

REPRODUCTIVE PERFORMANCE OF INDONESIAN SHEEP AND GOATS

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SUMMARY

Flocks of Javanese sheep and herds of goats were established under an intensive management system. All animals were housed and fed pellets of a mixture of *Pennisetum purpureum* and concentrate. Fertile males had continuous access to the females except for two weeks post-partum. Lambs and kids were weaned at three months of age. The number of offspring born and weaned per female joined per year for the different strains of sheep and goats were: Javanese thin-tail sheep Garut strain 3.37, 2.07 and Bogor strain 2.84, 2.14; Fat-tail sheep from Madura 1.04, 0.63; Ettawah goats from Tegal 3.09, 1.66 and local Bogor strain goats 3.68, 2.15.

INTRODUCTION

Indonesia has approximately four million sheep and eight million goats with 65% of the goats and 82% of the sheep located on Java (Year book of Indonesia 1976). These sheep represent the majority of sheep in South East Asia and are of importance to tropical animal production. Recent publications on the sheep and goats of Indonesia (Robinson 1977; Mason 1978; Turner 1978) stress the lack of information, other than descriptive opinions, of the productivity and socio-economic significance of small ruminants. Turner (1974, 1978) emphasised the need for documentation of the productivity of tropical sheep. It therefore seemed appropriate that one of the first objectives of research on small ruminants at the Centre for Animal Research and Development be to establish the productive potential of some of Indonesia's indigenous sheep and goats. This paper describes the reproductive efficiency achieved by five strains at the Centre in West Java during the period October 1977 to January 1980.

MATERIALS AND METHODS

Flocks or herds of about 30 breeding females and 10 entire males were established at the Centre for each of the following types: Javanese thin-tail sheep, Garut strain; Javanese thin-tail sheep, Bogor strain; Fat-tail sheep, Madura strain; crossbred goats (Ettawah x Kambing Kacang) named Kambing Bogor strain; Ettawah goats, Tegal strain. The strain names represent the geographic locality where the sheep or goats were selected and purchased. Selection of each animal was on phenotype, age and freedom from disease. For photographs and a description of each strain see Obst *et al.* (1980a).

Upon arrival at the Centre all animals were vaccinated against anthrax, foot and mouth disease, haemorrhagic septicaemia and clostridial organisms, and given a broad spectrum anthelmintic.

All sheep and goats were housed in roofed pens at the Centre. There were 10 to 15 females in each group, with 0.75 m² floor space per animal, and one fertile male in each pen. Floors were of galvanised metal mesh or of wooden slats raised two metres above ground level allowing easy daily cleaning and manure collection. Ambient diurnal temperatures within the houses varied from a minimum of 20°C to a

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maximum of 28°C. Relative humidity averaged 85%, declining from 95 to 100% early in the morning to a minimum of 65 to 70% at midday, then gradually increasing to over 90% during the night. No signs of heat stress were observed. Security lights in each house provided continuous light of unknown lux to all animals. Photoperiod in Ciawi-Bogor which is at an altitude of 480 m, latitude 6°39'S, longitude 106°48'E is about 12 hours \pm 20 min.

Animals were offered pellets each day consisting of 50/50 *Pennisetum purpureum*/Beef Kwik concentrate (Cargills, Bogor). The concentrate contained wheat pollard, corn, minerals and vitamins. Mean dry matter intakes were approximately 1.0 and 1.5 kg per head per day for sheep and goat females of 30 to 45 and 40 to 70 kg live weight respectively.

Males were continuously joined with females except for two weeks post-partum when the dams and offspring were in individual pens. Sires were rotated between the three group pens for each strain. Only original purchased sires were used for sheep but bucks bred at the Centre were also used for mating the goats. All offspring were weaned at three months of age and at six months the females were joined with males for the determination of age at first parturition.

Live weights were recorded weekly and daily feed intake was recorded for each group. The sire and dam of each offspring together with date of birth, sex, type of birth, birth weight and age of dam were recorded. The causes of deaths were investigated. This paper reports the general results on the reproductive efficiency achieved and a further paper (Obst et al. 1980c) describes aspects of reproductive wastage from the same flocks.

Fertility under the continuous mating system is defined as the percentage of females joined, which gave birth to offspring within an eight-month period. Any female not giving birth within that time was classified as infertile for that period.

RESULTS

The reproductive performance of each flock or herd is given in Table 1. All strains were highly fertile except for the Fat-tail ewes where the size and shape of the tail often prevented successful mating even with manual assistance.

Mean (\pm SD) inter-lambing intervals of 198 \pm 29, 199 \pm 31 and 250 \pm 40 for the Javanese thin-tail Garut, Bogor strain and Fat-tail sheep, and mean inter-kidding intervals of 201 \pm 25 and 198 \pm 33 for Ettawah and Kambing Bogor goats were observed. Thus each group except the Fat-tail gave birth a mean number of at least 1.8 times each year (Table 1).

Each group also experienced a high fecundity (number of offspring born per parturition). This gives the very high result, except for the Fat-tail sheep, of 284 to 368% offspring born per female joined per year. However, the high neonatal mortality of about 40%, except in the Bogor strain of Javanese thin-tail sheep (24%), reduced the number of weaned offspring at three months of age per female joined per year to about 200% in all animals except the Fat-tail sheep (63%) and the Ettawah goats (166%).

Dam mortality was particularly high in the Garut sheep and Ettawah goats (Table 1), the latter dying post-partum from mastitis or as a result of chronic vaginal prolapse which commenced during pregnancy. Mastitis resulted from damage to udders. Garut ewes also had a high incidence of vaginal prolapse before parturition and 6-tooth ewes also died from a pregnancy toxemia type disease. After two years, 40% of the garut ewes had died compared to 15% of the Bogor

strain ewes.

TABLE 1 Reproductive performance of Indonesian sheep and goats

Character	Sheep		Fat-tail	Goats	
	Javanese thin-tail			Ettawah	Kambing
	Garut strain	Bogor strain	Madura strain	Tegal strain	Bogor strain
Number of females joined	108	115	102	33	91
Fertility (%)	98	98	42	94	96
Offspring: number/parturition	1.86	1.58	1.67	1.81	2.08
number, singles	43	62	22	10	22
twins	78	76	28	34	80
triplets	63	36	18	12	63
quads	8	4	4	0	16
quintuplets	5	0	0	0	0
total	197	178	72	56	181
% of females joined	182	155	71	170	199
Mortality (%): birth to weaning	39	24	39	46	41
dams post-partum	11	4	6	18	4
dams/year	20	8	9	33	8
Weaned: number/parturition	1.14	1.19	1.02	0.97	1.22
% of females joined	112	117	43	91	116
Mean age at first parturition (days)	379	376	427	418	343
SD	31	48	91	26	24
Parturitions/year	<u>1.85</u>	<u>1.83</u>	<u>1.46</u>	<u>1.82</u>	<u>1.85</u>
Offspring/year:					
100% fertility	3.44	2.89	2.44	3.29	3.85
observed fertility	<u>3.37</u>	<u>2.84</u>	<u>1.04</u>	<u>3.09</u>	<u>3.68</u>
Weaned/year:					
100% fertility	2.11	2.18	1.49	1.77	2.26
observed fertility	2.07	2.14	0.63	1.66	2.15

Age at first parturition was about 12 months for the Javanese thin-tail sheep strains, about 11 months for the Kambing Bogor goats and about 14 months for the Ettawah goats and Fat-tail sheep (Table 1).

DISCUSSION

The outstanding reproductive performance of 3.68 kids born per female joined per year from the Kambing Bogor goats, and about 3.00 for the Ettawah goats and Javanese thin-tail sheep, suggests that the small ruminants of Java are among the most prolific goats and sheep in the world.

Ettawah goats were imported from India between 1911 and 1931 under government direction (Merkens and Sjariff 1932) and crossed with the Kambing Kacang. Some 44 original purebred Ettawah goats were studied by Raabe (1927) from May 1920 to August 1925. Analysis of his data reveals that 1.82 kids were born/parturition (cf 1.81 in current study) and the mean interval between parturitions was 252 ± 67 days ($n=50$) giving a potential offspring production of 265% per year. It therefore appears that the reproductive potential of the Ettawah from Tegal (329%) has not diminished over the last 50 years.

Comparative data for the Kambing Bogor strain of crossbred goat are available from Abdulgani (1978) who observed that these goats in villages in West Java produce 1.6 kids per parturition at an interval of 301 ± 15 days. Assuming

a fertility of 100%, this results in 194 kids born per year from the village goats compared with 385 kids born per year from the Kambing Bogor at the Centre. Management aspects such as mating system and nutritional level may account for this large difference in prolificacy (number of offspring produced/ewe joined/year).

Estimates of the fecundity (number of offspring/parturition) of the Javanese thin-tail and Fat-tail sheep reviewed by Mason (1978) are lower than those observed in the present study (Table 1). Observations by Batubara *et al.* (1979) on Javanese thin-tail ewes showed a fecundity of 1.82, and from a slaughter house survey Obst *et al.* (1980a) measured a mean ovulation rate of 1.77. However, ovulation rate increased with live weight and age to a maximum mean value of 2.4 in the 6-8 tooth age group of about 25 kg live weight.

The most prolific Australian Merino ewe, the Booroola, has produced 2.1 lambs born per ewe joined per year and a Peppin type Merino selected for prolificacy gave 1.36 (Turner 1977). While the Javanese thin-tail is less fecund than the Booroola, the Javanese thin-tail ewe can produce more lambs per year (3.37 and 2.84 from the Garut and Bogor strains respectively). This yearly production is similar to that of the highly prolific Finnish Landrace ewe which in Britain produced 2.0, 3.0 and 3.3 offspring per ewe lambing from one, two and three-year-old ewes respectively (Donald and Read 1978).

It is obvious that the Indonesian sheep and goats have the genetic potential for the production of large numbers of offspring. Assessment of production under village conditions over several years is necessary to establish constraints on productivity. High neonatal and ewe mortality are two factors which warrant investigation.

REFERENCES

- ABDULGANI, I.K. (1978). Proc. Ruminant Seminar 1: 106. Bogor 24-25 July 1978.
- BATUBARA, L.P., RANGKUTI, M. and SITURUS, P. (1979). Seminar penelitian dan hasil penelitian penunjang pengembangan peternakan tradisional. Cisarua, Bogor, 5-8 Nov. 1979.
- DONALD, H.P. and READ, J.L. (1976). Anim. Prod. 9: 471.
- MASON, I.L. (1978). World Anim. Rev. 27: 17.
- MERKENS, J. and ANWAR SJARIFF (1932). Nederland Indische Bladen Voor Diergeneeskunde 44: 436.
- OBST, J.M., BOYES, T. and CHANIAGO, T. (1980c). First Asian-Australian Animal Science Congress, Serdang, Malaysia, Sept. 1980 (in press).
- OBST, J.M., CHANIAGO, T. and BOYES, T. (1980a). Centre for Animal Research and Development, Bogor, Indonesia, Centre Report No. 10 (in press).
- OBST, J.M., NAPITUPULU, Z. and BOYES, T. (1980b). First Asian-Australian Animal Science Congress, Serdang, Malaysia, Sept. 1980 (in press).
- RAABE, R.J.C. (1927). Nederland Indische Bladen Voor Diergeneeskunde 39: 329.
- ROBINSON, D.W. (1977). Centre for Animal Research and Development, Ciawi, Bogor, Indonesia, Centre Report No. 1.
- STATISTICAL YEARBOOK OF INDONESIA (1976). Biro Pusat Statistik, Jakarta.
- TURNER, H.N. (1974). World Anim. Rev. 10: 31.
- TURNER, H.N. (1977). Anim. Breed Abstr. 45: 9.
- TURNER, H.N. (1978). World Anim. Rev. 28: 4.