

Published with Open Access at **Journal BiNET**

Vol. 11, Issue 02: 947-954

**Journal of Bioscience and Agriculture Research**Journal Home: [www.journalbinet.com/jbar-journal.html](http://www.journalbinet.com/jbar-journal.html)

## Morphology, morphometry and reproductive characteristics of indigenous horses in Bangladesh

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### ABSTRACT

The study was conducted in four districts of Bangladesh to investigate the morphology, morphometry and reproductive characteristics of indigenous horses. Morphology, morphometry and reproductive traits were individually measured on male and female horses of different age groups. Chestnut (42%) was the predominant coat color. Effects of age group were significant ( $p < 0.05$ ) in stallion only on head length and buttock height whereas significantly higher body weight ( $p < 0.01$ ), body length ( $p < 0.01$ ), chest girth ( $p < 0.05$ ), wither height ( $p < 0.01$ ), back height ( $p < 0.01$ ), croup height ( $p < 0.05$ ), croup depth ( $p < 0.05$ ) and scapula length ( $p < 0.05$ ) in different age groups of mares were observed. Age at first heat, age at first conception, age at first foaling, foaling interval and gestation period of mares were respectively  $1.95 \pm 0.07$ ,  $2.15 \pm 0.06$ ,  $3.15 \pm 0.06$ ,  $1.16 \pm 0.01$  years and  $11.44 \pm 0.09$  months. These data would provide basic information required for designing any program aiming at conservation and sustainable use of indigenous horses of the country.

**Key Words:** Indigenous horses, Morphology, Morphometry and Reproductive traits

**Cite article:** Alam, M. P., Bhuiyan, M. S. A. & Bhuiyan, A. K. F. H. (2016). Morphology, morphometry and reproductive characteristics of indigenous horses in Bangladesh. *Journal of Bioscience and Agriculture Research*, 11(02), 947-954.



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### I. Introduction

Livestock in Bangladesh is one of the major components of agriculture, which is important in establishing the status of the farmer in a society. Contribution of livestock in total GDP is 1.78% and in agriculture 12.64% (Bangladesh Economic Review, 2014). Among livestock, horse (*Equus caballus*), a non-ruminant equine species, has played significant role in the human civilization especially in developed countries (Alam, 2014). One previous report mentioned that Bangladeshi horse genetic resources are of non descriptive indigenous type but they have been influenced genetically by Arabian and Persian horses which have been through India from the west (Nozawa et al., 1984). In Bangladesh, people don't eat meat and milk of horses but horse is widely used in racing, transportation, pulling cart, draft and social festival purposes in horse pocket areas where one horse support one family (Alam, 2014). According to Alam et al. (2015) among horse keepers in rural villages 88% people were

directly involved on horse pulling cart as a main occupation in which they could earn from TK 3,000 to TK 20,000 per months. For sustainable use of genetic resources characterization of breed is a first step in which almost no investigation has yet been carried out to characterize or to evaluate the performance of horse genetic resources. The study was conducted to measure morphology, morphometric and reproductive parameters, horse management evaluation and to analyze the socio-economic status of the available horse genetic resources in Bangladesh.

## II. Materials and Methods

**Experimental sites and animal:** The study was conducted at randomly selected 20 villages of four districts in which all horses were indigenous type (Table 01). Villages were selected according to the information on the availability of horses and their use in these areas.

**Table 01. Location information.**

Districts	Upazila	Village	Sample size (N)	GPS Location
Mymensingh	Sadar	Rogurampur	10	N=24.77, E=090.46
		Charshamrampu	10	N=24.82, E=090.31
		Bororchor	10	N=24.87, E=090.29
		Bonpara	10	N=25.22, E=090.03
	Muktagachha	Komolapur	10	N=24.63, E=090.15
Tangail	Modupur	Orunkhola	10	N=24.52, E=090.05
		Vutia	10	N=24.69, E=090.07
		Sholakori	10	N=24.75, E=090.07
		Haguraguri	10	N=24.74, E=090.06
		Shirichala	10	N=24.76, E=090.05
		Sonkhola	10	N=24.72, E=090.44
	Ghatail	Kutubpur	10	N=24.41, E=090.16
		Shalika	10	N=24.041, E=090.16
	Sakhipur	Sripur	10	N=24.42, E=090.15
Sherpur	Jenaighati	Dudhnoi	10	N=24.83, E=089.98
		Panbor	10	N=25.22, E=090.01
		Bakakura	10	N=25.22, E=090.01
Jamalpur	Sadar	Khetipara	10	N=24.70, E=090.06
		Rashidpur	10	N=24.74, E=089.97
		Nawapara	10	N=24.74, E=089.99

**Data collection:** Data on morphology, morphometry and reproductive traits of individual horses were collected from 200 horse-owning households. The observed morphological traits of horse were coat color, skin pigmentation, ear direction, ear orientation, stocking color and star/stripe/patch white color on forehead. Data on morphometric traits like body weight, body length, chest girth, neck length, head length, head width, ear length, wither height, loin height, back height, hip height, buttock height, croup height, croup length, croup depth, scapula length, arm length, length from ear to tail, mane length and tail length were measured on spot using measuring taps. The reproductive traits such as age at first heat, age at first conception, age at first calving, calving interval and gestation period were estimated by personal interview of the horse owners.

**Statistical analysis:** Data were entered in Microsoft excel, checked, organized and processed for further analyses. Means with standard errors (SE) for different traits, analysis of variance, GLM procedure and for comparison of means were estimated with the help of Statistical Analysis System (SAS, 9.1.3).

### III. Results and Discussion

#### Morphological characterization

Coat colors of horses were (Figure 01) chestnut (42%), bay (42%), grey (12%), pseudo albino (2%), black (1%), chestnut roan (1%) and the bay roan (5%). Coat color of native horses were reported as bay, black, chestnut, bay cream, chestnut cream, pseudo albino, gray, bay roan, black roan, chestnut roan, bay spot, black spot, chestnut spot, bay roan spot and black roan spot in a previous study by Nozawa *et al.* (1984) in Bangladesh which are similar with the present study. Some coat colors such as bay spot, black spot, chestnut spot, bay roan spot and black roan spot were not found which could be due to the wider area sampled in the said earlier study.



**Figure 01. Photograph showing different coat colors of horse genetic resources.**

Among the studied non-descript horses, 28% had white spot on their body. Ear direction and orientation of them were completely forward and upright. The stocking colors were white (27.5%), black (40%) and black and white (0.5%). The star, stripe and patch color on face was observed to be 29.0, 20.0 and 3.5% respectively in the studied population.



**Figure 02. Face color of indigenous horses.**

### Morphometric measurements

For morphological measurement, data on 113 males and 87 females were used. Means along with standard error (SE) of different morphometric measurements of males and female horses at different age classes are presented respectively in Table 02 and Table 03.

**Table 02. Morphometric measurements of male horses**

Traits	Mean $\pm$ SE (N) at different age groups (year)			Significance
	2-5	6-10	11-20	
Body weight(kg)	158.87 $\pm$ 3.52(52)	167.76 $\pm$ 4.50(37)	167.18 $\pm$ 5.30(24)	NS
Body length(cm)	118.87 $\pm$ 0.94(52)	120.92 $\pm$ 0.93(37)	120.86 $\pm$ 1.38(24)	NS
Chest girth(cm)	123.57 $\pm$ 2.35(52)	128.02 $\pm$ 1.22(37)	127.85 $\pm$ 1.33(24)	NS
Neck length(cm)	37.27 $\pm$ 0.39(52)	37.27 $\pm$ 0.54(37)	37.99 $\pm$ 0.61(24)	NS
Head length(cm)	40.37 <sup>b</sup> $\pm$ 0.32(52)	41.53 <sup>a</sup> $\pm$ 0.33(37)	41.80 <sup>a</sup> $\pm$ 0.51(24)	*
Head width(cm)	22.96 $\pm$ 0.29(52)	23.10 $\pm$ 0.29(37)	22.96 $\pm$ 0.41(24)	NS
Ear length(cm)	15.77 $\pm$ 0.30(52)	16.27 $\pm$ 0.70(37)	18.29 $\pm$ 2.88(24)	NS
Wither height(cm)	113.32 $\pm$ 0.68(52)	115.35 $\pm$ 0.96(37)	115.37 $\pm$ 1.26(24)	NS
Height at loin region(cm)	111.37 $\pm$ 0.64(52)	113.10 $\pm$ 0.87(37)	113.55 $\pm$ 1.35(24)	NS
Back height(cm)	108.53 $\pm$ 0.57(52)	110.15 $\pm$ 0.96(37)	110.60 $\pm$ 1.34(24)	NS
Hip height(cm)	99.45 $\pm$ 0.70(52)	101.46 $\pm$ 0.93(37)	101.28 $\pm$ 1.35(24)	NS
Buttock height(cm)	95.99 <sup>b</sup> $\pm$ 0.72(52)	97.69 <sup>ba</sup> $\pm$ 0.91(37)	99.59 <sup>a</sup> $\pm$ 1.45(24)	*
Croup height(cm)	114.94 $\pm$ 0.67(52)	114.46 $\pm$ 2.23(37)	116.08 $\pm$ 1.25(24)	NS
Croup length(cm)	39.69 $\pm$ 0.45(52)	41.60 $\pm$ 1.83(37)	42.25 $\pm$ 2.62(24)	NS
Croup depth(cm)	29.23 $\pm$ 0.39(52)	30.75 $\pm$ 0.95(37)	29.90 $\pm$ 0.63(24)	NS
Scapula length(cm)	46.98 $\pm$ 0.61(52)	48.02 $\pm$ 0.95(37)	49.10 $\pm$ 0.83(24)	NS
Arm length(cm)	29.12 $\pm$ 0.35(52)	29.55 $\pm$ 0.65(37)	34.87 $\pm$ 5.36(24)	NS
Length from ear to tail(cm)	153.87 $\pm$ 1.28(52)	155.64 $\pm$ 1.47(37)	153.53 $\pm$ 5.75(24)	NS
Mane length(cm)	66.08 $\pm$ 1.23(52)	66.72 $\pm$ 1.37(37)	68.68 $\pm$ 0.85(24)	NS
Tail length(cm)	85.43 $\pm$ 1.64(52)	83.01 $\pm$ 2.28(37)	86.04 $\pm$ 2.20(24)	NS

NS=Not significant ( $p>0.05$ ), \*  $p<0.05$ , <sup>ab</sup>Means with different superscripts differed significantly ( $p<0.05$ ) within the row and N= No. of observation.

**Table 03. Morphometric measurements of female horses**

Traits	Mean $\pm$ SE (N) at different age groups (year)			Significance
	2-5	6-10	11-20	
Body weight(kg)	149.21 <sup>b</sup> $\pm$ 3.69(49)	161.96 <sup>ba</sup> $\pm$ 4.08(25)	169.78 <sup>a</sup> $\pm$ 6.17(13)	**
Body length(cm)	116.53 <sup>b</sup> $\pm$ 1.05(49)	119.89 <sup>ba</sup> $\pm$ 1.02(25)	120.94 <sup>a</sup> $\pm$ 1.39(13)	**
Chest girth(cm)	122.85 <sup>b</sup> $\pm$ 1.09(49)	126.49 <sup>ba</sup> $\pm$ 1.14(25)	128.95 <sup>a</sup> $\pm$ 1.80(13)	*
Neck length(cm)	36.37 $\pm$ 0.50(49)	37.12 $\pm$ 0.90(25)	41.94 $\pm$ 6.08(13)	NS
Head length(cm)	39.10 $\pm$ 0.57(49)	40.44 $\pm$ 0.38(25)	41.03 $\pm$ 0.56(13)	NS
Head width(cm)	22.05 $\pm$ 0.43(49)	22.25 $\pm$ 0.20(25)	21.90 $\pm$ 0.43(13)	NS
Ear length(cm)	15.78 $\pm$ 0.26(49)	15.60 $\pm$ 0.18(25)	16.41 $\pm$ 0.52(13)	NS
Wither height(cm)	110.39 <sup>b</sup> $\pm$ 0.70(49)	112.06 <sup>ba</sup> $\pm$ 0.83(25)	113.51 <sup>a</sup> $\pm$ 1.16(13)	**
Loin's height	109.50 $\pm$ 0.70(49)	110.85 $\pm$ 0.7(25)	112.05 $\pm$ 1.18(13)	NS
Back height(cm)	105.41 <sup>b</sup> $\pm$ 0.64(49)	107.95 <sup>ba</sup> $\pm$ 0.76(25)	108.44 <sup>a</sup> $\pm$ 1.12(13)	**
Hip height(cm)	97.40 $\pm$ 0.72(49)	99.46 $\pm$ 1.03(25)	99.64 $\pm$ 0.91(13)	NS
Buttock height(cm)	94.81 $\pm$ 1.35(49)	95.40 $\pm$ 1.06(25)	96.91 $\pm$ 1.28(13)	NS
Croup height(cm)	111.84 <sup>b</sup> $\pm$ 0.75(49)	114.45 <sup>ba</sup> $\pm$ 0.69(25)	115.57 <sup>a</sup> $\pm$ 1.09(13)	*
Croup length(cm)	38.54 $\pm$ 0.57(49)	39.667 $\pm$ 0.52(25)	38.88 $\pm$ 0.60(13)	NS
Croup depth(cm)	28.45 <sup>b</sup> $\pm$ 0.43(49)	29.36 <sup>b</sup> $\pm$ 0.49(25)	32.23 <sup>a</sup> $\pm$ 1.93(13)	**
Scapula length(cm)	45.20 <sup>b</sup> $\pm$ 0.68(49)	48.46 <sup>a</sup> $\pm$ 1.00(25)	45.32 <sup>b</sup> $\pm$ 1.77(13)	*
Arm length(cm)	28.01 $\pm$ 0.57(49)	28.75 $\pm$ 0.50(25)	30.09 $\pm$ 1.59(13)	NS
Length from ear to tail(cm)	150.79 $\pm$ 1.51(49)	154.94 $\pm$ 1.62(25)	156.30 $\pm$ 1.53(13)	NS
Mane length(cm)	61.74 $\pm$ 1.33(49)	66.34 $\pm$ 1.01(25)	62.12 $\pm$ 3.86(13)	NS
Tail length(cm)	86.76 $\pm$ 1.57(49)	88.18 $\pm$ 2.04(25)	88.90 $\pm$ 3.01(13)	NS

NS=Not significant ( $p>0.05$ ), \*  $p<0.05$ , \*\*  $p<0.01$ , <sup>ab</sup>Means with different superscripts differed significantly within the row ( $p<0.05$ ) and N= No. of observation.

From Table 02 and Table 03, it was observed that all traits of male horses were higher than females at the age category of 2-5 and 6-10 years. It was also observed that all parameters except head length and buttock length were not significantly higher in male horses among studied age groups. The non-significant results indicated that after 5 years their growth rate was very slow up to 20 years. Adult body weights of male and female horses were 167.76 $\pm$ 4.50 and 161.96 $\pm$ 4.08 kg at 6-10 years where Singh *et al.* (2002) reported that average body weight of Marwari horses in India at one year, two years and three years were 173.7 $\pm$ 9, 294.5 $\pm$ 5 and 319.4 $\pm$ 12.1 kg and in Kathiawari horses were 164 $\pm$ 9.5, 281.4 $\pm$ 13.0 301.4 $\pm$ 19.8 kg. Differences in breed, age, sex and nutritional level are the main reasons behind such differences in the body weight of horses. The average body lengths of the stallion and mare were found to be 120.92 $\pm$ 0.93 and 119.89 $\pm$ 1.02 cm, respectively at 6-10 years. Significant difference was found in mare among three different age groups. In this regard, Nozawa *et al.* (1984) reported that the average body length of adult male and female of native horse in Bangladesh were 113.58 $\pm$ 1.26 and 107.95 $\pm$ 10.08 cm which is relatively lower than the results of the present study. The average chest girth of male and females were 128.02 $\pm$ 1.22 and 126.49 $\pm$ 1.14 cm at 6-10 years in which had a significant difference among three groups of age. Singh *et al.* (2002) reported that chest girth of Marwari and Kathiawari in India were 169.21 $\pm$ 0.54 and 165.20 $\pm$ 0.77 cm which is 30-35 cm higher than the results of the present study. Genotype difference might be associated for this variation. The average neck length, head length, head width, ear length, wither height, height at loin region, back height, hip height, buttock height, croup height, croup length, croup depth, scapula length, arm length, length from ear to tail, tail length and mane length at 6-10 years of stallion and mare were found to be 37.27 $\pm$ 0.54; 37.12 $\pm$ 0.90 cm, 41.53 $\pm$ 0.33; 40.44 $\pm$ 0.38 cm, 23.10 $\pm$ 0.29; 22.25 $\pm$ 0.30 cm, 16.27 $\pm$ 0.70; 15.60 $\pm$ 0.18 cm, 115.35 $\pm$ 0.96; 112.06 $\pm$ 0.83 cm, 113.10 $\pm$ 0.87; 110.85 $\pm$ 0.7 cm, 110.15 $\pm$ 0.96; 107.95 $\pm$ 0.76 cm, 101.46 $\pm$ 0.93; 99.46 $\pm$ 1.03 cm, 97.69 $\pm$ 0.91; 96.91 $\pm$ 1.28 cm, 114.45 $\pm$ 0.69; 114.45 $\pm$ 0.69 cm, 41.60 $\pm$ 1.83; 48.46 $\pm$ 1.00 cm, 30.75 $\pm$ 0.95; 29.36 $\pm$ 0.49 cm, 48.02 $\pm$ 0.95; 29.36 $\pm$ 0.49 cm, 29.55 $\pm$ 0.65; 28.75 $\pm$ 0.50 cm, 155.64 $\pm$ 1.47; 154.94 $\pm$ 1.62 cm, 66.72 $\pm$ 1.37; 66.34 $\pm$ 1.01 cm, 83.01 $\pm$ 2.28 ; 88.18 $\pm$ 2.04 cm respectively. Among these traits in female, chest girth, wither height, back height, croup depth and scapula length showed significant difference among three groups of age. In Ethiopia, Kefena *et al.*

(2012) reported that the average neck lengths of stallion and mare of Abyssinian breed were  $64.3 \pm 0.4$  and  $62.2 \pm 0.5$  cm which is 13-25 cm higher than the present study of the result. Breed difference might be contributing factor for this deviation. Takaendengan *et al.* (2011) reported that the average head lengths of stallion and mare of Indonesian horse breed were  $47.74 \pm 3.43$  and  $48.61 \pm 3.6$  cm that is also 6-7 cm higher than the present findings. Singh *et al.* (2002) reported that head width of Marwari and Kathiawari horses were  $21.07 \pm 0.09$  and  $21.41 \pm 0.08$  cm which is similar to present result. They also reported that ear length of Marwari and Kathiawari horses were  $12.37 \pm 1.07$  and  $10.95 \pm 0.10$  cm respectively which is relatively lower than the present observation. Nozawa *et al.* (1984) reported that the average height at withers of adult male and female of native horse in Bangladesh were  $113.03 \pm 0.69$  and  $108.90 \pm 9.92$  cm which is almost similar to present investigation.

**Table 04. Difference in morphometric measurements of indigenous male and female horses**

Traits	Mean $\pm$ SE (N) at different age groups (year)								
	2-5			6-10			11-20		
	Male	Female	Sig.	Male	Female	Sig.	Male	Female	Sig.
Body weight(kg)	$158.87 \pm 3.52$	$149.21 \pm 3.69$	NS	$167.76 \pm 4.50$	$161.96 \pm 4.08$	NS	$167.18 \pm 5.30$	$169.79 \pm 6.17$	NS
Body length(cm)	$118.87 \pm 0.94$	$116.53 \pm 1.05$	NS	$120.92 \pm 0.93$	$119.89 \pm 1.02$	NS	$120.86 \pm 1.38$	$120.94 \pm 1.40$	NS
Chest girth(cm)	$123.57 \pm 2.35$	$122.85 \pm 1.09$	NS	$128.03 \pm 1.23$	$126.49 \pm 1.14$	NS	$127.85 \pm 1.33$	$128.96 \pm 1.80$	NS
Neck length(cm)	$37.27 \pm 0.39$	$41.94 \pm 6.09$	NS	$37.28 \pm 0.54$	$36.37 \pm 0.50$	NS	$37.99 \pm 0.62$	$37.12 \pm 0.89$	NS
Head length(cm)	$40.37 \pm 0.32$	$39.10 \pm 0.57$	*	$41.53 \pm 0.33$	$40.44 \pm 0.39$	*	$41.80 \pm 0.51$	$41.03 \pm 0.56$	NS
Head width(cm)	$22.96 \pm 0.29$	$22.05 \pm 0.43$	NS	$23.10 \pm 0.29$	$22.25 \pm 0.30$	*	$22.97 \pm 0.41$	$21.88 \pm 0.43$	NS
Ear length(cm)	$18.29 \pm 2.89$	$15.78 \pm 0.26$	NS	$16.27 \pm 0.70$	$15.60 \pm 0.19$	NS	$15.77 \pm 0.30$	$16.41 \pm 0.53$	NS
Wither height(cm)	$113.32 \pm 0.68$	$110.39 \pm 0.70$	**	$115.35 \pm 0.96$	$112.06 \pm 0.83$	**	$115.37 \pm 1.27$	$113.52 \pm 1.16$	NS
Height at loin region(cm)	$111.37 \pm 0.64$	$109.47 \pm 0.70$	*	$113.09 \pm 0.87$	$110.85 \pm 0.72$	NS	$113.56 \pm 1.26$	$112.05 \pm 1.18$	NS
Back height(cm)	$108.63 \pm 0.57$	$105.41 \pm 0.64$	**	$110.14 \pm 0.96$	$107.95 \pm 0.77$	NS	$110.60 \pm 1.35$	$108.43 \pm 1.13$	NS
Hip height(cm)	$99.45 \pm 0.71$	$97.40 \pm 0.72$	*	$101.46 \pm 0.93$	$99.47 \pm 1.03$	NS	$101.28 \pm 1.35$	$99.65 \pm 0.91$	NS
Buttock height(cm)	$95.59 \pm 0.72$	$94.81 \pm 1.35$	NS	$97.69 \pm 0.92$	$95.40 \pm 1.06$	NS	$99.59 \pm 1.45$	$96.91 \pm 1.28$	NS
Croup height(cm)	$114.94 \pm 0.69$	$111.84 \pm 0.75$	**	$114.46 \pm 2.23$	$114.45 \pm 0.70$	NS	$116.08 \pm 1.25$	$115.57 \pm 1.09$	NS
Croup length(cm)	$39.69 \pm 0.45$	$38.54 \pm 0.57$	NS	$41.60 \pm 1.83$	$39.67 \pm 0.52$	NS	$42.25 \pm 2.63$	$38.88 \pm 0.60$	NS
Croup depth(cm)	$29.23 \pm 0.39$	$28.46 \pm 0.43$	NS	$30.75 \pm 0.95$	$29.36 \pm 0.49$	NS	$29.90 \pm 0.63$	$32.23 \pm 1.94$	NS
Scapula length(cm)	$46.98 \pm 0.61$	$45.20 \pm 0.68$	*	$48.02 \pm 0.95$	$48.46 \pm 1.0$	NS	$49.10 \pm 0.83$	$45.32 \pm 1.77$	*
Arm length(cm)	$29.11 \pm 0.35$	$28.02 \pm 0.57$	NS	$29.55 \pm 0.65$	$28.75 \pm 0.50$	NS	$34.87 \pm 5.36$	$30.09 \pm 1.60$	NS
Length from ear to tail(cm)	$153.87 \pm 1.28$	$150.79 \pm 1.51$	NS	$155.64 \pm 1.47$	$154.94 \pm 1.63$	NS	$153.53 \pm 5.76$	$156.31 \pm 1.54$	NS
Mane length(cm)	$66.09 \pm 1.23$	$61.74 \pm 1.33$	**	$66.73 \pm 1.37$	$66.34 \pm 1.01$	NS	$68.68 \pm 0.86$	$62.13 \pm 3.87$	*
Tail length(cm)	$85.43 \pm 1.65$	$86.76 \pm 1.57$	NS	$83.01 \pm 2.28$	$88.18 \pm 2.04$	NS	$86.04 \pm 2.30$	$88.90 \pm 3.01$	NS

NS=Not significant ( $p > 0.05$ ), \*  $p < 0.05$ , \*\*  $p < 0.01$  and N= No. of observation.

Cervantes *et al.* (2009) reported that the average hip height of horses were 139.33 cm which is higher than the present study of the result. In case of croup height, Singh *et al.* (2002) reported that croup

heights of Marwari and Kathiawari were  $152.91 \pm 0.31$  and  $146.78 \pm 0.47$  cm respectively which is 20-30 cm higher than the present study. Komosa *et al.* (2009) measured that the average croup lengths, croup depths and arm lengths of Konik and Hucul horses were 45, 43.6 cm; 49.5, 42.9 cm and 32.5, 33.8 cm which are almost similar whereas croup depth is 20-30 cm higher than the present study of the result. Genotype variation, breed difference, body conformation and other genetic factors might be the major contributing factors for these differences.

### Sexual differences in morphometric measurements

From Table 04, it is observed that among 20 traits, at 2-5 years of age head length ( $p < 0.05$ ), wither height ( $p < 0.01$ ), height at loin region ( $p < 0.05$ ), back height ( $p < 0.01$ ), hip height ( $p < 0.05$ ), croup height ( $p < 0.01$ ), scapula length ( $p < 0.05$ ) and mane length ( $p < 0.01$ ) of males were significantly ( $P < 0.05$ ) than females indicating their more strength than female horses in context of drought or pulling cart purposes in our country. In case of 6-10 years of age, head length ( $p < 0.01$ ), head width ( $p < 0.05$ ) and wither height ( $p < 0.05$ ) were significantly higher and in 11-20 years of age, only scapula length ( $p < 0.05$ ) and mane length ( $p < 0.05$ ) were significantly higher in males than females horses. The differences in body weights between male and female horses within age groups were not significant and could be due sampling effect.

### Reproductive performance

For reproductive performance data on 87 females were included in this study. Means along with their standard errors are presented in Table 05.

**Table 05. Reproductive performance of female horses**

Parameter	Mean $\pm$ SE (N)
Age at first heat (year)	$1.95 \pm 0.07$ (87)
Age at first conception (year)	$2.15 \pm 0.06$ (87)
Age at first foaling (year)	$3.15 \pm 0.06$ (87)
Foaling interval (year)	$1.16 \pm 0.01$ (87)
Gestation period (month)	$11.44 \pm 0.09$ (87)

N= No. of observation

Average age at first heat was found  $1.95 \pm 0.07$  years in the present study. Velera *et al.* (2000) reported that age at first heat came at 12.3 months in Lusitano native thoroughbred which is much lower than the present result and could be due to breed and other non-genetic factors. The average age at first conception was found to be  $2.15 \pm 0.06$  years. Whereas Tavier *et al.* (2007) reported that age at first conception of mares were  $4.93 \pm 1.45$  years in Brazil which is also much higher than the present result and could be due to breed and other non-genetic factors like feeding, management and detection of estrus. The average age at first foaling and foaling interval of the indigenous horses were measured  $3.15 \pm 0.06$  and  $1.16 \pm 0.01$  years. Tavier *et al.* (2007) reported that foaling interval of mares were 490 days in Brazil which is almost similar with the present investigation. However, they reported a wide variation in calving interval with a range between 303-1095 days. The average gestation period was found  $11.44 \pm 0.09$  months. Singh *et al.* (2002) reported that gestation length of Marwari and Kathiawari horses were  $338.3 \pm 3$  days, and  $334 \pm 5$  (field) and  $331 \pm 1.9$  days (farm) respectively in India which is similar to the results of present study. However, the differences observed in reproductive traits of indigenous horses in Bangladesh compared to other would definitely be due to their genetic constitution and differences in environmental factors such as feeding, management, housing etc. Alam *et al.* (2015) indicated that in rural areas especially horse pocket areas; there is a great opportunity of horse rearing to turn the good financial aspects of rural farmers. One horse cart can support each family easily day after day. Alam *et al.* (2015) also reported that farmer exercised traditional knowledge on horse rearing that was used mainly for pulling cart, transportation, land tillage and sports purposes for their livelihood. Alam *et al.* (2015) also reported that most of the horse keepers were experienced in horse rearing for 0.2 to 40 years. Among the horse keepers 54% were landless followed by marginal (22.5%), small (12.5%), medium (8%) and large (3%). Their main occupation was horse pulling cart (88%) and the income from horse pulling cart was different from season to season which ranged from TK 3,000 to TK 20,000 per month. In case of secondary occupation, 81.5% farmers were involved in agriculture sector and 9% farmers involved in horse pulling cart.

#### IV. Conclusion

Study revealed basic information on morphological variations and morphometric potential and reproductive performance of horse genetic resources of Bangladesh. Therefore, government, research institute, different national and international NGOs and private companies should come forward for undertaking program for required conservation and development of existing indigenous horse genetic resources of the country.

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#### HOW TO CITE THIS ARTICLE?

##### APA (American Psychological Association)

Alam, M. P., Bhuiyan, M. S. A. & Bhuiyan, A. K. F. H. (2016). Morphology, morphometry and reproductive characteristics of indigenous horses in Bangladesh. *Journal of Bioscience and Agriculture Research*, 11(02), 947-954.

##### MLA (Modern Language Association)

Alam, M. P., Bhuiyan, M. S. A. & Bhuiyan, A. K. F. H. "Morphology, morphometry and reproductive characteristics of indigenous horses in Bangladesh". *Journal of Bioscience and Agriculture Research*, 11.02(2016): 947-954.

##### Chicago and or Turabian

Alam, M. P., Bhuiyan, M. S. A. & Bhuiyan, A. K. F. H. "Morphology, morphometry and reproductive characteristics of indigenous horses in Bangladesh". *Journal of Bioscience and Agriculture Research*, 11 no.02(2016): 947-954.