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Reproductive efficiency in high and low body weight Nilagiri ewes subjected to short term flushing and PMSG treatments

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ABSTRACT

Economics of sheep breeding is largely dependent on reproductive efficiency which include conception rate, litter size and percent of weaned lamb. Besides selection for high reproductive efficiency, non-genetic measures like flushing and exogenous hormone treatment can be adopted to increase the reproductive efficiency. Short term flushing (group I), 250 IU of PMSG (group II) and combination of I and II (group III) were used in 2 groups of ewes weighing above (A) and below (B) average to improve overall reproductive efficiency. The tupping percentage was 100 % in Group II and III. The percentage of tupping, lambing, twinning, number of lambs born, percentage of pre weaning mortality in different groups were 86.67,96.15,8,1.08,3.70 (group A I), 100,93.3,42,1.5,14.29 (group A II), 100,80,50,1.30,41.67 (group A III), 86.67,80.77,33,1.33,10.71 (group B I), 100,86.67,38,1.30,30.77 (group B II), 100,93.3,36,1.79,25 (group B III) as compared to 93.33,100,0,1,7.14 and 66.67,90,0,1,0 in 2 control groups. Based on litter size, lamb mortality and % lambs weaned it was observed that use of PMSG and flushing had increased reproductive efficiency. Higher dose rate of PMSG is needed in ewes weighing heavier at breeding and ewes which weigh less need not be subjected to superovulatory treatments but can be effectively flushed before breeding.

Key words: Twinning, ewes, flushing, PMSG, mortality

Litter size or prolificacy is one of the important component of flock productivity in sheep. It is a trait relatively easy to measure and report (Fogarty,1995). Even though it is a trait of low heritability, substantial improvement in the trait could be brought genetically by direct selection based on the number of lambs born per lambing (Hanrahan and Timon, 1978). Improvement of the trait could also be achieved through non-genetical means like flushing the ewes for a short period prior to the breeding season (Smith *et al.*, 1983, Leury *et al.*, 1990) and by hormonal treatments (Mutiga and Mugerwa 1992, Rhind *et al.*, 1993).

Not many of the Indian sheep breeds have been described to be prolific. Nilagiri sheep, a less known breed of the Nilagiri hills in Tamil Nadu seems to have inherent quality of prolificacy and hence has a good potential to be developed as a prolific breed by applying appropriate genetic, nutritional and hormonal techniques.

It is a widely reported fact that lamb mortality in multiple births is very high (Roda *et al.*, 1990, Otesile, 1993 and Mukasa *et al.*, 1994). Unless these multiple born lambs survive to market age or maturity, the advantage achieved through prolificacy would be lost. The present study was carried out to find out the effect of short term flushing and administration of PMSG on prolificacy and preweaning mortality of lambs in Nilagiri ewes.

MATERIALS AND METHODS

One hundred and fifty ewes of Nilagiri breed of sheep available at Sheep Breeding Research Station, Sandynallah, The Nilgiris were utilised for the study. The ewes were divided according to their body weight into 2 groups namely group A(>26kg

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and group B(<26Kg and > 20Kg). The ewes which weighed less than 20 kg were not taken for the study. The ewes in each of the above groups were further divided into 4 treatment groups as given below

Sub group	Treatment	Number of animals A	B
I	Flushing	30	30
II	Intravaginal Sponges + 250 IU PMSG	15	15
III	Intravaginal Sponges + 250 IU PMSG + Flushing	15	15
IV	Control	15	15

Ewes of group I and III were fed with 300 gms of sheep feed/ewe/day for 15 days before the start of the breeding season. Ewes of group II and III were impregnated with intravaginal sponges (Chronogest, Intervet, Holland) at the start of breeding season. The sponges were removed after 12 days and 250 IU of PMSG (Folligon, Intervet, Holland)) was injected at the time of sponge removal. The ewes were teased with apronised rams 48 hours after sponge removal. All the ewes in these subgroups were found to be in estrum. They were allowed natural service twice at 48 hours and 60 hours after the sponge removal. Ewes from group I and IV were teased with apronised rams and ewes found in estrum were bred with selected male. All the ewes bred were maintained as separate flock and were maintained on natural grazing. However they were fed 200 gms of concentrated in the last month of pregnancy.

Lambing in all ewes were monitored closely and lambs born were identified with their ewes and birth weight of the lambs were immediately recorded. The lambs which died during the preweaning period were subjected to postmortem examination and the causes of death, age of lamb at death were noted. The lambs were weaned after 90 days of lambing and their body weight were recorded.

RESULTS AND DISCUSSION

The number of ewes tupped, percentage of tupping, number and percentage of ewes lambed, percentage of twin and triplets and the number of lambs born live per ewe lambed are presented in table1.

A total of 136 ewes were bred from all the groups. In both the higher and lower body weight groups the tupping percentage was similar for the subgroups AI and BI, which were flushed before mating. All the sixty ewes which were subjected to estrus synchronization have shown signs of estrum and were covered. There was no incidence of loss of sponge or intravaginal infection as reported by Romano *et al.* (1996). In the control group 14 out of 15 have been covered in group A as against 10 out of 15 in group B. However the difference is not significant (c^2 =0.372). The above results signify that the body weight before mating or flushing of ewes prior to mating has no effect on tupping.

The overall percentage of lambing (number of ewes lambed per ewe joined) was 89.71 per cent. It was higher in control group (95.83%) than in any of the treatment groups The percentage was more in ewes which weighed heavier at breeding (92.86%) than in ewes weighed less at breeding (86.36%).

Out of the 136 ewes bred 122 ewes have lambed out of which 26 ewes gave birth to twins and 9 had triplets including abortion and still births (table 2). The overall twinning was 28.69%. No twinning was recorded in the control group. The overall twinning percentage excluding the control group was 35.35%. This was more than the average twinning rate of 12.72 per cent for the breed under natural

Table 1: Number and percentage of tupping, lambing, twins, triplets and lambs born per ewe lambed.

Group	No. of Ewes Allotted	No.of Ewes Tupped	% of Ewes Tupped	No. of Ewes Lambed	% of Ewes Lambed	Lambing details Single	%	Twin	%	Trip-let	%	Over-all %	No.of lambs born live per ewe lambed	
AI	30	26	86.67	25	96.15	23	92.0	2	8.00	-	-	8.00	27/25	1.08
AII	15	15	100.00	14	93.30	8	58.0	5	36.0	1	8.00	42.00	21/14	1.50
AIII	15	15	100.00	12	80.00	6	50.0	5	42.0	1	9.00	50.00	13/10	1.30
AIV	15	14	93.33	14	100.00	14	100.0	-	-	-	-	-	14/14	1.00
BI	30	26	86.67	21	80.77	14	67.0	7	33.0	-	-	33.00	28/21	1.33
BII	15	15	100.00	13	86.67	8	62.0	3	23.0	2	15.0	38.00	13/10	1.30
BIII	15	15	100.00	14	93.30	5	36.0	4	29.0	5	36.0	64.00	25/14	1.79
BIV	15	10	66.67	9	90.00	9	100.0	-	-	-	-	-	9/9	1.00
Total	150	136	90.66	122	89.71	87	71.0	26	22.0	9	7.00	29.00	150/117	1.28

Table 2: Twinning percentage of various groups

Group	I Flushing	II PMSG	III PMSG+ Flushing	IV Control	Total
A	8.00	42.00	50.00	0.00	21.54
>26kg	2/25	6/14	6/12	0/14	14/65
B	33.00	38.00	64.00	0.00	36.85
>20& <26kg	7/21	5/13	9/14	0/9	21/57
Total	19.57 9/46	40.74 11/27	57.70 15/26	0.00 0/23	28.69 35/122

breeding reported by Anil Kumar and Iyue (unpublished data). The twinning percentage was more in group III - (57.70%) followed by group II- (40.74%). Evidently, the increase in the twinning rate in group II and III were due to superovulatory effect of PMSG administered to the ewes. Similar results of increased litter size were recorded by Mutiga and Mukasa(1992) for 250IU and 300IU of PMSG and Romano *et al.*, (1996) for 250IU of PMSG.

Among the superovulatory groups, group III had higher twinning rate than group II. The additive effect of flushing on PMSG induced superovulation may be the reason for increased twinning observed in group III.

The twinning percentage was more in Group B (36.85%) than in Group A (21.54%). The superovulatory effect of PMSG at 250 IU observed was more in ewes weighed less at breeding (B) than in ewes weighed heavier at breeding. This could be explained by the fact that a higher dose of PMSG is required for the higher body weight group as explained by Rhind *et al.* (1993) that different rate of FSH infusion were required to achieve similar mean circulating concentration in high and low body weight ewes. A differential dose rate of PMSG according to the body weight would have brought a higher twinning rate in the high body weight group in the present study.

Similarly the percentage of twins was more in Group BI (33.00%) compared to AI(8.00%). The effect of flushing the ewes with same amount of concentrate had different effect according to the body weight at breeding. The concentrate provided may not be sufficient in ewes weighed heavier at breeding to increase ovulation rate.

The average number of lambs born live per ewe lambed was 1.28. It was highest in Group BIII (1.79) followed AII (1.50), BI (1.33), BII(1.33) and AII (1.30).

The mean birth weight and weaning weight of lamb born are presented in table 3 and 4. The average birth weight was 2.22±0.06kg. Males weighed heavier than (2.25kg) the female lambs (2.19kg). The birth weight of single lambs were heavier (2.67±0.06kg) than twins (1.73±0.07kg) and triplets (1.35±0.08kg). Wang *et al.*, (1991) found a significant difference in birth weight between single and twins. Similarly, Otesile (1993) reported the lamb birth weight as 2.01kg for single and 1.71 kg for twins.

Table 3: Birth weight of lambs (Mean± S.E.)

Group	I Flushing	II PMSG	III PMSG+ Flushing	IV Control	Total
A	2.70	2.03	2.28	2.81	2.46
>26kg	± 0.11 (27)	±0.14 (21)	±0.19 (12)	±0.15 (14)	±0.08 (74)
B	2.02	2.22	1.65	2.33	1.97
>20&	±0.13	±0.20	± 0.14	± 0.17	± 0.08
<26kg	(28)	(13)	(25)	(9)	(75)
Total	2.36 ±0.10 (55)	2.10 ± 0.12 (34)	1.85 ± 0.12 (37)	2.63 ± 0.12 (23)	2.22 ± 0.06 (149)

The birth weight in group II and III was less than in group I and IV. The lower birth weight may have been due to more number of twins and triplets in this groups.

The birth weight of lambs born to ewes which were heavier at breeding were heavier (2.46±0.0 kg). Than those born to (1.97±0.08kg) ewes with low body weight at breeding. Clarke *et al.*, (1997) noted that the total lamb birth weight, placental weight were lower for ewes weighed less at breeding than heavier ewes.

Out of 149 lambs born live 127 lambs were weaned. The percentage of weaning was 85.23% The average weaning weight of lambs was 8.26±0.21 kg.

Table 4: Weaning weight of lambs (Mean ± S.E.)

Group	I Flushing	II PMSG	III PMSG+ Flushing	IV Control	Total
A	9.88	7.23	8.24	9.25	8.83
>26kg	± 0.38 (26)	± 0.62 (18)	± 0.70 (7)	±0.65 (13)	± 0.31 (64)
B	8.07	7.56	7.12	7.90	7.67
>20&	± 0.45	± 0.72	± 0.49	± 0.73	±0.28
<26kg	(25)	(9)	(20)	(9)	(63)
Total	9.00 ± 0.32 (51)	7.34 ±0.43 (27)	7.41 ±0.41 (27)	8.70 ± 0.50 (22)	8.26 ±0.21 (127)

The weaning weight was more in group (9.00±0.32kg) followed by group IV (8.70± 0.50kg The weaning weight were significantly lower

group II and III (7.34± 0.43kg and 7.41±0.41kg). Similar findings were reported by Wang *et al.*, (1991). The weaned single lambs weighed heavier (9.11±0.23) than twins (7.15±0.38kg) and triplets (5.71±0.53 kg).

The weaning weight was more in ewes which weighed heavier at breeding (8.83±0,31kg) than in ewes which weighed less at breeding (7.67±0.28kg). Similar difference was also recorded for birth weight in this study.

The preweaning mortality was 14.77 %. The details of mortality in various groups is presented in table 5. The percentage of mortality was more in group III (27.03%) followed by group II (20.59%. It was low in group IV (4.35%) and group I (7.27%). The increase of mortality in group II and II was due to the death of more twins and triplets from these groups.

Table 5: Percentage of preweaning mortality

Group	I Flushing	II PMSG	III PMSG+ Flushing	IV Control	Total
A	3.70	14.29	41.67	7.14	13.51
>26kg	1/27	3/21	5/12	1/14	10/74
B	10.71	30.77	25.00	0.00	16.00
>20& <26kg	3/28	4/13	5/20	0/9	12/75
Total	7.27	20.59	27.03	4.35	14.77
	4/55	7/34	10/37	1/23	22/149

Yapi *et al.* (1990) found that the cause of death was not greatly influenced by litter size or sex of the lamb. However in the present study the preweaning mortality was found to be significantly (P>=0.128, df=2) affected by the litter size with the mortality of 8.04 % in singles, 16.67% in twins and 40.00% in triplets (23.44% for twins and triplets). Roda *et al.*, (1990) had reported the pre weaning mortality as 10.8 and 7.36 Vs 25.8 and 25.0% for single and twin born lambs of the 2 breed of Polwarth and Corridale ewes. Similarly Otesile (1993) observed preweaning mortality of 10.4 and 20.6% in single and twin lambs respectively.

The average birth weight of lambs which died was 1.60 kg. The birth weight of single lambs died was 2.06kg, 1.43kg for twins and 1.35 kg for triplets. Yapi *et al.*, (1990) observed that the birth weight of the lamb had highly significant influence on the cause of death. In this study also the birth weight of lamb had an effect on mortality.

The major cause of pre weaning mortality in lambs was pneumonia followed by septicaemia, enteritis and starvation. Yapi *et al.*, (1990) found that the major cause of death in descending order were starvation, pneumonia, trauma and gastrointestinal problem.

Based on litter size, lamb mortality and % lambs weaned it is concluded that groups A II and B III had increased reproductive efficiency. To bring out effective twinning differential dose rate of PMSG has to be adopted for the different body weight groups. Though the response for PMSG was more in ewes which weighed less at breeding the birth weight, weaning weight were less and the mortality was more. Hence the ewes which weighed less at breeding need not be subjected to superovulatory treatments. These ewes can be flushed effectively as the response for flushing was higher in these groups. Better lamb care is required for twin born lambs to reduce the mortality and maximize the productivity.

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