

Original Research Article

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Effect of Non-Genetic Factors on Reproductive Performance of Nellore Brown Sheep

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ABSTRACT

Keywords

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The data on reproductive performance of 502 Nellore Brown lambs born during 2006 to 2011 maintained at Livestock Research Station, Mamnoon, Warangal district which is a constituent of Sri P.V. Narsimha Rao Telangana Veterinary University, Hyderabad, were utilized for the present study. The overall least squares mean age at first service (AFS), age at first lambing (AFL), service period (SP) and lambing interval (LI) were 593.55 ± 6.74 , 742.53 ± 6.75 , 155.03 ± 10.71 and 304.41 ± 10.71 days, respectively. Year of birth had shown highly significant ($P \leq 0.01$) effect on all the reproductive traits studied. The season of birth significantly ($P \leq 0.01$) influenced service period and lambing interval only. The parity of the ewe had significant ($P \leq 0.05$) effect on service period and lambing interval. The significant effect of non-genetic factors plays an important role in reproductive performance of animal so higher emphasis on management practices, nutrition and health cover will improve the reproductive performance of animal.

Introduction

Small ruminants have become the most promising livestock in the country due to ample marketing opportunities for their products. Sheep farming is a major source of income and livelihood of small and marginal farmers of arid and semi-arid regions of India besides providing nutritional security to the rural people. Sheep are efficient converters of unutilized poor quality grass and crop residues into meat and skin. However, the performance of different breeds of sheep in

India is relatively low as they are reared mostly under harsh and unfavorable climatic conditions (Arora and Garg, 1998). Most of the south Indian breeds are mainly maintained for meat production. Mutton is one kind of meat towards, which there is no prejudice by any community in India and further development of superior breeds for mutton production will have a great scope in the developing economy of India. The role of sheep is more pronounced as a source of non-

vegetarian food. Further, the demand for non-vegetarian food products is on increase and its consumption would be nearly 8.0-9.0 million tons by 2020, up from 2.0-3.0 million tons in 2001 (Birthal and Taneja, 2006). To meet the surging domestic and international demand for mutton and mutton products, it is necessary to improve the production and productivity of sheep.

Nellore is a popular and tallest mutton breed in the country distributed predominantly in Nellore and Prakasam districts of Andhra Pradesh. Nellore is also known for heat tolerance, disease resistance and thrives well in harsh conditions. Based on coat color pattern Nellore sheep is classified into three varieties *viz.* Palla, Jodipi and Brown or Dora. There is no information available on the reproductive performance of Nellore Brown sheep. Therefore present study was under taken to study the effect of non-genetic factors on the reproductive performance of Nellore Brown sheep under organized farm conditions to find out the breeding and management interventions for improvement in economically important traits.

Materials and Methods

The data on reproductive performance of 502 Nellore Brown lambs born during 2006 to 2011 maintained at Livestock Research Station, Mamnoon, Warangal district which is a constituent of Sri P.V. Narsimha Rao Telangana Veterinary University, Hyderabad, were utilized for the present study. The animals were maintained on semi-intensive system with a provision of concentrates supplementation (250-300g/day/animal) and 8hours grazing. Water is provided *ad libitum* in the farm and grazing areas. Lambs were weaned at the age of 3 months. Data on age at first service, age at first lambing, service period and lambing interval were analysed by using the least squares analysis of variance

technique using mixed model least-squares and maximum likelihood computer program pc-2 developed by Harvey (1990). The linear model included the effect of factors like year of birth, season of birth (major-October to December, off-season-April to June) and parity as fixed effects. Duncan's Multiple Range Test (D.M.R.T) as modified by Kramer (1957) was used for comparing the sub-group means.

Results and Discussion

Age at First Service

The overall least squares mean age at first service was 593.55 ± 6.74 days (Table 1) and the means recorded in the present study are close to means reported by Dixit *et al.*, (2002) in Bharat Merino sheep (580 ± 13 days), Gopaldass *et al.*, (2004) in Marwari sheep (579.27 ± 2.24 days) and Rajanna *et al.*, (2012) in Nellore sheep (610.00 ± 3.81 days). However, higher age at first service was reported in Nellore sheep (779.88 ± 16.35 days) by Gupta *et al.*, (1987), in Nali ewes (775.83 ± 12.94 days) by Dey and Poonia (2005) whereas lower age at first service was reported by Mane *et al.*, (2014) in Deccani sheep (489.21 ± 3.55 days). The variation may due to breed differences in breeds, agro-climatic conditions and feeding management.

The data analysis revealed that the effect of year of birth was significant ($P \leq 0.01$) on the age at first service. Similar findings were reported by Dixit *et al.*, (2002) in Bharat Merino sheep and Mandakmale *et al.*, (2013) in Deccani sheep while contrasting results were reported by Mane *et al.*, (2014) in Deccani sheep. The mean age at first service among the years ranged from 526.23 ± 18.17 (2011) to 732.18 ± 14.14 days (2006) which might be due to better body condition of ewes due to higher growth rates during early stages of life.

The least squares analysis of variance revealed that there is no significant difference between the lambs born during off season (594.75 ± 10.07) and main season (592.35 ± 8.05 days). Similar findings were observed by Mane *et al.*, (2014) in Deccani sheep while contrasting findings were reported by Dixit *et al.*, (2002) in Bharat Merino sheep, Dey and Poonia (2005) in Nali sheep and Mandakmale *et al.*, (2013) in Deccani sheep.

Age at First lambing

The overall least squares mean age at first lambing was 742.53 ± 6.75 days (Table 1). The present findings are close to the mean AFL reported in Bharat Merino sheep (730 ± 13 days) by Dixit *et al.*, (2002) and in Marwari sheep (730.50 ± 2.47 days) by Gopaldass *et al.*, (2004). Higher AFL was reported Acharya (1982) in Nellore sheep (841.04 ± 1.21 days) and Dey and Poonia (2005) in Nali sheep (925.08 ± 13.02 days) whereas lower means were reported by Poonia (2008) in Munjal sheep (530.53 ± 12.39 days) and Mane *et al.*, (2014) in Deccani sheep (638.91 ± 3.56 days).The variation may due to breed differences in breeds, agro-climatic conditions and feeding management.

The least squares analysis of variance revealed significant ($P \leq 0.01$) effect of year of birth on age at first lambing. Similar findings were observed by Dixit *et al.*, (2002) in Bharat Merino sheep and Mandakmale *et al.*, (2013) in Deccani sheep whereas non-significant effect of year of birth was reported by Mane *et al.*, (2014) in Deccani sheep. Mean AFL ranged from 675.68 ± 18.19 (2011) to 881.11 ± 14.15 days (2006) which might be due to better body condition of ewes due to higher growth rate during early age.

The effect of season of birth was non-significant on the age at first lambing. Similar findings were reported by Mane *et al.*, (2014)

in Deccani sheep and the significant effect of season of birth was reported in Bharat Merino sheep by Dixit *et al.*, (2002), in Nali sheep by Dey and Poonia (2005) and in Deccani sheep by Mandakmale *et al.*, (2013).The mean age at first lambing for the lambs born during off season and main season were 743.71 ± 10.08 and 741.35 ± 8.06 days, respectively.

Service period

The overall least squares mean service period was 155.03 ± 10.71 days (Table 1) and the estimate is close to the mean value reported by Dixit *et al.*, (2002) in Bharat Merino sheep (142 ± 26 days) and lower mean was reported by Patro *et al.*, (2006) in indigenous meat type sheep of coastal Orissa (63.13 ± 0.25 days).

The analysis of data revealed the significant ($P \leq 0.01$) effect of year of birth on service period and ranged from 104.10 ± 16.84 (2008) to 288.83 ± 15.05 days (2006) which might be due to better body condition of ewes due to higher growth rates in early stages of life. The effect of season of birth was significant ($P \leq 0.01$) on service period and the lambs born during offseason (178.62 ± 13.23) had higher service period than the lambs born during main season (131.44 ± 12.18 days), which might be due to better availability of fodder and management practices in farm. The data analysis revealed, the parity of ewes significantly ($P \leq 0.05$) contributed to the variation in service period and similar findings were reported by Dixit *et al.*, (2002) in Bharat Merino sheep. Service period reduced from first parity (174.55 ± 7.95) to the second parity (135.51 ± 18.33).

Lambing interval

The overall least squares mean lambing interval was 304.41 ± 10.71 days (Table 1). The means recorded in the present study are in accordance with the findings of Dixit *et al.*,

(2002) in Bharat Merino sheep (290 ± 26 days), Mane *et al.*, (2014) in Deccani sheep (307.90 ± 1.37 days). However higher lambing interval was reported by Rajanna *et*

al., (2012) in Nellore sheep (420.93 ± 2.76 days) and lower values reported by Patro *et al.*, (2006) in indigenous meat type sheep of coastal Orissa (214.01 ± 0.33 days).

Table.1 Least-squares means (\pm SE) for reproductive traits (days) in Nellore brown sheep

Effects	AFC	AFL	SP	LI
Overall mean	593.55 \pm 6.74 (502)	742.53 \pm 6.75 (502)	155.03 \pm 10.71 (571)	304.41 \pm 10.71 (571)
Year	**	**	**	**
2006	732.18 ^a \pm 14.14 (83)	881.11 ^a \pm 14.15 (83)	288.83 ^a \pm 15.05 (114)	437.99 ^a \pm 15.06 (114)
2007	591.41 ^b \pm 7.92 (222)	740.25 ^b \pm 7.93 (222)	163.85 ^b \pm 11.16 (252)	313.03 ^b \pm 11.17 (252)
2008	591.51 ^b \pm 12.64 (91)	740.23 ^b \pm 12.66 (91)	104.10 ^d \pm 16.84 (96)	253.33 ^d \pm 16.85 (96)
2009	589.62 ^b \pm 22.34 (27)	738.20 ^b \pm 22.37 (27)	132.62 ^c \pm 26.82 (29)	282.35 ^c \pm 26.84 (29)
2010	530.36 ^c \pm 19.34 (36)	679.72 ^c \pm 19.36 (36)	110.09 ^d \pm 24.31 (37)	259.60 ^d \pm 24.32 (37)
2011	526.23 ^c \pm 18.17 (43)	675.68 ^c \pm 18.19 (43)	130.67 ^c \pm 23.26 (43)	280.13 ^c \pm 23.28 (43)
Season	NS	NS	**	**
Off-season (April-June)	594.75 \pm 10.07 (193)	743.71 \pm 10.08 (193)	178.62 ^a \pm 13.23 (218)	328.03 ^a \pm 13.24 (218)
Main season (Oct- Dec)	592.35 \pm 8.05 (309)	741.35 \pm 8.06 (309)	131.44 ^b \pm 12.18 (353)	280.78 ^b \pm 12.19 (353)
Parity			*	*
1	-	-	174.55 ^a \pm 7.95 (502)	323.72 ^a \pm 7.95 (502)
2	-	-	135.51 ^b \pm 18.33 (69)	285.09 ^b \pm 18.34 (69)

Figures in parentheses are number of observations; * Significant ($P \leq 0.05$); ** Significant ($P \leq 0.01$); NS-Non Significant; Means followed by the same super script(s) do not differ significantly ($P \leq 0.05$)

In the present study, effect of year on lambing interval was significant ($P \leq 0.01$) and similar findings reported by Mane *et al.*, (2014) in Deccani sheep and contrast findings were reported by Dey and Poonia (2005) in Nali sheep and Mandakmale *et al.*, (2013) in Deccani sheep. Lambing interval ranged from 253.33 ± 16.85 (2008) to 437.99 ± 15.06 days (2006). The lambing interval was significantly

($P \leq 0.01$) higher in lambs born during off season (328.03 ± 13.24) than the main season (280.78 ± 12.19 days) whereas, non-significant effect of season of birth reported in Nali sheep by Dey and Poonia (2005) and in Deccani sheep Mandakmale *et al.*, (2013). Parity of the ewes had significant ($P \leq 0.05$) effect on lambing interval and similar findings reported by Dixit *et al.*, (2002) in

Bharat Merino sheep. This difference might be due to the better physiological condition of the ewes in the second parity.

It can be concluded that non-genetic factors like year, season of birth and parity influenced the reproductive performance of Nellore Brown sheep due to variations in management, feed and fodder resources available during period so higher emphasis on management practices, nutrition and health cover will improve the reproductive performance of animal.

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