

ESTIMATION OF NORMAL BIOCHEMICAL PARAMETERS IN INDIGENOUS GOAT OF ASSAM: “A PRELIMINARY STUDY”

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Abstract: The blood of indigenous Goat was taken for the experiments to find out the normal biochemical parameters. The venous blood was collected from five randomly selected animals (Goat) irrespective of gender from goat farm of College of Veterinary Science, Khanapara. The animal blood was collected from the Jugular vein. The serum was separated by centrifuging at 3000 rpm for 15 min. The blood profile activity was estimated on the day of collection. The level of blood glucose, total protein, cholesterol, creatinine, blood urea nitrogen along with liver specific enzymes like AST, ALT and mineral profile Calcium and Phosphorus were estimated. It was concluded that the blood parameters were found to be in the normal range. Most of the animals showed deficient plasma mineral status. Mineral deficiency affects hormone status and impairs production potential of animals.

Keywords: ALT, AST, Blood profile, *Capra hircus*, mineral.

1. INTRODUCTION

Goats are considered as one of the most important livestock. Livestock production is a vital component of the Agricultural Industry in India. About 20.5 million people in India depend upon livestock for their livelihood and much effort is being directed towards improving this sector. Goats (*Capra hircus*) are the dominant small ruminants that play a significant role in the rural economy of India and acts as an insurance against crop failure to meet the immediate demand of finance. It also provides an alternative source of livelihood to the farmers all the year round. Goat is known as poor man's cow because goat rearing is a great economic support to a large section of population in rural areas.

Due to the limited information about the local goat breeds about their blood chemistry, it is essential to conduct such a research especially because local people prefer them more than the commercial breeds.

Biochemical profiles are important to be determined because they provide valuable information about the breed, sex and animals health status (Madan *et al.*, 2016). There is considerable information about the normal parameters of blood of the domestic animal

species, but the values are expected to vary according to the breeds, different environmental factors and the different methods of management.

This main objective of the research was to observe the blood chemistry of different indigenous goats as a preliminary study, to compare the obtained results with the standard values.

Table 1: Normal Values for the blood constituents of Goat

Blood parameters	Normal value
Glucose	40 - 60(mg/dl)
Ca	9.5 – 10.5(mg/dl)
Phosphate	3.8 – 7.6(mg/dl)
SGPT(ALT)	15.3-25.3 (IU/L)
SGOT(AST)	50 – 100 (IU/ L)
BUN	13 - 28(mg/dl)
Creatinine	0.9 – 1.8(mg/dl)
Total Protein	6.5 – 7.5(g/dl)
Cholesterol	80-130(mg/dl)

2. METHODOLOGY:

◆Period of Study:

The observation in the present study were made for a period of 60 days from 1st Feb to 31st March 2019. A total of five random goats from the Goat Farm of C.V.Sc, Khanapara were selected for the experiment.

◆Collection of Blood:

Blood samples were collected from 5 random goats. The experimental animals were restrained and blood samples were collected directly from jugular vein of the Goats under aseptic condition by using 15 gauge, 4 inches needle and transferred to 15 ml glass centrifuge tube. Then the tubes were centrifuged at 2000-3000 r.p.m. for 15 min. The serum was separated, kept in plastic vials and stored in deep freeze at -20°C for estimation of blood biochemical constituents.

◆ Biochemical Analysis:

Blood biochemical constituents viz. Blood Glucose, Total Protein, Blood Urea Nitrogen, Creatinine, SGPT, SGOT, Cholesterol, Calcium and Phosphorus were estimated by available kit.

3. RESULTS AND DISCUSSION

Table 2: Values of blood parameters of Indigenous Goat (*Capra hircus*)

Parameters	Sample No.1	Sample No. 2	Sample No. 3	Sample No. 4	Sample No. 5
Glucose(mg/dl)	49.70	43.54	45.23	52.78	49.33
Total protein(g/dl)	6.38	6.42	7.92	6.56	8.49
Creatinine(mg/dl)	1.26	1.85	3.10	2.12	1.98
BUN (mg/dl)	14.68	23.12	33.42	24.01	27.53
ALT (U/L)	16.57	18.24	17.45	14.65	15.72
AST(U/L)	69.37	66.23	61.89	65.98	70.27
Cholesterol(mg/dl)	64.33	63.32	64.53	65.09	62.71
Calcium(mg/dl)	8.01	9.07	8.53	10.24	9.46
Phosphorus(mg/dl)	2.18	3.65	4.53	4.34	4.81

The differences in the values of the biochemical parameters are observed due to the age difference, sex and environmental factors.

3.1. Blood Glucose

Blood glucose appears to be one of the key nutrients affecting cyclicity in farm animals and a minimum level of 40-60 mg/dl is required to maintain the physiological processes of the body (Duke, 1970). Low blood glucose may be associated with infertility. The normal resting blood sugar of non-fasted goat has, as a rule, been found to be below 50 mg per 100 ml. It seemed that such low sugar levels might be indicative of a further peculiarity in the manner in which the goat utilizes carbohydrate (Jessie T. Cutler, 1934). The blood glucose can be used as indices of nutritional status during pregnancy in goats (Khan, J. R., 2002).

3.2. Total Protein:

Proteins are the building blocks of all cells and body tissues. They act as transport substances of hormones, vitamins, minerals, lipids and other materials. Thus, protein act as working horses of the cell (Satyanarayana, 2002). The lower level of serum total protein

might cause a deficiency of certain amino acid required for gonadotropins synthesis, thereby causing reproductive disturbance (Vhora *et al.*, 1995).

3.3. Creatinine:

Creatinine is a waste product that forms when creatine, which is found in muscle, breaks down. Creatinine levels in the blood can provide information about how well kidneys are working. A study conducted by Mbassa and Poulsen (1991), creatinine levels increased in the oldest goats and urea levels were higher in young goats than in adult goats

3.4. Blood Urea Nitrogen (BUN):

Urea is made in the liver and passed out from the body in the urine. A BUN test is done to see how well kidneys are working. If kidneys are not able to remove urea from the blood normally, then BUN level rises. Heart failure, dehydration, or a diet high in **protein** can also make BUN level higher. It is known that dietary protein taken by ruminant is decomposed to amino acids and simpler nitrogenous compounds, especially ammonia, by the action of microorganisms dwelling in rumen, and that these nitrogenous compounds are resynthesized to microbial protein (Phillipson, A. T., 1964).

3.5. Cholesterol:

Cholesterol is naturally produced in liver and intestinal walls. It is also acquired from supplemental food. Cholesterol is a precursor of steroid hormones, bile acids and also required for normal cell function. The level of serum cholesterol is generally lower in goat breeds as compared to other cattle (Akbar Khan, 2003). Cholesterol, the starting point of steroid hormone synthesis, has long been known to be regulatory in both female and male reproductive physiology, especially at the gonad level, also has an effect on gametogenesis (Saez *et al.*, 2011).

3.6. Alanine Aminotransferase (ALT):

Alanine Aminotransferase (ALT), also referred to as glutamate pyruvate transaminase (GPT) is an enzyme involved in amino acid metabolism. It is found in many tissues, but the highest levels are found in liver and kidney tissues. Serum ALT has been recognized as a marker of hepatocellular injury since the 1950s (Sakha *etal*, 2008). Numerous studies using carbon tetrachloride have clearly shown the value of serum ALT as an indicator of hepatocellular necrosis, especially in dogs and cats but to a much lesser extent in horses, cattle, swine, sheep, and goats (Everett *et al.*, 1977).

3.7. Aspartate Aminotransferase (AST):

Aspartate aminotransferase (AST) also referred to as glutamate oxaloacetate transaminase (GOT), is an enzyme involved in amino acid metabolism. Increased serum AST activity is observed with both reversible and irreversible injury to hepatocytes and can be seen following hepatocellular injury and cholestasis, similar to serum ALT activity in dogs, swine, cats and goats. The diagnostic sensitivity of serum AST activity in animals has been reported as 72% for hepatic necrosis and 100% for hepatic lipidosis (West, 1989).

3.8. Calcium:

The major biological function of calcium is for bones. Calcium is also necessary for muscle contraction, nerve conduction and blood clotting. The main deficiency symptoms are seen in the skeletal system. Bones can become soft and weak and may be deformed, resulting in lameness. Milk is relatively high in calcium, and lactating goats need adequate levels of calcium for milk production. An excess of calcium can cause abnormal bone growth (Hart, S., 2008). Serum calcium has a critical role in the metabolism of the body including the cells of reproductive system (McCullagh, 1932). Calcium must always be maintained to assure the proper cellular functions of the animal.

3.9. Phosphorus:

Phosphorus is vital to bone growth and energy storage, among other things. Serum inorganic phosphorus deficiency in animals involve alterations of oestrus and induces lowered conception rate, anoestrus, decreased ovarian activity and generally depressed fertility (Morrow, 1980). Phosphate concentration is characterized by a high physiological variation, depending on age, gender, physiological state (eg, pregnancy), and even season (due to the seasonal variation of vitamin D which is directly involved in the regulation of phosphate concentration).

4. Conclusion

The biochemical profile shows some changes and the blood plasma components which varies according to the growth requirements, breed, ages, environmental factors, management conditions, sexual maturity, and the productivity of the animals. Most of the animals showed deficient plasma mineral status. Mineral deficiency affects hormone status and impairs production potential of animals. Based on these findings supplementation of mineral to goat is imperative.

5. References

- [1] Akbar Khan, Rehman, R. Imran and Imtiaz Khan (2013). Analysis of Serum Cholesterol Level in Goats Breeds in Gilgit-Baltistan Area of Pakistan. *Journal of Agricultural Science and Technology*. **3**:302-306.
- [2] Dukes, H.H (1996). The physiology of domestic Animals (c.f. Melvin J. Swenson and William O. Reece Edn.) P.42, Comstock Publishing Associates. Ithaca and London.
- [3] Everett, R.M., Duncan, J.R., and Prasse, K.W. (1977). Alkaline phosphatase, leucine aminopeptidase, and alanine aminotransferase activities with obstructive and toxic disease in cats. *Am.J. Vet. Res.* **38**, 963-966.
- [4] Hart, S. 2008. Meat Goat Nutrition. Pages 58-83 in Proc. 23rd Ann. Goat Field Day, Langston University, Langston, OK.
- [5] Jessie T. Cutler, 1934. Studies On The Carbohydrate Metabolism Of The Goat The Blood Sugar And The Inorganic Phosphate From the Department of Pharmacology, Vanderbilt University School of Medicine, Nashville)
- [6] Khan, J. R.; Ludri, R. S. (2002). Changes in blood glucose, plasma non-esterified fatty acids and insulin in pregnant and non-pregnant goats. *Trop Animal Health Production*. **34**(1):81-90. 5.
- [7] Madan J, Sindhu S, Gupta M, Kumar S. Hematobiochemical profile and mineral status in growing beetal goat kids. *J. Cell Tissue Res.* 2016; **16**:5517–5522.
- [8] Mbassa GK. Poulsen JS. 1991. Haematological profile in neonatal dwarf and landrace kids. *Zentralbl. Veterinarmed. A.* **38**: 510-522.
- [9] McCullagh, E. P., and McCullagh, D. R., *J. Lab. and Clin. Med.*, **17**, 754. (1932)
- [10] Morrow, D.A. (1980). *Current therapy in theriogenology*. 1stEdn., W.B. Saunders Co., Philadelphia. P. 449.
- [11] Phillipson, A. T. (1964) *Mammalian Protein Metabolism* 1: 80-96. Academic Press. New York.
- [12] Saez, F., Ouvrier, A. and Drevet. J. R (2011). Epididymis cholesterol homeostasis and sperm fertilizing ability. *Asian J. Androl.* **13**: 11-17.
- [13] Sakha, M., Shamesdini. M. and Mohamad-Zadeh.F. (2008). Serum biochemistry values in Raini goat of Iran. *Iranian Journal of Veterinary Medicine.* **6**: 1-7.
- [14] Satyanarayana, U. (2002). *Biochemistry*. 2ndEdn., Books and Allied (P) Ltd., Chintamani Das Lane, Kolkata. P.45.

- [15] Vhora, S.C.; Dindorkar, C.B. and Kaikini, A.S. (1995) Studies on blood serum level of certain biochemical constituents in normal cycling and anoestrous crossbred cows. *Indian J. Anim. Reprod.*, 16(2): 85-87.
- [16] West, H.J. (1989). Evolution of total plasma bile acid concentrations for the diagnosis of hepatobiliary diseases in horses. *Res. Vet. Sci.* **46**, 264-270.