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Effect of type of birth of ewes on reproductive and productive efficiency in Garole × Malpura crosses

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Prolificacy has been recognized as a major factor influencing profitability of sheep production. As lamb production is an important source of income in all sheep flocks, increasing prolificacy of the sheep has always been an important breeding goal. Most of the sheep breeds of India produce single lambs barring Garole; a highly prolific breed of sheep (Davis *et al.* 2002, Nimbkar *et al.* 2003a, b, Mishra *et al.* 2005). To improve the prolificacy of sheep, Garole was crossed with Malpura sheep the Central Sheep and Wool Research Institute, Avikanagar. Free martin cases are noticed in cattle; however in other species especially when females born as twins with male foetus; there is question regarding reproduction; hence the present study was undertaken to report the effect of type of birth of ewes on reproductive efficiency in Garole x Malpura (GM) crosses.

This study was carried out at the Central Sheep and Wool Research Institute, Avikanagar, Rajasthan. The Garole × Malpura (GM) halfbreds were evolved by crossing of Garole rams with Malpura ewes and after that *inter se*-mating among GM halfbreds were made to produce GM lambs. The reproductive traits studied were litter size (number of lambs born alive/number of ewes lambed), weaning rate (WR =number of lambs alive up to 3 months age/number of ewes lambed) and litter size at 6 months (LS6 = number of lambs alive up to 6 months marketing age/number of ewes lambed). The ewes' productivity efficiency (EPE) of GM ewes born as single, twins (born as Male/female or female/female lambs) and triplets (male/female/female or male/male/female or all female lambs) from year 2002–2006 were calculated in terms of total weight of lambs in kg produced at birth, weaning, 6 and 12 months age per ewe lambed per year. The ewes born as triplets (all female lambs) are very less in numbers hence not included in the study. All the animals were raised under semi-intensive management system and provided similar grazing/feeding conditions. Least squares procedures (Harvey 1990) were used to analyse the reproductive and ewes' productive efficiency traits.

The least square means of litter size, weaning rate (WR) and litter size at 6 months marketing age (LS6) of GM ewes are given in Table 1. The 4 combinations of ewes born as: single (SB), twins with male lambs (TBMF), twins with female lambs (TBFF) and triplets with male/male/female or male/female/female lambs (TRBMF) are available. The overall litter size and WR was 1.61±0.11 and 1.46±0.13 in GM ewes respectively. These results are in accordance with Nimbkar *et al.* (2003b) and Mishra *et al.* (2007). Rosati

Table 1. Effect of type of birth of ewes on litter size, weaning rate (WR) and litter size at six months of age (LS6)

Particulars	N	Litter size	WR	LS6
μ	166	1.61±0.11	1.46±0.13	1.36±0.13
Ewes birth type		NS	NS	NS
SB	95	1.68±0.09	1.48±0.10	1.40±0.10
TBMF	31	1.46±0.13	1.28±0.14	1.14±0.14
TBFF	36	1.77±0.13	1.56±0.14	1.45±0.14
TRBMF	5	1.55±0.29	1.50±0.32	1.46±0.32
Parity		NS	**	*
1	77	1.36±0.10	1.08±0.11 [b]	1.05±0.10 [b]
2	43	1.60±0.13	1.49±0.15 [a]	1.37±0.15 [a]
3	25	1.56±0.15	1.44±0.17 [b]	1.30±0.17 [ab]
4	13	1.70±0.20	1.42±0.22 [ab]	1.44±0.22 [ab]
5	9	1.85±0.23	1.86±0.25 [a]	1.64±0.25 [a]
Year of birth		NS	*	*
2002	10	1.59±0.22	1.41±0.24	1.38±0.24
2003	10	1.83±0.21	1.81±0.24	1.80±0.24
2004	17	1.67±0.17	1.53±0.19	1.33±0.19
2005	72	1.42±0.11	1.17±0.12	1.05±0.12
2006	58	1.55±0.11	1.37±0.12	1.26±0.12

Ewes birth type: SB= born as single, TBMF= born as twins with male, TBFF= born as twins with female, TRBMF= born as triplets (male/female/female or male/male/female); N= number of observations; NS= non-significant; ** P<0.01; *P<0.05.

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Table 2. Effect of type of births of ewes on ewes' productivity efficiency (EPE)

Particulars	N	EPE (kg) at			
		Birth	3 months	6 months	12 months
μ	166	2.94±0.18	13.04±1.11	20.29±1.91	25.83±2.50
Ewes birth type	NS	NS	NS	NS	
SB	95	3.10±0.15	12.97±0.90	20.08±1.55	26.15±1.94
TBMF	31	2.63±0.21	11.59±1.29	17.63±2.21	21.55±2.88
TBFF	36	3.08±0.21	13.73±1.26	21.93±2.17	27.94±2.84
TRBMF	5	2.93±0.47	13.86±2.89	21.50±4.97	27.66±6.52
Ewes parity		**	**	NS	NS
1	77	2.41±0.16 [b]	9.51±0.97 [a]	16.16±1.66	20.43±2.14
2	43	3.02±0.21 [a]	13.92±1.30 [b]	20.05±2.23	25.43±2.90
3	25	3.06±0.24 [a]	13.45±1.51 [b]	20.68±2.58	26.68±3.39
4	13	3.11±0.32 [a]	13.35±1.94 [b]	22.34±3.33	27.90±4.38
5	9	3.09±0.37 [ab]	14.95±2.26 [b]	22.20±3.88	28.70±5.09
Ewes year of birth	NS	NS	**	**	
2002	10	2.58±0.35	12.54±2.18	21.25±3.75	30.66±4.88
2003	10	3.24±0.35	15.74±2.14	27.25±3.67	35.34±4.76
2004	17	3.15±0.27	12.55±1.69	18.78±2.90	22.22±3.79
2005	72	2.77±0.18	11.28±1.11	14.77±1.91	17.36±2.49
2006	58	2.85±0.18	13.08±1.09	19.38±1.88	23.55±2.43
Reg. of ewe wt		NS	NS	NS	-

Ewes birth type: SB= born as single, TBMF= born as twins with male, TBFF= born as twins with female, TRBMF= born as triplets (male/female/female or male/male/female); N, number of observations; NS, nonsignificant; ** P<0.01; *P<0.05; same superscripts did not differ significantly.

et al. (2002) reported number of lambs born alive and number of lambs alive at weaning as 1.68 and 1.48. Although the ewes' birth type nonsignificantly affects litter size, WR and LS6 however the ewes born as twins with female lambs produce 21.33% more lambs and also weaned 21.88% more lambs compared to ewes born as twins with male lambs. The litter size, WR and LS6 of ewes born as twins with male lambs were lower than all combinations but the difference was non-significant. The year and parity did not affect significantly litter size. The result indicates that GM ewes were more prolific at the fourth and fifth parity. Bathei (1994) also reported that prolificacy increased as parity proceeds. The weaning rate was significantly affected by year and parity of the ewes. In accordance with present study, Mishra *et al.* (2008) also reported that WR was significantly affected by parity. Over the 5 years (2002–2006) of study, lambing% on ewes' available basis of TBMF, TBFF and TRBMF GM ewes averaged 80.46, 83.33 and 86.67%. The results indicated that type of birth did not affect lambing% in prolific sheep and the ewes born as twin either with male or with female lambs are equally efficient.

The effect of type of birth of ewes on EPE was analysed and results are given in Table 2. The least squares mean of EPE at birth, 3, 6, 9 and 12 months age were 2.94±0.18±1.11, 20.29±1.91 and 25.83±2.50 kg respectively. The results are in accordance with Mishra *et al.* (2007). The study reveals that ewes birth type non-significantly affects (P<0.01) the EPE from birth to 12 month of age. The ewes born as twins with female lambs weaned 2.14 kg more weight of lambs compared to ewes born as twins and with male lambs. EPE of ewes born as twin and with male lambs was lower than other combination and EPE of SB ewes and TBFF ewes was higher than other combination but theses differences were statistically, not significant. The parity nonsignificantly affects EPE at 6 and 12 months however it affects significantly EPE at birth and weaning, it indicated that lower EPE at birth and weaning compensated after 6 months, due to better growth of lambs. In accordance with present Mishra *et al.* (2007) reported that parity affects significantly EPE at birth only. Bathei (1994) also reported that the ewes' productivity increased with parity. The year of birth non-significantly affect EPE from birth to weaning and after that it affects significantly up to 12 months age.

The results clearly indicate that since the effect of type of birth status of ewes used in breeding programme have non-significant effect on litter size, weaning rate and ewes productivity efficiency from birth to 12–month of age, the GM crosses may be propagated as a new prolific strain for enhancing overall productivity of sheep. However, further research is needed to reach certain conclusions due to small numbers of observations in some sub-group combinations.

SUMMARY

The present study was undertaken to know the effect of type of birth of ewes on reproductive efficiency in Garolex Malpura (GM) crosses. The ewes' reproductive efficiency

of GM ewes born as single, twins (born as male/female or female/female lambs) and triplets (male/female/female or male/male/female or all female lambs) were studied. The ewes' birth type non-significantly affects litter size and weaning rate however the ewes born as twins with female lambs produce 21.33% more lambs and also weaned 21.88% more lambs compared to ewes born as twins with male lambs. The lambing% on ewes' available basis of GM ewes born as twins with male lambs (TBMF), twins with female lambs (TBFF) and triplets with male/male/female or male/female/female lambs (TRBMF) averaged 80.46, 83.33 and 86.67%. The results indicated that type of birth did not affect significantly the reproductive efficiency in prolific sheep and the ewes born as twin either with male or with female lambs are equally efficient.

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