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EFFECT OF IMPROVED FEEDING ON REPRODUCTIVE PERFORMANCE OF SHEEP UNDER TRADITIONAL MANAGEMENT SYSTEM IN CHAR AREAS OF BANGLADESH

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ABSTRACT

The study was conducted to investigate the effect of improved feeding on reproductive performance of sheep under traditional management system in char areas (remote and riverine sand islands) of Sadar Upazilla under Kurigram District of Bangladesh. A total of 100 native sheep were selected for this study. The collected data were compiled, decoded and analyzed statistically. Sheep were initially five to six months of old where the average body weight of ewes and rams were 9.0 kg and 13.5 kg, respectively. Sheep were assigned randomly into two feeding system i.e. traditional feeding system and improved feeding system. In improved feeding system group, each sheep intake 250 g of ready concentrate feed in addition to grazing. The heated ewes were conceived by natural mating. For ensuring the natural mating, male and female ratio was maintained as 1:3 during the study period. The results showed that the age at first heat, services per conception, age at first lambing, post-partum heat period and lambing intervals were reduced significantly ($P<0.05$) by improved feeding compared to the traditional feeding system. But average gestation lengths were not significantly ($P>0.05$) differed between the groups of sheep. The lamb mortality was significantly ($P<0.05$) reduced in improved feeding system compared with the traditional feeding system. Therefore, the farmers of char areas in Kurigram District of Bangladesh may provide improved feeding to their sheep to achieve better performances.

Key wards: Native sheep, improved feeding system, productive and reproductive performance

INTRODUCTION

Bangladesh is an agricultural country where livestock is the second important component of agriculture. Livestock plays an important role in the national economy. Among the domestic animals, sheep play a significant role in the subsistence economy of Bangladesh. Sheep are multipurpose animals and important enterprise for providing meat, wool and skin. There are 2.78 million sheep (BBS 2008), of which 32% are reared in three ecological zones i.e. Barind, Jamuna basin and Coastal areas (Bhuiyan 2006) and rest 68% sparsely distributed all over the country. The large numbers of sheep are available in Rajshahi, Dinajpur, Bogra, Rangpur, Tangail Districts and in the delta region of Noakhali Districts (Rahman 1989; Hossain *et al*. 1997). About 9.4 thousand metric tons of meat was annually produced from sheep in Bangladesh (FAO 2007). Sheep population in Bangladesh was increased 2.5 times by the last twelve years, with annual growth rate of 5% (BBS 2008). Most of the sheep are indigenous with few crossbreds are capable of bi-annual lambing and multiple births (Bhuiyan 2006). Indigenous sheep is inferior to produce hides and wool (Mukherjee 2000).

About 98% sheep are reared by landless and marginal farmers of rural areas, char (remote, riverine sand islands) and coastal area as well as in plane land under zero input. The sheep are penned at night in animal houses and allowed to grazing on fallow lands, roads, canal sides (Sultana *et al.* 2010) and char area, and also graze on aquatic weeds and grass in knee-deep water almost without concentrate supplementation. No other domestic animals are capable of existing on such feed. It can nibble tiny blades of vegetation efficiently by their small muzzles and split upper lips compare to other animals (Banerjee, 1989). Their coat color is grey, with black or white patches, face, ear and feet are mostly light black and their wool is coarse with high medullation. Their average live weight is 15 to 25 kg (Mukherjee 2000). In Bangladesh sheep production is reputed due to their early maturity, high prolificacy, delicacy of meat, superior skin quality (than other sheep), extreme disease resistance and wide range of acceptability under adverse agro climatic condition (Devendra and Burns 1983). Moreover, sheep rearing may give a financial support to the jobless people. Indigenous sheep are resistant to diseases and parasites, good flocking instinct, ability to walk long distances in search of feed, high tolerance to adverse climatic conditions, endurance to droughts and to low and fluctuating nutrient availability (Kosgey *et al.* 2008). They are well adapted to hot-humid climatic condition of Bangladesh with poor nutrition. They require smaller investments, have shorter production cycles and greater environmental

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adaptability, and hence have a unique niche in small-holder agriculture. Their higher reproductive capacity and growth performance are ideally attractive for the smallholder farmers (Devendra 1999; Tibbo 2006).

Sheep were neglected in the past, but now a days Bangladesh government has been emphasizing the raising of sheep. Sheep can easily be maintained under rural conditions because of their ability to adapt with harsh environment, poor management and feeding practices. In Bangladesh, goat and sheep are mainly kept by the poor farmers and distressed women in extensive system under ranged condition without any concentrate supplementation. This system of production causes reduced growth rate and poor reproductive performance, which in turn results in severe economic losses. Concentrate supplementation reduces age of breeding and increases production (Mtenga and Kitalyi 1990). Dietary nutrients usually energy and protein are the major important factors affecting reproduction in sheep (Shahjalal *et al.* 1992). Growth performance can be exploited by the use of high-energy diet**.** Consequently, poor feeding regime affects the genetic potentiality of native sheep and breed improvement programs. In char areas, sheep are usually raised on only natural grass. Inadequate amount and poor quality feed resources are the main constraints for sheep production under the traditional feeding systems in char area of Bangladesh.

However, there was no study conducted whether improved diet can overcome the poor reproductive performance of native sheep in char areas. Therefore, the study was designed to evaluate the effect of improved diet on reproductive performances of sheep under traditional management conditions in char areas.

MATERIALS AND METHODS

The study was conducted in char areas of Sadar Upazilla under Kurigram District in Rangpur Division where sheep were available, data collection was easier for the researcher because most of the farmer were under The study was conducted under the project Pathways for Poverty (PFP) Bangladesh and UK-Aid and implemented by a local NGO named Own Village Advancement (OVA), sheep owners were being supported for five years (from April/2009 to March/2014) by the PFP shire project.

Sheep management and breeding system: A total of 100 native sheep were selected for this study. They were initially five to six months of old where the average body weight of ewes and rams were 9 and 13.5 kg, respectively. Heated ewes were conceived by natural mating. For ensuring the natural mating, male and female ratio was maintained as 1:3 during the study period. As a regular work, the physical checkup of each ram and pregnant ewes were done.

Feeding system: Experimental sheep were randomly divided into two feeding groups i.e. traditional feeding and improved feeding system. Their feeding and management were uniform throughout the year. During the study, the sheep of traditional feeding group were grazed in the char from morning up to afternoon for fulfilled their feed requirement. On the other hand, sheep of improved feeding group supplied concentrate feed @ 250 g/d/sheep additionally with grazing in char like traditional feeding system. Sheep had access to fresh *ad libitum* drinking water with iodized salt. The concentrate feed was formulated by Advance Chemical Industry - Godrej feed company is shown in Table 1.

Table 1. Chemical composition of concentrate feed:

General	**Specification**
Ingredients*	Corn Gluten Meal, Grains, Pluses, Essential Amino Acids, Vitamins, Minerals, Trace Minerals, Toxin
Ingredient Profile	100% Vegetarian
Moisture (% Maximum)	12
Calculated nutrient	***Amount (%)***
Crude protein	21
Crude fat	4 – 4.5
Crude fiber	9 – 10
Total digestible	64

Source: Advance Chemical Industry (ACI) - Godrej feed company, **Ingredients are specified but the amounts are not specified due to the secret policy of the company.*

Vaccination and medication: The sheep were treated with deworming tablets (Albendazole, 250 mg/10 kg body weight) in every four months, respectively. Stud rams were treated with Vitamin A, Vitamin D and Vitamin E_3 compound injection in every three months interval. All sheep were vaccinated against infectious disease like Peste Des Patits Ruminants (PPR) etc.

Data collection: Formatted data sheets were supplied to selected farmers and emphasized on importance of data recording and how to put data in data sheet. Sometimes, data were collected by farmer's group discussion and informal interview. The information age at first heat, service per pregnancy, pregnancy diagnosis, gestation period, litter size, age at first lambing, post partum heat period, lambing interval, lamb mortality etc. were recorded.

Statistical analysis: The data were analyzed and presented using simple statistical techniques. The raw data were decoded, entered and sorted accordingly using the MS Excel and transferred into SPSS software (version 16.0) for descriptive analysis, 5% level of significance (Steel *et al.* 1997). Analysis was mainly done as mean ± SEM.

RESULTS AND DISCUSSION

Age at first heat: Effect of improved feeding on the age at first heat is shown in Figure 1. The present result revealed that the average age at first heat of native ewes were 11 months in traditional feeding system and 8 months in improved feeding system. The age at first heat were significantly (P<0.05) reduced in improved feeding system compared to the traditional feeding system (Figure 1). The present findings were agreed with the result of Pervage *et al*. (2009), they observed that the age at first heat of Jamuna, Barind and Costal sheep were 333, 329 and 341 days, respectively. Hassan and Talukder (2011) found in comparative performance of different regional native sheep in Bangladesh that the age at first heat of Jamuna, Barind and Costal sheep were 239, 224 and 279 days, respectively. Tsedeke (2007) found that age at first heat of Ethiopian Adilo sheep is 12.7 months.

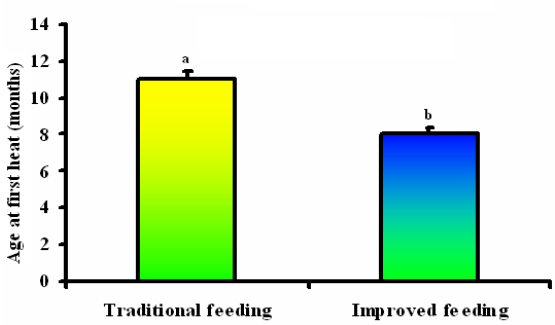

Figure 1. Effect of improved feeding on age at first heat of sheep. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant difference (p<0.05) between the groups.

Service per conception: Effect of improved feeding on service per conception is presented in Figure 2. The present result expressed the average value of service per conception of 1.5 times in traditional feeding system and 1.2 times in improved feeding system. The services per conception of native ewes were significantly (P<0.05) lower in improved feeding system than traditional feeding system (Figure 2). Pervage *et al.* (2009) observed that service per conception of Jamuna, Barind and Costal sheep were 1.47, 1.52 and 1.44 times, respectively. Sultana *et al.* (2011) systems were 1.6 times and 1.4 times, respectively. Hassan and Talukder (2011) found that the number of services per conception of Jamuna, Barind and Costal sheep were 1.3, 1.3 and 1.4 times, respectively. Proper sexual health control and take care of post lambing period may be improved the service per conception. This might have been occurred due to lack of caring during post lambing period and reproductive infection of ewes (Sultana *et al.* 2011).

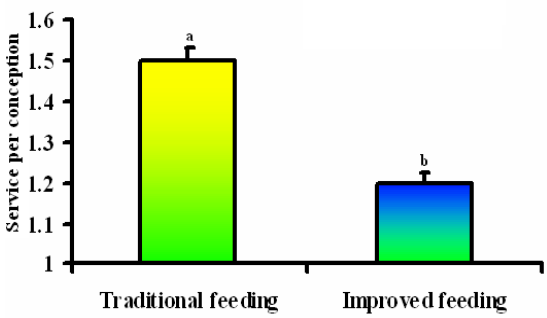

Figure 2. Effect of improved feeding on service per conception of sheep.

Gestation period: The average mean of gestation period of native sheep was 4.87 months infeeding system and 4.90 was in improved feeding system. The values showed no significant differences (P>0.05) between the groups of sheep reared under the two feeding systems (Figure 3). Husain and Amin (2003) reported that the gestation period of native sheep was 149 days. Rahman and Huq (1976) reported gestation length in native, native×Lohi grade I and native×Lohi grade II were 143, 149 and 134 days, respectively. Pervage *et al.* (2009) observed that the gestation period of Jamuna, Barind and Costal sheep were 151.5, 150.3 and 149.6 days, respectively. Sultana *et al.* (2011) recorded the gestation period of native sheep in intensive and semi intensive feeding system were 147.0 days and 146.0 days, respectively. Hassan and Talukder (2011) found that the gestation period of Jamuna, Barind and Costal sheep were 152.8, 145.0 and 146.6 days, respectively. Feeding systems are not known to have role in altering the gestation length of a species.

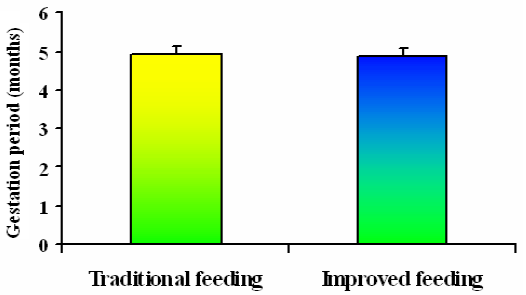

Figure 3. Effect of improved feeding on gestation period of sheep.

Age at first lambing: Effect of improved feeding on age at first lambing is shown in Figure 4. The present result shown the average age at first lambing of native sheep was 15 months in traditional feeding system and 13 months in improved feeding system. The age at first lambing of native sheep was significantly (P<0.05) reduced by improved feeding compared with traditional feeding system (Figure 4). Poonia (2008) found in

Munjal sheep in India that the mean of age at first lambing was 530 days. Hassan and Talukder (2011) found that the age at first lambing of Jamuna, Barind and Costal sheep were 410, 390 and 440 days, respectively. Pervage *et al*. (2009) observed that the age at first lambing of Jamuna, Barind and Costal sheep were 492, 489 and 500 days, respectively. Tsedeke (2007) found that age at first lambing of Ethiopian Adilo sheep was 17.9 months.

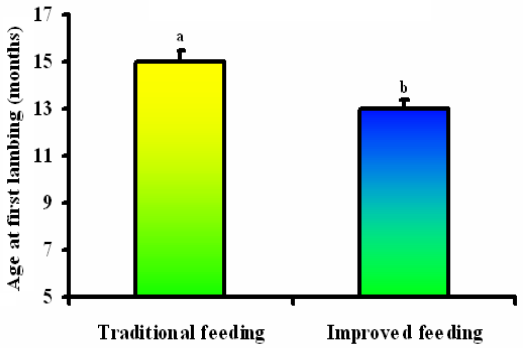

Figure 4. Effect of improved feeding on age at first lambing of sheep.

***Litter size*:** Effect of improved feeding on litter size of native sheep is represented in Figure 5. The present result showed the average value of litter size 1.7 in traditional feeding system and 1.8 in improved feeding system. The values of litter size have no significant difference (P>0.05) between the groups of sheep reared under the two feeding systems (Figure 5). Average litter size of Garole×Deccani sheep was 1.6 (Nimbkar *et al.* 2002). Pervage *et al*. (2009) observed that the litter size of Jamuna, Barind and Costal sheep were 1.7, 1.6 and 1.6, respectively. Hassan and Talukder (2011) also found that the litter size of Jamuna, Barind and Costal sheep were 1.8, 1.7 and 1.6 respectively. Sultana *et al.* (2011) recorded the litter size of native sheep in semi intensive and intensive feeding systems were 1.5 and 1.7 respectively. Another study noted average litter size of Garole sheep was 1.7 (Sharma *et al.* 1999). Singh and Bohra (1996) found litter size at first lambing in Garole was 2.0. Litter size is

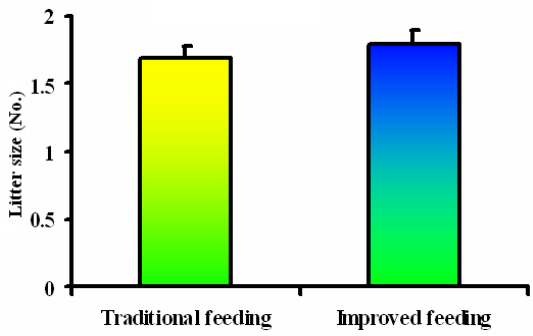

Figure 5. Effect of improved feeding on litter size of sheep.

significantly affected by year of lambing, parity and weight of ewes at mating (Abegaz *et al.* 2002; Gemeda *et al*. 2002; Berhanu and Aynalem 2009).

Post partum heat period: Effect of improved feeding on post partum heat period of native sheep is shown in Figure 6. The present result expressed the average value of post partum heat period was 64.5 days in traditional feeding system and 35.2 days in improved feeding system. Post partum heat period of native ewes is significantly (P<0.05) lower in improved feeding system than traditional feeding system (Figure 6). Pervage *et al*. (2009) observed that the post partum heat period of Jamuna, Barind and Costal sheep were 39, 41 and 43 days, respectively. Hassan and Talukder (2011) found that the post partum heat period were lower (31, 32 and 38 days, respectively) in the same types of sheep. But Sultana *et al*. (2011) recorded higher post partum heat period of native sheep in intensive and semi-intensive feeding system 104 and 102 days, respectively. This present result is much lower than other findings. Khan *et al.* (2000) reported that average post partum heat period was 250 days. Sinha *et al.* (1979) found average post partum heat period was 212 and 202 days in Muzaffarnagri and Suffolk×Muzaffarnagri ewes, respectively.

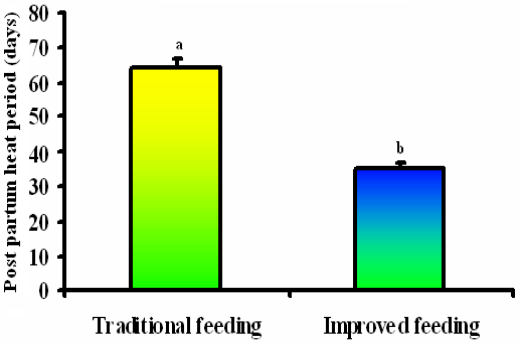

Figure 6. Effect of improved feeding on Post partum heat (Days) of sheep.

Lambing interval: Effect of improved feeding on lambing interval of native sheep is demonstrated in Figure 7. The present result showed the average value of lambing interval was 226 days in traditional feeding system and 191 days in improved feeding system. The lambing intervals of native ewes were significantly (P<0.05) reduced in improved feeding system compared to the traditional feeding system (Figure7). Poonia (2008) found in Munjal sheep in India that the mean lambing interval was 248 days. Pervage *et al*. (2009) observed the lambing interval of Jamuna, Barind and Costal sheep were 221, 229 and 214 days, respectively. Hassan and Talukder (2011) found the lower period of lambing interval in the Jamuna, Barind and Costal sheep (189, 190 and 204 days, respectively). Sultana *et al.* (2011) recorded the lambing interval of native sheep in intensive and semi intensive feeding system were 258 and 263 days, respectively. Kishore *et al.*

(1982) observed the average lambing interval was on different genotypes where found longer intervals of 451 and 422 days for ¾ Ramboullet×¼ Chokla and ¾ Rambouillet×¼ Malpura ewes, respectively. The average lambing interval of Kajli ewes was 331.0 days (Haque *et al.* 1988). Minimizing lambing interval through dietary intervention and management followed in this study, sheep production in the country can be doubled in one and half year.

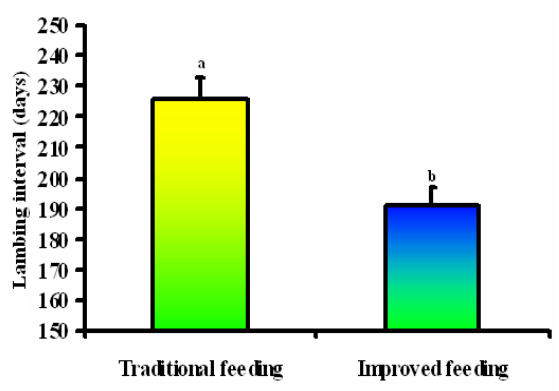

Figure 7. Effect of improved feeding on lambing interval (Days) of sheep.

Lamb mortality: Effect of improved feeding on lamb mortality of native sheep is shown in Figure 8. The present result expressed the average value of lamb mortality was 08% in traditional feeding system and 2% in improved feeding system. The lamb mortality of native ewes is significantly ($P<0.05$) lower in improved feeding system compared to the traditional feeding system (Figure 8). Sultana *et al.* (2011) recorded the lamb mortality of native sheep higher in semi intensive feeding system was 7.6%.

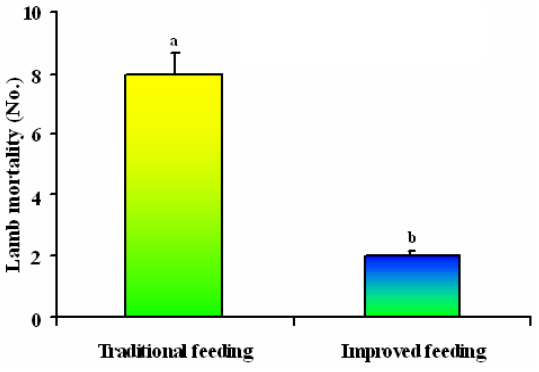

Figure 8. Effect of improved feeding on lamb mortality of sheep.

CONCLUSION

The productive and reproductive performances of sheep were higher in improved feeding system compared with traditional feeding system. Therefore, the farmers of char areas in Kurigram District of Bangladesh may provide improved feeding to their sheep to achieve better performances.

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REFERENCES

Abegaz S, Negussie E, Duguma G and Rege JEO. 2002. Genetic parameter estimates for growth traits in Horro sheep. Journal of Animal Breeding and Genetics119: 35 – 45.

Banerjee GC. 1989: A Text book of Animal Husbandry. 6th edn. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi, India.

BBS 2008. Bangladesh Bureau of Statistics. Planning division, Ministry of Planning. Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.

Berhanu B and Aynalem H. 2009. Factors affecting growth performance of sheep under village management conditions in the south western part of Ethiopia. Livestock Research for Rural Development 21 (11): 1 – 11.

Bhuiyan AKFH. 2006. Livestock genetic resources in Bangladesh: Preservation and management. International conference on livestock services, Chinese Academy of Agricultural Science (CAAS), Beijing, China, April 16 – 20.

Devendra C and Burns M. 1983. Goat production in the tropics. Commonwealth agricultural bureax, Farnham House, Farham Royal, Slough, SL2 3BN, United Kingdoms.

Devendra C. 1999. Goats: challenges for increased productivity and improved livelihoods. Outlook on Agriculture. 28 (4): 215 – 226.

FAO 2007. Food and Agriculture Organization of the United Nations Production Year Book, Rome, Italy, 58.

Gemeda D, Schoeman SJ, Cloete SWP and Jordan GF. 2002. The influence of nongenetic factors on early growth traits in the Tygerhoek Merino lambs. Ethiopian Journal of Animal Production 2(1): 127 – 141.

Haque A, Ali CS, Ahmad N, Samad HA and Qureshi ZI. 1988. Studies on the reproductive efficiency in Kajli sheep. Sarhad Journal of Agriculture 4: 241 – 247.

Hassan MR and Talukder MAI. 2011. Comparative performance of different regional native

sheep in Bangladesh. The Bangladesh Veterinarian 28(2): 85 – 94.

Hossain MM, Hashem MA and Hossain MS. 1997. Relationship of carcass and non-carcass parameters with live weight of sheep. Bangladesh Journal of Animal Science 26: 39 – 44.

Husain SS and Amin MR. 2003. Genetic resource conservation and utilization: participatory maintenance of animal Genetics resource at rural level in Bangladesh. Paper presented Genetic resource conservation, Bangladesh Livestock Research Institute, Savar Dhaka, Bangladesh.

Khan MD, Ahamad N, Samad HA and Rehman NU. 2000. Reproductive efficiency of Rambouillet X Kaghani cross bred sheep. International Journal of Agriculture and Biology 2: 278 – 281.

Kishore K, Gour D, Rawat PS and Malik RC. 1982. Note on some reproductive traits in three quarter bred strain of sheep. The Indian Journal of Animal Sciences 52: 1108–1110.

Kosgey IS, Rowlands GJ, van Arendonk JAM and Baker RL. 2008. Small ruminant production in smallholder and pastoral/extensive farming systems in Kenya. Small Ruminant Research 77:11 – 24, Nairobi Kenya.

Mtenga LA and Kitalyi AJ. 1990. Performance and carcass composition of Tanzania goats fed Chloris gayana hay with supplements containing different levels of protein. Small Ruminant Research 3: 1 – 8.

Mukherjee TK. 2000. Final Consultancy Report on Goat and Sheep Production. Agriculture Research Management Project (BLRI Part) IDA, Credit No. 2815 BD, Bangladesh Livestock Research Institute, Savar Dhaka-1341, Bangladesh.

Nimbkar C, Ghalsasi PM, Walkden-Brown SW and Kahn LP. 2002. Breeding program for the genetic improvement of Deccani sheep of Maharashtra, India. 7th World congress of genetics applied to livestock production, Montpellier, France. August 19 – 23.

Pervage S, Ershaduzzaman M, Talukder MAI, Hasan MN and Khandoker MAMY. 2009. Phenotypic characteristics of indigenous sheep of Bangladesh. Bangladesh Journal of Animal Science 38(1&2): 1 – 6.

Poonia JS. 2008. Reproductive performance of Munjal sheep. The Indian Journal of Small Ruminants 14: 121 – 123.

Rahman MM and Huq MA. 1976. A comparative study of gestation period, prolificacy and lambing interval of native and upgraded Lohi sheep. Bangladesh Veterinary Journal 10: 31 – 35.

Rahman, M. M. 1989. Sheep production and development in Bangladesh. Proceeding of the workshop on sheep production in Asia. PCARRD. Los Banos. Philippines. pp. 81–95.

Shahjalal MD, Galbraith H and Topps JH. 1992. The effect of changes in dietary protein and energy on growth, body composition and Mohair fibre characteristics of British Angora goats. Animal Production 54: 405 – 412.

Sharma RC, Arora AL, Narula HK and Singh RN 1999. Characteristics of Garole sheep in India, Animal Genetic Resources Information 26: 57 – 64.

Singh RN and Bohra SDJ. 1996. Garole Sheep: A profile (Bengal breed of sheep locally known as Garole). The Indian Journal of Small Ruminants 2: 38 – 43.

Sinha NK, Joshi JD and Sahni KL. 1979. Note on the occurrence of puberty and sexual maturity in native and crossbred sheep reared under confinement. The Indian Journal of Animal Sciences 49: 1096–1098.

Steel RGD, Torrie JH and Dickey D.1997. Principles and Procedure of Statistics. A Biometrical Approach 3rd Ed. McGraw Hill BookCo. Inc., New York. pp. 352 – 358.

Sultana N, Hossain SMJ, Chowdhury SA, Hassan MR and Ershaduzzaman M. 2010. Effects of age on intake, growth, and nutrient utilization and carcass characteristics of castrated native sheep. The Bangladesh Veterinarian 27: 62 – 73.

Sultana N, MN Hasan, A Iqbal, Ershaduzzaman M, MAI Talukdar and S Dey 2011. Effect of intensive and semi-intensive feeding system on productive and reproductive performances of native sheep. J. Sci. Res. 3 (3): 693 –698.

Tibbo M. 2006. Productivity and health of indigenous sheep breeds and crossbreds in the central Ethiopian highlands. Faculty of Medicine and Animal Science Department of Animal Breeding and Genetics. Ph.D. dissertation. Swedish University of Agricultural Sciences, Uppsala, Sweden. pp 11 – 63.

Tsedeke K. 2007. Production and marketing of sheep and goats in Alaba, SNNPR. Msc thesis, Hawassa University. Hawassa, Ethiopia.