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Article

Variation of morphological features and growth traits in half sib baby calves of Pabna cattle in Bangladesh

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Abstract: This study was aimed to identify the phenotypic features of local Pabna calves including their growth trait attributes at BLRI Regional Station, Baghabari. Data on different phenotypic measurements and growth traits were collected from 12 half sib Pabna baby calves. Each calf was allowed to drink 10% of milk for individual's body weight from respective dam. Data analyses were conducted following independent sample *t*-test and one-way ANOVA using SAS 9.1.3 (SAS Institute Inc., Cary, NC, USA). Although significant differences observed in body weight ($p<0.001$), body length ($p<0.05$), heart girth ($p<0.05$) and mouth circumference ($p<0.05$) based on two types of birth weight groups in calves (<20 kg and ≥20 kg) but there were limited effects observed in the baby calves at three months except head length ($p<0.05$) considering dam's body weights. Observed growth rate has no variations ($p>0.05$) in baby calves. This study revealed that half sib calves originated from the same sire had similar morphological features and growth in the early stage while dams' body weight had limited effects on those aspects.

Keywords: growth performance; selection; phenotypic features; body weight

1. Introduction

Pabna cattle are one of the most promising local varieties for productivity among the available cattle varieties which was originated from the area of Pabna and Sirajganj districts of Bangladesh having disease resistant capability and environmental adaptability (Ghosh, 1981; Majid *et al.*, 1992; Bhuiyan *et al.*, 2007). Phenotypic characterization contributes to the improvement of animal genetic resources in the context of country-level implementation (FAO, 2012). The study of Talukder *et al.* (2017) revealed that morphological features were not varied between local Pabna cows populations except body length, height at wither, pelvic length, tail dock circumference and mouth circumference. Although several studies had been carried out for local Pabna cattle in Bangladesh (Husain *et al.*, 1984; Husain and Mostafa, 1985; Khan *et al.*, 1999), but the in-depth studies on morphological and growth traits of half sib baby calves are not conducted yet. Thus, this study was aimed to reveal the phenotypic features of local Pabna calves including their growth trait features.

2. Materials and Methods

2.1. Source of data

Data on different phenotypic measurements and growth traits were collected from 12 half sib Pabna baby calves having same sire using measuring tape and digital weighing balance within three months of calving, respectively, at BLRI Regional Station, Baghabari during January-June in 2018. The body weight of newborn calves and respective dams were recorded separately immediate after calving (Source Trace System, Massachusetts, USA). Further body weights of calves were recorded in each consecutive measuring period of one month's interval. In case of phenotypic measurements of calves same side and direction were followed for all individuals in each time.

2.2. Feeding and other management

Each calf was allowed to drink 10% of milk for individual's body weight from respective dam twice per day at calf shed. In addition, dams were rearing under specific farm management conditions at milking cow shed of BLRI Regional Station, Baghabari.

2.3. Data analyses

Data were recorded in excel sheet and analyses were conducted following independent sample *t*-test and one-way ANOVA using SAS 9.1.3 (SAS Institute Inc., Cary, NC, USA).

3. Results and Discussion

The morphological features of Pabna calves at birth had significant differences in body weight ($p<0.001$), body length ($p<0.05$), heart girth ($p<0.05$) and mouth circumference ($p<0.05$) based on two types of birth weight groups in calves (<20 kg and ≥20 kg) where the values found higher in ≥20 kg weight group for 20.97±0.52 kg, 53.33±1.20 cm, 61.33±0.67 cm and 21.33±0.33 cm, respectively (Table 1). In case of dams' body weights (<250 kg and ≥250 kg), there were no variation observed in the baby calves except head length ($p<0.05$) in two groups, respectively (Table 1).

Table 1. Effects body weight on phenotypic features of half sib baby calves at birth in local Pabna cattle.

Phenotypic features	Calves' body weight (Mean±SE)			Dams' body weight (Mean±SE)		
	<20 kg (n=9)	≥ 20 kg (n=3)	*t*-test	<250 kg (n=6)	≥ 250 kg (n=6)	*t*-test
Body characteristics						
Body weight (kg)	17.99±0.33	20.97±0.52	0.001	19.22±0.76	18.25±0.55	0.326
Body length (cm)	50.56±0.53	53.33±1.20	0.034	51.50±0.85	51.00±0.89	0.693
Heart girth (cm)	58.78±0.52	61.33±0.67	0.028	60.00±0.86	58.83±0.60	0.291
Wither height (cm)	64.22±0.70	65.67±1.45	0.347	64.17±0.98	65.00±0.86	0.536
Carpal circumference (cm)	9.22±0.28	9.67±0.33	0.418	9.50±0.22	9.17±0.40	0.485
Tarsal circumference (cm)	10.56±0.29	10.83±0.17	0.614	11.00±0.26	10.25±0.31	0.092
Tail length (cm)	33.22±0.52	33.67±2.19	0.768	34.17±0.98	32.50±0.62	0.181
Tail dock circumference (cm)	8.67±0.33	9.33±0.67	0.356	9.17±0.31	8.50±0.50	0.282
Pelvic length (cm)	11.44±0.29	12.00±1.00	0.468	11.50±0.43	11.67±0.49	0.804
Rump length (cm)	11.56±0.24	12.33±0.67	0.190	11.83±0.40	11.67±0.33	0.756
Head characteristics						
Mouth circumference (cm)	20.22±0.22	21.33±0.33	0.028	20.83±0.31	20.17±0.31	0.156
Ear length (cm)	13.56±0.47	12.67±0.33	0.329	13.83±0.48	12.83±0.54	0.197
Ear diameter (cm)	8.33±0.17	8.00±0.58	0.448	8.50±0.22	8.00±0.26	0.174
Head length (cm)	21.00±0.37	21.00±0.58	1.00	20.33±0.21	21.67±0.42	0.018
Head width (cm)	10.00±0.24	10.33±0.67	0.554	10.17±0.31	10.00±0.37	0.734

Although Bahashwan and Alfadli (2016) reported that dams body weight class at parturition had significant ($p<0.05$) effect on birth weight of Dhofari calves. In addition, Holland and Odde (1992) observed the birth weight of a calf ranges from 5 to 10% of the weight of its dam. However, in the present study the non-significant birth weight based on dams' weight might be the reason of lower sample number or closer genetic relation among half sib progeny. The head length feature also showed significant increasing pattern at three month of age in half sib calves (Table 2).

Table 2. Phenotypic features of half sib baby calves at three months based on dams' body weight in local Pabna cattle.

Phenotypic features	<250 kg body weight (n=3)		≥ 250 kg body weight (n=5)		*t*-test
	Mean	SE	Mean	SE	
Body characteristics					
Body weight (kg)	56.54	0.46	54.09	1.71	0.328
Body length (cm)	70.67	1.76	74.90	1.21	0.860
Heart girth (cm)	84.67	1.48	85.50	1.52	0.729
Wither height (cm)	78.33	1.20	79.20	0.70	0.524
Carpal circumference (cm)	10.67	0.17	10.80	0.12	0.537
Tarsal circumference (cm)	11.83	0.33	11.90	0.10	0.818
Tail length (cm)	43.83	0.73	44.90	0.33	0.173
Tail dock circumference (cm)	12.50	0.29	12.50	0.32	1.00
Pelvic length (cm)	19.83	0.93	20.40	0.40	0.535
Rump length (cm)	23.50	0.87	24.80	0.62	0.260
Head characteristics					
Mouth circumference (cm)	23.50	0.50	24.20	0.34	0.274
Ear length (cm)	18.00	0.58	19.50	0.50	0.106
Ear diameter (cm)	10.67	0.17	10.60	0.24	0.855
Head length (cm)	26.00	0.00	27.20	0.12	0.000
Head width (cm)	12.67	0.88	12.70	0.25	0.965

These data are indicating few phenotypic characters which could be considered as effective differentiating features of calves during selection. In addition, these data suggested that higher body weight of dam might not responsible of changing overall phenotype of calves. The body weight of local Pabna calves at birth, first, second and third months were found as 18.73±0.47, 31.11±0.66, 43.45±1.12 and 53.67±1.47 kg, respectively (Table 3).

Table 3. Body weight (kg) of half sib baby local Pabna calves.

Body weight	n	Minimum	Maximum	Mean	SE
At birth	12	16.60	22.00	18.73	0.47
First month	10	27.55	34.65	31.11	0.66
Second month	9	37.90	48.45	43.09	1.12
Third month	8	46.66	57.41	53.67	1.47

According to Hossen *et al.* (2012) birth weight of calves is regarded as one of the most important indicators for improving future performance. The mean birth weight of Pabna calves in the study was higher than the findings of Udo *et al.* (1990) and Hoque *et al.* (1999), who reported the weight 15.60 kg and 17.92 kg, respectively for the same genotype which might be the consequent of selective breeding the foundation herd. Our results on calves' birth weight also agreed with the findings of Bhuiyan *et al.* (2007). There were no variations (p>0.05) observed in the growth rates of those measuring periods in baby calves for average daily gain (Figure 1 and 2). These data showed that half sib calves originated from the same sire had similar growth rate in the early stage.

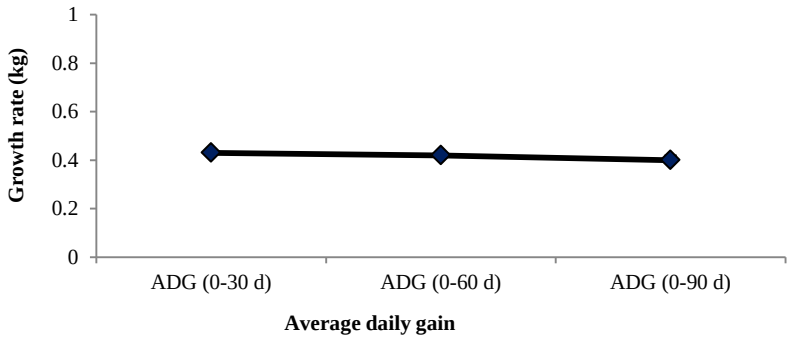

Figure 1. Variation of growth traits at early stage in local Pabna calves.

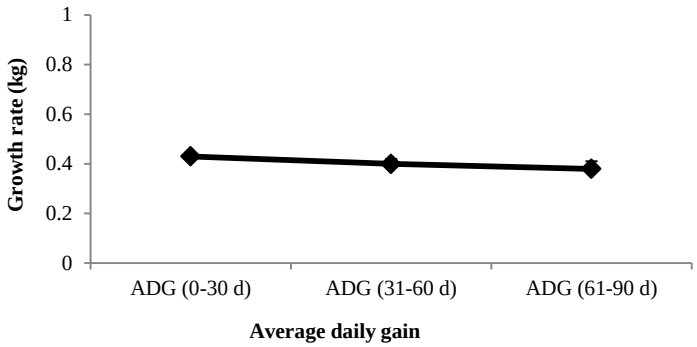

Figure 2. Variation of average daily gain at different months of early stage in local Pabna calves.

4. Conclusions

It is concluded that phenotypic variation and growth traits were almost similar for half Pabna baby calves; in addition, dams' body weight had limited effects on those features rather than individual calf weight. However, more calf samples are recommended to clarify such morphological features and growth traits studies more clearly in Pabna cattle.

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Conflict of interest

None to declare.

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