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Reproductive performance in Deccani sheep

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Abstract
The present investigation was undertaken to evaluate the effect of genetic and non-genetic factors on reproductive traits in Deccani flock comprising records of 53 animals maintained at Livestock Research Station, Mahabubnagar, Telangana State from October, 2012 to July, 2015. The least-squares means recorded were 338.59 ± 9.36 days, 21.89 ± 0.50 kg, 644.65 ± 11.59 days, 24.56 ± 0.33 kg, 155.53 ± 0.49 days, 1.00 ± 0.00 and 0.80 ± 0.04 for age at first tupping, weight at first tupping, age at first lambing, weight at first lambing, gestation period, litter size at birth and litter size at weaning respectively. All the reproductive traits studied in the present investigation revealed that the reproductive traits studied were significantly influenced by season of birth of ewe ($P \leq 0.01$).

Keywords: Deccani, Sheep, Tupping, Litter size, Gestation period

Introduction
Deccani is an important sheep breed of Southern India which is a medium-sized breed with predominantly black or black with white markings. This breed is well-suited to the extreme temperatures of the Deccan Plateau which is capable of long-distance migration and has been traditionally reared by pastoral communities such as the Kurmas and Gollas in Telangana State which ranks first in the country in sheep population.
Due to inadequate grazing resources, and migration of the breed to the green pastures in adjoining Andhra Pradesh much inter-mating among neighbouring breeds takes place. There is little selection of breeding rams, and disease problems, low reproductive rate, increased costs of maintainence are dwindling the breed at a faster pace. Genetic improvement of growth rate and of reproductive traits are both important to increase lamb-meat production. Thus, the present study was conducted to investigate the reproductive performance in Deccani sheep breed.

Materials and methods
Data on reproductive parameters were recorded on 53 purebred Deccani ewes born in the research station. The ewes were grazed for 8 hours a day and supplemented with green fodder @ 3-5 kg and concentrate mixture (CP 18%) @ 300 gm/animal. Age at first tupping was recorded when ewe lambs exhibited estrus behavior. The teaser rams were introduced to hoggets which have crossed 15 kg body weight to detect onset of estrus. Rams were introduced twice daily at 7 am and 4 pm for 30-60 min. Ewe being receptive for ram and standing for mounting by the ram was considered a sign of oestrus and Tupping was allowed then. The weight at first tupping of the hoggets which are receptive for ram was taken with weighing scale with an accuracy of 50 grams. The duration in days between the date of birth and the date of first lambing of the ewe was taken as the age at first lambing. The weight at first lambing of the ewe after lambing was recorded using weighing scale with an accuracy of 50 grams. The duration in days between tupping and lambing was taken as the gestation period. The number of offspring given by the ewe in a single lambing is taken as the litter size at birth. The number of offspring that were given by a single ewe in a single lambing which have survived till weaning which is generally three months is taken as the litter size at weaning. Data on reproduction traits were analyzed for the influence of non-genetic factor i.e., season of birth of the ewe only by least-squares analysis (Harvey, 1966) [10] and the means were compared by Duncan's Multiple range test (Kramer, 1957) [16].
The statistical model used for the reproductive traits is as follows:

$$Y_{ij} = \mu + P_i + e_{ij}$$

Where,
Y_{ij} = is the reproductive trait of the j^{th} animal of the i^{th} season
μ = overall mean
P_i = effect of i^{th} season (Season I: Jan.-June; Season II: July-Dec.)
e_{ij} = residual random error, NID (0, $\sigma 2$)

Results and discussion

The present investigation revealed that all the reproductive traits studied were significantly influenced by season of birth of ewe.

The overall age at first tupping was 338.59 ± 9.36 days (11.13 months). Rajanna *et al.* (2012) [19] reported a slightly lesser age at first tupping of 303.33 days (9.97 m) in Deccani sheep. However, a much wider range of 377 to 632.52 days (12.4 to 20.79 m) was reported by Babar and Javed (2009) [1] in Lohi, Kumar *et al.* (2008) [13] and Gowane *et al.* (2014) [9] in Malpura, Karunanithi *et al.* (2011) [12] in Mecheri; Das *et al.* (2012) [8] and Das *et al.* (2014) [7] in Kashmir Merino sheep. Age at first tupping in ewes born during season I was significantly lower (325.83 ± 17.57 days) than the ewes born during season II (351.21 ± 6.49 days). Babar and Javed (2009) [1], Das *et al.* (2012) [8] and Das *et al.* (2014) [7] reported a non-significant influence of season on this trait. This could be due to the precise seasonal differences during the study periods as season influences the reproductive activity mainly through ambient temperature and fodder availability.

The average weight at first tupping recorded on Deccani lambs was 21.89 ±0.50 kg. It was 21.76 ± 0.35 kg in season II to 22.02 ± 0.93 kg in season I with significant differences among seasons. Babar and Javed (2009) [1] also observed a significant influence of season on weight at first tupping in Kashmir Merino and Lohi sheep. On the contrary, Das *et al.* (2012) [8] and Das *et al.* (2014) [7] observed a non-significant effect. Published literature revealed a range between 26.05 and 42.00 kg for weight at first tupping in Malpura, Lohi and Madras Red sheep (Kumar *et al.,* 2008; Babar and Javed 2009; Sivakumar *et al.,* 2009; Balasubramanyam and Kumarasamy *et al.,* 2011 and Gowane *et al.,* 2014) [13, 1, 20, 2, 9]. The variation in weight at first tupping in different studies could be due to breed differences climatic factors and management.

The average age at first lambing was 644.65 ± 11.59 days (21.19 months). More or less similar age at first lambing was reported in Deccani sheep ICAR Annual report, 2009-10, 2010–11; Mandakmale *et al.,* 2013 and Mane *et al.,* 2014 [15, 14]. However, earlier age at first lambing ranging from 379.33 to 596.16 days (12.47 to 19.60 months) was reported for various Indian breeds (Poonia, 2008; Gopal, 2008; Karunanithi *et al.,* 2011; Rajanna *et al.,* 2012; Das *et al.,* 2012; Panda *et al.,* 2012 and Das *et al.,* 2014) [17, 6, 12, 19, 8, 18, 7]. In the present study, the age at first lambing was significantly lower in season II born ewes (635.53 ±14.59 d) when compared to season I born ewes (653.76 ± 18.01 d). Similar significant effect of season was also reported by Mandakmale *et al.* (2013) [15] in Deccani sheep while Das *et al.* (2012) [8], Das *et al.* (2014) [7] and Mane *et al.* (2014) [14] observed a non-significant effect in Kashmir Merino and Deccani sheep.

Average weight at first lambing recorded in the present study was 24.56 ± 0.33 kg while the published literature revealed a range of 27.59 to 44.8 kg in Indian sheep breeds (Poonia, 2008, Kumar *et al.,* 2008 and Gowane *et al.,* 2014) [17, 13, 9].

Mean gestation period recorded in Deccani ewes was 155.53 ± 0.49 days. Gestation period ranging from 149.54 to 153.38 days was reported by many authors on Indian breeds (Gopal, 2008; Babar and Javed 2009; Panda *et al.,* 2012) [6, 1, 18]. Gestation period was significantly lower in season II born ewes (154.81 ± 0.61 days) than that in season I born ewes (156.24 ± 0.76 days). Similar significant effect of season on gestation period was reported by Babar and Javed (2009) [1] in Lohi ewes.

Mean litter size at birth and weaning recorded in the present study was 1.00 ± 0.00 and 0.80 ± 0.04 lambs, respectively. Published literature on Indian breeds also revealed a range of 1.00 to 1.04 for LSB (Kumar *et al.,* 2008; Ganai *et al.,* 2009 and Karunanithi *et al.,* 2011) [13, 5, 12] and 0.94 to 0.97 for LSW (Kumar *et al.,* 2008 and Jeichitra *et al.,* 2013) [13, 11] in Malpura and Mecheri ewes. The average litter size at birth is unity in present study which indicates the monotocous nature of Deccani sheep. Litter size at birth did not vary much according to season of lambing but litter size at weaning in season I was 0.77 ± 0.07 lambs and in the season II it was 0.83 ± 0.06 lambs showing good survivability of lambs during season II. Similar significant influence of season was reported by Jeichitra *et al.* (2013) [11] in Mecheri ewes. The differences observed in various breeds may be due to differences in breeds, climatic conditions and lamb management. Season and management of lambs are important factors influencing survivability of lambs.

Table 1: Least-squares means for age (days) and, weight (kg) at first tupping and first lambing in Deccani Sheep.

	Age at first tupping			Weight at fist tupping			Age at first lambing			Weight at first lambing		
	n	Mean	SE	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall	50	338.59	9.36	50	21.89	0.50	53	644.65	11.59	53	24.56	0.33
Season												
I (Jan-June)	6	325.83^{b}	17.57	6	22.02^{a}	0.93	21	653.76^{a}	18.01	21	24.37^{b}	0.51
II (Jul-Dec)	44	351.21^{a}	6.49	44	21.76^{b}	0.35	32	635.53^{b}	14.59	32	24.74^{a}	0.41

Means with similar superscripts in a column within the effect do not differ significantly (P≥0.01)

Table 2: Least-squares means for gestation period (days), litter size at birth and litter size at weaning in Deccani sheep.

	Gestation period			Litter size at birth			Litter size at weaning		
	n	Mean	SE	n	Mean	SE	n	Mean	SE
Overall	53	155.53	0.49	29	1.00	0.00	29	0.80	0.04
Season									
I (Jan-June)	21	156.24^{a}	0.76	13	1.000^{b}	0.001	13	0.77^{b}	0.07
II (Jul-Dec)	32	154.81^{b}	0.61	16	1.001^{a}	0.001	16	0.83^{a}	0.06

Means with similar superscripts in a column within the effect do not differ significantly (P≥0.01)

Conclusion

Significant effect of season on reproductive traits indicates the possibility of capitalizing the favourable agro-climatic conditions for higher reproductive rates. The reproductive performance of Deccani sheep is also comparable with other native breeds indicating its adaptation to the harsh climatic conditions of Deccan plateau. In view of this, the breed need to be supported by scientifically managing the flocks under organized farms.

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