

NUTRIENT REQUIREMENTS FOR GROWTH

Twentyfour Alpine - Malabari crossbred kids of 3-4 months of age and weighing on an average 9.0 kg were selected and divided into three groups of 8 animals each as uniformly as possible with regard to sex, age and weight. All the animals were dewormed and sprayed against ectoparasites before the commencement of the experiment. The animals were fed concentrate mixture having the following composition.

Groundnut cake	30%
Coconut cake	10%
Yellow maize	32%
Horse gram	15%
Rice bran	10%
Mineral mixture	2%
Salt	1%
Vitablend AB_2D_3	25 g/100 kg

Jack leaves formed the sole roughage for the experimental kids. The percentage chemical composition of the concentrate mixture and jack leaves on DM basis were as follows:

	Concentrate mixture	Jack leaves
Dry matter	93.5	42.4
Crude protein	21.3	12.8
Ether extract	5.6	4.1
Crude fibre	5.1	19.7
Total ash	9.1	9.6
Nitrogen free extract	58.9	53.8
Calcium	1.4	1.96
Phosphorus	1.00	0.57

The animals in the three groups, group I, II and III were given concentrate mixture and jack leaves as follows:

	Concentrate mixture	Jack leaves
Group I	250 g	300 g
Group II	300 g	400 g
Group III	350 g	500 g

Table 2. Energy requirements of adult goats for maintenance - Females.

Animal number	Body weight	Total digestible nutrients requirement			Starch equivalent requirements		
		Per day (g)	Per kg wt. (g)	Per W kg$^{0.73}$ (g)	Per day (g)	Per kg body weight (g)	Per W kg 0.73 (g)
48	27.5	257.8	9.37	22.94	224.17	8.15	19.94
109	22.6	204.74	9.06	21.02	178.03	7.88	18.31
177	23.4	181.76	7.77	18.19	158.05	6.75	15.82
93	24.3	157.81	6.49	15.37	137.23	5.65	13.36
43	24.5	260.06	10.61	25.18	226.14	9.23	21.89
110	24.4	226.34	9.30	22.03	197.25	8.08	19.15
81	27.0	221.11	8.19	19.94	192.27	7.12	17.34
22	27.5	195.01	7.09	17.35	169.57	6.17	15.09
236	29.5	271.39	9.20	22.94	235.99	8.00	19.95
20	26.2	246.07	9.39	23.19	213.97	8.17	19.72
A9	25.4	264.78	10.42	24.96	230.24	9.07	21.70
353	24.3	215.19	8.47	20.95	187.12	7.70	18.22
		Average with SE	8.84			7.66	

Table 3. Energy requirements of adult goats for maintenance - Males.

Animal Number	Body weight (kg)	Total digestible nutrient requirements			Starch equivalent requirements		
		Per day (g)	Per kg Body weight (g)	Per w.kg$^{0.73}$ (g)	Per day (g)	Per kg Body weight (g)	Per w.kg$^{0.73}$ (g)
76	20.0	264.85	13.24	29.73	230.30	11.52	25.85
60	18.5	233.58	12.63	27.77	203.11	10.98	24.15
63	15.5	258.38	16.67	33.38	224.68	14.50	29.03
84	24.9	317.35	12.75	30.37	275.96	11.08	26.41
70	21.5	245.47	11.42	26.14	213.45	9.93	22.73
68	16.0	220.35	13.77	29.11	191.61	11.98	25.31
64	18.5	255.50	13.81	30.38	222.17	12.01	26.42
82	16.0	230.02	14.38	30.39	200.02	12.50	26.42
74	23.5	324.24	13.80	32.36	281.95	12.00	28.14
62	18.5	302.87	16.37	36.01	263.37	14.24	31.32
71	15.5	287.24	18.53	38.84	249.77	16.11	33.78
77	14.0	264.20	18.87	38.45	229.74	16.41	33.44
	Average with SE			14.69			12.77

Table 4. Data on average fortnightly body weights (in kg) of animals maintained on experimental rations.

Group	Number of animals in the group	Fortnights										
		0	1	2	3	4	5	6	7	8	9	10
I	8	9.2 ±0.7	9.8 ±0.7	10.6 ±0.7	11.1 ±0.7	12.0 ±0.6	12.9 ±0.6	14.0 ±0.6	15.1 ±0.5	16.0 ±0.5	17.2 ±0.5	17.9 ±0.5
II	8	9.3 ±0.8	10.3 ±0.6	10.9 &0.8	11.5 ±0.7	12.2 ±0.8	13.2 ±0.9	14.1 ±0.9	15.7 ±0.9	16.0 ±0.9	17.1 ±1.0	18.1 ±1.1
III	8	9.2 ±0.8	10.2 ±0.8	11.3 ±0.9	11.9 ±0.9	12.7 ±1.0	13.6 ±0.9	14.6 ±1.0	15.6 ±1.0	10.4 ±0.9	17.7 ±1.0	18.4 ±1.0

Table 5. Data on average daily gain (in g) of animals maintained on the experimental rations for a period of 136 days.

Group	Number of animals in the group	Initial body weight(kg)	Final body weight (kg)	Total weight gain (kg)	Daily gain (g)
I	8	9.2 ±0.7	17.9 ±0.5	8.4 ±0.8	63.7 ±5.3
II	8	9.3 ±0.8	18.1 ±1.1	8.8 ±0.6	64.4 ±5.0
III	8	9.2 ±0.8	18.4 ±1.0	9.2 ±0.3	67.6 ±2.0

Table 6. Dry matter consumption (in kg) of animals recorded during the second metabolism trial

Group	Body weight (kg)	Number of animals in the group	Daily dry matter intake from jack-leaves (g)	Daily dry matter intake fron con-centrates (g)	Total dry matter in take per day (g)	Dry matter in take per 100 kg body weight
I	14.6 ±0.4	4	118.5 ±0.0	327.6 ±0.04	446.1 ±0.04	3.1 ±0.2
II	15.3 ±1.5	4	158 ±0.0	361.5 ±12.9	519.5 ±11.5	3.5 ±0.3
III	16.7 ±1.6	4	197.5 +_0.0	392.1 ±17.6	589.6 ±17.3	3.6 ±0.3

Table 7. Average feed efficiency (kg feed/unit weight gain) of animals maintained on the three dietary regimes

Group	Number of animals in the group	Dry matter in take from concentrates (kg)	Dry matter intake from jack leaves (kg)	Total dry matter in take (kg)	Total weight gain (kg)	Feed efficiency
I	8	38.6 ±0.0	16.38 ±0.02	54.98 ±0.02	84 ±0.4	7.01 ±0.71
II	8	42.1 ±0.9	21.6 ±0.1	63.7 ±0.4	8.8 ±0.6	7.5 ±0.5
III	8	45.2 ±0.9	26.8 ±0.1	74.8 ±.3	9.2 ±0.3	79 ±0.3

Table - 8. Data on average blood values of experimental animals recorded at the beginning of the experiment.

Group	Total number of animals in the group.	Packed cell volume	Haemoglobin (g/100 ml)	Plasmaprotein (g) 100 ml)	Calcium (mg/100 ml)	Inorganic phosphorus (mg/100 ml)
I	8	36.1 ±7.0	9.9 ±0.4	7.9 ±0.3	12.3 ±0.7	6.2 +_0.7
II	8	37.0 ±0.40	9.8 ±0.40	8.1 ±0.3	11.8 ±2.2	5.9 ±0.40
III	8	35.3 ±2.7	9.2 ±1.6	7.1 ±0.1	11.8 ±0.6	6.3 ±0.7

Table-9. Data on average blood values of experimental animals recorded at the middle of the experiment.

Group	Total number of animals in the group	Packed cell volume	Haemoglobin (g/100 ml)	Plasmaprotein (g) 100 ml)	Calcium (mg/100 ml)	Inorganic phosphorus (mg/100 ml)
I	8	32.4 ±2.9	10.4 ±0.2	7.1 ±0.3	11.9 ±0.5	6.3 ±0.3
II	8	34.4 ±2.3	9.7 ±0.1	7.9 ±0.3	11.0 ±0.3	6.0 ±0.6
III	8	35.8 ±2.6	9.9 ±0.2	8.1 ±0.3	11.7 ±0.7	6.7 ±0.6

Table 10. Data on average blood values of experimental animals recorded at the end of the experiment.

Group	Number of animals in the group	Packed cell volume	Haemoglobin (g/100 ml)	Pharma protein (g/100 ml)	Calcium (mg/100 ml)	Inorganic Phosphorus (mg/100 ml)
I	8	35.6 ±2.4	9.1 ±0.3	7.5 ±1.5	12.0 ±0.3	6.8 ±0.5
II	8	35.9 ±1.4	9.8 ±0.5	7.5 ±0.2	11.1 ±0.5	6.8 ±0.4
III	8	34.5 ±1.2	10.5 ±0.4	7.7 ±0.3	12.5 ±0.6	6.6 ±0.4

Table-11. Digestible crude protein, total digestible nutrients and starch equivalent requirements per kg body weight gain of experimental animals calculated from the data on feeding trials.

Group	Total DCP in take (kg)	Total TDN intake (kg)	Total SE intake (kg)	Total weight gain (kg)	DCP required per kg gain (kg)	TDN required per kg gain (kg)	SE required per kg gain (kg)
I	7.1 ±0.0	39.8 ±0.0	34.6 ±0.0	8.6 ±0.8	0.86 ±0.06	4.84 ±0.40	4.21 ±0.40
II	7.7 ±2.20	44.2 ±0.6	38.5 ±0.5	8.8 ±0.7	0.90 ±0.06	5.20 ±0.30	4.52 ±0.29
III	8.1 ±0.3	48.5 ±0.8	42.1 ±0.8	9.2 ±0.3	0.89 ±0.03	5.31 ±0.19	4.60 ±0.17

Table 12. Summarised data on DCP, TDN and SE requirements of growing kids calculated from the results of the present study (Average values with S.E.)

	DCP required			T.D.N. required			S.E. required		
	Per kg gain (kg)	Per $W^{0.73}$ kg (g)	Per day (g)	Per kg gain (kg)	Per $W^{0.73}$ kg (g)	Per day (g)	Per kg gain (kg)	Per $W^{0.73}$ kg (g)	Per day (g)
Group I	0.86 ±0.06	6.38 ±0.13	54.78 ±0.32	4.84 ±0.46	37.82 ±0.73	308.31 ±0.07	4.21 ±0.46	31.08 ±0.63	268.18 ±0.08
Group II	0.90 ±0.06	6.83 ±0.25	57.96 ±0.96	5.20 ±0.30	39.75 ±0.99	334.88 ±4.76	4.52 ±0.29	34.57 ±1.31	291.09 ±4.13
Group III	0.89 ±0.03	7.21 ±0.14	60.13 ±1.30	5.31 ±0.19	42.88 ±1.11	358.7 ±6.3	4.60 ±0.17	37.21 ±0.96	310.78 ±5.90

The feeding experiment was conducted in three stages of approximately 1½ months each, the total duration of the trial being 4½ months. At the end of each stage, the concentrate allowance for kids of each group was increased by 50 g. each taking into consideration the increased nutrient needs of the animals commensurate with advancing growth. Records of daily feed consumption, water consumption and weekly body weights were maintained throughout the experiment. Two separate digestion cum metabolism trials involving 5 days' collection period were conducted on male animals of each group, one at the beginning and the other at the end of the experiment, using separate metabolism cages designed for the purpose. Data on blood values of all animals were collected at the beginning, middle and at the end of the experiment. From the data gathered from the metabolism trials, the nutrient requirements for growth were calculated in terms of digestible crude protein, total digestible nutrients and starch equivalent per unit gain in body weight.

Data on average fortnightly body weight of animals in groups I, II and III are set out in Table 4 and those on average daily gains of the various groups in Table 5. The dry matter consumption of the animals (kg/100 kg body weight) recorded during the second metabolism trial are presented in Table 6. The feed efficiency of the experimental animals maintained on the three dietary regimes are given in Table 7.

Tables 8, 9 and 10 incorporate the data on average blood values gathered during the course of the experiment. Table II presents the digestible crude protein, total digestible nutrients and starch equivalent requirements expressed per unit body weight gain calculated from the results of the feeding trial. The summarised values on DCP, TDN and SE requirements of the growing kid are presented in Table 12.

9. (x) MANAGEMENT

a) HOUSING AND SHELTER

The project required accommodation facilities for the whole stock. 5 types of buildings were in existence during the period.

(i) Completely covered sheds with individual feeding facilities and able to accommodate 200 adult does. This shed was completed in October 1977 and constructed out of project funds. That shed was found to be the ideal one for all weather. These sheds are arranged on the four sides of a central paddock which was provided with 2 trees for shade purpose.

(ii) Partially covered with open concrete paddock. Ten pens, each with a capacity of 12 does and 20 pens, each for accommodating bucks individually. These pens have concrete floors and feed and water manger. Removable plat forms are provided in all the pens. This shed appeared not ideal in heavy monsoon months.

(iii) Completely covered building with concrete floor and provided with fly-proof nets etc. This building was provided by the University to accommodate 70-80 does. For rainy season this building has been found satisfactory.

(iv) Completely covered buildings with raised permanent plat form and group feeding facilities. 5 sheds are available which can accommodate 25-30 growing stock in each shed. These sheds appeared ideal in all months but individual feeding facilities were not provided.

b) KIDDING BOXES/PENS

No kidding boxes were separately provided but partitions were arranged for individual cages during kiuding in the sheds.

c,d & e) KID MANAGEMENT/REARING/MIS MOTHERING/WEANING

All kids were allowed to remain with dams for the first 3 days and were trained to suckle colostrum as early after birth as possible. After 3 days they were kept separately, but allowed to suckle at fixed intervals. This reduced overfeeding and at the same time ensured better immunity in kids by suckling their own dams. Disinfection of floors were practised 3 times a day. Due to operational difficulties caused by the increased flock strength rotation of kidding pens could not be practised. However, mortality was much lower in kids during the year 1979.

f) CASTRATION

During the period male kids were not castrated. The Malabari males were sold for meat purpose, after 6 months of age and crossbred males were sold after one year for breeding purpose, as there were heavy demands for the above. The project proposed to dispose males even at the age of 3 months to facilitate accommodation and to reduce feed cost.

g) METHODS OF IDENTIFICATION/TATTOEING ETC.

For identification, the kids were tattoed on the left ear at the age of 2 to 3 days. Each breed was given separate serial numbers with alphabets also when needed. Tags, number discs etc. earlier used at the inception of the project had been of limited use as they fell out in due course due to mutual manipulation.

h) SALE AND DISPOSAL OF ANIMALS CULLED, PRICES OBTAINED

16 males and 10 females were culled and sold at the rate of Rs.6/kg live body weight. Crossbred males were sold at the rate of Rs.400+S.T. for adult (above one year) and Rs.200+S.T. for 6 months to one year and Rs.125+S.T. for 3 months to 6 months and Rs.100+S.T. for 0-3 months. 6 Malabari and 114 breedable crossbred males were sold.

i) SALE AND DISPOSAL OF PRODUCTS, MEAT, MILK, MANURE, SKIN etc.

Surplus milk was sold from the project @ Rs.150/kg milk. During 1979 a total quantity of 6536.40 kg milk was sold to the residents of the campus and different departments of the college of Veterinary and Animal Sciences.

Culled animals were slaughtered by the Veterinary Public Health Department of the Veterinary College and the sale proceeds of meat, bones, hide etc. were credited to the project receipt head. The project was not directly dealing with the disposal of animals by slaughter.

10. RESEARCH WORK ON ANY SPECIFIC ASPECT OF GOAT PRODUCTION GENETICS (IN PROGRESS)

1. Detailed studies on the reproduction performance of Malabari goats.
2. Production performance of Malabari goats, standardisation of pheno type and studies on factors influencing the same.

3. Adaptability of Malabari and crossbred goats to the agro-climatic conditions of Kerala.
4. Studies on birth weight, growth rate of Malabari and crossbred kids.
5. Genetic studies on immunoglobulin level in goats and its association with survivability.
6. Inheritance of certain qualitative traits in goats.
7. Inheritance of threshold characters in goats.

Data on above aspects in goats were collected and detailed analysis envisaged when more data accumulate.

PATHOLOGY

1. Investigation of caseous lymphadenitis in Goats.

Objectives: To investigate the incidence and nature of the caseous lymphadenitis in Goats.

Work done: Sixty more cases were recorded during this year. The disease was observed in both sexes. Detailed gross examination of the lymphnodes and abscesses were done. Histopathological studies were conducted by using biopsy materials of affected animals.

Result obtained: The condition was more prevalent in adult animals. Compared to the previous year (1978) the incidence was found to be higher. No sex pre-disposition was noticed. In most cases the affected lymphnodes were enlarged upto the size of the lemon and contained inspissated and calcified mass concentrically layred and limited by thick fibrotic capsule. In four cases mastitis was caused by this condition. Corny Bacterium sp. isolated from these lesion. Further detailed studies regarding Bacteriological aspects is in progress. In one case the lesion was noticed in spleen during Autopsy. Histologically there was a central caseous mass surrounded by a layer of mono-nuclear cells, to which an external re-inforcing layer of fibrous tissue is added. In some cases calcification also observed.

II. Investigation on posterior paralysis in Goats.

Objectives: Tofind out the causes prevention and treatment of this condition.

Work done : No clinical cases were observed during the period.

Result obtained: During postmortem one goat exhibited atrophy of the crebellar hemispheres. Histopathological studies revealed oedema, cytoplasmic vacuoles and neuronophagia.

III. Studies on the incidence pathology and preventive measures of common diseases in Goats.

Objective: To study the disease affecting goats.

Work done: Diseases recording continued. Histopathological studies on 396 tissues from 50 dead animals were made. As a prophylexis to endemic pneumonia naturally affected animals were sacrificed and 0.2% formalrised vaccine was prepared from the lung tissue. In the initial stage of pneumonia, administration of chloramphenicol preparations were found affective to counteract secondary Bacterial infection. For virus isolation nasal swabs and pieces of the tissues were taken.

Results obtained: The incidence of abortion was low during this period. The incidence of caseous lymphadenitis was more on crossbred goats and mainly affected adult goats. No sex difference was observed. The occurrence of endemic type of pneumonia was high during this winter season. The disease mainly affected the kids of age group 4-8 months. In proper sanitation, ventilation and antibiotic treatments were given during the onset of disease the mortality can be reduced. Histopathology of lung tissues of affected animals with pneumonia revealed in lesion bodies. This is suggestive of a viral Ethiology. Further studies in this line is in progress. The section also revealed local suppurative Bronchopneumonia and chronic progressive pneumonia. The cause of death was mainly due to secondary infection.

Gastro Enteritis was also recorded during the period. The main causative agents were coccidia and E.coli. Coccidiosis was more prebalent in rainy season. It may be due to high humidity wet condition and dampness in the pens. For preventive and curative purposes codrinal was found to be affective especially for coccidiosis. A course of three days treatment is only necessary.

IV. Studies on the co-relation of post-natal development of stomach compartments and the incidence of gastro intestinal disorders in goats.

Objectives: To know the exact period required for the complete development of Rumen, Reticulum, Omasum and Abomasum in Goats.

To suggest suitable measures to prevent the gastro intestinal disorders.

Assessment of weight of kids at birth. Detailed observations on gastro intestinal disorders during the development phases.

V. Physio pathological investigations.

Work done: During this period 50 kids died were studied. About 50% of the kids have coccidiosis. Others died due to Bacterial Enteritis and indigestion E. Coli. have been isolated from intestinal contents of these animals. Kids with low weight were highly succeptible to Bacterial enteritis. Histological examination revealed oedema, congestion of mucosa and increased production of mucus.

VI. HEMATOLOGICAL studies on MALABARI, EXOTIC and CROSS BRED GOATS under different physiological and pathological conditions.

Objective: To assess the health and disease status of goats by leading the haemogram.

Work done: Blood samples from 12 Alpine Malabari and four AAM kids affected with pneumonia were collected for Hematological studies. Reduction of total RBC count, low haemoglobulin value were recorded in all these animals. Slight leucocytosis and lymphocytosis were revealed.

PHYSIOLOGY

1. AGE OF SEMEN AND CONCEPTION RATE IN GOATS:

The objective was to study the rate of conception using diluted buck semen stored for different periods. It was observed that as the age of semen increased, the motility decreased. After 24 hours of storage the motility reduced rapidly. After 48 hours of storage the motility reduced to 40% or less and that could not be used for artificial insemination purpose. Correspondingly the conception rate was also seen decreased. Further studies were in progress. Studies to develop a new extender was also undertaken.

EXTENSION WORK

Artificial insemination in goats of the local farmers was carried out regularly on all days in the goat project. That work was in addition to the routine inseminations done in the farm. The exotic bucks and few selected crossbred bucks were used for collection of semen for this purpose. Good quality semen, from crossbreds after collection, evaluation and dilution, was used for insemination of local goats. During the year under report 441 goats owned by the farmers in the locality were inseminated. There appeared to have demand for crossbred goats and also enthusiasm for cross-breeding goats among farmers. So far upto the end of 1979 December, 2334 local goats were inseminated.

During the year under report 114 crossbred bucks were distributed to interested farmers/development agencies/charitable institutions for grading up of local goats. The cost of each goat (above one year) was fixed at Rs.400/- (local taxes extra) and that for 6-12 months of age at Rs.200/- Upto the end of the reporting period a total of 240 bucks were distributed.

Disease prevention activities in local goats were an important future of work carried out mainly by the Veterinarians in the Government Veterinary Dispensaries. Treatment of goat was also carried out in the University Veterinary Hospitals.

Market price of goat meat was Rs.11/- per kg and it was well appreciated by most of the people in the locality. The goats that were culled for meat were slaughtered by the departments of Veterinary Public Health, College of Veterinary and Animal Sciences. The cost of meat fixed by the department was Rs.12/- per kg. Goats manure was sold regularly from the project at the rate of Rs.1/50 per kerosene tin and there has been heavy demand for the manure.

ACTUAL EXPENDITURE FROM 1-1-1979 to 31-12-1979

RECURRING

Pay of Officers	70,616.91
Pay of Establishment	1,28,064.77
Dearness Allowance	36,251.24
Travelling Allowance	883.30
Compensatory & Other Allowance	7,844.69
Recurring Contingencies	1,94,207.84
Sub-total	4,37,868.75
Non-recurring Contingencies	2,140.52
GRAND TOTAL	4,40,009.27

STATEMENT OF RECEIPTS FROM 1-1-1979 to 31-12-1979

Sale of Bucks	Rs. 31,145.00
Sale of Milk	5,235.00 + 4569.60 *
Sale of goat manure	5,049.00
Auction sale of gunny bags and jack twigs	1,280.00
Registration fee	10.00
Total	Rs.42,719.00 + 4569.60
Grand total	Rs.47,288.60

* on account of supply to various departments.

14. PROBLEM, DIFFICULTIES, BOTTLE-NECKS IN THE SUCCESSFUL IMPLEMENTATION OF THE TECHNICAL PROGRAMME

1. Saanen breeding has been stopped since 2/77 due to the nonavailability of bucks. Only Alpine x Malabari breeding and Saanen x Malabari F_1 interse matings were followed. But during the year under report we have procured two Saanen bucks in the age group of 4-12 months from Rural Agricultural Institute, Narayangaon, Maharashtra.

They were not used for semen collection as they have not attained maturity. At the end of 1979 only one Alpine buck was available and was in use.

2. Some of the sheds where goats were housed were not quite suitable for goat keeping under the existing agro-climatic conditions. So new buildings with fixed raised platforms and facilities for individual feeding must be useful to improve the health of goats.

15. SUMMARY

The technical programme of the Co-ordinated Research Project on goats for Milk envisaged.

1. Evolusion of new breeds of milch goats suitable for agro-climatic condition of Kerala and capable of yielding more milk. The genetic potential of the breed to be developed will be such that does will yield at least 300 kg of milk in a lactation period of 150 days.

2. Production of different combination of crosses of the local breed with exotic breeds and testing their performance in respect of total milk production and economics of feed conversion.

3. Ancillary studies in Nutrition, Physiology, management and disease control to support the above programme.

4. Studies on goats evolved for adaptability under rural conditions of housing and management.

5. Studies on chemical and bacteriological quality of goat milk.

6. Studies on processing and technology of goat milk.

The breeding programme modified in the workshop and followed during the period for the unit was as follows. 350 breedable females of local breed (Malabari) would be divided into 3 groups of 150, 150 and 50. Eabh 150 will be crossed with one of the exotic breeds viz. Saanen and Alpine and 50 will be bred to create pure bred contemporaries. Breedable females will be 350 each year and this can be maintained by 10% replacement every year. 2/3 of the half bred (F_1) will be bred interese and remaining 1/3 bred to the alternate breed to create three breed cross.

FLOCK STATISTICS

As on 31-12-1979 the foundation stock consisted of 183 Malabari females including 178 adults. There were 49 Saanen x Malabari F_1 and 170 Alpine x Malabari F_1 females including 87 adults. Eight females with 75% Saanen inheritance were available, of which 5 were adults. Out of the twenty eight 75% Alpine group 10 were males. The breeding programme for producing the 75% single exotic breed group has been stopped as per workshop recommendations. The animals of that genetic group available was proposed to be distributed to outside agencies for breeding purpose. The three breed crosses as well as the F_2 groups were produced and the animals were below 4 months age during the period.

GROWTH.

There were no Sanen x Malabari kids born during the period under report. The average birth weight of Malabari singles, twins reppectively were 2.25 kg, 1.37 kg for males and 2.06 kg, 2.00 kg for females. The average birth weight of Alpine x Malabari singles, twins and triplets, respectively, were 2.20 kg, 1.86 kg and 1.75 kg for males and 2.04 kg, 1.75 kg and 1.55 kg for females. For ASM males the figures were 2.00 kg and 2.45 kg and for females 2.10 kg and 1.92 kg for single and twin births respectively.

At 12 weeks, weight of Malabari male was 5.10 kg for twins and females were 7.70 kg and 5.40 kg for singles and twins. At twelve weeks weight of A x M males were 6.70, 6.23 and 5.71 for singles, twins and triplets respectively and that of females were 6.34, 6.38 and 5.60 respectively. For ASM the corresponding figures in respect of singles and twins were 11.55 kg, 7.24 kg 7.06 kg and 6.00 kg respectively.

At six months AxM males had 10.24 kg, 9.80 kg and 10.20 kg for singles, twins and triplets respectively and females had 11.17 kg, 10.23 kg and 10.66 kg respectively. The corresponding figures for ASM were 15.00 kg, 12.25 kg, 11.00 kg and 10.03 kg respectively.

Since the data on other genetic groups during the period were not available no comparison could be made. In comparison to SxM and Malabari during the previous years, the birth weight, in AxM was higher than that of Malabari and lower than that SxM and growth rate was higher.

PRODUCTION

Age at first conception in Malabari, Saanen x Malabari F_1 and Alpine x Malabari F_1 were 594.23 (100), 473.90 (60) and 455.36 (36) days respectively.

Age at first kidding in Malabari was 705.93 days (97) where as the same for Saanen x Malabari F_1 676.38 days (63) and for Alpine x Malabari 548.44 days (43). Post partum interval showed an increase from 85.7 days (473) in Malabari to 149.77 days(48) in Saanen Malabari and 70.75 days (20) in Alpine x Malabari. Service period for these three groups were 159.34 days, 234.97 days and 224.42 days respectively. Kidding interval of 47 Saanen x Malabari crossbred does was 390.31 days where as the same for Malabari was less with 289.14 days. Eight Alpine x Malabari does gave an average Interkidding interval of 390.75 days. This result is expected when considering the higher lactation length for the crossbreds. Six abortions recorded during the year 2 in Malabari and 2 in $SxMF_1$, one in AxM and one in AxSxM. 5 still births and premature births occurred in Malabari while the same for AxM was one and two in SxM. Number of kids per kidding showed much difference in Malabari (1.60) SxM F_1 (1.62) and AxM F_1 (1.21). Out of 175 kiddings in Malabari 76 were singles, 87 twins, 12 triplets. In 35 kiddings in Saanen x Malabari 14 were singles and 20 twin and one triplet. In 37 kiddings in Alpine x Malabari 28 were singles and 9 twins. Gestation length in Malabari, Saanen x Malabari and Alpine x Malabari did not show appreciable difference with a range of 145 to 149 days. Difference between number of days carried for males and females foetuses were also not apparent. The same observation could be made for different types of birth.

No. of live kids born per 100 breedable does available was fixed as 110 in the IIIrd Workshop in Goats.

During 1979 the number of kids born per 100 breedable does was only 102.33.

PRODUCTION PERFORMANCE

Average lactation yield in 150 days was 52.8 kg (387 Nos.), 76.8 kg (66 Nos.) and 83.850 kg (13 Nos.) in Malabari, Saanen x Malabari F_1 and Alpine x Malabari respectively. The average lactation length in the same order of genetic groups was 123.02 days, 249.72 days and 168.53 days respectively. This shows that the production performance of crossbreds has increased from 50 to 100% from locals.

The production and reproduction performance of the does in this unit were optimum, if not higher. With the available germ plasm from exotic bucks, with only limited genetic potential we were able to keep the production and reproduction performance of does to a satisfactory level.

MANAGEMENT

The Project has completed infrastructural facilities for accommodation of all categories of goats with different types of sheds. Completely covered sheds with raised platforms fixed permanently and with facilities for cleaning below the platform have been found to be ideal shed for Kerala conditions. The practise of weaning of kids from mother and bottle feeding was stopped from September 1977 onwards and the kids were allowed to suckle till 2 months of age and then separated and pan fed till they attain 8 kg body weight in case of crossbreds.

GENETICS

Specific research studies on growth, reproduction and production performance of the different genetic groups as well as the adaptability of these three groups were in progress.

PHYSIOLOGY

Artificial insemination was practised for routine breeding operations in the project. Regular collections of semen were made from Alpine, Malabari, Alpine x Malabari and Saanen x Malabari bucks and subjected to evaluation. In general the extender used was goat milk. A specific study on storage of semen and conception rate in goat was undertaken and the result so far obtained showed that after 24 hours the semen could not be used. Studies to develop new extender was also in progress.

PATHOLOGY :

Mortality among kids has been fairly high during the year. Various factors as over crowding, weaning system practised flaring up of resistant organisms and viral infections could be attributed for the mortality. Efforts were made for reducing the incidence of mortality. Mortality among adults was higher during the year due to the out-break of pneumonia in 1979.

Steps taken for reducing the mortality was furnished in item 2(c) mortality.

Specific research projects on the following aspects are being undertaken and are in progress.

1. Investigation on caseous lymphadenitis in goats.
2. Investigation on Posterior paralysis in goats.
3. Studies on the incidence, Pathology and preventive measures on common diseases in goats.
4. Studies on the co-relation of Postnatal development of stomach compartments and the incidence of gastro-intestinal disorders in goats.
5. Physiopathological investigations.
6. Heamatological studies in Malabari Exotic and cross-bred goats under different physiological and pathological conditions.

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NUTRITION

The feeding schedule followed for various age groups was as per the recommendations of the Head, Nutrition Division, N.D.R.I. with modifications to suit the local conditions. For feeding of kids, along with the milk ration, kid starter compounded daily was used. Specific research projects such as Establishment of Feeding standards for goats including determination of nutrient requirements for maintenance and growth, evaluation of the nutritive value of tree leaves commonly fed to goats, studies on kid starters and studies on dry matter consumption of various classes of goats were also taken up. Challenge feeding and ad libitum feeding of some of the animals were also carried out during the period.

EXTENSION

441 goats of the local farmers were given artificial insemination free of charge during the year utilising some of the available exotic bucks and crossbred bucks of the project. In addition 4 crossbred bucks were maintained at the Agricultural College, Vellayani for breeding purpose. In addition 114 crossbred bucks were distributed for breeding purpose during the year to private farmers/Govt. institutions/ Development Agencies and Charitable Institutions. The above programmes have evidently provided an impact on goat rearing in the state among farmers. Crossbred goats especially Saanen x Malabari attracted the attention of farmers.

16. GENERAL REMARKS SUGGESTIONS FOR IMPROVEMENT, SIMPLIFICATION OF PROCEDURE ETC.

Cross-breeding utilising Saanen was discontinued since 2/77 dueto the non-availability of bucks. Two Saanen bucks were procured during the year in the age group of 4-12 months from Rural Agricultural Institute, Narayangaon, Maharashtra. Considering the special needs of Kerala State, Saanen breeding need to be continued. Hence 15 Nos. of pedigreed Saanen bucks required for the implementation of the technical programme may be procured and supplied to the project. Also

9 more Alpine bucks of good pedigree may be supplied so that the technical programme can be implemented in full.

The extension activities including Artificial Insemination and buck distribution taken up by the project along with the technical programme of the project has gained the popular support from farmers to the project and the fruits of the research could be transferred to the benefit of the public. This was evident from the numerous enquiries received here for supply of crossbred males and females.

Climatological observations made during the period from 1-1-1979 to 31-12-1979.

Latitude : 10° 32"

Longitude : 76° 16"

Height above sea level : 22.25 metres

		January	February	March	April	May	June	July	August	September	October	November	December
Temperature C°	Max	34.1	35.1	36.7	40.1	35.7	35.1	30.8	31.4	32.8	33.4	32.9	32.2
	Mini	18.6	21.6	22.3	21.3	21.8	22.0	21.0	21.6	22.6	22.0	22.2	19.4
Humidity	Max	96	96	96	95	97	97	98	98	97	95	96	95
	Mini	38	37	38	33	53	57	68	65	64	45	61	45
Sunshine		9.3	9.0	9.5	9.0	7.8	5.2	1.2	4.3	5.4	5.9	3.1	6.0
Wind velocity (KM)		21.2	13.7	12.4	6.6	7.9	6.6	4.8	5.0	5.6	11.7	14.6	17.1
Rainfall (m.m)		Nil	22.0	3.2	46.5	155.1	722.7	929.8	462.6	208.7	127.3	317.4	Nil

GENETICIST