

Study on the Growth Pattern of Gayals (*Bos Frontalis*) and their Crossbred Calves

K. S. Huque*, M. M. Rahman and M. A. Jalil

Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh

ABSTRACT : A study was conducted with 14 gayals to study their growth pattern from birth to 24 months of age, and gayal was compared with native calves and crossbred calves of gayals and exotic animals. A significant difference in liveweight gains up to 3 months ($p < 0.001$) or up to 6 months ($p < 0.05$) was found between gayal and native calves, but the difference reduced with increase of age and found non-significant ($p > 0.05$) at 9 months and 12 months. The daily liveweight gain up to 3, 6, 9 or 12 months of age of gayals were 404.60, 306.80, 315.20 and 312.20 g/d, respectively and of native calves were 217.3, 245.3, 262.0 and 269.0 g/d, respectively. Gayal female calves had lower weights at birth (20.2 kg) and weaning (81.8 kg) and daily liveweight gains (298.5 g/d) than males (24.3 kg, 84.0 kg and 317.8 g/d, respectively) but the differences were not significant ($p > 0.05$). Cross breeding gayal cows with Friesian bulls increased daily liveweight gain of the crossbred calves. The rate of increase of daily liveweight gain may further be increased if gayals are crossed with beef type animals, and optimum feeding may also be required which needs further research. (*Asian-Aust. J. Anim. Sci.* 2001. Vol 14, No. 9 : 1245-1249)

Key Words : Crossbred, Gayal, Liveweight Gain, Disease

INTRODUCTION

The gayal belongs to the genus *Bos frontalis* and occurs in the hilly districts of Bangladesh, north-eastern part of India and some hilly areas of Myanmar and Bhutan. The animal has prominent beef type characters and is reported to be very hardy and capable of thriving well in any adverse environments. It is believed to be a domesticated form of guar (Sinoons and Simoons, 1968), but some believe it is a guar cattle hybrid or guar-bentang hybrid. It used to be termed differently in different regions of its origin (NRC, 1983). The gayal cow produces a very small amount of milk, not even sufficient for nourishing their newborn calves. They browse tree leaves or grasses on the hill slopes, tops and valleys and graze in grass fields. Phenotypic and to some extent genetic characteristics of the gayal have already been studied and reported (Majid et al., 1995). It is stated in the report that the gayal was much bigger and heavier than the native domestic cattle. In Bhutan, the livestock breeders have produced profitable hybrid offspring crossing gayal bulls with Siri cows (*Bos taurus*) of India and called "Jatsha" and Jatshums; the female hybrids of the same parents are excellent for milk production (NRC, 1983).

The vast majority of the hilly area of Chittagong Hill Tracts (CHT) may be used for raising gayals browsing the available plant biomass, which may not be edible or available to native cattle. However, the potentiality of using gayals as profitable meat purpose animals need to be

assessed through determination of their growth performances, often considered to be an indication of health and adaptability of animals, under traditional management and feeding systems.

Therefore, the present research work was undertaken to determine the variations in liveweight gains of growing gayals associated with some non-genetic factors, differences of liveweight gains between growing gayals and native cattle, and effect of inclusion of exotic blood in gayals on their liveweight gains and disease incidences.

MATERIALS AND METHODS

The present study was conducted with fourteen gayals and their 3 crossbred calves, which are available at the gayal research farm of Bangladesh Livestock Research Institute (BLRI) at Naikhongchari of Bandarban district. Ten years data (1991-2000) on the liveweight of gayals and the recent data on their crossbred calves recorded at the research farm were analysed to determine the growth rate up to 1 year of age. Data on the birth weights and growth performance of growing native cattle (31) was collected from the cattle herd of Animal Research Farm at Pachutia, BLRI. The animals were maintained in a semi-intensive condition (stall feeding with daily 4 hours grazing) and liveweights were recorded at 2 weeks intervals from birth to maturity. These data were analyzed and average of birth weights and daily liveweight gains of different age groups were compared with those of cattle of the same age group which were native animals in good nutritional condition. Differences in liveweight gains in different age groups (birth to 3 months, 3 to 6 months, 6 to 9 months and 9 to 12

* Corresponding Author: K. S. Huque. Tel: +88-2-7708005, Fax: +88-2-7708325, E-mail: aprdblri@accessstel.net
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months), sexes and seasons were determined using available data. The cumulative liveweight of each animal was regressed on the age in days and the slope was considered as daily liveweight gain of the animal. The calves were fed on colostrum for the first five days and allowed to suckle their mothers up to the weaning age, which is about 6 months. The newborn calves were weighed immediately after birth to record their birth weights. The calves were weighed weekly up to 12 months and then fortnightly (14 days) weight gains were recorded. The calves were housed at nights in a tin shed house with a paved area for exercise. Sufficient ventilation and drainage systems are available at the farm. In the day time the gayal calves were allowed to browse on the hill slopes, but the native calves were completely confined in groups except the milking time of the dams.

Data on annual rainfall and humidity were collected from the Meteorological section of Cox's Bazaar district near the experimental station and a year was divided into wet and dry seasons considering the two factors of the weather of the area where the research farm was located.

Diseases problem

A longitudinal observation on infections and parasitic diseases in gayals was continued and any disease problem was recorded.

Statistical analysis

Significant differences in growth performance of growing gayals of different sexes in different seasons and comparisons with native animals were analyzed using Student's test described by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Comparison between gayal and native cattle

Daily liveweight gains of calves of the two genotypes within 12 months of age at different age groups (at 3, 6, 9 and 12 months) were calculated and compared to determine significant differences (table 1). Gayal calves gained at a higher rate ($p < 0.05$) up to 3 months (404.6 g/d) and 6

months (306.8 g/d) of age than the native calves (217.3 and 245.3 g/d, respectively). The daily liveweight gains of gayal calves were found to be higher also at 9 months (315.2 g/d) and 12 months (312.2 g/d) than the native calves (262.0 and 269.0 g/d, respectively), but the differences reduced with the advancement of age and became non-significant ($p > 0.05$). The higher daily liveweight gains of gayal calves resulted in higher cumulative liveweight than those of the native calves (figure 1).

Islam et al. (1993) reported daily liveweight gains of gayal calves at the rate of 391 g, 447 g, 479 g and 508 g up to an age of 3, 6, 9 and 12 months of age, respectively. The number of observations in their study was few and the period of study was shorter than that of the present work.

Effect of sex

Average liveweight (kg) at birth and six (6) months of age (weaning) of both the male and female gayal calves and their average daily live weight gains (g/d) are presented in table 2. Sex differences had no significant ($p > 0.05$) effect on the live weight at birth or weaning or on daily live weight gains. The female gayal calves had a lower live weight at birth (20.2 kg) or weaning (81.8 kg) and daily live weight gain (298.5 g/d) than those of the males (24.3 kg, 84.0 kg and 317.80 g/d, respectively).

Effect of season

Figures 2 and 3 show the distribution of the annual

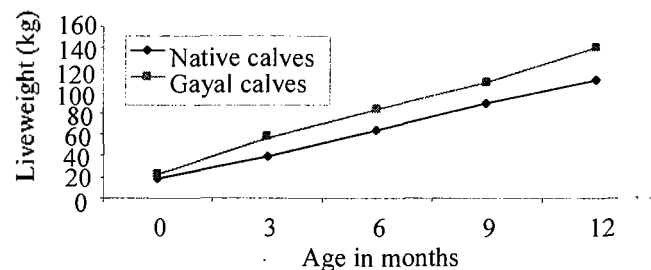


Figure 1. Growth pattern of Gayal and native cattle calves

Table 1. Genetic differences in average live weight gain (g/d) of Gayal and native calves

Age group	Live weight gain (g/d)		Significance	
	Gayal calves	Native calves	SED	Level
Up to 3 months	404.60±134.39 (11)	217.30±52.21(31)	28.4236	$p < 0.001$
3 to 6 months	306.80±116.73 (14)	245.30±46.35 (31)	24.1353	$p < 0.05$
6 to 9 months	315.20±93.95 (9)	262.00±46.639 (18)	26.7813	$p > 0.05$
9 to 12 months	312.20±90.69 (6)	269.00±43.15 (4)	49.3208	$p > 0.05$

Values are mean±SE; Figures in parentheses denote number of observations.

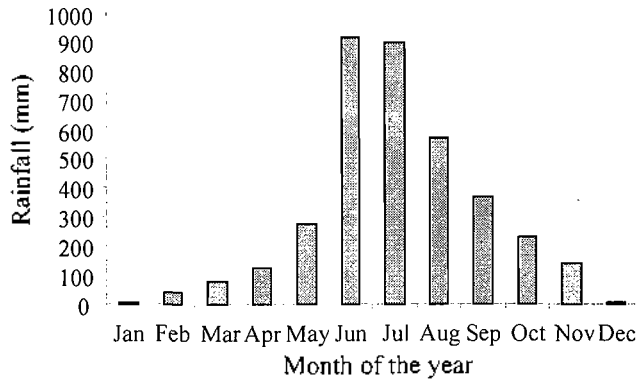


Figure 2. Year round rainfall (mm) in Naikhongchari

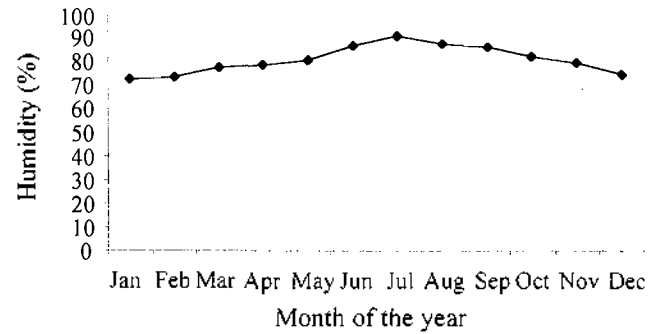


Figure 3. Year round humidity (%) in Naikhongchari

Table 2. Effect of sex on birth weight and growth rate of Gayal calves (up to six months)

Item	Sex		Significance	
	Male	Female	SED	Level
Birth wt. (kg)	24.30±6.99 (6)	20.20±4.08 (8)	2.96	p>0.05
Live wt. at 6 months (kg)	84.0±14.47 (5)	81.80±33.27 (4)	16.35	p>0.05
Live weight gain (g/d)	317.80±104.71 (6)	298.50±131.49 (8)	0.07	p>0.05

Values are mean±SE; figures in parentheses denote number of observations.

Table 3. Seasonal differences in birth weight and growth rates of male gayal calves (up to six months)

Type	Seasons		Significance	
	Dry season (Nov-April)	Wet season (May-Oct)	SED	Level
Birth wt. (kg)	21.60±6.47 (2)	23.00±2.99 (2)	5.042	p>0.05
Live weight gain (g/d)	353.50±120.92 (2)	372.00±22.63 (2)	0.087	p>0.05

Values are mean±SE; figures in parentheses denote number of observations.

Table 4: Seasonal differences in birth weight and growth rates of female gayal calves (up to six months)

Type	Seasons		Significance	
	Dry season (Nov-April)	Wet season (May-Oct)	SED	Level
Birth wt. (kg)	19.50±1.78 (2)	20.40±4.75 (6)	3.60	p>0.05
Live weight gain (g/d)	226.50±146.37 (2)	322.50±130.98 (6)	0.11	p>0.05

Values are mean±SE; figures in parentheses denote number of observations.

rainfall and humidity at Naikhongchari. Most of the rainfalls in the area occur in May to October which may be termed the wet season; the other six (6) months remain dry or semi-dry and may be termed the dry season. During the wet season, the rainfall and humidity varied from 275 to 913 mm (fig 2) and 81 to 91% (fig 3), respectively. In the dry season, (November to April) they varied from 5.0 to 142 mm (fig 2) and 73 to 80% (fig 3), respectively. Gayals browse green forages, the availability of which increases with the increase of rainfalls during the wet season on hill slopes, and decreases during the dry season. Differences in green forages availability in the two seasons had no significant ($p>0.05$) effects on birth weight and liveweight gain of male (21.6 kg and 353.5 g/d in the dry and 23.0 kg and 372 g/d in the wet, respectively) and female (19.5 kg and 226.5 g/d in the dry and 20.4 kg and 322.5 g/d in the

wet, respectively) gayal calves up to 6 months of age (tables 3 and 4).

Table 5 shows the average weaning weight (kg) and liveweight gain (g/d) of gayal calves in the two seasons. The differences between the dry and wet seasons were found non-significant ($p>0.05$). The average weaning weights and liveweight gain in the dry and wet seasons were 83.9 kg and 281.0 g/d and in the wet seasons were 69.1 kg and 242.3 g/d, respectively.

The growth responses of the growing gayals under the present study was recorded on traditional feeding systems with fluctuations in nutrient supply throughout the year and variations in meeting requirements of the nutrients. However, their growth performances on the plane of nutrition calculated on their daily requirement may differ and are essential to determine.

Table 5. Differences in weaning weights (kg) and daily live weight gain of both male and female gayals (six months up to two years)

	Seasons		Significance	
	Dry season (Nov-April)	Wet season (May-Oct)	SED	Level
Weaning wt. at 6 months (kg)	83.9±17.7 (3)	69.1±25.0 (3)	17.71	p>0.05
Live weight gain (g/d)	281.0±85.1 (3)	242.30±33.8 (3)	0.05	p>0.05

Values are mean±SE; figures in parentheses denote number of observations.

Table 6. Live weight gains (g/d) of crossbred calves (up to 6 month) for dry and wet season

Type	Genotypes	Birth weight (kg)	Liveweight at 6 months (kg)	Liveweight at 1 year (kg)	Liveweight gain (g/d)
Crossbred female	50% Gayal ×50% Friesian	36.0	165	226	701
Crossbred male	50% Gayal × 50% (Friesian×Friesian×Hariana)	34.0	113	177	437
Crossbred male	50% Gayal ×50% Jersey	28.0	128	212	556

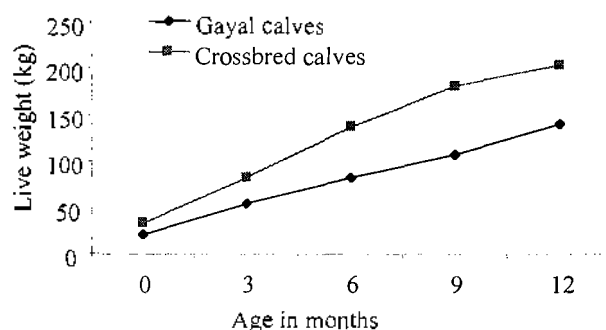
Table 7. Important diseases of gayal

Foot and Mouth disease	Most prevalent disease found mostly in the rainy seasons.
Diarrhoea	Throughout the year
Conjunctivitis	Throughout the year
Parasitic disease	
a) Fascioliasis	Most prevalent parasite during in the rainy and winter seasons.
b) Gastro-intestinal parasite	Throughout the year
c) Ticks	winter and summer

Growth performance of crossbred calves

Liveweight at different ages of crossbred calves with 50% and 37.5% Friesian and 50% Jersey blood and their average daily liveweight gains are shown in table 6. Only one animal of each crossbred germplasm was available in the research farm and the data were collected from the single animal unit. Moreover, the crossbred animal with 50% Friesian blood was female but the other two were male.

The female crossbred calf with 50% Friesian blood had a higher daily liveweight gain (701 g/d) than the male crossbred calf with 50% Jersey blood (556 g/d) or with 37.5% Friesian and 12.5% Hariana blood (437 g/d). The daily liveweight gain of crossbred calf with 50% Friesian blood (701 g/d) was more than double than that of the pure gayal female calf (322 g/d) (tables 6 and 4). Figure 4 shows that average birth weight and the cumulative liveweight of the crossbred calves were higher than that of the gayal calves. In addition to heterosis effects (Lush, 1958) the faster growth rate of Friesian cattle might help to increase the daily growth rate and cumulative liveweight of the crossbred calves.

**Fig 4.** Growth pattern of Gayals and their crossbred calves

The number of crossbred calves were very few. So it is difficult to draw a definite conclusion on their growth performances.

Disease problem

Calf mortality (24%) of gayal was found to be high. Two main factors were responsible for calf mortality: inadequate milk production by mother and disease incidences. The daily milk yield of gayal cows was reported to be 2.93 liter per day (Islam et al., 1993). Foot and Mouth disease (FMD) and Fascioliasis were the most prevalent diseases found during the rainy and winter seasons. Non-specific diarrhoea, conjunctivitis and gastro-intestinal parasite were found throughout the year. High incidence of ticks infection was found during the winter and the summer. The incidence of different types of disease is shown in table 7. Huque and Giasuddin (1998) reported similar observations on disease incidences of gayals.

CONCLUSION

Gayal was found to be a potential germplasm for beef production, and crossing with a beef breed may increase the

rate of growth performance. Studies on the growth performances of gayals on optimum feeding are required.

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