

Physical Feature, Physiological Character and Behavior Study of Gayal (*Bos frontalis*)

M. Giasuddin* and M. R. Islam

Animal Health Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh

ABSTRACT : The physical feature, physiological character and behavior studies were conducted with fifteen newly collected gayals in Bandarban hill tract area of Bangladesh. Their morphology is different from domestic cattle. The range of pulse rate, body temperature and respiration rate were 47 to 75 per minute, 37.78 to 38.88°C and 20 to 40 per minute, respectively. These physiological values vary with different age group and seasonal variation. In hematological feature, the average findings were RBC 7.01 ± 0.52 million/cu.mm, WBC 14.3 ± 3.69 thousand/cu.mm, hemoglobin concentration 9.81 ± 2.25 gm%, PCV $35.86 \pm 3.68\%$. In differential WBC count neutrophils $28.23 \pm 1.75\%$, lymphocytes $62 \pm 2.05\%$, monocytes $4.4 \pm 1.34\%$, eosinophils $5 \pm 2.49\%$ and basophils $0.4 \pm 0.51\%$. In behavior study, the animal shows browsing nature on hill slopes. They are watchful in new environment, become excited and nervous with strangers. Heated female gayals response for mating with domestic bull. (*Asian-Aust. J. Anim. Sci.* 2003, Vol 16, No. 11 : 1599-1603)

Key Words : Physical Feature, Physiological Character, Behavior, Gayal

INTRODUCTION

The gayal belongs to the family Bovidae, tribe Bovini, group Bovina, genus *Bos* and species *Bos frontalis*, is very much related with the Indian Bison. They are mostly found some hilly areas of Bangladesh, northeastern part of India, some part of Myanmar and Bhutan (Majid et al., 1995). Some investigators believed that this animal was domesticated from Gaur (Simoons and Simoons, 1968), but some thought this species to be cross between Gaur and domestic cattle (Tint, 1993). In Bangladesh, the hill tribes collect them from the dense forest and domesticate these animals. The morphology of this animal is different from domestic cattle and their body size is much bigger than the indigenous cattle of Bangladesh. This animal is medium large type of cattle, the cow reaching weight up to 500 kg and the bulls weighing up to 700 kg (Faiz, 1968) in nature. In Bangladesh this animal are mainly used as a sacrificial animal during religious festival in exchange of high price. They are rarely used for work and also used as a valuable zoo animal. Genetic characteristics of gayal were studied by Majid et al. (1995) and growth pattern reported by Huque et al. (2001). But physical, physiological and behavior study was not found enough in literature. On this regard present study was undertaken.

MATERIALS AND METHODS

Location and agro-ecological climate

The study was conducted at the regional station under

Bandarban hill tract area of Bangladesh Livestock Research Institute. The station is located Southeastern hilly parts of Bangladesh and about 20 meter above the sea level. The land type is high land with strong acidic (pH 4.5 to 4.9) loamy soil. The rainfall and humidity varies from 255 to 1,093 mm, 85 to 95% respectively during the wet and hot period (June to October), mean annual temperature is about 26.1° to 32.3°C.

The experimental animals

A total of fifteen newly collected gayals out of which eleven females and four males were consider as experimental animal to study the physical feature, physiological character and behavior of these animals.

Feeding and health management

The animals were experimented in semi-intensive management and were allowed to browse for about 8 h daily and were supplied with 1 kg concentrate mixture per 100 kg body weight daily. Necessary treatments were provided against specific diseases according to the suggestions of the scientist working in the respective field.

Physical character

Ten adult physically sound male and female animals were examined carefully to record the physical characters. The size and shape of the body parts such as head, eyes, horns etc. were examined.

Physiological parameters

To measure the physiological parameters such as body temperature, respiration rate, pulse rate and rumen movement were taken twice daily (morning and evening) in

* Corresponding Author: Md. Giasuddin. E-mail: mrislam210@hotmail.com

Received March 14, 2002; Accepted July 3, 2003

four seasons (summer, monsoon, winter and spring) in a year. Rumens movements were measured by placing the chest piece of stethoscope on the abdominal wall of the left flank region. To study the hematological values about 10 ml of blood sample were directly drawn from the jugular vein of each animals using heparinized vacuum vacutainer. Hemoglobin (Hb) concentration and packed cell volume (PCV) were measured by hemoglobinometer and haemocrit methods respectively, described by Bauer et al. (1974) and Coles (1980). Total white blood cell (WBC) and differential leucocytes count were performed using haemocytometric method by using Wright's stain.

Behavior study

The animals were carefully observed and recorded their behavior to know the nature of these animals.

Feeding behavior : Data were collected once in a week for one year.

Sexual behavior : Male and female both types of gayals were observed 25 times during the oestrus period of female gayal.

Calf mother behavior : Ten pregnant mothers were observed from advanced stage to up to three weeks of parturition.

Investigative behavior : Fifteen newly collected gayals were kept under observation up to three months to watch their investigative nature.

RESULTS AND DISCUSSION

Origin an habitual

This cattle breed still found in the deep forest area of

Bangladesh, India, Bhutan and Myanmar. At first the tribal families of these areas collect the animal and rear as a semi-domestic animal.

Feeding behavior

Gayal mostly like browsing on hill slopes. They browse about freely in the forest during the daytime and return to the owners place at night. These animals like to browse on 300 to 400 m. heights above the sea level. Unless naturally available feed shortage these animals are not accustomed to concentrate or silage prepared from cultivate fodder plants. This animal very much fond of salt and use to follows any place if tempted with a piece of rock salt. They search open hilly area during browsing period and like open forest where is plenty of bamboo leaves available. Gayal always chooses natural feed. But when they are in stall feeding, they like salt added feed staffs and concentrates. Gayal spends about one third time in browsing and grazing, almost same time in rumination or chewing their cud. They go for lying only at night and spend very little time for standing or walking.

Sexual behaviors

Female gayal does not show sexual behaviors like domestic cattle. Most of the cases they show silent estrus. Male animal always needs for the detection of estrus for this animal. Male animal generally detects estrus by smelling and licking the external genitalia of the females in estrus. During estrus the female generally accept the advancement of the male gayal. Females that which are not in estrus never respond to such advancement. It was observed that native domestic bull also could detect estrus of female gayal and female gayal also responds for mating. Male gayal

Table 1. Physical characters of gayal

Parts of the body	Character
Head	
Fore-head	Wide and frontal bone convex
Face	Short bridge of nose straight and nostrils are wide
Muzzle	Black
Eyes	Alert, bright, big and prominent black
Horns	Long, flat, whitish at the base and dark at the tips
Ears	Medium sized, strong and erected
Neck	Short, thick and heavy
Dewlap	Thick, pendulous skin and downward near sternum
Chest	Broad strong and well muscle developed
Buttock	Angular in shape
Hump	Not developed
Back	Bony dorsal ridge started from the middle of back to hump
Udder	Poorly developed, hairy
Tail	Moderate length reaching the hock joint with medium amount of hair
Leg	Short, strong and usually white stocking on all four legs
Skin	Very thick, hairy and smooth
Overall looking	Beautiful and very smart

Table 2. Comparison of estrus symptoms between cattle and gayal

Symptoms	Cattle*	Gayal
a) Excitement	Always shown	Not-shown
b) Shouting	Always shown	Not-shown
c) Anorexia	Always shown	Not-shown
d) Jumping	Always shown	Most of the time
e) Mucus secretion	Found most of the cases	Very less amount
f) Swelling of the vulva	Always shown	Very less

* Symptoms of estrus in cattle, Samad (1996).

becomes furious and cannot tolerate the presence of any other fellow near his targeted and heated female. Some time they fight each other and stronger one get chance for courtship and mating. It was also observed that male gayal generally does not response to heated domestic female cattle.

Calf-mother behavior

The pregnant mother becomes nervous and try to leave the rest of the herd just before parturition. They go through the forest area to finding a hidden place. They are not come back to the stall and stay in the forest. After parturition, the newborn calf breaks through the amnionic sac and begins breathing, the mother licks away the remains of the amnionic sac and tissues of the new born calf. The newborn calf struggles to find the udder to being got meal. This period the mother gayal threats if a person or other animal approaches closely to her baby. She browses and grazes around her newborn baby so that she can keep a sharp watching to her calf. After one or two days she used to come back to her herd. The calf brows and play around her mother and suck milk 12-15 times in a day. At the first week gayal mother is very careful about the safety of her baby. After one week gradually she became in normal and calf was found move freely in the herd.

Table 3. Physiological parameters of gayal

Parameters	Seasons	Day time	Bull	Cow	Calf	
			Mean±SD	Mean±SD	Mean±SD	
Temperature (°C)	Summer	Morning	37.81±0.45	37.92±0.51	38.49±0.26	
		Evening	38.64±0.31	38.91±0.44	38.77±0.26	
	Monsoon	Morning	37.91±0.34	38.22±0.29	38.07±0.57	
		Evening	38.83±0.29	38.62±0.32	38.76±0.26	
	Winter	Morning	37.86±0.40	37.68±0.53	37.65±0.51	
		Evening	38.50±0.27	38.65±0.28	38.49±0.51	
	Spring	Morning	37.78±0.08	37.66±0.27	37.80±0.43	
		Evening	38.89±0.23	38.74±0.25	38.77±0.26	
	Pulse rate	Summer	Morning	47±5.16	48±1.41	63.25±5.43
			Evening	62±4.55	53.5±6.45	75.25±3.30
		Monsoon	Morning	56.5±4.43	59.5±1.73	61.25±3.59
			Evening	59.75±5.12	65.25±1.70	69±3.65
Winter		Morning	59.5±5.92	60.5±1.73	62.5±3.69	
		Evening	64±5.83	63.75±0.95	71.25±1.70	
Spring		Morning	53.25±1.26	57.5±1.91	62±2.58	
		Evening	63±0.82	61.75±1.5	69.25±3.86	
Respiration		Summer	Morning	21.5±1.91	19.75±2.21	35±2.70
			Evening	29.25±3.30	24.25±4.19	36.5±4.04
		Monsoon	Morning	24.75±3.09	21.25±2.62	33.5±2.64
			Evening	32.25±2.5	30.5±2.51	40±1.41
	Winter	Morning	31.5±2.64	30±3.55	35.25±0.95	
		Evening	38.75±4.78	36±5.83	41.25±2.62	
	Spring	Morning	23.5±3.87	19.5±1.73	31±1.63	
		Evening	26±2.45	29±0.81	39.5±1.73	
	Rumen movement	Summer	Morning	3.12±0.25	3.13±0.25	5±0
			Evening	4.13±0.25	4.25±0.28	5.37±0.47
		Monsoon	Morning	3.25±0.5	3.13±0.25	4.75±0.28
			Evening	3.75±0.29	4.13±0.25	5.75±0.5
Winter		Morning	3.12±0.25	3.5±0.57	4.87±0.25	
		Evening	3.5±0.58	4.38±0.47	5.62±0.47	
Spring		Morning	3.25±0.29	3.13±0.25	4.87±0.25	
		Evening	3.75±0.5	4.25±0.28	5.87±0.25	

Table 4. Haematological parameters of gayal

Parameters	Unit	Value (Mean±SD)
RBC	Millions/cu. mm	7.01±0.52
WBC	Thousands/cu. mm	14.3±3.69
Haemoglobin concentration	gm %	9.81±2.25
PCV	%	35.86±3.68
Differential leucocyte count:		
<i>Neutrophils</i>	%	28.23±1.75
Lymphocytes	%	62±2.05
Monocytes	%	4.4±1.34
Eosinophils	%	5±2.49
Basophils	%	0.4±0.51

**Figure 1.** Physical appearance of male gayal.

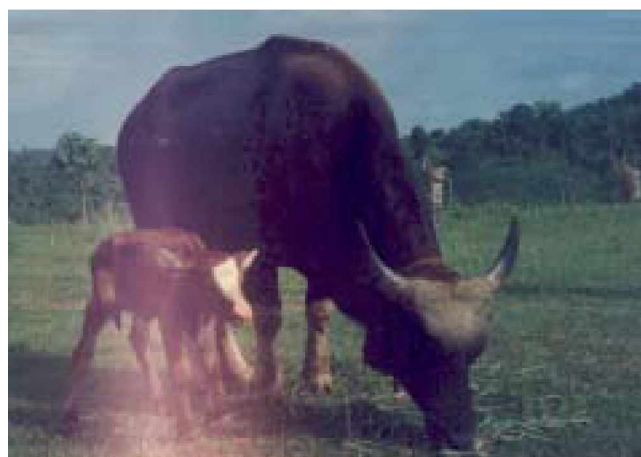
Investigative behavior

It is very difficult to bring them to plain land from hills. The animal shows the watchful behavior in new environment. They become very excited and nervousness with strangers and try to run away in the deeper forest. They like humid and shady land and save themselves from the heat or direct sunlight. During noon they hid themselves in the dense forest areas. They show reluctant to browse or graze with cattle in new environment but after few days they become habituated with this practice. Sometime they hide themselves in deep forest with their other fellows of the herd. They are not accustomed with medication or injection. It becomes a great problem to control a male gayal, but he becomes more docile when he get a female gayal as his companion.

Physical character

At a glance physical characters of gayal described in Table 1. The gayal is a large medium sized, deep-chested, fine-legged animal. The color is usually black. The muzzle fat and switch are black and legs are white up to the hocks.

The male gayal is darker than the female, the coat color becoming dark brown to black at maturity. At birth the calves of both sexes possess a golden to reddish-brown coat with typical light spot on the back of the legs. The black color disappears and the reddish-brown coat color returns

**Figure 2.** Physical appearance of female gayal with calf.

after few months. The hair is short, fine and smooth. The skin is pigmented and fine.

The head is broad and short with a flat poll, the ears are of medium size and erect. The horns of the male are large, grow side ways and then upwards and are pointed.

Considerably small horns are observed in female. The male possesses a definite crest and dewlap is well developed in both sexes. The udder of the female is poorly developed and covered with hair. The gayal possesses beef type characters they have well-developed musculature.

Physiological parameters

Average rectal temperature, pulse rate, respiration and rumen movement of different classes of gayals in different seasons, shown in Table 3. Average rectal temperature in bull, cow and calf was same. Low temperature was observed in morning time and high temperature in evening (1-2°C) time in all groups. High temperature also observed in summer and spring where as low temperature observed in winter and monsoon seasons. This observation supported by Samad (1996), who reported daytime and environmental condition increased the body temperature of animals. High pulse rate and respiration observed in evening then morning in all groups. High respiration and pulse rate also observed in winter season than other seasons. During morning the

animal always in resting condition, which cause reduce temperature, pulse and respiration rate where as after grazing in the lilly field the animal perform exercise and show high temperature, pulse rate and respiration in all groups of animals. Rumen movement observed high in calf than bull and cow, but significant difference observed between seasons to seasons. This observation supported by Majid et al. (1995) who worked on this animal in Bangladesh.

The average hematological values on blood samples of ten gayals determined in this investigation, presented in Table 4. The RBC and WBC count were 7.01 ± 0.52 million/cu.mm and 14.3 ± 3.69 thousand/cu.mm respectively. Hemoglobin concentration 9.81 ± 2.25 gm % and PCV 35.86 ± 3.68 %. Ahmad et al. (1968) reported lower RBC and WBC count and similar Hemoglobin concentration and PCV from the local cattle of Bangladesh. Similar observation also reported by Radostits et al. (1995) and Samad (1996). Differential leucocyte count shows neutrophils 28.23 ± 1.75 , lymphocytes 62 ± 2.05 , monocytes 4.4 ± 1.34 , eosinophils 5 ± 2.49 and basophils 0.4 ± 0.51 percent. Ahmad et al. (1968) also similar observation in local domestic cattle from Bangladesh. Radostits et al. (1995) recorded similar information about domestic cattle.

REFERENCES

- Ahmad, A., S. U. Ahmed and M. A. Maleque. 1968. Some hematological values for the Pabna cattle. *Pakistan Journal of Veterinary Science*. 2(1):41-43.
- Baur, J. D., P. C. Ackerman and G. Toro. 1974. *Clinical laboratory methods*. Eighth edition, the C. V. Mosby Co. Saint Louis.
- Coles, E. H. 1980. *Veterinary clinical pathology*. Third edition. W. B. Saunders Co. London.
- Faiz, M. A. 1968. Gyal in Chittagong hill tracts. *Pakistan journal of veterinary science*. 2(1): 7-11.
- Huque, K. S., M. M. Rahman and M. A. Jalil. 2001. Study on the growth pattern of Gayal (*Bos frontalis*) and their crossbred calves. *Asian-Aust. J. Anim. Sci.* 14(9):1245-1249.
- Majid, M. A., M. M. Mia and A. I. Talukder. 1995. Development of Gayal-Friesian breeding in Bangladesh. Progress report, Animal Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka.
- Radostits, O. M., D. C. Blood and C. C. Gay. 1995. *Veterinary Medicine: A textbook of the diseases of cattle, sheep, pig, goats and horses*. Eighth edition. Bailliere Tindal, London.
- Samad, M. A. 1996. *Animal Husbandry and Medicine*. Lyric-Epic Prokasoni, Bangladesh.
- Simoons, F. J. and Simoons. 1968. *A ceremonial Ox of India. The Mithan in nature, culture and history*. The University of Wisconsin Press, Madison. Wisconsin, USA.
- Tint, T. 1993. Utilization of indigenous animal species in Myanmar. *Asian Livestock*. Vol. XVIII No. 10. pp. 115-119.