

Article

Productive and reproductive performances of Sheep at field level of Rajshahi and Mymensingh District of Bangladesh

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Abstract: This study was undertaken to assess the reproductive performances of sheep at field level of Rajshahi and Mymensingh district of Bangladesh during January to December, 2016. A total of 52 farms (26 each in Rajshahi and Mymensingh) were selected for determining the reproductive parameters of ewes. Ewe lambs in Mymensingh reached puberty at significantly ($P<0.03$) younger age (186.9 ± 18.4 days) than in Rajshahi (199.9 ± 24.9 days). The average age at first pregnancy was 201.4 ± 20.0 days in two regions. Similarly, the ewes in Mymensingh was lambing at significantly ($P<0.002$) early age than ewes in Rajshahi (356.0 ± 6.8 days vs. 372.7 ± 27.8 days). The observed duration of oestrus at Rajshahi and Mymensingh was 36.0 ± 6.7 hrs and 36.0 ± 7.3 hrs, respectively. The gestation length varied from 145 to 150 days. The average gestation length was 147.9 ± 3.4 days in two regions. The gestation length was not significant ($P>0.05$) in the ewes between Rajshahi and Mymensingh (148.7 ± 3.4 and 147.1 ± 3.2 days; respectively). The pooled over litter size was 1.6 ± 0.2 in two regions. However, there was no significant ($P>0.05$) difference in litter size of ewes in Rajshahi and Mymensingh region (1.7 ± 0.2 vs. 1.6 ± 0.2). The pooled lambing interval was 193.9 ± 21.7 days in two regions. Mean birth weights of lambs, weaning weight and mature weight were 1.7 ± 0.6 vs. 1.3 ± 0.1 kg; 8.9 ± 2.7 vs. 6.9 ± 1.0 kg and 24.9 ± 7.3 vs. 19.4 ± 2.7 kg in Rajshahi and Mymensingh, respectively. These reproductive parameters were significantly higher ($P<0.001$) in Rajshahi compared with in Mymensingh. The reproductive parameters are almost similar between confined and the traditional management system if the farms are well managed.

Keywords: productive; reproductive; performance; sheep; field level

1. Introduction

Sheep is one of the important livestock species of mixed farming system in Bangladesh. Sheep are the basic livelihood option for the poor farmers in developing countries like Bangladesh. It provides nutritional security, employment and income generation. The sheep population has shown to be in increasing trend with 2.5 times during the last twelve years with annual growth rate of 5% (Sarket *et al.*, 2015). The total sheep population in Bangladesh is 3.3 million (DLS, 2016). Sheep rearing is common in Bangladesh with major percentage about, 32% are reared in three ecological zones namely Barind, Jamuna basin and Coastal areas. Bangladeshi sheep are indigenous, with few crossbreds (Bhuiyan, 2006) and are capable of bi-annual lambing with multiple births; usually produce twins and rarely triplets. The hot and humid climate of Bangladesh favors well adaptation for these indigenous sheep. They reached in puberty at 5-11 months of age, estrus cycle length varied from 14 to 20 days (average 17 days), duration of estrus varied from 24 to 36 hours, gestation length varied from 141 to 145 days and litter size varied from 1.2 to 1.9 observed under close monitoring in research station (Zohara *et al.*, 2014; Hassan and Talukder, 2011). Despite of these positive prosperities, farmers are not aware with modern

husbandry-veterinary practices and controlled breeding schemes for profitable sheep farming. There are mainly two downstream in sheep breeding at farmers level; first - the farmers castrate their male at early age for getting current profit resulting falls of breeding rams and second - farmers use same ram for breeding year after year which increases inbreeding. Beside these, farmers are lack of breeding and management information practices about reproductive and productive benefits from sheep farming. Therefore the present research was performed to study the reproductive performances of sheep maintained in traditional management system at field level in Rajshahi and Mymensingh district of Bangladesh.

2. Materials and Methods

2.1. Study area and farm selection

The study was carried out in some sheep farms at Rajshahi and Mymensingh division in Bangladesh. The study was conducted from January to December, 2016. Sheep farmer's information was taken from the district livestock officer and a total of 52 farms (26 farms in each division) farms were randomly selected within those areas.

2.2. Animal management in the farm

Sheep flocks in the selected area were reared in their traditional management system. Early in the morning, sheep were pastured in the mango garden or open paddy field or open grass land. They were kept in the pasture land for the duration of whole day and came back during sundown. Few farmers fed concentrate feed after returning at home. Some good farmers maintained proper vaccination and deworming schedule. Necessary treatments were given against specific diseases according to the suggestion of the veterinary surgeons.

2.3. Data collection

A well-structured data sheet was prepared before data collection. The selected farms were visited personally. The information was collected by face to face interview with the farm owner and animal caretaker. The information included parameters for reproductive performances were as follows: age at 1st heat, weight at 1st heat, duration of estrus, gestation length, age at first pregnancy, age at first lambing, lambing interval, onset of post partum heat, post partum heat period, litter size, birth weight of lamb, weaning weight and mature weight.

2.3.1. Age at 1st heat or puberty

The age at puberty was estimated as the age in days when ewes exhibited the sign of first estrus, by observing wagging tail, swelling and mucus discharge from the vulva, jumping tendency to others, rubbing their body with the rams and remain closer to the rams.

2.3.2. Weight at 1st heat

This trait was estimated in terms of kg when the ewes come in heat with the help of weighing balance.

2.3.3. Measurement of oestrous cycle length and duration

Estrous detection in ewes was carried out by the observation of estrus sign by the farmer or animal caretaker. Oestrus duration was determined by measuring the time interval between the onset of oestrus and when a ewe no longer stood to be mounted.

2.3.4. Length of gestation period

It was calculated as the interval from fertile service to parturition. Gestation length was counted from the day of service to the day of onset of labour. The duration of gestation was determined in days.

2.3.5. Age at first lambing

Age at first lambing was estimated in days from the date of birth to the date of first lambing.

2.3.6. Lambing interval

Lambing interval was determined by measuring the interval between the dates of one lambing to the date of next lambing. The lambing interval was recorded in days.

2.3.7. Litter size

Litter size was calculated as the number of lambs born per conception per ewe.

Litter size was calculated by the following formula:

Litter size (prolificacy) = number of lambs / number of ewes lambing

2.3.8. Post-partum onset of oestrus

Post-partum onset of oestrus was determined by the first observed oestrus after parturition.

2.3.9. Lamb birth weight, weaning weight and mature weight

Within 24 hours of the new born, date of birth, birth weight, type of birth, sex of lamb was taken. Lamb birth weight, weaning weight and mature weight was measured by weighing balance and values were recorded in kg.

2.4. Statistical analysis

All data were stored in MS Excel and further analysis was done using SPSS IBM 20.0 version software program. The statistical analysis of the data was performed using compare mean with one way ANOVA and univariate analysis of variance procedure.

3. Results

3.1 Age at first heat (puberty), pregnancy and lambing

Age at first heat, pregnancy and lambing in indigenous ewes under traditional management system is shown in the Table 1. The age at puberty or first heat varied from 150-300 days (5-10 months). The average age at first puberty was 193.4±22.6 days in two regions. Ewe lambs in Mymensingh reached puberty at significantly (P<0.03) younger age (186.9±18.4 days) than in Rajshahi (199.9±24.9 days). The pooled over age at first lambing was 364.3±22.6 days in two regions. Similarly, the ewes in Mymensingh was lambing at early age than ewes in Rajshahi (P<0.002) (356.0±6.8 days vs. 372.7±27.8 days). The average age at first pregnancy was 201.4±20.0 days in two regions. There was no significant difference in age at first pregnancy between the ewes of two different areas (206.5±22.6 vs. 196.2±15.8).

Table 1. Comparison of age effects on reproductive parameters of ewes maintained under traditional management system.

Parameters (days)	Region			Level of significance
	Rajshahi (n=26)	Mymensingh (n=26)	Pooled over data (n=52)	
Age at first heat	199.9±24.9 ^a	186.9±18.4 ^b	193.4±22.6	(P < 0.03)
Age at first pregnancy	206.5±22.6	196.2±15.8	201.4±20.0	NS
Age at first lambing	372.7±27.8 ^a	356.0±6.8 ^b	364.3±22.6	(P < 0.002)

NS: Not significant, ^{a-b} Mean values having different superscripts in a row differ significantly (P<0.05)

3.2. Oestrus duration and onset of post-partum heat (estrus)

The duration of oestrus, onset of post-partum heat (estrus) and post-partum heat period are shown in Table 2. Duration of oestrus in the present study varied from 24 to 36 hrs. The pooled over duration of oestrus was 36.0±8.2 hours in two regions. There was no significant difference (P>0.05) in duration of oestrus in indigenous ewes between Rajshahi and Mymensingh. The observed duration of oestrus was 36.0±6.7 hrs and 36.0±7.3 hrs, respectively. Onset of post-partum heat (estrus) was not significant (P>0.05) in Rajshahi and Mymensingh (26.0±11.1 vs. 24.3±9.9 days).

Table 2. Comparison of reproductive parameters of ewes between two regions.

Parameters	Region			Level of significance
	Rajshahi (n=26)	Mymensingh (n=26)	Pooled over data (n=52)	
Duration of estrus (hrs.)	36.0±6.7	36.0±7.3	36.0±8.2	NS
Gestation length (days)	148.7±3.4	147.1±3.2	147.9±3.4	NS
Litter size	1.7±0.2	1.6±0.2	1.6±0.2	NS
Lambing interval	197.9±24.9	189.8±16.7	193.9±21.7	NS
Onset of post-partum heat (days)	26.0±11.1	24.3±9.9	25.2±10.4	NS

NS- Not significant.

3.3. Gestation length, litter size and lambing interval

The gestation length, litter size and lambing interval in indigenous ewes is placed in Table 2. The gestation length varied from 145 to 150 days. The average gestation length was 147.9 ± 3.4 days in two regions. The gestation length was not significant ($P > 0.05$) in the ewes between Rajshahi and Mymensingh (148.7 ± 3.4 and 147.1 ± 3.2 days; respectively). The pooled over litter size was 1.6 ± 0.2 in two regions. However, there was no significant ($P > 0.05$) difference in litter size of ewes in Rajshahi and Mymensingh region (1.7 ± 0.2 vs. 1.6 ± 0.2). Also there was no significant ($P > 0.05$) difference in lambing interval of ewes in Rajshahi and Mymensingh region (197.9 ± 24.9 vs. 189.8 ± 16.7 days). The pooled lambing interval was 193.9 ± 21.7 days in two regions.

3.4. Birth weight of lambs, weaning weight and mature weight

Lamb birth weight, weaning weight of lamb and mature weight from this study are presented in Table 3. Mean birth weights of lambs were 1.7 ± 0.6 kg and 1.3 ± 0.1 kg in Rajshahi and Mymensingh, respectively. The birth weight of lambs in Rajshahi were significantly higher ($P < 0.001$) compared with lambs born in Mymensingh. However, the pooled over birth weight of lambs was 1.5 ± 0.5 kg in two regions. The weaning weight were significantly higher ($P < 0.001$) of lambs born in Rajshahi (8.9 ± 2.7 kg) compared with Mymensingh (6.9 ± 1.0 kg). The mature weight were also significantly higher ($P < 0.001$) in Rajshahi (24.9 ± 7.3 kg) compared with Mymensingh (19.4 ± 2.7 kg).

Table 3. Growth performance of indigenous sheep at field level (Mean \pm SD).

Parameters (kg)	Region			Level of significance
	Rajshahi (n=26)	Mymensingh (n=26)	Pooled over data (n=52)	
Lamb birth weight	1.7 ± 0.6^a	1.3 ± 0.1^b	1.5 ± 0.5	($P < 0.001$)
Weaning weight of lamb	8.9 ± 2.7^a	6.9 ± 1.0^b	7.9 ± 2.2	($P < 0.001$)
Mature weight	24.9 ± 7.3^a	19.4 ± 2.7^b	22.2 ± 6.2	($P < 0.001$)

^{a-b}Mean values having different superscripts in a row differ significantly ($P < 0.001$)

4. Discussion

The age effects of puberty, first pregnancy and first lambing in ewes maintained under traditional management system were observed in two regions in Bangladesh. The age at puberty or first heat varied from 150 to 300 days (5 to 10 months). According to the opinions of sheep farmers in Rajshahi division that indigenous ewes show heat or oestrus at earlier age compared with the Garole ewes. The present observation is more or less similar with the study of other researcher, 5 and 12 months required to reached puberty (Schoenian, 2014); 28.2 ± 0.8 weeks (Souza *et al.*, 2010); 6 to 9 months (Changjun, 2013) 6.22 ± 1.31 months and group 8.43 ± 1.15 months (Zohara *et al.*, 2014). Therefore the difference between reproductive performances in Rajshahi and Mymensingh division could be due to breed, feeding and climatic condition of the region. In traditional management system both Rajshahi and Mymensingh division may have an positive effect which resulted no difference from the study of Zohara *et al.* (2014); where the sheep were maintained in good management system in research station.

In present study, the average age at first lambing was 364.3 ± 22.6 days in two regions. The ewes in Mymensingh were lambing at early age than ewes in Rajshahi. The present observation is similar in Barind sheep, 389.9 ± 43.0 days and Jamuna basin sheep, 409.8 ± 75.0 days (Hassan and Talukder, 2011). In other studies, the age at first lambing was 530.5 ± 12.4 days in Munjal sheep (Poonia, 2008), higher than the present findings.

The average age at first pregnancy was 201.4 ± 20.0 days in two regions. There was no significant difference in age at first pregnancy between the ewes of two different areas. The present observation is similar with the age of first pregnancy in Jamuna basin sheep, 277.0 ± 104.9 days, Barind sheep, 264.7 ± 49.4 days and Costal sheep, 292.3 ± 47.5 days (Hassan and Talukder, 2011) performed in Bangladesh Livestock Research Institute (BLRI) research station.

The reproductive parameters viz, duration of oestrus, gestation length, litter size, lambing interval and onset of post-partum oestrus were observed in Rajshahi and Mymensingh division also supported with Zohara *et al.*, 2014. In traditional management system, the gestation length in ewes varied from 145 to 152 days. In the present study pooled over gestation length was 147.9 ± 3.4 days in two regions. Similar with above parameters gestation length in ewes was also not significantly ($P > 0.05$) different between Rajshahi and Mymensingh (148.7 ± 3.4 vs. 147.1 ± 3.2 days), respectively. The present study is supported by Timurkan and Yildiz (2005); Husain and Amin (2003) and Zohara *et al.* (2014).

The average litter size was 1.6 ± 0.2 in two regions and is supported by other researcher in Garole sheep (Sharma *et al.*, 1999); in controlled, ewes (Zohara *et al.*, 2014; Nimbkar *et al.*, 2002). These observations indicate that average litter size is more or less similar (1 or 2 commonly, rarely 3) among the sheep breeds of tropical countries in well managed condition. No significant ($P > 0.05$) difference in lambing interval of ewes in Rajshahi and Mymensingh region (197.9 ± 24.9 vs. 189.8 ± 16.7 days). It is supported by Hassan and Talukder, (2011) observed in Jamuna, Barind and Coastal sheep. Nimbkar *et al.* (2002) found in Deccani sheep in India that the average lambing interval was 264.0 ± 81.0 days, higher than the present findings. This could be due to differences in breed, nutrition and environment of the study region.

Mean birth weights of lambs were 1.7 ± 0.6 kg and 1.3 ± 0.1 kg in Rajshahi and Mymensingh, respectively. Researchers found that, lamb birth weight 1.2 kg (Husain and Amin, 2003) and 1.00 ± 0.30 and 1.33 ± 0.25 kg in controlled and supplemented group (Zohara *et al.*, 2014), which is more or less similar to the present study.

The mean weaning weight of indigenous lambs obtained in the current study was lighter than weaning weights of other breeds (Awgichew, 2000; Tibbo, 2006). The present study is supported by Zohara *et al.* (2014), supplemented groups compared with controlled groups (3.58 ± 0.93 kg & 5.71 ± 1.03 kg, respectively) indicating no difference between confined rearing sheep and well managed traditional management system. Similarly, the mature body weight were also significantly higher ($P < 0.001$) in sheep in Rajshahi (24.9 ± 7.3 kg) compared with Mymensingh (19.4 ± 2.7 kg). As stated above, this higher mature body weight could be due to breed effect.

5. Conclusions

From the above study it may be concluded that reproductive performances of indigenous sheep in research station is more or less similar with the well managed traditional rearing system. The differences in traditional management system between the farms results in difference in reproductive performances of ewes in two regions.

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Conflict of interest

None to declare.

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