# Studies on some important enzymes of non-descript sheep of Assam

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## Abstract

Enzymes are being routinely used in clinical laboratory for diagnosis of various diseases. It is imperative to have reference values of clinically important enzymes for accurate interpretation of laboratory data as well as for their correlation with relevant diseases. Though numerous studies have been carried out on blood biochemical profile of various domestic animal species, the Assam local sheep remain untouched in this aspect. Present study reports the physiological values of major diagnostic enzymes viz. SGPT, SGOT, LDH, ALP, GGT and Amylase as 20.6 ± 1.68 U/L, 170.8 ± 3.96 U/L, 534.6 ± 9.91 U/L, 163.8 ± 41.82 U/L, 154.2 ± 65.38 and 92.2 ± 11.47 U/L, respectively. The data generated may be of use for interpretation of laboratory data to confirm a disease along with the signs and symptoms.

**Keywords**: Enzyme; sheep; Assam

# Introduction

Combined with hematology and urinalysis, the biochemical profile forms the data base for most diagnostic investigations (Pal *et al*., 2009). Many biochemical parameters tend to have specificity for an organ and/or a limited range of pathological processes. Amongst these, enzymes are very sensitive and specific (Boyd, 1988). Therefore, the measurement of enzyme activity in biological fluids such as plasma or serum is of great clinical importance and is being routinely used in clinical laboratory for differential and confirmatory diagnosis of various diseases. Although, a broad range of enzymes with diagnostic importance are reported, the most commonly and routinely used are SGPT/ALT (Serum Glutamate Pyruvate Transaminase/Aalanine aminotransferase) and SGOT/AST (Serum Glutamate Oxaloacetate Transamianase/Aspertate aminotransferase), ALP (Alkaline Phosphatase) LDH (Lactate Dehydrogenase) GGT (Gamma-Glutamyl Transferase) and Amylase (Hemalatha *et al*, 2013). There are numerous reports on enzyme profile of different farm animals. However, no study could be traced investigating the biochemical profile of indigenous sheep of Assam. These sheep constitute 0.66 per cent of total livestock population of Assam and generally owned by small, marginal farmers and landless agricultural labourers as a source of their livelihood. Considering their importance in the livelihood of poor farmers, there is an urgent need for a basic research on these non-descript sheep so as to plan and implement disease and health monitoring program.

In view of the above, current study was planned to determine the physiological level of SGPT, SGOT, ALP, LDH, GGT and Amylase in indigenous sheep of Assam.

# Materials and Methods

A total of 10 clinically healthy Assam local sheep reared in the Livestock Farm, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram was randomly selected for the study. Approximately ten (10) ml of blood samples were collected aseptically once from each of the experimental animal via jugular vein puncture into sterile vials containing $K_3$ EDTA (1 mg/ml of blood). Subsequently, the plasma was separated from the blood samples by centrifugation at 3000 rpm for 20 min. The enzymes viz. SGPT, SGOT, ALP, LDH, GGT and Amylase) were analyzed in plasma using diagnostic kits from M/s Crest Biosystems, India employing UV-Vis Spectrophotometer (Chemito-Spectroscan 2600). The results were statistically evaluated by using Duncan's multiple range tests (Statistica, 2008).

# Results and discussion

The mean and SE values of the different blood metabolites are presented in Table-1. It was observed that the level of SGPT of Assam local sheep is lower than goat, but higher than the level reported for other exotic breed of sheep (Aruwayo *et al*., 2011). SGPT is considered to be liver specific in small animals since significant SGPT activity is confined to the cytoplasm of the liver. Plasma concentration is elevated in acute hepatitis (viral or toxic), Jaundice, cirrhosis of liver. In hepatitis, SGPT level rises several days before jaundice begins. The enzyme levels are especially useful in assessing subtle and early changes in biliary obstruction and active cirrhosis. SGPT is a marker enzyme of liver damage in dogs, cats, primates and some other small animal species. In large domestic animals like cattle, horse, the activity of ALT in liver is low and hence in liver injury the serum ALT level is not remarkably elevated (Jacob, 2012). The magnitude of ALT elevations in serum is generally related to the number of hepatocytes affected. However, the level cannot be used to predict either the type of lesion, or whether cell damage is reversible *(leakage)* or irreversible *(frank necrosis)*.In myocardial infarction, there is little or no alteration of SGPT. Nonetheless, the ALT recorded in our study is higher than those reported by Daramola *et al*. (2005) (8.9±0.9U/L). Lower ALT values, than one we presented, were reported by Miloslav *et al*. (2011) in west African sheep (10.0±1.1 U/L) while studies reported by Mostaghni *et al*. (2005) in wild sheep (21.15±3.20 U/L) demonstrated higher/or comparable ALT concentration to the present study indicating a great variation in ALT levels among different small ruminants having different geographical distribution.

The SGOT level of sheep was higher than cow but lower than goat. Similarly, the amylase activity of sheep slightly lower than goat, but comparable with that of cow. Nonetheless, the GGT level of sheep was almost similar with other ruminants. The ALP activity observed was lower than goat, cow, and horse; but higher than swine (Elitok *et al*., 2004). Nevertheless, SGOT is commonly measured clinically as a marker for liver health along with SGPT. Both SGOT and SGPT are associated with liver parenchymal cells (Patel *et al*., 2016). The difference is that SGPT is found predominantly in the liver, with clinically negligible quantities found in the kidneys, heart, and skeletal muscle, while SGOT is found in the liver, heart (cardiac muscle), skeletal muscle, kidneys, brain, and red blood cells. As a result, SGPT is a more specific indicator of liver inflammation than SGOT, as it may also be elevated in diseases affecting other organs, such as myocardial infarction, acute pancreatitis, acute hemolytic

**Table-1 :** Mean ± SE values of enzymes of Assam Non-descript sheep

| **Enzymes** | **Plasma level (U/L)** |
|---|---|
| SGPT | 20.6±1.67 |
| SGOT | 170 ± 3.96 |
| ALP | 163.8 ± 41.82 |
| LDH | 534.6 ±9.91 |
| GGT | 154.2 ± 65.38 |
| Amylase | 92.2 ±11.47 |

anemia, severe burns, acute renal disease, musculoskeletal diseases, and trauma. SGOT is not liver specific in any domestic animal species. Similarly, LDH has immense value in the diagnosis of heart and liver diseases. In healthy animals, the activity of $LDH_2$ is higher than that of $LDH_1$ in serum. Whereas, in myocardial infarction, the $LDH_1$ is much higher than $LDH_2$ within 12-24 hours of infarction; elevations of LDH-2 and LDH-3 indicate lung injury or disease; elevations of LDH-4 and LDH-5 indicate liver or muscle disease or both. A rise of all LDH isoenzymes at the same time is diagnostic of injury to multiple organs (Chattaerjea and Shinde, 2008). LDH levels may be increased whenever there is cell necrosis or when neoplastic proliferation of cells causes an increase LDH production. GGT catalyzes the transfer of the glutamyl groups among different polypeptides and amino acids. Clinically significant GGT found in the blood comes from cells that line the biliary tract. GGT levels rise dramatically with obstructive diseases of the biliary tract and liver cancers. GGT is especially useful in assessing liver function (Cenesiz *et al*. 2011). An elevated level of ALP is also seen in bone disease such as primary bone tumors (e.g. osteogenic sarcoma), Pagets' disease, osteomalacia, rickets and hyperparathyroidism etc. High serum level of ALP may be observed following damage to intestinal mucosa.Renal diseases such as nephrosis, renal tubular acidosis may also cause moderate increase in serum ALP level. A mild elevation may also be seen in young growing animals, which is likely to be the result of normal bone growth. In fact, there is a gradual increase in the proportion of liver ALP with age Devaraj *et al*. (1984). Amylase is also being routinely used as marker enzyme for acute pancreatitis.

Thus, the level of the different diagnostic enzymes estimated in the present study may be us as a reference values to diagnose the relevant diseases of this non-descript sheep of Assam.

# Reference


1) Aruwayo, A., Maigandi, S.A., Malani, B.S. and Daneji, A.I. 2011. Haematological and Biochemical parameters of Uda Lambs Fed Graded Levels of Alkali-Treated Neem Kernel Cake. Nigerian Journal of basic and Applied Science, 19: 277-284.
2) Boyd J.W. 1988. Serum enzymes in the diagnosis of disease in man and animals. Journal of Comparative Pathology, 98: 381-404.
3) Cenesiz M., Cenesiz S., Yarim G.F. and Nisbet C. 2011. Changes in hematologic and biochemical values of water buffaloes indifferent ages, sexes and during the pregnancy bred in Samsun province. YYU Veterinery Fakultesi Dergisi, 22: 1-4.
4) Chattaerjea M.N. and Shinde R. 2008. Textbook of Medical biochemistry. Section five-Clinical biochemistry, 7th ed. Pub. Jaypee brothers Medical Publishers (P) Ltd., New-Delhi. 597-608.
5) Daramola J.O., Adeloye A.A., Fatobam T.A., Soladoye A.O. 2005. Hematological and biochemical parameters of West African Dwarf goat. Livestock Res Rural Dev., 17: 1–8.
6) Devaraj M., SrinivasaRao B., Patel A.V., Despande L.V., and Janakiraman K. 1984. Serum protein bound iodine, alkaline phosphatase and peroxidise calves from birth to sexual maturity. Indian Journal of Animal Reproduction, 5: 49-53.
7) Elitok B., Elitok O.M. and Gundogan M. 2004. Haematological and biochemical reference values of various age and sex in Anatolian water buffaloes (Bubalus bubalus). Hayvancılık Araştırma Enstitusu Dergisi, 14: 85-90.
8) Hemalatha T., Umamaheswai T., Krithiga G., Sankaranarayanan P. and Puvanakrishnan R. 2013. Enzymes in clinical medicine: an overview. Indian Journal of Experimental Biology, 51:777-788.
9) Jacob N. 2012. Haematological, biochemical and endocrine parameters at different ages and physiological stages in Gir cattle and Jaffarabadi buffaloes. PhD Thesis submitted to Anand Agricultural University (AAU), Anand (Gujarat).

10) Miloslav S., Broucek J., Srejberova P. 2011. Hematology and blood microelements of sheep in south Bohemia. Biologia., 66: 181–186.
11) Mostaghni K., Badiei K., Emadi M. 2005. Hematology and serum biochemistry of captive wild sheep (*Ovis orientalis esphahanica*) in Iran. Comperative Clinical Pathology. ;13: 158–161
12) Pal P.S., Joshi R., Reddy M.V.R. and Jain A.P. 2009. Diagnostic yield of simple biochemical investigations amongst medical inpatients in teaching hospital. Journal of Mahatma Gandhi Institute of Medical Sciences, 14: 40-46.
13) Patel M.D., Lateef A., Das H., Prajapati M.V., Kakati P. and Savani H.R. 2016. Estimation of blood biochemical parameters of Banni buffalo (Bubalus bubalis) at different age, sex and physiological stages. Journal of Livestock Science 7: 250-255
14) Stastistica. 2008. Stat Soft, Inc. version 8.0, www. statsoft.com.