

Environmental factors affecting gestation period and lambing interval in Malpura sheep in semi-arid region of Rajasthan

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ABSTRACT

Malpura sheep is one of the draught-resistant and heavy sheep breed of the semi-arid region of Rajasthan, India. The study of gestation period (GP) and lambing interval (LI) is important for improvement of production. A total of 2329 gestation records and 1644 lambing interval records of 609 Malpura ewes, collected over a period of 10 years (1996 to 2010) at ICAR-CSWRI Avikanagar were studied. The least squares means for GP and LI for the Malpura ewes were obtained as 151.74 ± 0.22 days and 428.98 ± 5.39 days, respectively. Highly significant effect of year was observed on both GP and LI, whereas, lambing season and dam's age group significantly ($P < 0.01$) affected lambing interval only. Type of birth showed significant influence on gestation length but parity, ewe weight and sex of lamb did not have significant effect on this trait. This study indicated that the LI and gestation length traits in Malpura sheep are affected by most of the factors investigated which must be taken in to consideration in genetic evaluation of these traits in breeding programs.

Keywords: Malpura sheep, Gestation period and Lambing interval

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INTRODUCTION

Sheep husbandry plays a significant role in sustaining the livelihood of landless and small holder farmers in India. It has played a noteworthy role in shaping and maintaining the socio-economic and cultural status of the rural folk. Rural human population constitutes 72.22 % out of which majority are dependent directly or indirectly on the agriculture and livestock related occupations. They provide a dependable source of income to the animal owners. India has a vast diversity of sheep breeds. The small land holders and village farmers prefer sheep and goat rearing as they need low initial investment, and have high feed conversion efficiency. Beside this point, sheep are adapted to rough climate, long distance migration, resistant against tropical diseases, thrive under inadequate nutrition and dearth of drinking water. Gestation length (GL) remains same for all the animals of a particular species and vary very little, on the other hand lambing interval (LI) can vary greatly because of both genetic and management reasons. Both GL and LI are essential components that must be taken care of while evaluation of breed and breeding programs.

MATERIAL AND METHODS

Data and management of sheep

Data for the present study were collected from the livestock data registers such as inventory, reproduction registers maintained at the AG&B Division, CSWRI, Avikanagar (Rajasthan). A total of 2329 Gestation period records and 1644 Lambing interval records of 609 Malpura sheep spread over a period of 15 years from 1996 to 2010 comprised the material for this study. The information on these animals were used to study gestation period and lambing interval.

Statistical analysis of data

The data of Gestation period and Lambing interval, were calculated as year-wise and overall for each year. These parameters were also calculated as Type of birth, sex of lamb, Lambs weight at Birth(kg), Ewe weight at Lambing(kg), Dam's age at Lambing(days), parity and lambing season by using least squares analysis (SPSS 14). Frequency distribution across year and across Lambs weight at Birth(kg), Ewe weight at Lambing(kg), Dam's age at Lambing(days) groups were tested using chi squares statistics.

RESULTS AND DISCUSSION

Gestation period in Malpura ewes

The least squares mean value of gestation period for the Malpura ewes was obtained as 151.74±0.22 (Table 1). The statistical analysis (SPSS 14.0) showed (Table 1-2) the effect of year on gestation period to be highly significant. Oztirk, A. and Aktas, A.H. (1996) also found similar results where effect of year was significant ($P < 0.05$) in Konya Merino sheep. The sex of lamb did not affect GP significantly in malpura sheep and similar results were reported by Oztirk, A. and Aktas, A.H. (1996) in Konya Merino sheep.

The analysis (Table 2) revealed that the effect of lamb weight at birth ($P < 0.001$) and type of birth ($P < 0.05$) on gestation period was significant. Oztirk, A. and Aktas, A.H. (1996) reported that type of birth had significant association with gestation length. Season of lambing, ewe's weight at lambing, sex of lamb and parity did not have significant effect on gestation period in the present study.

Lambing interval in Malpura ewes

The least squares mean value of LI for the Malpura ewes was obtained as 428.98±5.39 days (Table 3). This result was higher than that given by Tailor *et al.*, 2007, Gbangboche *et al.*, 2006 and Dey and Poonia, 2005 who reported LI of 275.08 ± 4.22 days in sonadi sheep, 240.50±1.25 days in Djallonke sheep and 351.90 ± 2.56 days in Nali sheep respectively. The statistical analysis (table 4) showed the effect of year on LI was highly significant which contradicts with the findings of Dey and Poonia, 2005 and Dass *et al.*, 2000, both of which worked on Muzaffarnagari sheep and reported the effect of year on LI to be non-significant.

The analysis revealed the effect of season of lambing on LI to be highly significant. The present findings are in accordance with the results of Dey and Poonia, 2005 but contradicts with findings of Dass *et al.*, 2000, and Gbangboche *et al.*, 2006, who reported that the effect of season on LI to be non-significant. The effect of dams's age at lambing on LI was highly significant (Table 4). Lambing interval was highest for the age group >2300 days and lowest for dam's age group 801-1300 days (Table 3).

Table 1: Least square means (±SE) of gestation period in Malpura ewes

Effects	Gestation Period (Days)
Overall	151.74 ± 0.22 (2329)
Year	**
1996	151.76 ^{ab} ± 0.45 (106)
1997	152.03 ^{abc} ± 0.60 (52)
1998	151.48 ^{abc} ± 0.41 (137)
1999	150.83 ^a ± 0.36 (165)
2000	151.55 ^{abc} ± 0.42 (126)
2001	151.35 ^{ab} ± 0.34 (228)
2002	152.27 ^{bcd} ± 0.34 (219)
2003	152.35 ^{cd} ± 0.32(238)
2004	151.38 ^{ab} ± 0.32 (244)
2005	151.47 ^{abc} ± 0.30 (255)
2006	151.24 ^{ab} ± 0.35 (202)
2007	151.45 ^{abc} ± 0.36 (160)
2008	152.41 ^{bcd} ± 0.41 (109)
2009#	152.78 ^d ± 0.46 (88)
Lambing Season	NS
Jan.-June	151.89 ± 0.18 (2102)
July-Dec.	151.59 ± 0.32 (227)
Lambs Wt. at Birth(kg)	**
≤2.5	150.86 ^a ± 0.24 (575)
2.5-3.0	151.42 ^a ± 0.24 (780)
3.0-3.5	152.22 ^b ± 0.26 (658)
≥3.5	152.55 ^b ± 0.31 (316)
Ewe Wt. at Lambing(kg)	
NS	
≤27.0	152.19 ± 0.32 (312)
27.0-30.0	151.83 ± 0.27 (562)
30.0-33.0	151.95 ± 0.25 (645)
33.0-36.0	151.53 ± 0.26 (527)
≥36.0	151.31 ± 0.30 (283)
Type of Birth	*
Single	151.34 ± 0.26 (2148)
Twins	152.14 ± 0.35 (181)
Sex of Lamb	NS
Male	151.71 ± 0.23 (1170)
Parity	NS
1	151.82 ^{ab} ± 0.27 (611)
2	151.52 ^a ± 0.26 (515)
3	152.10 ^{ab} ± 0.27 (441)
4	151.46 ^a ± 0.28 (363)
5	151.96 ^a ± 0.31 (274)
6	151.57 ^{ab} ± 0.41 (125)

Number of observations are given in the parentheses. NS: Non-Significant, ** ($P \leq 0.01$), * ($P \leq 0.05$) at level of significance. # Observations of year 2009 and 2010 were merged. Two Triplet lambs were merged with Twins lamb.

Table 2: ANOVA for gestation period of Malpura ewes

Source of Variation	D F	MSS	F-ValueLevel of Significance
Parity	5	26.06	1.780.114
Sex_ Lamb	1	1.40	0.090.757
Type_ Birth	1	92.22*	6.290.012
Ewe Wt._ Class	4	28.39	1.940.102
Lamb Birth Wt._ Class	3	195.37**	13.320.000
Year 13	41.65**	2.84	0.000
Season	1	14.95	1.020.313
Error	2300	14.67	

** ($P \leq 0.01$), * ($P \leq 0.05$) at level of significance

Table 3: Least square means (\pm SE) of lambing interval of Malpura ewes

Effects	Gestation Period (Days)
Overall	428.98 \pm 5.39 (1644)
Year	**
1998#	461.21 ^{cd} \pm 12.01 (116)
1999	439.66 ^{bcd} \pm 11.57 (117)
2000	414.72 ^{ab} \pm 13.12 (97)
2001	462.06 ^d \pm 11.11 (143)
2002	434.41 ^{abcd} \pm 10.93 (145)
2003	423.62 ^{ab} \pm 10.48 (159)
2004	403.63 ^a \pm 10.04 (171)
2005	414.82 ^{abc} \pm 9.51 (171)
2006	430.03 ^{abc} \pm 10.12 (184)
2007	411.35 ^{abc} \pm 10.04 (157)
2008	427.21 ^{bcd} \pm 12.55 (99)
2009#	425.06 ^{bcd} \pm 13.87 (85)
Lambing Season	**
Jan.-June	398.14 \pm 3.20 (1510)
July-Dec.	459.82 \pm 10.32 (134)
Dam's age at Lambing(Days)	**
801-1300	396.27 ^a \pm 7.86 (363)
1301-1800	442.43 ^b \pm 7.38 (445)
1801-2300	432.46 ^b \pm 6.85 (569)
\geq 2300	444.76 ^b \pm 8.59 (267)

** ($P \leq 0.01$) at level of significance. Number of observations are given in parentheses. # Observations of 1996 and 1997 was merged with 1998 and 2010 was merged with 2009 year. Observations for dam age at lambing 800 days and less was merged in class of 801-1300 days.

Table 4: ANOVA for lambing interval of Malpura ewes

Source of variation	D.F.	MSS	F-ValueLevel of significance
Year 11	45432.18**	3.39	0.000
Season	1	435724.41**	32.540.000
Dam's age at Lambing	3	161942.24**	12.090.000
Error	1644	13390.85	

** ($P \leq 0.01$) at level of significance.

CONCLUSION

These research findings discuss the importance of different factors on Malpura sheep's reproduction traits. Which should be taken into account in genetic evaluation under a managed sheep farm. For both wool and meat production purposes, single and male lambs usually weigh more compared to twins and female lambs respectively. Ewes which are generally more heavy exhibited shorter lambing intervals compared to ewes with lesser body weight. Farm managing practices play very important role in affecting sheep gestation period and lambing interval.

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