

Reproductive and productive performance of sheep of Rajshahi, Bangladesh insight about effects of genotype and parity

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Abstract

Context: The reproductive and productive parameters of sheep is very important to develop the sheep farming.

Objectives: The aim of the present study was to evaluate the reproductive and productive performance (RPP) in relation to genotype and parity of 200 sheep.

Materials and Methods: The study was done at Poba and Mohonpur upazila's of Rajshahi district, Bangladesh during the period from July, 2011 to June, 2012. The RPP were age at puberty (AP), age at first lambing (AFL), gestation length (GL), first heat after lambing (FHAL), birth weight of lamb (BWL), litter size (LS), weaning period (WP) and lambing interval (LI). The data collected from the owners using pre-tested questionnaires.

Results: The average values for the AP, AFL, GL, FHAL, BW, LS, WP and LI were found 252±7 days, 398±7 days, 147±.15 days, 16.26±1.45 days, 0.96±.32 kg, 1.85±.02, 95.9±1.7 days and 162±2.43 days, respectively have been studied. Genotype of sheep has divided into two groups on the basis on their genetic composition of ear size viz; Long ear (n=48) and Short ear (n=152). Genotype had significant effect (P<0.05) on FHAL, LS and LI but no effect on AP, AFL, GL, BW and WP. Long ear sheep had shown better performance of RPP than the short ear sheep. The minimum values of AP, AFL, GL, FHAL, BW, WP and LI except LS in Long ear sheep and maximum in Short ear sheep. 1st (n=47), 2nd (n=53), 3rd (n=43), 4th (n=26), 5th (n=13) and > 6th (n=18) parity of sheep had significant effect (P<0.05) on all the RPP excluding FHAL, WP and LI. Significantly (P<0.05) highest liter size (2.17±0.1) was found in the >5th parity and lowest in 1st parity (1.52±0.4). The lowest time required for LI (8.64±2.3) in >6th parity and highest in 1st parity (176.50±23days).

Conclusion: It was concluded that the Long ear genotype and >6th parity group had shown excellent RPP under the conventional condition of sheep in Rajshahi region of Bangladesh.

Keywords: Sheep, reproductive, productive performance, genotype and parity.

Introduction

The sheep is one of the species most widely distributed throughout the world. There 1028 million sheep in the world belong to as many as 200 distinct breeds (FAO, 2004) 20% of the world sheep population is located in tropical and sub-tropical regions. Worldwide sheep are used for producing meat, milk and wool. It is an important source of income for the sheep rearer involving minimum investment, care and management. These animals have the ability to utilize and survive on otherwise waste fodder resources such as weeds (*Atrémisia*, *Eupatorium* and other waste plants) which other livestock do not readily consume. Furthermore, they symbolize extreme docility. They always graze with unity. Bangladesh has the 3rd highest population of sheep which accounted for about 2.78 million heads (BES, 2008) and distributed throughout the country but densely distributed in the northern districts specially Barind areas of the country. Sheep in Bangladesh are used for meat, wool, religious offerings and also commercial purposes. Their meat (mutton) is softer than goat which easily digests. Sheep available in Bangladesh comprise non-descript animals. They do not belongs any specific breed. But there are some remarkable genetic qualities are found in this local sheep. They are good prolific and can bred throughout the year. They can graze in uncultivated land with less amount of because they can graze from very close to the soil. Feed requirement is low and graze marshy land. They have also better resistance to diseases and produces quality of meat and significant amount of coarse wool. In northern region of the country, phenotypically two types of

sheep are found commonly. One type having rudimentary ears and short tail and another type having comparatively long ears and medium tail. In these regions sheep are primarily kept by the poor farmers as meat purpose only. Sheep of Bangladesh usually produce 250-500 gm fleece per year. They lamb twice in a year, twins are most common, and triplets are also found. The ewe lambs mature at 7-9 months. Considering the importance, the objective of the present study was to investigate the evaluation the reproductive and productive performance in relation to genotype and parity of sheep at northern region specially Rajshahi Barind area of Bangladesh.

Materials and Methods

Study Area

The survey was carried out around the Rajshahi University campus, Mohonpur and Paba Upazila of Rajshahi district under in the Department of Animal Husbandry and Veterinary Science, University of Rajshahi, Bangladesh during 1st July, 2011 to 30th June, 2012. Theses regions are based on high sheep population density, large number of farmer's involvement in sheep rearing as well as good communication.

Selection of Experiment Animals

A total of 200 ewes were selected from 29 farmers of said study area. Out of 29 farmers, 16 farmers (n=110 ewes) were at Rajshahi city and 13 farmers were (n=90 ewes) from Mohonpur upazila. Each farm comprises 2-10 ewes. These sheep were non-descript type or local breed. The selected ewes were classified according to their genotype and parity. Firstly, ewes were classified according to the genotypic composition on the basis of size and shape of ears and tail such as Short ears

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(n=152, rudimentary ears and short tail) Long ears (n=48, another type having comparatively long ears and medium tail). The selected ewes again classified into 6 groups on the basis of number of lambing stage such as Group-I: 1st parity (first time lambing, n=47), group II (second times lambing, n=53) group-III (third times lambing, n=43), group-IV (times lambing, n=26), group-V (five times lambing, n=13) and group-V (six and above times lambing, n=18).

Management of sheep

The sheep management system was not commercial. They kept their buck in low cost house. The house made of brick or wooden or muddy floor, wall of bamboo and roof of tin or straw. The farmers raise their sheep under scavenging condition without any economic consideration. The farmers keep the flock in an open house or open confined area without tethering during night time. In day time, the flock is usually grazing in field, bank of river, road or bazaar etc. The sheep lives on grass or leaves. Farmers could not supply any concentrate. Every flock has at least 2-4 rams per 10 ewes. The farmers are unplanned breeding. The ewe is conceived by natural service with the ram of same flock. The farmers do not vaccinate against the infectious diseases. Some farmers deworm their sheep irregularly. Most of the farmers did not shearing their sheep. Somebody shear their sheep and the wool has sold for commercial purposes.

Data collection

The survey schedule was developed according to the objectives of the study. Survey sheet was prepared to collect the desired information from the sheep owner and sheet contains reproductive and productive performance (RPP). The researcher visited the selected sheep one month interval and data collected from the farm register or interviewing from the respective sheep farmers. The following RPP were collected as given below:

Age at puberty (AP) - The age at puberty which a ewe first shows oestrus sign and behavior may be defined as age at puberty. It was measured in days (d) and total number of observation was 200.

Age at first lambing (AFL) - It is defined as the age when the ewe gives first lamb in her life. In this study total records for age at first lambing was 200 and it was measured in days (d).

Gestation length (GL) - It was calculated that as interval from conceived to parturition. The duration of gestation was expressed in terms of days and total number of observation was 199.

First heat after lambing (FHAL) - It is defined that the interval between date of lambing and the date of first shows the oestrus. It was also measured in days (d). Total number of observation was of this trait was also 199.

Birth weight of lamb (BWL) - The birth weight of new born lamb is termed as the birth weight. It was measured in Kilogram (Kg) and total observation of this trait was also 199.

Litter size (LS) - How many lambs at a time or per parturition. Total observation was 198.

Weaning period (WP) - Age at which a lamb leaves from their mother or when lamb starts to take green grass rather than suckling is called weaning period. It is recorded in days (d) and total observation was 163.

Lambing interval (LI) - It is calculated that interval between one lambing to succeeding lambing. It was also measured as days (d) and total observation was 153.

Statistical Analysis

The raw data has been sorted and computed and statistically analyzed to calculate the effect of breed and parity on RPP of ewe. Means \pm SE has been calculated of reproductive and productive performance of ewes in relation to breed and parity. The obtained information was loaded and stored on to the SPSS spread sheet. Then data was analyzed using SPSS programme. The means were compared by Duncan's Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

The present study was carried out to evaluate the status of RPP in relation to genotype and parity of 200 ewes belonged to Short ears (n=152) and Long ears (n=48) from Rajshahi city area and Mohonpur upazila of Rajshahi district during the period from July, 2011 to June, 2012. The average values for the age at puberty (AP), age at first lambing (AFL), gestation length (GL), first heat after lambing (FHAL), birth weight of lamb (BWL), litter size (LS), weaning period (WP) and lambing interval (LI) were found 252 \pm 7 days, 398 \pm 7 days, 147 \pm 15 days, 16.26 \pm 1.45 days, 0.96 \pm 0.32 kg, 1.85 \pm 0.02, 95.9 \pm 1.7 days and 162 \pm 2.43 days, respectively.

Effect of genotype on reproductive and productive performance in sheep is presented in Table-1. Genotype had significant effect ($P < 0.05$) on FHAL, LS and LI but no effect on AP, AFL, GL, BW and WP. The highest value of age at puberty was observed in short ear sheep (257 \pm 8 days) and the lowest in Long ear sheep (235 \pm 12 days). The overall mean was observed as 252 \pm 7 days. The long ear genotype of sheep showed the lowest age at first lambing (383 \pm 13 days), first heat after lambing (12.9 \pm 2.00 days), lambing interval (159 \pm 2.30 days), weaning period (89 \pm 3.40 days) and birth weight (0.95 \pm 0.02 days) than the short ear genotype sheep. Maximum and minimum gestation length was found in short ear (148 \pm 0.17 days) and long ear sheep (147 \pm 0.30 days), respectively. Long ear sheep had shown better RPP than the short ear sheep. The minimum values of AP, AFL, GL, FHAL, BW, WP and LI except LS were found in Long ear sheep and maximum values of RPP were found in Short ear sheep.

Table1. Effect of genotype on reproductive and productive performance of sheep

Reproductive and productive parameters	Genotypes		Overall
	Long ear	Short ear	
Age at puberty (days)	235 \pm 12 n=48	257 \pm 8 n=152	252 \pm 7 n=200
Age at first lambing (days)	383 \pm 13 n=48	403 \pm 8 n=152	398 \pm 7 n=200
Gestation length(days)	147.±.30 n=48	148.±.17 n=151	147±.15 n=199
First heat after lambing (days)	12.9 \pm 2.0 ^b n=48	17.3 \pm 1.7 ^a n=151	16.26 \pm 1.45 n=199
Birth weight of lamb (kg)	0.95 \pm 0.02 n=48	0.96 \pm 0.03 n=151	0.96 \pm 0.32 n=199
Litter size	1.90 \pm 0.44 ^a n=48	1.84 \pm 0.47 ^b n=150	1.85 \pm 0.02 n=198
Weaning period (days)	89 \pm 3.4 n=38	97 \pm 1.7 n=125	95.9 \pm 1.7 n=163
Lambing interval (days)	159 \pm 2.3 ^b n=34	163 \pm 3.05 ^a n=119	162 \pm 2.43 n=153

Values are Mean \pm SE; N= Number of observation; SE= Standard Error of mean; ^{ab} superscript significant effect ($P < 0.05$) between the column.

Table 2. Effect of parity on reproductive and productive parameters in sheep at Rajshahi region

Reproductive and productive parameters	Parity						Overall
	1 st parity	2 nd parity	3 rd parity	4 th parity	5 th parity	> 6 th parity	
Age at puberty (days)	225±8 ^b n=47	251±12 ^{ab} n=53	273±21 ^{ab} n=43	240±15 ^b n=26	305±41 ^a n=13	255±20 ^{ab} n=18	252±7 n=200
Age at first lambing (days)	371±9 ^b n=47	399±12 ^{ab} n=53	422±21 ^{ab} n=43	384±16 ^{ab} n=26	442±44 ^a n=13	402±20 ^{ab} n=18	398±7 n=200
Gestation length(days)	146±0.2 ^c n=47	147±0.2 ^{bc} n=53	148±0.3 ^b n=43	149±0.2 ^a n=26	148±0.7 ^b n=12	149±0.5 ^a n=18	147±0.10 n=199
First heat after lambing (days)	17.62±2.5 n=47	18.42±3.8 n=53	15.30±2.9 n=43	15.15±3.3 n=26	18.7±4.1 n=12	8.64±2.3 n=18	16.26±1.4 n=199
Birth weight of lamb (kg)	0.98±0.33 ^a n=47	0.95±0.22 ^{ab} n=53	0.98±0.46 ^a n=43	0.93±0.20 ^{ab} n=26	0.90±0.67 ^b n=12	0.98±.85 ^a n=18	0.96±0.53 n=199
Litter size (no.)	1.52±0.4 ^b n=46	1.85±0.3 ^{ab} n=53	2.00±0.4 ^{ab} n=43	2.08±0.1 ^{ab} n=26	2.17±0.1 ^a n=12	1.83±0.1 ^{ab} n=18	1.85±0.1 n=198
Weaning period (days)	92±6 n=11	93±2 n=53	95±3 n=43	100±3 n=26	99±5 n=12	97±5 n=18	95±1 n=163
Lambing interval (days)	176.50±23 n=2	167±4 n=53	162±2 n=42	166±5 n=26	172±8 n=12	161±4 n=18	162±2.43 n=153

Values are Mean±SE; N= Number of observation; SE= Standard Error of mean; ^{abc} superscript significant effect (P<0.05) between column.

Effect of parity on reproductive and productive performance of sheep is presented in Table 2. From the table 2, 1st (n=47), 2nd (n=53), 3rd (n=43), 4th (n=26), 5th (n=13) and >6th (n=18) parity of sheep had significant effect (P<0.05) all the RPR excluding FHAL, WP and LI. Significantly (P<0.05) highest litter size (2.17±0.1) was found in the >5th parity and lowest in 1st parity (1.52±0.4). The lowest time required for LI (8.64±2.3) in > 6th parity and highest in 1st parity (176.50±23 days).

Lozano and Martinez (1977) reported that the age of puberty of female sheep for 300 days of Tabasco breed which is differ from the present study. Barerjee (2004) reported that age of puberty and gestation lengths were 7-14 months and 147 days, respectively which are more closed to the present study. He also observed the mean age at first lambing for 115 females born on the station from 1974 to 1980 was 18.8 ± 0.8 months. The variation of age of puberty and first lambing due to the following factors viz. breed, management system, nutrition status, milk uptake during young, environmental condition and body weight and condition. The significance of environmental influences on age at first lambing over this period is indicated.

The length of gestation was found 147±0.5 days in indigenous sheep in this present study which are almost similar Combellas *et al.* (1979). They found the gestation was 148±2.6 days in West African sheep. Musa *et al.* (2005) reported that the gestation length was found 150.44±2.64 days ranging between 145-156 days. Sultana *et al.* (2011) reported that average gestation length were 146.0 and 147 days in semi-intensive and intensive feeding system respectively which is very close to the present study.

The overall birth weight of lambs was found to be 0.96±0.23 kg is disagree to 2.90±0.50 kg as reported by Musa *et al.* (2005). The average birth weigh of lamb is 0.96±0.23 kg which is differ from Sultana *et al.* (2011). They reported the average birth weight was 1.56 and 1.60 kg for semi-intensive and intensive feeding system. Musa *et al.* (2005) found that the weaned approximately 3 months which is similar in the present study.

Birth weight and weaning period are affected by genetic, physiological, litter size, weight of ewe at parturition and environmental factors, with significant differences reported for sex (Valencia *et al.*, 1975; Reveron *et al.*, 1979, Combellas *et al.*, 1979).

The overall result of this study on litter size was 1.85±0.1 is almost similar to 1.74 by Held *et al.* (2005). But Demirel *et al.* (2004) reported that lamb number per mated was 1.09±0.43 of Norduz ewe but present finding is dissimilar. Lassoued and Rekik (2001) observed the litter size of Queue Fine de l'Ouest pure breed and their first cross with the D'Man were 1.07±0.26 and 1.26±0.44 respectively. Josefina de Combellas (1980) reported that the Mean values in improved production systems were 2.6 kg birth weight and 1.3 lambs per parturition. The variation of litter may be the following factors; viz. breed, generation, parity, age, body weight, better nutrition and environmental conditions, sample size and management. The present study showed that first heat after lambing 16.26±1.45 days in indigenous type of sheep which result agreed by Valencia *et al.* (1975).

An average lambing interval was found 263.0 days and 258.0 days for semi-intensive and intensive feeding system respectively by Sultana *et al.* (2011) but present result was found shorter (162±2.43 days). The average lambing interval of Kajli ewes was 331.0 days (Haque *et al.*, 1988). Considering 60 days as the optimum post lambing oestrus interval, conception of first service and 150 days as gestation length, the optimum lambing interval comes to be around 210 days. Minimizing lambing interval through selection of breed, age, parity and management followed in this study, sheep production in the country can be doubled in one and half year.

Conclusions

It was concluded that the Long ear breed and >6th parity group had shown excellent reproductive and productive performance under the conventional condition of sheep in Rajshahi region of Bangladesh. Finally, the present investigation was

recommended that there is large scope to establish the sheep farm at small scale at Rajshahi area specially.

Acknowledgements

The authors are thanks to the farmers of ewe to provide the information and allow visiting the farm. The authors are also grateful to UGC for their financial supports.

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