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RESEARCH ARTICLE

NON-GENETIC FACTORS AFFECTING BIRTH AND WEANING WEIGHT IN MANDYA SHEEP.

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Abstract

1400 records of Mandya sheep Maintained at Livestock Research and Information Centre (Sheep), KVAFSU, Nagamangala, Mandya (Dst), Karnataka for seven years (2010-2016) were analyzed to estimate the effect of non-genetic factors viz., season of birth, year of birth, sex of lamb and parity of dam on birth and weaning weights. The overall mean of birth weight and weaning weight were 2.07 ± 0.01 kg and 10.13 ± 0.05 kg, respectively. The year of birth of lamb had significant effect on weaning weight and non-significant effect on birth weight. The season of birth of lamb, sex of the lamb and parity of dam were also significantly effects the birth weight and weaning weight of lambs.

Introduction:-

Mandya sheep is considered as one of the most popular meat breed of India because of its superiority over the other meat breeds in terms of higher dressing percentage, meat and bone ratio, juiciness of meat, good aroma and taste due to marbling nature of meat. Since the agricultural production is low in the home tract area of Mandya sheep all the shepherd families have depended on rearing of Mandya sheep for their livelihood. Birth weight is the first observed trait in life of an animal on which growth, production and reproduction traits are dependent (Thiruvenkadan *et al*., 2008). The birth weight of lamb and its pre-weaning growth rate are highly influenced by both genetic and non-genetic factors. The understanding of the non-genetic factors which influence the development and growth of lambs may help for changes in the breeding plans and management practices to minimise the influence of factors which reduce production performance. Hence the present investigation was undertaken to study the various non-genetic factors affecting birth weight and weaning weight of Mandya lambs born under organised farm conditions.

Materials And Method:-

The data were obtained from the records of 1400 Mandya sheep maintained at livestock Research and Information Canter (Sheep), Nagamangala, Mandya dist, Karnataka state. The data were spread over a period of seven years from 2010 to 2016. The growth traits such as birth weight and weaning weight were considered for the study. Based on preliminary observations under semi-intensive system of management, Mandya sheep was found to be non-

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seasonal breeder coming to oestrus all around the year and hence lambing season was broadly categorised into main lambing season (June- September) off lambing season (October-January) and lean lambing season (February – may). The birth weight was recorded and individual lambs were identified by ear tags. The weighing of animals was carried during morning hours prior to feeding or grazing using an electronic weighing balance. Lambs were weaned at 90 days of age. Lambs suffered illness or underwent treatment during the experimental period were excluded from the study.

Prior to weaning, lambs were sheltered together with dam in the yard and allowed free access to green fodder with 200 g (per dam basis / day) of supplemental compounded livestock feed (Crude Protein 16%, Crude fibre 14%, Ether extract 2%, Common salt 2%, Calcium 1.5% and Phosphorus 1%). Animals were allowed free access to clean water and salt licks. Preventive measure such as periodical anti- parasitic treatment, and foot care was undertaken on regular basis.

The mean and standard errors for birth weight and weaning weight were computed statistically. The effects of non-genetic factors such as year of birth of lamb, season of birth of lamb, sex of birth of lamb and parity of dam on these growth traits were analysed by least square analysis using the technique developed by Harvey (1990). The least square means of significant effects were compared using Duncan's multiple range test (DMRT) as modified by Kramer (1957).

The following fixed model was used for analysis,

$Y_{ijklm} = \mu + Y_i + S_j + G_k + P_l + e_{ijlkm}$

Where,

Y_{ijklm} = the record of m^{th} individual belonging to i^{th} year of birth, j^{th} season of birth, k^{th} gender and i^{th} parity of dam.

μ = population mean

Y_i = fixed effect of i^{th} year of birth (i =1, 2, 3, 4,5,6,7)

S_j = fixed effect of j^{th} season of birth (j = 1, 2, 3)

G_k = fixed effect of k^{th} gender (k = 1, 2)

P_l = fixed effect of l^{th} parity (l = 1, 2, 3, 4, 5,6,7,8)

e_{ijlkm} = Random error associated with Y_{ijklm} and assumed to be, identically, independently and normally distributed with mean zero and the unit variance $(0, \sigma^2_e)$ and interaction between various effects was assumed to be zero.

Result and Discussion:-

The least square means of birth weight and weaning weight of Mandya lamb is presented in table 1.The least square means of birth weight and weaning weight were 2.07 ± 0.01 and 10.13 ± 0.05 kg, respectively. The effect of year of birth on birth weight of lambs was found be significant (Table 1), which is in agreement to Sahani *et al*. (1993) in Karakul sheep, Thiruvenkadan *et al.* (2008) in Mecheric and Reddy *et al*. (2009) in Nellore sheep, reported the significant effect of year of birth on birth weight. The significant effect of year of birth on weaning weight were also reported by Sahani *et al*. (1993) in Karakul sheep, Reddy *et al*. (2009) in Nellore sheep and Nirban *et al*. (2015) in Mawari sheep breeds. The significant difference in birth and weaning weight among lambs born in different years may be attributed to differences in management and environmental conditions such as ambient temperature, humidity, rain fall and availability of good feed and fodder.

The season of birth had highly significant effect ($p \leq 0.01$) on both birth weight and weaning weight (Table-1). Lambs born in main lambing season were found to be significantly heavier (2.14 ± 0.02, kg) than lambs born in off lambing season (2.06 ±0.01, kg) and lean lambing season (2.01 ±0.02, kg). Whereas, lambs born in lean lambing season recorded significantly heavier (10.34 ± 0.10, kg) weaning weight than born in main lambing season (10.02 ±0.10, kg) and off lambing season (10.03±0.09, kg). The significant effect of season of birth on birth weight and weaning weight of lambs were also reported by Singh and Dhilon (1992) in Avikalin sheep, Sahani *et al*. (1993) in karakul sheep and Nirban *et al.* (2015) in Marwari sheep. However, Balasubramanyan *et al*. (2010) in Madras red sheep reported non-significant effect of season of lambing on birth weight. The significant effect of season of lambing on birth weight and weaning weight may be due to difference in the availability of inputs in terms of feed and fodder, prevailed climatic conditions and managemental practices that ewes and new born lambs exposed in different seasons which directly influence the growth.

The mean birth and weaning weight of different sexes revealed that the male lambs had significantly ($p \leq 0.01$) higher birth weight and weaning weight than females (Table 1). The present finding is in agreement with reports of

Balasubramanyan and Kumaraswamy (2011) in Madras red sheep and Nirban et al. (2015) in Marwari sheep. The significant difference between the sex is attributed mainly due to the sexual dimorphism and anabolic effect of androgen which caused higher growth in males.

The mean birth weight and weaning weight of the lambs were lowest in the first parity (Table-1). The mean birth weight of lambs consistently increased with advancement of parity and maximum in the seventh parity and thereafter decreases in the birth weight. It is in accordance with the reports of Thiruvenkadan *et al.* (2008) in Mecheri sheep and Nirban *et al.* (2015) in Marwari sheep. The significant effect of parity of dam on birth weight of lamb might be because of consistently increased in the size of uterus with increase of parity which in turn better nourishment of the growing foetus inside the womb and could lead to more birth weight. The weaning weight of lambs had increased from second parity and reached maximum at third parity and tended to decrease in fourth and fifth parity. The difference found among lambs of third, fourth and fifth parity was not statistically significant from each other. Similar observation also reported by Mousa *et al.* (2013) in Fara fra lambs. The significant effect of parity on weaning weight might be due to the enhancement of quality and quantity in milk production and improved maternal ability after first and subsequent lambings.

Conclusion:-

The effect of non-genetic factors were studied on birth weight and weaning weight of Mandya sheep. The effect of sex of lamb, season of birth of lamb, year of birth and parity of dam were found to have significant influence on both birth weight and weaning weight.

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Table 1:- Least square means along with standard errors of birth weight and weaning weight (kg) of Mandya lambs

Particulars	Birth Weight	Weaning weight
Overall	2.07 ± 0.01 (1400)	10.13 ± 0.05 (1085)
Sex	<.0001	<.0001
Male	2.12±0.01 (722)	10.51±0.08 (583)
Female	2.01±0.01 (678)	9.68±0.07 (502)
Season	<.0001	0.0274
1 (Feb - May)	2.01±0.02 [x] (384)	10.34±0.10 [a] (346)
2 (Jun – Sep)	2.14±0.02 [a] (388)	10.02±0.10 [b] (331)
3 (Oct - Jan)	2.06±0.01 [b] (628)	10.03±0.09 [b] (408)
Parity	<.0001	<.0001
1	1.87±0.02 [c] (193)	9.83±0.13 [c] (174)
2	2.07±0.02 [ab] (301)	10.08±0.12 [b] (245)
3	2.05±0.02 [b] (314)	10.16±0.12 [ab] (235)
4	2.07±0.02 [ab] (258)	10.28±0.13 [ab] (191)
5	2. 08±0.03 [ab] (167)	10.21±0.16 [ab] (118)
6	2.09±0.04 [ab] (90)	10.11±0.20 [ab] (68)

7	2.18±0.05 [a] (44)	10.47±0.31[a] (31)
8>	2.00±0.05 [b] (33)	10.41±0.35[a] (23)
Year	<.0001	<.0001
2010	2.07±0.04 [c] (99)	9.29±0.15[b] (94)
2011	1.95±0.03 [b] (124)	9.76±0.16[ab] (113)
2012	2.06±0.03 [a] (212)	10.74±0.19[a] (204)
2013	2. 04±0.02 [a] (314)	9.60±0.11 [ab] (252)
2014	2. 08±0.02 [a] (283)	10.19±0.13 [a] (201)
2015	2.01±0.02 [a] (155)	10.88±0.14 [a] (135)
2016	2.22±0.02 [a] (212)	10.31±0.08[a] (85)

Within the column means with at least one common superscript do not differ significantly from each other

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