



## PHYSIOLOGICAL AND HAEMATO-BIOCHEMICAL STUDIES OF THREE COLOUR VARIETIES OF BENGAL GOATS IN THEIR HOME TRACT UNDER HOT-HUMID CONDITIONS

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<sup>#</sup>Part of PhD Thesis of the first author submitted to Visva Bharati University (a Central University), West Bengal, India

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### ABSTRACT

The present study communicates the physiological attributes and haemato-biochemical profiles of three colour varieties of Bengal goats in their home tract under village conditions in West Bengal. Non-pregnant adult females (does) aged between 1½ -2 years of the three colour varieties of Bengal goats, viz., Black Bengal, Brown Bengal and White Bengal goats were used for determining physiological attributes like rectal temperature, respiration rate and pulse rate; haematological parameters like total leucocyte count (TLC), total erythrocyte count (TEC), packed cell volume (PCV), erythrocyte sedimentation rate (ESR) and haemoglobin (Hb); and various biochemical profiles like total protein, albumin, globulin, glucose, SGOT, SGPT and AP. Analysis of variance indicated non-significant effect of colour variety on different physiological attributes, haematological values and serum biochemical profiles. The observed values of physiological, haematological and blood biochemical parameters were within the normal biological limits of the species. It can be concluded that there was no remarkable variation among the three colour varieties of Bengal goats in regard to physiological, haematological and serum biochemical attributes studied.

**KEYWORDS:** Physiological, haemato-biochemical profile, Black Bengal, Brown Bengal, White Bengal goats

### INTRODUCTION

Many reports are available on the characterization and performances of Black Bengal goat, which is a recognized goat breed in India as per ICAR-National Bureau of Animal Genetic Resources (Accession No. INDIA\_GOAT\_2100\_BLACK-BENGAL\_06004). It is found in West Bengal, north-eastern states of India and also in the neighbouring country Bangladesh. However, information about the other two prominent colour varieties of this goat breed is not commonly found in the available literatures. Keeping in view of its importance for socio-economic development of poor people as well as to assess the potential of indigenous breeds/varieties of goats, a study is being undertaken to know the variation of their physiological attributes and haemato-biochemical profiles of three colour varieties of Bengal goats under field conditions in their home tract in West Bengal.

### MATERIALS & METHODS

The present work was done in Nadia district of West Bengal, which is located between 22°52'30" and 24°05'40" parallels of North latitudes and 22°08'10" and 88°48'15" meridians of East Longitudes and characterized by an oppressive hot summer, high humidity all the year round and well distributed rainfall (average ambient temperature ranged from 21.3°C minimum to 31.8°C maximum, relative humidity 61.5% minimum to 92.9% maximum and annual average rainfall 1419 mm). The work was carried out during the year 2013 at ten villages

of Nadia district of West Bengal, India having hot-humid climatic conditions.

Twenty non-pregnant adult females (does) aged between 1½ -2 years each of the three colour varieties of Bengal goats were used for determining physiological attributes viz., rectal temperature, respiration rate and pulse rate, which were recorded once a day at about 9 am-11 am for consecutive 7 days leading to 140 observations of each parameter for each colour variety of Bengal goats. The data were compiled to get the mean values of rectal temperature, respiration rate and pulse rate. Thirty non-pregnant does aged between 1½ -2 years of the three colour varieties of Bengal goats (10 Black Bengal, 10 Brown Bengal and 10 White Bengal) were used for haemato-biochemical studies. Blood samples (10 ml) were collected aseptically from jugular vein in both non-EDTA (Ethylene diamine tetra acetate) and vacutainer tubes (EDTA (@ 1 mg/ml of blood) at about 8 am to 10 am once daily for consecutive 3 days and analysed for various haematological and serum biochemical profiles respectively. The uncoagulated blood samples were used for haematological assessment viz. total leucocyte count (TLC), total erythrocyte count (TEC), packed cell volume (PCV), erythrocyte sedimentation rate (ESR) and haemoglobin (Hb) as per standard methods (Schalm *et al.*, 1975). TLC and TEC was estimated by using Neubauer's haemocytometer, PCV and ESR by Micro-haematocrit method, and Haemoglobin was estimated by the Sahli's acid haematin method. The non-EDTA blood was allowed to clot and the separated serum samples were decanted

into autoclaved plastic vial and stored in Eppendorf tubes at  $-20^{\circ}\text{C}$  till analysis was done. Serum samples were analyzed for total protein, albumin, and globulin (by the modified Biuret method, Dumas, 1971 and Verley, 1980), glucose (by the Glucose oxidase-peroxidase (GOD-POD) method), serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) by 2, 4-DNPH (dinitrophenylhydrazine) method of Reitman and Frankel (1957) and alkaline phosphates (AP, by the method of Kind and King, 1954) in a semi-automatic blood analyzer using commercial kit (from EMerck., India Ltd., Mumbai, India). The generated data were compiled to get mean values of the haemato-biochemical parameters of the three colour varieties of Bengal goats. The data generated from this study were subjected to statistical analysis following the standard procedures (Snedecor and Cochran, 1967).

## RESULTS & DISCUSSION

### Physiological responses

Physiological attributes of Black, Brown and White colour varieties of Bengal goats are presented in Table 1. The mean values of rectal temperature, respiration rate and pulse rate were  $102.82 \pm 0.152$   $^{\circ}\text{F}$ ,  $23.30 \pm 0.857$  per minute and  $63.70 \pm 0.539$  per minute, respectively in Black Bengal goats,  $102.68 \pm 0.241$   $^{\circ}\text{F}$ ,  $22.30 \pm 0.932$  per minute and  $65.00 \pm 0.615$  per minute, respectively in Brown Bengal goats and  $102.34 \pm 0.158$   $^{\circ}\text{F}$ ,  $23.80 \pm 0.929$  per minute and  $64.50 \pm 0.806$  per minute, respectively in White Bengal goats. Analysis of variance of colour variety on different physiological attributes indicated non-significant effect in all the colour varieties of Bengal goats. The observed values of the physiological attributes were within the normal biological limits and these were expected from any such study. The present findings are in close agreement with the findings of Sahoo *et al.* (2004) and Samanta *et al.* (2009).

**TABLE 1:** Physiological attributes of three colour varieties of Bengal goats

Colour varieties	Physiological attributes (Mean $\pm$ SE)		
	Rectal temperature ( $^{\circ}\text{F}$ )	Respiration rate (per minute)	Pulse rate (per minute)
Black	$102.82^{\text{a}} \pm 0.152$ (140)	$23.30^{\text{a}} \pm 0.857$ (140)	$63.70^{\text{a}} \pm 0.539$ (140)
Brown	$102.68^{\text{a}} \pm 0.241$ (140)	$22.30^{\text{a}} \pm 0.932$ (140)	$65.00^{\text{a}} \pm 0.615$ (140)
White	$102.34^{\text{a}} \pm 0.158$ (140)	$23.80^{\text{a}} \pm 0.929$ (140)	$64.50^{\text{a}} \pm 0.806$ (140)
SEm ( $\pm$ )	0.188	0.906	0.633
CD (P=0.05)	NS	NS	NS

The subclass means with common superscripts within the columns do not differ significantly from each other; p 0.05-Significant, NS-Non-significant. Figures in the parenthesis indicate number of observation.

### Haematological profile

Haematological profiles of Black, Brown and White colour varieties of Bengal goats are presented in Table 2. The mean values of total leucocyte count (thousand/dl), total erythrocyte count (million per cubic millimeter), packed cell volume (percent), erythrocyte sedimentation rate (mm h<sup>-1</sup>) and haemoglobin (g/dl) were  $7.29 \pm 0.016$ ,

$12.36 \pm 0.011$ ,  $27.35 \pm 0.011$ ,  $0.145 \pm 0.012$  and  $10.24 \pm 0.013$ , respectively in Black Bengal goats,  $7.28 \pm 0.024$ ,  $12.34 \pm 0.010$ ,  $27.34 \pm 0.013$ ,  $0.138 \pm 0.009$  and  $10.25 \pm 0.014$ , respectively in Brown Bengal goats, and  $7.30 \pm 0.011$ ,  $12.35 \pm 0.009$ ,  $27.35 \pm 0.011$ ,  $0.142 \pm 0.008$  and  $10.26 \pm 0.012$ , respectively in White Bengal goats.

**TABLE 2:** Haematological profile of three colour varieties of Bengal goats

Colour varieties	Haematological profile (Mean $\pm$ SE)				
	Total Leucocyte Count (thousand/dl)	Total Erythrocyte Count (million per cubic millimeter)	Packed Cell Volume (percent)	Erythrocyte Sedimentation Rate (mm h <sup>-1</sup> )	Haemoglobin (g/dl)
Black	$7.29^{\text{a}} \pm 0.016$ (30)	$12.36^{\text{a}} \pm 0.011$ (30)	$27.35^{\text{a}} \pm 0.011$ (30)	$0.145^{\text{a}} \pm 0.012$ (30)	$10.24^{\text{a}} \pm 0.013$ (30)
Brown	$7.28^{\text{a}} \pm 0.024$ (30)	$12.34^{\text{a}} \pm 0.010$ (30)	$27.34^{\text{a}} \pm 0.013$ (30)	$0.138^{\text{a}} \pm 0.009$ (30)	$10.25^{\text{a}} \pm 0.014$ (30)
White	$7.30^{\text{a}} \pm 0.011$ (30)	$12.35^{\text{a}} \pm 0.009$ (30)	$27.35^{\text{a}} \pm 0.011$ (30)	$0.142^{\text{a}} \pm 0.008$ (30)	$10.26^{\text{a}} \pm 0.012$ (30)
SEm ( $\pm$ )	0.018	0.010	0.012	0.010	0.013
CD (P=0.05)	NS	NS	NS	NS	NS

The subclass means with common superscripts within the columns do not differ significantly from each other; p 0.05-Significant, NS-Non-significant. Figures in the parenthesis indicate number of observation.

Analysis of variance indicated non-significant effect of colour variety on different haematological values in Black, Brown and White Bengal goats, and the observed values were within normal biological limits of the species. The

present findings are in close agreement with the earlier findings (Shaikat *et al.*, 2013, Sejian *et al.*, 2008, Hossain *et al.*, 2011, Shah *et al.*, 2010 and Mohare and Mahanta, 2013). Al-Sultan and El-Bahr (2014) observed the mean

values of neutrophil percentage of sheep received 0.2 % urea ( $48.8 \pm 4.1$ ) compared to that of sheep received 0.1% urea ( $67.7 \pm 1.0$ ) and control group ( $63.3 \pm 8.2$ ). Moreover, percentage of lymphocyte of sheep received 0.2 % urea was increased significantly ( $50.7 \pm 4.1$ ) compare to that of sheep received 0.1% urea ( $31.9 \pm 1.00$ ) and control group ( $36.2 \pm 8.2$ ).

### Serum biochemical profiles

Various blood biochemical profiles of Black, Brown and White colour varieties of Bengal goats are presented in Table 3.

The mean values of total protein, albumin, globulin, glucose, SGOT, SGPT and AP were  $6.36 \pm 0.014$  g/dl,  $3.08 \pm 0.102$  g/dl,  $2.84 \pm 0.012$  g/dl,  $50.68 \pm 0.511$  mg/dl,  $165.07 \pm 0.801$  U/L,  $182.61 \pm 0.439$  U/L and  $281.72 \pm 3.203$  U/L, respectively in Black Bengal goats,  $6.34 \pm 0.015$  g/dl,  $3.24 \pm 0.018$  g/dl,  $2.83 \pm 0.013$  g/dl,  $50.42 \pm 0.230$  mg/dl,  $163.92 \pm 0.549$  U/L,  $182.07 \pm 0.406$  U/L and  $272.99 \pm 4.567$  U/L, respectively in Brown Bengal goats and  $6.34 \pm 0.013$  g/dl,  $3.23 \pm 0.016$  g/dl,  $2.86 \pm 0.011$  g/dl,  $50.65 \pm 0.322$  mg/dl,  $165.10 \pm 0.655$  U/L,  $182.68 \pm 0.391$  U/L and  $282.90 \pm 2.701$  U/L, respectively in White Bengal goats. Analysis of variance indicated that there was no significant variation in different blood biochemical profiles among the three colour varieties of Bengal goats.

The observed values of blood biochemical parameters were within the normal biological limits of the species. The findings are in close agreement with the earlier findings (Shaikat *et al.*, 2013, Sejian *et al.*, 2008, Hossain *et al.*, 2011, Shah *et al.*, 2010 and Mohare and Mahanta, 2013). I. Al-Sultan and M. El-Bahr (2014) observed that in serum biochemistry, sheep received 0.1% and 0.2% of urea dissolved in drinking water caused significant increase in the values of glucose ( $60 \pm 1.1$ ;  $62 \pm 2.1$  mg/dl, respectively), ALT ( $17 \pm 1.1$ ;  $18 \pm 2.1$  U/L), AST ( $105 \pm 1.2$ ;  $107 \pm 2.1$  U/L), creatinine ( $1.5 \pm 0.1$ ;  $1.6 \pm 0.1$  mg/dl) and phosphorus ( $4.1 \pm 1.9$ ;  $5.2 \pm 0.1$  mg/dl) compared to control ( $50 \pm 2.1$ ;  $14 \pm 1.1$ ;  $99 \pm 2.1$ ;  $1.1 \pm 0.1$  and  $2.0 \pm 0.2$ , respectively). Tanritanir *et al.* (2014) observed, before and after administration of minosel oral tablets in goat kids, the levels of different blood parameters *viz.*, Glucose mg/dl  $94.8889 \pm 3.529$  and  $81.0000 \pm 4.021$ , Total protein g/dl  $5.9889 \pm 0.099$  and  $6.0778 \pm 0.255$ , Urea mg/dl  $11.3222 \pm 0.831$  and  $10.6667 \pm 1.518$ , ALP U/L  $937.4444 \pm 158,600$  and  $1103.22 \pm 163.411$ , ALT U/L  $68.3333 \pm 14,213$  and  $74.1111 \pm 17.329$ , AST U/L  $207.6250 \pm 38.685$  and  $105.1250 \pm 16.629$ , LDH U/L  $693.1111 \pm 111.874$  and  $515.8889 \pm 91.593$ , Calcium mg/dl  $8.21 \pm 0.83$  and  $9.1667 \pm 0.572$ .

**TABLE 3:** Blood biochemical profile of three colour varieties of Bengal goats

Colour varieties	Blood biochemical profile (Mean $\pm$ SE)						
	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Glucose (mg/dl)	SGOT (U/L)	SGPT (U/L)	AP (U/L)
Black	$6.36^{a\pm} 0.014$ (30)	$3.08^{a\pm}$ 0.102 (30)	$2.84^{a\pm} 0.012$ (30)	$50.68^{a\pm} 0.511$ (30)	$165.07^{a\pm}$ 0.801 (30)	$182.61^{a\pm}$ 0.439 (30)	$281.72^{a\pm}$ 3.203 (30)
Brown	$6.34^{a\pm} 0.015$ (30)	$3.24^{a\pm}$ 0.018 (30)	$2.83^{a\pm} 0.013$ (30)	$50.42^{a\pm} 0.230$ (30)	$163.92^{a\pm}$ 0.549 (30)	$182.07^{a\pm}$ 0.406 (30)	$272.99^{a\pm}$ 4.567 (30)
White	$6.34^{a\pm} 0.013$ (30)	$3.23^{a\pm}$ 0.016 (30)	$2.86^{a\pm} 0.011$ (30)	$50.65^{a\pm} 0.322$ (30)	$165.10^{a\pm}$ 0.655 (30)	$182.68^{a\pm}$ 0.391 (30)	$282.90^{a\pm}$ 2.701 (30)
SEm ( $\pm$ )	0.014	0.060	0.012	0.373	0.676	0.413	3.578
CD	NS	NS	NS	NS	NS	NS	NS
(P=0.05)							

The subclass means with common superscripts within the columns do not differ significantly from each other; p 0.05-Significant, NS-Non-significant. Figures in the parenthesis indicate number of observation.

SGOT-Serum glutamate oxaloacetate transaminase/AST-Aspartate aminotransferase, SGPT- Serum glutamate pyruvate transaminase/ALT-Alanine aminotransferase, AP-Alkaline phosphatase

### CONCLUSION

From the present study, it can be concluded that physiological, haematological and serum biochemical studies, there was no remarkable variation among the three colour varieties of Bengal goats under field conditions in their home tract.

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