Bangladesh livestock journal. 2016. 2: 30-32 ISSN 2409-7691

Hemogram and serum biochemistry of Black Bengal Buck

Md. Royhan Gofur, Khandoker Mohammad Mozaffor Hossain* and Shah Md. Abdur Rauf
Department of Animal Husbandry and Veterinary Science, University of Rajshahi, Bangladesh

Abstract

Context: Hemogram and serum biochemistry and its knowledge can be used to assess the health as well as the physiological status of farm animals. Normal hemogram and serum biochemistry are the key factors for soundness of breeding bucks.

Objectives: The aim of this study was to estimate the baseline information on hemogram and biochemical parameters of Black Bengal buck and to compare the recorded values with those reported by other researchers in goat.

Materials and Methods: The hemogram of Black Bengal bucks (n=5, eight months old, apparently healthy) was determined by Automated Mythic-22 Hematology Analyzer and the biochemical values were determined by using humalyzer-2000.

Results: The erythrocyte indices of Black Bengal buck were RBC 10.26±0.68 $\times 10^6$/µl, hemoglobin 9.56±0.92 g/dl, PCV 28.83±0.78 %, MCV 27.79±1.08 fl, MCH 9.23±0.27 pg and MCHC 33.13±0.48 g/dl. The leucocyte indices were WBC 12.06±0.56 $\times 10^3$/µl; neutrophil, eosinophil, basophil, lymphocyte and monocyte were 36.6±0.81, 4.6±0.50, 0.6±0.24, 55.4±1.72 and 2.4±0.51%, respectively. The lipid profile includes total cholesterol, triglyceride, HDL and LDL which were 67.33±3.38, 44.33±1.45, 40.33±2.08 and 17.66±1.45 mg/dl, respectively. The total serum protein, albumin and globulin were 6.66±0.26, 3.91±0.14 and 2.75±0.36 g/dl, respectively. Glucose level was 70.23±2.71 g/dl. The SGPT and SGOT levels were 11.21±0.37 unit/L and 16.73±0.75 unit/L, respectively.

Conclusions: Most of the values were within the normal range described by different authors in goats with a few exceptions and the recorded value of hemato-biochemical parameters indicated the breeding soundness of Black Bengal buck. The present values could be used to evaluate the breeding soundness of Black Bengal buck.

Key words: Erythrocyte indices, leucocyte indices, lipid, serum protein, glucose

Introduction

Bangladesh is a tropical agro-based developing country, possesses the third largest repository of goats, with a population of more than 34 million heads, about 57% of total livestock in Bangladesh. The Black Bengal goats are famous for its adaptability, fertility, fecundity, delicious meat, superior skin, extreme disease resistance and wide range of acceptability under adverse agro-climatic evaluation of the management practices, nutritional condition (FAO, 2008). International Atomic Energy Agency (IAEA) claimed that among the developing countries, Bangladesh is home to one of the richest treasures, prized Black Bengal goats. The Black Bengal goat used as a tool to promote sustainable livelihoods in rural Bangladesh. Since 1998, Bangladesh Livestock Research Institute has been attempted to improve Black Bengal goat through selective breeding (Faruque *et al.,* 2010). Recently, artificial insemination (AI) of goats being popular to improve the genetics of the goat herd.

Serum biochemistry and hematological analysis have been found to be important and reliable means for assessing an animal's health status and might give an indication of the degree of damage to host tissue as well as severity of infection (Otesile *et al.*, 1991; Daramola *et al.,* 2005; Etim *et al.,* 2014). Testosterone plays a crucial role in the proper development of male reproductive tissues (Winters, 1999) and affect the hemogram of animals. Haematological studies are of ecological and physiological interest in helping to understand the relationship of blood characteristics to the environment (Ovuru and Ekweozor, 2004) and so, could be useful in the selection of animals that are genetically resistant to certain diseases and environmental conditions (Mmereole, 2008; Isaac *et al.,* 2013). Animals with good blood composition are likely to show good performance (Isaac *et al.,* 2013). Determination of the haematological and biochemical parameters of animals helps veterinarians to confirm clinical diagnoses, determine stresses due to environmental, nutritional and/or pathological factors, estimate the severity of cases, administer appropriate treatment, and evaluate outcomes (Roubies *et al.,* 2006; Afolabi *et al*., 2010). It is needed to establish an appropriate physio-biochemical baseline values for Black Bengal buck of Bangladesh which will help in realistic evaluation of the management practices, nutritional status and diagnosis of health conditions. Such knowledge is essential for a professional to evaluate the status of breeding soundness of a breeding buck. Though the hematological and biochemical values are important for evaluation of health status of animal, very few works has been undertaken in relation with Black Bengal buck. Therefore, the present study was aimed to estimate the baseline information on hemogram and serum biochemistry of Black Bengal buck.

Materials and Methods

Collection of blood samples

A total of 7.5 ml of blood from each Black Bengal buck (n=5, eight months old, apparently healthy) was collected by jugular venipuncture using a sterile needle and syringe. Five ml of blood of each buck was put into commercially prepared tubes containing EDTA as anticoagulant, while 2.5 ml was put in separate tubes without anticoagulant. The samples were taken before 10 AM in the morning when the animals were calm and the ambient temperature was low. Thereafter, the samples were immediately taken to the laboratory for analyses.

Hematological analysis

The hematological analysis was carried out by Automated Mythic-22 Hematology Analyzer.

Biochemical analysis

The biochemical analysis was performed by HUMALYZER-2000. The glucose, protein and lipid profile were measured by

* Corresponding author: mozaffor03@yahoo.com

using end point method and serum enzyme (SGOP and SGPT) level was measured by using kinetic method.

Statistical analysis

Data were analyzed with the help of SPSS version 20. The values were represented as mean ± standard error (SE).`

Results and Discussion

The erythrocyte indices of Black Bengal buck in the present study were RBC 10.26±0.68 ×10^6/µl, hemoglobin 9.56±0.92 g/dl, PCV 28.83±0.78 %, MCV 27.79±1.08 fl, MCH 9.23±0.27 pg and MCHC 33.13±0.48 g/dl (Table 1). The values were within the reliable range as described by Coles (1986), Plumb (1999), Feldman *et al.* (2000), Daramola *et al.* (2005), and Olaifa and Opara (2011) in goats. However, RBC was lower than 13-14 10^6×/µl and 11.5 ± 0.4 10^6×/µl as reopeted by Swenson (1977) and Daramola *et al.* (2005), respectively. Similarly, hemoglobin (Hb) was also lower than 10.6 g/dl as described by Harvey (1962). Whereas, MCV was higher than 16-25 fl and MCH was also higher than 5.2 - 8.0 pg as described by Plumb (1999) and Feldman *et al.* (2000).

Table 1. Erythrocyte and leucocyte indices of Black Bengal buck (mean ± SE)

Erythrocyte		Leucocyte	
Parameters	**Values**	**Parameters**	**Values**
RBC (×10^6/µl)	10.26±0.68	WBC (×10^3/µl)	12.06±0.56
Hemoglobin (g/dl)	9.56±0.92	Neutrophil (%)	36.6±0.81
PCV (%)	28.83±0.78	Eosinophil (%)	4.6±0.50
MCV (fl)	27.79±1.08	Basophil (%)	0.6±0.24
MCH (pg)	9.23±0.27	Lymphocyte (%)	55.4±1.72
MCHC (g/dl)	33.13±0.48	Monocyte (%)	2.4±0.51

The leucocyte indices in this study were WBC 12.06±0.56×10^3/µl; neutrophil, eosinophil, basophil, lymphocyte and monocyte were 36.6±0.81, 4.6±0.50, 0.6±0.24, 55.4±1.72 and 2.4±0.51%, respectively (Table 1). The values were within the reliable range as described by Coles (1986), Reece (1991), Plumb (1999), Feldman *et al.* (2000) and Daramola *et al.* (2005) in goats. However, WBC was lower than 13.5 ± 0.8 10^3×/µl as reported by Daramola *et al.* (2005). Similarly, monocyte was lower than 5% as described by Reece (1991) and Swenson (1977) in goat. These differences in the hematological parameters might be due to breed, age, sex, feeding and management, evaluation technique, collection time, season and other environmental factors and may also due to any internal diaease.

The normal serum biochemistry (biochemical values) of Black Bengal bucks includes lipid profiles, glucose and protein level and serum enzyme levels.The lipid fraction of animal body includes cholesterol, triglycerides, and lipoproteins. These components attract clinical attention when present in abnormal concentrations. Increased or decreased levels usually occur because of abnormalities in the synthesis, degradation, and transport of their associated lipoprotein particles. Increased concentration of plasma lipids may occur as a secondary phenomenon in a large variety of diseases. The lipid profile of Black Bengal bucks of present study were cholesterol, triglyceride, HDL and LDL which were 67.33±3.38, 44.33±1.45, 40.33±2.08 and 17.66±1.45 mg/dl, respectively (Table 2). These values were within the reliable range as described by Plumb (1999), Solaiman *et al.* (2006), Elitok (2012) and Monfared (2013) in goats. However, cholesterol level was lower than 47.25 ± 2.9 mg/dl as reported by Monfared (2013); HDL and LDL were lower than 55.66±3.34 and 24.13±2.46 mg/dl, respectively as showed by Elitok (2012). Osman and AlBusadah (2003) reported that a mean value for cholesterol was 69.6±5.7 mg/dL for ewes in Saudi Arabia. Very low density lipoprotein (VLDL) value was almost similar to those reported by Elitok (2012) and Monfared (2013). The LDL/HDL ratio of Black Bengal buck of present study was in accord with the results of Khan *et al.* (2013) and Salem *et al.* (2009).

Table2. Serum biochemistry of Black Bengal buck (mean ± SE)

Lipid profile		Protein and other profiles	
Parameters	**Values**	**Parameters**	**Values**
Cholesterol (mg/dl)	67.33±3.38	Total serum protein (g/dl)	6.66±0.26
Triglyceride (mg/dl)	44.33±1.45	Albumin (g/dl)	3.91±0.14
HDL (mg/dl)	40.33±2.08	Globulin (g/dl)	2.75±0.36
LDL (mg/dl)	17.66±1.45	Albumin/Globulin (ratio)	1.48±0.21
VLDL (mg/dl)	8.87±0.29	Glucose (g/dl)	70.23±2.71
LDL/HDL (ratio)	0.44±0.03	SGPT (Unit/L)	11.21±0.37
		SGOT (Unit/L)	16.73±0.75
		SGOT/SGPT (ratio)	1.49±0.02

In the present study, the total serum protein, albumin and globulin were 6.66±0.26, 3.91±0.14 and 2.75±0.36 g/dl, respectively. Glucose level was 70.23±2.71 g/dl. The SGPT and SGOT levels were 11.21±0.37 unit/L and 16.73±0.75 unit/L, respectively (Table 4). The total serum protein level in Black Bengal buck was in the optimum range as described by Plumb (1999), Feldman *et al.* (2000) and Olaifa and Opara (2011). However, total serum protein was lower than 7.1 ± 0.1 g/dl and 8.02±0.22 g/dl as reported by Daramola *et al.* (2005) and Sultana *et al.* (2011), respectively. Whereas, the albumin was higher than 3.03± 0.13 g/dl and globulin was lower 4.99± 0.23 g/dl as reported by Sultana *et al.* (2011) but globulin was higher than 2.30 g/dl as reported by Coles (1986). Similarly, Lower serum albumin concentration (3.7±0.1 g/dl) for sheep in Saudi Arabia was reported by Osman and Al-Busadah (2003). The albumin/globulin ratio was somewhat higher than the value reported by Salem *et al.* (2009) and lower than the value reported by Khan *et al.* (2013). They reported the albumin/globulin ratio was 1.30 in rats and 1.73 in sheep, respectively.

The glucose and enzymatic properties of blood serum in Black Bengal buck were within the optimum range and in accordance with the findings of Plumb (1999), and Olaifa and Opara (2011). However, glucose level was higher than the range 45-60 g/dl as deccreibed by Swenson (1977). Whereas, SGPT and SGOT was lower than 15.96 ± 1.04unit/L and 57.50±2.18 unit/L, respectively as reported by Sultana *et al.* (2011) but SGPT level was somewhat higher than 8.90±0.90 unit/L, as reported by Daramola *et al.* (2005). Similarly, Oduye and Adadevoh (1976) reported AST/SGOT (67.9±4.9 U/L) and ALT/SGPT (10.0±1.1 U/L) activities in West African Dwarf sheep. The assay of transaminase enzyme activity (SGOT and SGPT) is a good indicator of semen quality because it measures sperm membrane stability (Khokhar *et al.,* 1987). The SGOT/SGPT

(AST/ALT) ratio of present study was similar to the findings of Salem *et al.* (2009) and Pandey *et al.* (2014) but somewhat lower to the findings of Daramola *et al.* (2005). Pandey *et al.* (2014) reported the AST/ALT ratio as 1.49 in Bhadawari buffalo bull and Salem *et al.* (2009) reported the ratio as 1.58 in rats but Daramola *et al.* (2005) showed the ratio 2.35 in goat. The AST/ALT ratio is usually increased in cirrhosis and in the first day or two of acute hepatitis or injury from bile duct obstruction. In muscle injury, AST is often much higher than ALT (often 3-5 times as high). These differences in the serum biochemistry might be due to breed, age, sex, feeding and management, evaluation technique, collection time, season and other environmental factors and may also due to any internal diaease.

Conclusions

The present study represents the normal hemogram and serum biochemistry of Black Bengal buck. Most of the values were within the reliable range described by different authors in goats with a few exceptions. Intensive studies on all the haemato-biochemical parameters with some micro-minerals were needed to establish a final reference values. However, the recorded values regarding hemogram and serum biochemistry of the present study could be used to evaluate the breeding soundness of Black Bengal buck.

Author's contribution

Authors have no conflict of interest to report.

References

Afolabi KD, Akinsoyinu AO, Olajide R, Akinleye SB. Haematological parameters of the Nigerian local grower chickens fed varying dietary levels of palm kernel cake. Proceedings of 35th Annual Conference of Nigerian Society for Animal Production. 2010; p. 247.

Coles EH. Veterinary Clinical Pathology. 2nd edn. W. B. Saunders Company, Philadelphia, USA. 1986; pp-13, 44-45, 126-127, 138-139.

Daramola JO, Adeloye AA, Fatoba TA, Soladoye AO. Haematological and biochemical parameters of West African Dwarf goats. Livestock Research for Rural Development. 2005; 17(8): 95.

Elitok B. Reference values for hematological and biochemical parameters in saanen goats breeding in Afyonkarahisar province. Kocatepe Vet J. 2012; 5 (1): 7–11.

Etim NN, Williams ME, Akpabio U, Offiong EEA. Haematological parameters and factors affecting their values. Agricultural Science. 2014; 2(1): 37-47.

FAO (Food and Agricultural Organization of the United Nations) 2008. FAOSTAT http://faostat.fao.org/ default.

Faruque S, Chowdhury SA, Siddiquee NU, Afroz MA. Performance and genetic parameters of economically important traits of Black Bengal goat. J. Bangladesh Agril. Univ. 2010; 8(1): 67–78.

Feldman BV, Zinkl JG, Jain NC. Schalm's Veterinary Hematology. 5th edn. Lippincott Williiams & Wilkins, Philadelphia, USA. 2000; p-1077.

Harvey DG. Biochemistry for Veterinary Students. 1st edn. Blackwell scientific publications, Oxford. 1962; pp- 134-135.

Isaac LJ, Abah G, Akpan B, Ekaette IU. Haematological properties of different breeds and sexes of rabbits. Proceedings of the 18th Annual Conference of Animal Science Association of Nigeria. 2013; pp. 24-27.

Khan KMH, Ahmed KA, Ahmad EH, Omar CA. Study some serum biochemical parameters of karadi sheep in Sulaimani city, Iraq. Res. Opin. Anim. Vet. Sci., 2013; 3(12): 443-446.

Khokhar BS, Mehar S, Chaudhary KC. Transaminases in cattle and buffalo (*Bubalis bubalis*) semen in relation to fertility and seminal characteristics during moderate and colder seasons. Anim. Reprod. Sci., 1987; 13: 177-182.

Mmereole FUC. The effects of replacing groundnut cake with rubber seed meal on the haematological and serological indices of broilers. Int. J. Poul. Sci, 2008; 7(6): 622-624.

Monfared AL. Correlation of serum lipid profile with histological and seminal parameters of testis in the goat. I. J. Fertil. Steril. 2013; 7(2): 122-129.

Oduye OO, Adadevoh BK. Biochemical values of apparently normal Nigerian Sheep. Nigeria Vet. J., 1976; 5: 43-50.

Olaifa AK, Opara MN. Haematological and biochemical parameters of West African Dwarf (WAD) bucks castrated by the Burdizzo method. Vet. Arhiv. 2011; 81: 743-750.

Osman TEA, Al-Busadah KA. Normal concentration of twenty serum biochemical parameters of she-camels, cows and ewes in Saudi Arabia. Pakistan J. Bio. Sci., 2003; 6: 1253-1256.

Otesile EB, Fagbemi BO, Adeyemo O. The effect of Trypanosoma brucei infection on serum biochemical parameters in boars on different planes of dietary energy. Vet. Parasito., 1991; 40(3-4): 207-216.

Ovuru SS, Ekweozor IKE. Haematological changes associated with crude oil ingestion in experimental rabbits. African J. Biotechno. 2004; 3(6): 346-348.

Pandey V, Nigam R, Singh P, Sharma A, Saxena A, Swain DK, Sharma L, Dixit S. Influence of Season on Biochemical Attributes of Bhadawari Buffalo Bull Semen: Effect of Temperature and Humidity. J. Anim. Res, 2014; 4(2): 201-209.

Plumb DC. Veterinary Drug Handbook. Iowa State University Press, USA. 1999.

Reece OR. Physiology of Domestic Animals. 12th edn. Lea & Febiger, Philadelphia, USA. 1991; p-103.

Roubies N, Panousis N, Fytianou A, Katsoulos PD, Giadinis N, Karatzias H. Effects of age and reproductive stage on certain serum biochemical parameters of Chios sheep under Greek rearing conditions. J. Vet. Med. A Physiol. Pathol. Clin. Med., 2006; 53: 277-281.

Salem SA, El-Agamy EI, Salama FA, AboSoliman NH. Biological value of goat milk casein. Tropical and Subtropical Agroecosystems, 2009; 11: 15 -21.

Solaiman SG, Shoemaker CE, Jones WR, Kerth CR. The effects of high levels of supplemental copper on the serum lipid profile, carcass traits, and carcass composition of goat kids. J. Anim. Sci. 2006; 84(1): 171-177.

Sultana M, Verma PK, Raina R, Pankaj NK, Dubey N, Khan AM, Naseem S. Evaluation of biochemical indices in pregnant and non-pregnant goats. J. Res, SKUAST-J, 2011; 10(1): 113-116.

Swenson MJ. Duck's Physiology of Domestic Animals. 9th edn. CBS publishers & distributors, New Delhi, India. 1977; pp- 14-35.

Winters SJ. Current status of testosterone replacement therapy in men. Arch Fam Med. 1999; 8:257-263.