

Comparative performance of different regional native sheep in Bangladesh

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Abstract

This study was undertaken to investigate the performance of native sheep in Bangladesh. Data were collected during 2004-2010 from sheep of the Barind, Jamuna and Coastal areas. The phenotypic characteristics did not differ significantly, but ears were shorter in Barind than in Jamuna and Coastal sheep. The coat colour was 45% white, 26% brown, 24% white brown and 3% black brown in Barind and Jamuna sheep, but white (70%) and white brown (30%) in Coastal sheep. Differences were not significant for age at first heat, age at first pregnancy and age at first lambing. Days open and post-partum ewe weight were significantly ($P<0.01$) different. Onset of post-partum heat, lambing interval, gestation length, number of services per pregnancy, litter size and placental weight did not differ significantly. Birth weight was significantly ($P<0.05$) higher in Coastal sheep than in Barind and Jamuna. Higher ($P<0.05$) wool yield was obtained in Coastal sheep and in the summer. Though the wool was coarse and hairy, wool from Coastal sheep had more ($P<0.05$) bends per inch, and was finer. Diarrhoea, pneumonia in lambs and skin diseases were the most common diseases in all sheep. Though sheep from the different areas had similar performance, better reproductive performance was obtained in the Barind sheep. (*Bangl. vet.* 2011. Vol. 28, No. 2, 85 – 94)

Introduction

Sheep are important in Bangladesh, providing meat and wool. During the last twelve Years sheep population increased 2.5 times, with annual growth rate of 5% (BBS, 2008). There are 2.7 million sheep (BBS, 2008), of which 32% are reared in three ecological zones. Barind, Jamuna basin and Coastal areas. Most of the sheep are indigenous, with few crossbreds (Bhuiyan, 2006) and are capable of bi-annual lambing and multiple births. The fecundity gene (Booroola) in Australian Merino may be derived from this Bengal line (Piper and Bindon, 1996). Native sheep (*Ovis aries*) might have originated from the wild Urial (*Ovis orientalis vignei*) of Asia.

Under traditional feeding systems, the sheep are raised on harvested or fallow lands, roads, and canal sides (Sultana *et al.*, 2010) and also graze on aquatic weeds and grass in knee-deep water.

No other domestic animals are capable of existing on such feed. With their small

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muzzles and split upper lips they can nibble tiny blades of vegetation, which cannot be eaten by bigger animals (Banerjee, 1989). They average 15 to 25 kg live weight (Mukherjee, 2000) and are adapted to hot humid climate. Their body is grey, with black or white patches, and the face, ear and feet are mostly light black. Wool is coarse with high medullation. Sheep are tolerant to disease in the humid and sub-humid tropics. These animals were neglected in the past, therefore there is limited information regarding the potential of native sheep. But the Bangladesh government is emphasising the raising of sheep. The present study was undertaken to determine the phenotypic characteristics, reproductive performance, growth and wool production of sheep in different areas of Bangladesh.

Methods and Materials

Sheep were purchased in 2003 from three areas of Bangladesh, Barind (Naogaon, Rajshahi, Chapi Nababganj), Jamuna river basin (mostly in Tangail) and Coastal (Noakhali) areas, and reared in the Goats and Sheep production research farm, Bangladesh Livestock Research Institute, Dhaka, Bangladesh. The breeding programme was designed so that the purity of animals from a particular area was maintained. Animals were housed in slatted floor permanent houses. Rams were kept separately from ewes to avoid unplanned mating. Animals were allowed to graze for 6-7 hours except during rain and supplemented with concentrate (17% CP, 11 MJ/kg DM) 200g/ animal/day and seasonally available green and dry fodder. Ewes were kept in lambing pens under close observation for three to four days prior to the expected date of parturition. At lambing, lambs and ewes were weighed, and the lambing date, sex and parity of each lamb were recorded. Wool was sheared both summer and winter and yield was measured by digital platform balance (Kern, Germany). The wool was sorted, graded and cleaned. Staple length was measured. The wool fibres were observed and counted with the help of a projection microscope at 500-power magnification. Disease was recorded daily on the basis of clinical signs and laboratory examinations, and causes of mortality were observed by clinical signs, post-mortem examination and laboratory tests. Necessary treatments were given against specific diseases according to the suggestion of the veterinary surgeons. Treatments were provided regularly against internal and external parasites. All animals were dipped in 0.1% malathion solution monthly. Sheep with ill health, stunted growth, repeat breeding, or severe skin diseases were culled.

Phenotypic characteristics studied were body length, heart girth, wither height, hip height, head length and breadth, ear length, udder length and breadth, testis length, teat length and breadth, tail length and breadth, body depth and body weight and nose length. Reproductive traits were age at first heat (AFH), age at first pregnancy (AFP), age at first lambing (AFL), onset of post-partum heat (OPPH), days open (DO: number of days between lambing to conception), lambing interval (LI), gestation length (GL), number of services per pregnancy (NSP), litter size (LS), post-partum ewe weight (PEW) and birth weight of lamb (BWL).

Statistical analysis

The statistical analysis of the data was performed using general linear model procedure of SPSS 11.5 software program. The differences between treatment means were examined using least significant difference (LSD).

The data on reproductive traits were analysed using the statistical model

$$Y_{ijkl} = \mu + Y_i + G_j + L_k + (G \times L)_{jk} + e_{ijkl}$$

where, Y_{ijkl} = an observed reproductive trait,

μ = the overall mean,

Y_i = effect of the year of birth ($i = 2004 - 2010$),

G_j = effect of location of sheep ($j =$ Jumuna, Barind and Coastal area),

L_k = effect of the lactation number; ($k = 1 - 3$),

$(G \times L)_{jk}$ = effect of interaction between j -th location and k -th lactation number,

e_{ijkl} = random error, assumed to be normally distributed with mean zero and common variance.

Results and Discussion*Phenotypic characteristics*

The phenotypic characteristics are in Table 1. The coat colour was 45% white, 26% brown, 24% white-brown and 3% black-brown. The differences between areas were not significant, except ears were significantly ($P < 0.05$) shorter in Barind than Jamuna and Coastal areas. Gopal and Prasad (2007) stated that the overall least square means for body length, height at withers, chest girth and tail lengths were 82.9, 83.9, 85.1 and 53.3 cm in adult Muzaffarnagari sheep in India, which is higher than the present findings.

Reproductive characteristics

The reproductive characteristics are in Tables 2 and 3. The differences in reproductive characteristics were non-significant between areas except days open, post partum ewe weight and birth weight of lamb.

Age at first heat, pregnancy and lambing

Ages at first heat, first pregnancy and lambing did not differ significantly between areas (Table 2). Barind sheep matured earliest, but this difference was not significant.

Onset of post-partum heat, days open and lambing interval

Onset of post-partum heat and placenta weight did not differ significantly between areas (Table 3). Post-partum heat occurred later (37.5 days) in Coastal but earlier (30.5 days) in Jamuna areas. Though the lambing interval did not differ

significantly, days open was significantly ($P<0.05$) higher in Coastal than the other two areas. Consequently, post-partum weight of ewes was remarkably ($P<0.05$) higher in Coastal and Barind than Jamuna areas, maybe due to the body size. Poonia (2008) found in Munjal sheep in India that the mean age at first lambing, weight at first lambing and lambing interval were 530.5 ± 12.4 days, 35.4 ± 0.6 kg and 247.7 ± 4.9 days, respectively, higher than the present findings.

Table 1. Phenotypic characteristics of native sheep

Parameters (cm)	Region			SED	Level of significance
	Jamuna river basin	Barind	Coastal		
Body length	41.5	43.4	45.9	1.9	NS
Heart girth	62.7	61.5	64.9	1.0	NS
Weather height	51.7	52.9	53.5	0.7	NS
Hip height	51.9	52.5	52.9	0.3	NS
Head length	16.0	16.1	16.3	0.3	NS
Head breath	7.7	7.4	7.8	0.2	NS
Ear length	8.4 ^a	3.2 ^b	8.4 ^a	3.7	$P<0.05$
Udder length	6.8	6.8	6.9	0.4	NS
Udder breath	7.1	7.0	7.1	0.5	NS
Testis length	10.7	11.0	10.7	0.1	NS
Tail length	12.0	11.5	12.0	0.2	NS
Tail breath	4.2	4.3	4.21	0.2	NS
Body weight (kg)	41.2	40.6	41.6	1.0	NS
Body depth	3.0	3.0	3.1	0.4	NS
Nose	17.0	16.9	17.8	0.2	NS

NS Not significant; ^a, ^b, ^c Mean values having different superscripts in a row differ significantly ($P<0.05$)

Table 2. Reproductive traits of ewes from three different areas

Parameters (day)	Region			Level of significance
	Jumuna	Barind	Coastal	
Age at first heat (AFH)	239.9 ± 35.5	224.4 ± 24.3	279.0 ± 50.3	NS
Age at first pregnancy (AFP)	277.0 ± 104.9	264.7 ± 49.4	292.3 ± 47.5	NS
Age at first lambing (AFL)	409.8 ± 75.0	389.9 ± 43.0	439.5 ± 58.3	NS

Gestation length and number of service per pregnancy

Gestation length and number of services per pregnancy did not differ significantly between areas (Table 3). Gestation was longer in Jamuna sheep. Coastal

sheep required more services (1.4) for successful pregnancy. Husain and Amin (2003) reported that the gestation period of Native sheep was 149.0 days. Rahman and Huq (1976) reported gestation length in Native, Native × Lohi grade I and Native × Lohi grade II was 143.2 ± 5.5 , 149.2 ± 5.8 and 134.2 ± 5.3 days, respectively.

Litter size

Litter size did not differ significantly among the three areas (Table 3) but was higher in Jamuna area. Nimbkar *et al.* (2002) found that the average litter size of Garole × Deccani sheep was 1.6, which agrees with the present findings. Bhuiyan and Curran (1991) reported that litter size of Romney marsh ewes differed with age and year. Rahman and Huq (1976) found in Native ewes 48% single and 52% multiple births. Sharma *et al.* (1999) noted average litter size of Garole was 1.7 with 40% single, 53% twins, 5% triplets and 1.7% quadruplets. However, Bose *et al.* (1999) recorded litter size in Garole as 1.7 with percentage of single, twin, triplet and quadruplet is 42, 43, 15 and 0.2, respectively. According to Pan *et al.* (2004) average lambing frequency was 1.6 - 1.9, but Singh and Bohra (1996) found litter size at first lambing in Garole was 2 and at subsequent lambing 2.3. Banerjee (2008) reported litter size of 1.9 in native Bengal Garole.

Table 3. Reproductive traits of different type's of ewe

Parameters	Region			Level of sig.
	Jamuna	Barind	Coastal	
Onset of post-partum heat (OPPH; day)	30.5 ± 3.9	32.0 ± 4.1	37.5 ± 4.0	NS
Days open (DO; day)	33.6 ± 6.0^b	36.6 ± 6.8^b	58.0 ± 7.8^a	P<0.05
Lambing interval (LI; days)	188.6 ± 6.0	189.5 ± 5.5	204.3 ± 7.7	NS
Gestation length (GL; days)	152.8 ± 3.8	145.0 ± 4.1	146.6 ± 5.4	NS
Number of services/pregnancy (NSP)	1.3 ± 0.1	1.3 ± 0.1	1.4 ± 0.1	NS
Litter size (LS)	1.8 ± 0.1	1.7 ± 0.1	1.6 ± 0.2	NS
Post-partum ewe weight (PEW; kg)	17.8 ± 0.4^b	19.2 ± 0.4^a	19.6 ± 0.6^a	P<0.01
Placenta weight (PW; gm)	355.5 ± 14.1	335.9 ± 15.5	331.0 ± 18.6	NS

NS Not significant; P<0.01 Significant at 1% level of probability; ^{a, b, c} Mean values having different superscripts in a row differ significantly (P<0.05)

Lambing interval

Lambing interval did not differ significantly between areas, being 188.6, 189.5 and 204.3 days in Jamuna, Barind and Coastal sheep, which indicates that three lambings in two years are attainable. Husain and Amin (2003) reported that lambing interval of native sheep was 253.0 days. 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. Poonia (2008) found that the lambing interval was 247.7 ± 4.9 days, also higher than the present findings. Rahman and Huq (1976) reported the lambing

interval of Native sheep, Native x Lohi grade I, and Native x Lohi grade II was 253.9 ± 82.6 days, 294.1 ± 92.7 and 484.6 ± 53.8 days.

Lamb birth weight

Lamb birth weight differed significantly ($P < 0.05$) between areas (Table 4). Irrespective of sex, lamb birth weight was significantly ($P < 0.05$) higher in Coastal area followed by Barind and Jamuna areas. Sani *et al.* (1999) found that male sheep had slightly higher body weight than female sheep of same ages. Husain and Amin (2003) reported that birth weight of native sheep was 1.2 kg.

Table 4. Birth weight (kg) of native sheep according to sex

Litter size	Sex	Birth weight (kg)			Level of significant
		Jumuna river basin	Barind	Coastal	
Single	Male	1.5 ± 0.1^b	1.4 ± 0.0^b	1.9 ± 0.0^a	$P < 0.05$
	Female	1.1 ± 0.2^b	1.0 ± 0.0^b	1.4 ± 0.0^a	$P < 0.05$
Twin	Male	1.2 ± 0.1^c	1.5 ± 0.0^b	1.6 ± 0.1^a	$P < 0.05$
	Female	1.2 ± 0.1^b	1.4 ± 0.0^b	1.5 ± 0.3^a	$P < 0.05$
Triplet	Male	1.3 ± 0.1	1.4 ± 0.1	1.3 ± 0.0	NS
	Female	1.3 ± 0.1^b	1.2 ± 0.1^b	1.5 ± 0.0^a	$P < 0.05$

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

Wool yield

The average wool production per cutting and the annual wool production of native sheep was significantly ($P < 0.05$) higher in Coastal than Barind and Jamuna areas. Wool production was higher in the summer than in winter (Table 5). Thus, the Coastal sheep had higher body weight and wool production. In India, Khan *et al.* (2003) found that wool production was 1.3 kg/year in Tirahi breed of sheep, higher than the present findings.

Table 5. Wool production of native sheep from different areas

Season	Wool yield (gm)			Level of significance
	Jamuna region	Barind region	Coastal region	
Summer (April)	$415.4^b \pm 8.9$	$440.0^a \pm 14.1$	$463.6^a \pm 16.0$	$P < 0.05$
Autumn (November)	$318.3^b \pm 63.4$	$410.7^a \pm 60.3$	$388.5^a \pm 50.2$	$P < 0.05$
Yearly total	$733.6^c \pm 36.1$	$810.7^b \pm 10.2$	$852.9^a \pm 33.1$	$P < 0.05$

^{a, b, c} Mean values having different superscripts in a row differ significantly ($P < 0.05$)

The wool quality parameters of native sheep are shown in Table 6. The staple length of native sheep did not differ significantly between areas. The number of

crimps per inch was significantly ($P<0.05$) higher in Coastal than Jamuna and Barind areas. Though the major proportion of wool was hairy in all sheep, a significantly ($P<0.05$) higher proportion of fine wool was in the Coastal sheep. This may be due to crossing of Coastal sheep with other exotic breed.

Bose *et al.* (1999) showed that wool of Garole was extremely coarse, hairy and not very dense. Sharma *et al.* (1999) observed average annual adult wool yield from Garole sheep procured from Sundarban area was 179g and was for rough carpet use. Singh and Bohra (1996) reported that average wool yield was 150g per shearing, lower than the present findings, which may be due to the body size. Prasad (1997) reported average annual production of wool per sheep was around 300g and average fibre diameter, medullation, staple length and crimp/cm of Garole sheep were 67.8μ , 75.5%, 5.1 cm and 2.1, respectively. On the other hand, Pan and Sahoo (2003) and Pan *et al.* (2004) recorded that Garole could produce approximately 400g greasy fleece annually and fibre diameter, medullation and fibre length were 53μ , 79% and 5 cm, respectively.

Table 6. Wool quality parameters from different region

Parameter	Jamuna	Barind	Coastal	Significance
Staple length (cm)	7.21 ± 1.12	7.26 ± 2.12	7.95 ± 1.25	NS
Crimp (bend/inch)	$2.34^b \pm 0.33$	$2.35^b \pm 0.18$	$2.75^a \pm 0.45$	$P<0.05$
Wool (%)				
Fine	$15.31^b \pm 4.32$	$16.32^b \pm 5.40$	$19.60^a \pm 4.30$	$P<0.05$
Hetero	8.17 ± 3.19	7.35 ± 3.11	10.27 ± 6.45	NS
Hairy	$76.52^b \pm 7.37$	$76.33^b \pm 9.14$	$70.13^a \pm 8.29$	$P<0.05$

^{a, b} Mean value with different superscripts within rows differ significantly at $P<0.05$

Diseases and mortality

The average lamb mortality of Native sheep was 12.4%, 7.0% in July - October, 17.6% in November - February and 12.5% in March - May. In India, Nimbkar *et al.* (2002) in Garole sheep found that the average lamb mortality was 13.8%, similar to the present findings. Diarrhoea, respiratory disorder, bloat, lice and skin disease were the most common diseases (Table 7). From birth to puberty, diarrhoea and pneumonia were the most common problems in all areas. In adult sheep, incidence of parasitic infestation was higher in Coastal than in Barind and Jamuna areas. On the other hand, highest alopecia (14.2%) was in Coastal but conjunctivitis was more common in Barind (7.5%) areas. The incidence of other diseases was similar in all areas.

Hoque and Mollah (1972) found that native sheep commonly suffer from lice infestation. Nooruddin *et al.* (1988) found lice infestation in 58% of sheep, dirty fleece in 18%, psoroptic mange and mycotic dermatitis in 12%, and other skin diseases in 11%. Sheep were not affected by *peste des petits ruminants*. Most of the diseases occurred in the rainy season and lambs were mostly affected. Garole sheep are

considerably more resistant to the roundworm *Haemonchus contortus* as well as to typical liver fluke (Nimbkar *et al.*, 2002). Banerjee (2008) mentioned that Garole sheep are resistant to internal parasites, liver fluke and bacterial and viral diseases. Pan *et al.* (2004) recorded no trematode infection in Garole sheep. The incidence of gastrointestinal tract infection was 55%, and that of abortion, repeat breeding, placental retention and post-partum mortality was 7.8, 9.3, 2.6 and 14.1%, respectively.

Table 7. Incidence of sheep diseases in different areas

Name of the disease	Region		
	Jumuna river basin	Barind	Coastal
Diarrhoea	23.1	15.5	13.7
Pneumonia in lamb	15.4	16.4	13.1
Shortage of mother milk and weakness in lamb	21.5	14.2	13.2
Parasitic disease	17.4	18.2	23.2
Alopecia	11.2	8.4	14.2
Bloat	1.9	5.7	6.2
Conjunctivitis	3.5	7.5	6.8
Urolithiasis	3.2	4.1	3.6
Enterotoxaemia	1.2	2.9	1.7
Tetanus	1.4	0.6	-
Obstetrical diseases	0.9	1.3	1.7
Sub-clinical mastitis	3.4	3.2	3.0
Udder problem	2.7	1.4	2.5
Pregnancy toxemia	0.2	-	-
Foot rot	-	0.6	-
Unknown diseases	2.4	-	1.1

Conclusions

In conclusion, native sheep from three different areas showed similar performance. Highest birth weight and wool production was in Coastal sheep but better reproductive performance was in Barind sheep.

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