International Journal of Livestock Research, Vol. 11 (8) Aug' 2021
http://www.ijlr.org
eISSN: 2277-1964

Original Research

Reproductive Performances of Native Sheep of Meghalaya under the Existing Management System

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How to cite this paper: Khanikar, D., Phookan, A., Kalita, D., Zaman, G., Das, A., Hussain, J., Saikia, D. P., & Das, E. (2021). Reproductive Performances of Native Sheep of Meghalaya under the Existing Management System. *International Journal of Livestock Research*, 11(8), 33-39.
https://dx.doi.org/10.5455/ijlr.20201123055347

Received : Dec 22, 2020
Accepted : Feb 12, 2021
Published : Aug 31, 2021

Abstract

The present work was designed to study various reproductive traits of native sheep of Meghalaya under field condition covering the breeding tracts viz. West Khasi Hills district and East Khasi Hills district of Meghalaya. Data pertaining to 77 ewes were utilised for the study through personnel interviews and questionnaires. The overall least squares mean for age at first oestrus, age at first fertile service, age at first lambing, service period, lambing interval, oestrus cycle duration and lifetime lamb production were 370.052±0.802days, 389.307±0.134days, 540.123±0.128days, 256.432±8.961days, 408.005±9.527days, 16.494±0.058days and 3.584± 0.091 nos. respectively. The effect of location was found to be non-significant for all traits. This basic data will be helpful to design suitable conservation strategies for improvement of the sheep of Meghalaya.

Keywords: Meghalaya, Reproductive Performances, Sheep

Introduction

The native sheep of Meghalaya is unique germplasm which is yet to be under the focus of scientific study. The sheep is reared mainly for meat production with minimum input from the farmer's end and possess some valuable traits such as resistance to diseases and adaptability to low input management system. Since the inhabitants of this region are mainly non vegetarians, mutton is highly in demand. The factors mainly influencing the profitability of sheep breeding system are the reproductive characteristics (Matos *et al*., 1997). Higher degree of reproductive efficiency of breedable ewes is directly related to profitable mutton production and faster genetic progress of sheep flock. Therefore, the present study was designed to study the reproductive traits of native sheep of Meghalaya under field conditions.

Materials and Methods

Relevant information and data required to study the reproductive traits were collected through field surveys and providing questionnaires to farmers of different areas in the breeding tract of the indigenous sheep of Meghalaya *viz.* and Mawthungkper, Marang and Jaidoh villages of West Khasi Hills district and Nongrum, Thynroit and Mawjrong villages of East Khasi hills district of Meghalaya. A total of 77 animals were utilised for analysing reproductive traits. The data was classified according to location (*viz.* West Khasi Hills and East Khasi Hills). The collected data were subjected to least-squares analysis of variance technique as suggested by Harvey (1990) in order to study the non-orthogonal data associated with location.

Table 1: Description of reproductive traits under study

S. No.	Traits (days)	Description
1	Age at first oestrus (AFO)	Age at which the female first expressed signs of oestrus/heat.
2	Age at first fertile service (AFFS)	Age at which the first successful conception occurred.
3	Age at first lambing (AFL)	Age of the ewe, at which the first lamb is born
4	Service period (SP)	Period between the date of last lambing to the next successful service/ conception.
5	Lambing interval (LI)	Period between two successive lambing.
6	Oestrus cycle duration (OC)	Period between two successive oestrus
7	Lifetime lamb production (LP)	Total number of lambs produced by an ewe in its entire lifetime.

The mathematical model used to study of reproductive traits was as follows:

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

where,

Y_{ij}- is the value of the jth animal in the (i)th sub-class
μ - is the overall population mean
M_i- is the effect of ith location (i=1, 2)
E^{ij}- is the random error associated with Yij assumed to be normally and independently distributed with mean zero and variance $\sigma 2e$

Result and Discussions

The overall least-squares means along with standard errors and least-squares constants for different reproductive traits under study are presented in Table 2. Least-squares analysis of variance showing the effects of location on different reproductive traits are presented in Table 3.

Table 2: Least- squares Means ± Standard Errors (LSM±SE) and Least- Squares Constants (LSC) for reproductive traits

Sub-Class Description	Age At First Oestrus (Days)		Age at first fertile service (days)		Age at first lambing (days)		Service period (days)		Lambing interval (days)		Oestrus cycle duration (days)		Lifetime lamb production (No.)	
	LMS±SE	LSC	LMS±SE	LSC	LMS±SE	LSC	LMS± SE	LSC	LMS± SE	LSC	LMS± SE	LSC	LMS± SE	LSC
Overall mean (μ)	370.052± 0.802 (77)	-	389.37± 0.134(77)	-	540.123± 0.128 (77)	-	256.433± 8.961 (77)	-	408.005 ±9.527 (77)	-	16.494± 0.058 (77)		3.584 ±0.091 (77)	-
Location														
East Khasi Hills	370.862± 0.802 (36)	-0.81	389.445± 0.212 (36)	-0.136	540.028± 0.177 (36)	0.095	257.5 ±13.077 (36)	0.068	409.083± 13.904 (36)	0.945	16.5± 0.084 (36)	0.006	3.612 ± 0.128 (36)	-0.028
West Khasi Hills	369.243± 3.735 (41)	0.81	389.171± 0.171 (41)	0.136	540.219± 0.176 (41)	-0.095	255.366± 12.254 (41)	-0.068	406.928± 13.0289 (41)	-0.945	16.487± 0.079 (41)	-0.006	3.561 ± 0.131 (41)	0.028

NB: Within parentheses are the number of observations.

Table 3: Least –squares analysis of variance for various factors affecting reproductive traits

Sources of variation	Age at first oestrus (days)		Age at first fertile service (days)		Age at first lambing (days)		service period (days)		Lambing interval (days)		Oestrus cycle duration		Lifetime lamb production (No.)	
	d.f	M.S.S	d.f.	M.S.S	d.f	M.S.S	d.f	M.S.S	d.f	M.S.S	d.f	M.S.S	d.f	M.S.S
Location	1	50.133^{NS}	1	1.436^{NS}	1	0.704^{NS}	1	87.305^{NS}	1	47.767^{NS}	1	0.0029^{NS}	1	0.048^{NS}
Error	75	315.591	75	1.395	75	1.281	75	6155.927	75	6959.78	75	0.256	75	0.742

NS = Not significant

Age at First Oestrus

The overall least-squares means for age at first oestrus (AFO) in the present study was recorded as 370.052±0.802 days. The least-squares means for AFO with respect to two locations East Khasi Hills and West Khasi Hills were found to be 370.862±0.802 and 369.243±3.735 days respectively. The ambient temperature of the habitat of this indigenous sheep ranges from 6 to 24˚C. Due to this cold harsh climatic condition and scarcity in vegetation may have delayed AFO or sexual maturity. Comparable results to the present finding were given by Karunanithi *et al*. (2005) in Mecheri sheep (12.1±0.10 months). Pervage *et al*. (2009) in Indigenous sheep of Bangladesh (Jamuna river basin, Barind and Coastal regions) to be 333.17±4.64, 329.00±4.60 and 341.23±5.05 days respectively in the three districts. However, values higher than the present estimate was reported by Yadav *et al.* (2011) in Munjal sheep as 15-18 months. Lower values were reported by Nath (2018) in the Indigenous ewes of Assam (199.113 ± 2.41 days) and Khadse *et al.* (2019) in Deccani sheep (10.67±0.05 months).

Effect of Location

Least-squares analysis of variance revealed non-significant effect of location on AFO. Similar non-significant effect of location was observed by Hassan and Talukdar (2011) in native sheep of Bangladesh. On the contrary, the effect of location was found to be significant by Pervage *et al.* (2009) and Al Mansur *et al.* (2018) in native sheep of Bangladesh. They reported that the sheep of Bangladesh Livestock Research Institute and Rajshahi district had higher AFO.

Age at First Fertile Service (AFFS)

The overall least-squares means for age at first fertile service (AFFS) in the present study was recorded as 389.307±0.134 days. The least-squares means for AFFS with respect to two locations East Khasi Hills and West Khasi Hills were found to be 389.445±0.212 and 389.171±0.171 days respectively. In females, the most prominent effect of nutrition is around the time of mating on the wave-like pattern of follicle development, embryo survival and twinning rate (Vinoles, 2003). Sheep being seasonal breeders, are affected due to the scanty green fodder which may be due to cold climatic condition, thereby may have delayed the age at first fertile conception. The mean values obtained in this study corroborated with those reported by Pervage *et al*. (2009) in case of indigenous sheep of Bangladesh belonged to Jamuna river basin, Barind and Coastal regions as 341.92±6.26, 338.09±5.59 and 349.92±5.78 days respectively. Similar finding was reported by Senthilmuthukkumaran *et al.* (2019) in Mecheri sheep in beneficiary group of Salem (9.44±0.10 months) and Karur (9.52±0.08 months). However, values higher than the present estimates were given by Reddy *et al.* (2017) in Nellore Brown sheep (593.55±6.74 days) and Yadav *et al.* (2018) in Munjal sheep (563.08±14.43 days). Al Mansur *et al.* (2018) and Nath (2018) reported the AFFS in indigenous sheep of Bangladesh and in indigenous sheep of Assam as 201.4±20.0 and 200.830±2.44 days respectively. These were comparatively lower than the values of present study.

Effect of Location

Least-squares analysis of variance revealed non-significant effect of location on AFFS. Similar report was published by Hassan and Talukdar (2011) in native sheep of Bangladesh. Contrarily to the present study, significant effect of location was found by Senthilmuthukkumaran *et al*. (2019) in Mecheri sheep where the ewes of Karur district had lower AFFS than that of Salem district.

Age at First Lambing

The overall least-squares means for AFL in the present study was recorded as 540.123±0.128 days. The least-squares means for AFL with respect to two locations East Khasi Hills and West Khasi Hills were found to be 540.028±0.177 and 540.219±0.176 days respectively. Due to harsh prevailing climatic conditions in the locations under study may have lead to higher age at first lambing. Comparable values were reported by Rao *et al.* (2013) in indigenous sheep of North Coastal Zone of Andhra Pradesh (23.07±0.11 months) and Harini *et al.* (2019) in Nellore Palla sheep (509.32±1.00 days). Higher values were reported by Mehrotra (2017), Reddy *et al.* (2017) and Yadav *et al*. (2018) in Chokla (773 ± 8.77days), Nellore (742.53±6.75 days) and Munjal sheep (713.48±14.02 days) respectively. Contrarily, lesser values were reported by Hassan and Talukder (2011) in indigenous sheep of Bangladesh in Jamuna river basin region (409.8±75.0), Barind region (389.9±43.0days) and Coastal region (439.5±58.3 days) respectively.

Effect of Location

The least-squares analysis of variance revealed that location had non-significant effect on AFL. Similar effect was reported by Khadse *et al.* (2019) in Deccani sheep. On contrary, significant effects were reported by Rao *et al.* (2013) in sheep of Andhra Pradesh where the sheep from the districts of Visakhapatnam were better performers followed by Vizianagaram and Srikakulam and Al Mansur *et al.* (2018) in native sheep of Bangladesh where the ewes of Rajshahi district had higher AFL than ewes of Mymensingh district.

Service Period

The overall least-squares means for service period (SP) in the present study was recorded as 256.432±8.961 days. The least-squares means for SP with respect to two locations East Khasi Hills and West Khasi Hills were found to be 257.500±13.077 and 255.366±12.254 days respectively. The period between two successful service was found to be longer which may be because sheep are seasonal breeders. Failure of conception in one season along with impact of harsh climate led to higher values of service period. Results comparable to the present study were observed by Mehrotra (2017) in Chokla (228.31±6.62 days) and Khadse *et al.* (2019) in Deccani sheep (288.29±1.06days). Contrasting to present observation, Karunanithi *et al*. (2005) reported higher SP in Mecheri sheep (73.6±0.80 days). However, Ashebir *et al.* (2016), Reddy *et al.* (2017), Luna-Palomera *et al*. (2019) and Zaman and Akhtar (2019) observed lower SP than the present study in Begayt sheep, Nellore, Pelibuey ewes and indigenous sheep of Assam respectively.

Effect of Location

The least-squares analysis of variance revealed that location had non-significant effect on service period. Ashebir *et al.* (2016) reported a contrasting observation compared to the present study. They observed significant effect of location on SP in Begayt sheep. The ewes of Private sheep farm had lesser service period followed by Government sheep Ranch and Privet sheep Ranch.

Lambing Interval

The overall least-squares means for lambing interval (LI) in the present study was recorded as 408.005±9.527days. Higher lambing interval may be due to poor reproductive efficiency of these germplasm. The least-squares means for LI with respect to two locations East Khasi Hills and West Khasi Hills were found to be 409.083±13.904 and 406.928±13.028days respectively. Comparable values to the present study were reported by Lalit *et al.* (2016) in case of Harnali sheep (402.85±2.40 days) and Mehrotra (2017) in case of Chokla (371.12± 6.875 days). In contrary to present finding, lower averages were recorded by Rao *et al*. (2013) in sheep of Andhra Pradesh (9.70±0.04 months) and Khadse *et al*. (2019) in Deccani sheep (288.29±1.06 days).

Effect of Location

The least-squares analysis of variance revealed that location had non-significant effect on lambing interval. Similar observations were reported by Hassan and Talukdar (2011) in native sheep of Bangladesh. In contrary, significant effect of location was reported by Pervage *et al.* (2009) in native sheep of Bangladesh. It was reported that the average lambing interval shorter in sheep of Bangladesh livestock research institute nucleus flock followed by Barind, Jamuna river basin and Coastal regions.

Oestrus Cycle Duration

The overall least-squares means of oestrus cycle duration was found to be 16.494±0.058 days in indigenous sheep of Meghalaya. The least-squares means for OC with respect to two locations East Khasi Hills and West Khasi Hills were found to be 16.500±0.084 and 16.487±0.079 days respectively. Zohara *et al*. (2014) in indigenous ewes of Bangladesh reported the oestrus cycle duration to be 16.06±0.35 days, which was comparable to the present study. However, higher values were found by Ravimurugan *et al*. (2012) in Chevadu sheep and Khadse *et al.* (2019) in Deccani sheep respectively.

Effect of Location

The least-squares analysis of variance revealed that location had non-significant effect on oestrus cycle duration. Contradicting to the present study, the effect of location was found to be significant by Khadse *et al.* (2019) in case of Deccani sheep. The highest oestrus cycle duration was recorded in ewes of Solapur followed by Amadnagar and Pune.

Lifetime Lamb Production

In the present study under field condition, the life time lamb production includes the data up to 3-4 lambing as the farmers usually reared the sheep up to 4-5 years only. Thereafter, the animals were sold for mutton. Mutton from older animals not preferred by the customers since the tenderness of the meat is lost with age. The overall least-squares means for LLP in the present study was recorded as 3.584± 0.091 numbers. The least-squares means for LLP with respect to two locations East Khasi Hills and West Khasi Hills were found to be 3.612±0.128 and 3.561±0.131 numbers respectively. However, Rao (2012) reported a higher lifetime lambing in sheep of Andhra Pradesh (6.40±0.05 nos.) and Khadse *et al.* (2019) a lesser lifetime lambing in case Deccani sheep (2.91±0.03 nos.) compared to Meghalaya native sheep.

Effect of Location

Result of least-squares analysis of variance suggested that the influence of location was non-significant on LLP. The finding was consistent with the observation of Iman and Slyter (1996) in Finn-Dorset-Targhee (FDT) ewes and Targhee ewes and Khadse *et al.* (2019) in Deccani sheep.

Conclusion

The study revealed poor reproductive performances of native sheep of Meghalaya. This might be due to the fact that more emphasis given by rearers for mutton production instead of breeding. Baseline information from the present study can be utilised for designing suitable breeding strategies for improvement of this native sheep. Moreover, these sheep are reared in flocks/herds with a flock size ranging from 65-80 numbers which comprises of sheep of all age groups. Steps can be taken to improve these traits by selective breeding to break through the homogeneity. Also, awareness can be showered among the herders to initiate breeding between the herds rather than within the herds.

Acknowledgement

Directorate of Animal Husbandry, Meghalaya and farmers of East Khasi Hills and West Khasi Hills for their cooperation during collection of the required information.

Conflict of Interests

There is no conflict of interest.

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