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## Glucose and Total Protein of Red Chittagong Cattle and Local Cattle at Chittagong

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### ABSTRACT

Seventy-five Red Chittagong Cattle and equal number of Local Cattle were kept under the research at Chittagong district and divided into three age groups i.e. Calf, Heifer and Cow to determine the serum glucose and total serum protein. Blood samples were collected from all the experimental animals, serum was separated and stored at  $-20^{\circ}\text{C}$  and assayed with a biochemical analyzer (Model: PLD-951/951A/951B) by enzymatic colorimetric test. The results revealed no significant variation of values, e.g. glucose ( $35.16 \pm 2.402 \text{ g dL}^{-1}$  and  $35.37 \pm 2.403 \text{ g dL}^{-1}$ ), total protein ( $8.98 \pm 0.470 \text{ g dL}^{-1}$  and  $8.997 \pm 0.558 \text{ g dL}^{-1}$ ) between RC cow and Local cow respectively having slightly lower levels in RC cow. The variations of serum-biochemical values (Glucose, Total Protein) were also non-significant between RC heifer ( $39.02 \pm 2.151 \text{ g dL}^{-1}$ ,  $9.22 \pm 0.731 \text{ g dL}^{-1}$ ) and Local heifer ( $39.15 \pm 2.395 \text{ g dL}^{-1}$ ,  $9.37 \pm 0.645 \text{ g dL}^{-1}$ ) though it was higher in Local. But the glucose level was significantly ( $P < 0.05$ ) higher in RC calf ( $44.50 \pm 2.466 \text{ g dL}^{-1}$ ) than Local calf ( $38.36 \pm 2.247 \text{ g dL}^{-1}$ ). Another value like, total Protein ( $8.55 \pm 0.686 \text{ g dL}^{-1}$  and  $8.55 \pm 0.492 \text{ g dL}^{-1}$ ), had no significant variations between RC calf and Local calf. Within same breed, only glucose had significant ( $p < 0.05$ ) variations between RC cow and RC calf. Glucose level was decreased along with advancement of age in RC cattle but in other case did not show this trend of change.

**Key words:** Blood, serum-biochemical values, glucose, total protein

### INTRODUCTION

Bangladesh stands 7th position in the world having 24.5 million cattle head. Out of these 80% are indigenous, among these 90% are non-descriptive and 10% are improved variety like Red Chittagong cattle, Pabna cattle, North Bengal Grey cattle etc. (Bhuiyan *et al.*, 2007). Among these improved variety Red Chittagong cattle are mainly found in Chittagong region at varying concentration along with other cross and non-descriptive cattle. These cattle are mainly reared by poor people in small holding farming nearly zero input production system for their additional

income (Sarker *et al.*, 2010). Red Chittagong is considered talented for its better productive and reproductive traits than any other improved variety with red color of its coat, muzzle, eyeball, eyebrow, tail and hoof; smaller body size and inward curving of short horns (Bhuiyan *et al.*, 2007). The blood glucose and the serum total protein of many indigenous cattle breeds has been reported by many researchers. Shrikhande *et al.* (2008) studied serum glucose, total protein and others blood components in lactating cattle and found lower serum protein and glucose in rainy season. Kapale *et al.* (2008) reported that female calves had low total proteins, albumin and globulin than the adult Gaolao cows. But these values in RC cattle are not studied yet. Glucose, principal carbohydrate and total protein of serum are the major blood components responsible for maintaining homeostasis and metabolism. Deficiency of glucose causes ketosis. Both clinical and sub clinical ketosis are accompanied by decreased milk yields, lower milk protein and milk lactose (Lean *et al.*, 1994) and increased risk for delayed estrus, lower first service conception rates, increased inter calving intervals (Harman *et al.*, 1996) and increased risk of cystic ovarian disease and mastitis (Dohoo *et al.*, 1983) causing loss to the dairy farmer. Protein deficiency results, delay onset of puberty, increased days open, decreased dry matter intake and lead to energy deficit. Adequate protein intake is necessary for normal fetal growth and development (Gaikwad *et al.*, 2007).

Hence present study was undertaken to determine the serum glucose and total serum protein of RC and Local cattle. Also find out the relation/variation of the serum glucose and total protein among different age groups (cow, heifer and calf) in both breeds.

## **MATERIALS AND METHODS**

Blood profile study was conducted on 75 RC cattle and equal no. of local cattle in the area of Potia, Anowara, Chandanish, Satkania and Raojan of Chittagong district from June 2009 to November 2009. The animals were divided into three age groups (25 in each age group) i.e., Calf (<1 year), Heifer (>1 to <2 year) and Cow. Blood samples were collected from all the selected animals in orderly labeled vacutainer without EDTA possibly at the early of the day. The blood containing vacutainer were shifted to the laboratory as quick as possible with aid of cool box. Then serum was separated gently with the help of micropipette and this serum was purified by centrifugation at 3000 rpm for 10 minutes and stored in labeled eppendrop tube at -20°C until assayed for glucose ( $\text{g dL}^{-1}$ ) and total protein ( $\text{g dL}^{-1}$ ). The study was conducted from July 2009 to December 2009 but the animals were bled in only one occasion in rainy season (August to September). Glucose and total serum protein of the serum were analyzed in a biochemical analyzer (Model: PLD-951/951A/951B) by enzymatic colorimetric test using GLUCOE liquicolor diagnostic kits and by Photometric Colorimetric test using TOTAL PROTEIN liquicolor diagnostic kits as per instructions given in the catalogue.

**Statistical analysis:** At first, raw data were organized by using computer Excel program and then analyzed by using SPSS (15.0) statistical program for one way Analysis of Variance (ANOVA) and LSD (Least Significant Differences) was done to know the differences among the group and breed of cattle; means at 5% level of significance (Steel and Torrie, 1980).

## **RESULTS AND DISCUSSION**

In the present study, glucose level (Fig. 1) was recorded  $35.16 \pm 2.402 \text{ g dL}^{-1}$  in RC cow and  $35.37 \pm 2.403 \text{ g dL}^{-1}$  in Local cow and there was no significant difference between the age groups. The determined values were lower than the accepted range  $45-75 \text{ g dL}^{-1}$  (Radostits *et al.*, 2000).

In other study Ahmad *et al.* (2004) reported higher values in cyclic cross breed cow ( $50.72 \pm 1.12 \text{ g dL}^{-1}$ ). Shrikhande *et al.* (2008) also studied seasonal effect of the composition of blood and stated higher value of glucose ( $44.26 \pm 1.27 \text{ g dL}^{-1}$ ) in cow in the same (rainy) season. Doornenbal *et al.* (1988) studied blood glucose  $37 \text{ g dL}^{-1}$  in Shorthorn cow which support the present study. This finding might have a similarity with Seifi *et al.* (2001) reported that 92% of dairy cows suffer negative energy balance at early lactation due to peak production of milk than dry matter intake and the result is low blood glucose. Glucose level of RC Heifer and Local heifer was  $39.02 \pm 2.151$  and  $39.15 \pm 2.395 \text{ g dL}^{-1}$ , respectively. This result was also similar with Shorthorn heifer  $37 \text{ g dL}^{-1}$  studied by Doornenbal *et al.* (1988). But this result disagreed with the findings ( $55.2 \pm 2.14 \text{ g dL}^{-1}$ ) of Kumar *et al.* (2006). In case of calves, there was significant variation between RC ( $44.50 \pm 2.466 \text{ g dL}^{-1}$ ) and Local ( $38.36 \pm 2.247 \text{ g dL}^{-1}$ ) and the both values were lower than the findings ( $55 \text{ g dL}^{-1}$  in Shorthorn calf) of Doornenbal *et al.* (1988). Here glucose level of RC cattle decreased gradually with advancement of age that showed similarity with Doornenbal *et al.* (1988) but contradictory with Kumar *et al.* (2006).

Total serum protein level (Fig. 2) was recorded  $8.98 \pm 0.470 \text{ (g dL}^{-1})$  and  $8.997 \pm 0.558 \text{ (g dL}^{-1})$  in RC cow and local cow, respectively. There was no significant variation in between studied two breeds. These values had a close relation with the findings ( $9.28 \pm 0.23 \text{ g dL}^{-1}$ ) cited by Roy *et al.* (2007) and ( $8.38 \pm 0.68 \text{ g dL}^{-1}$ ) in Gaolao Cow studied by Kapale *et al.* (2008). But Doornenbal *et al.* (1988) studied in Shorthorn cows found  $7.56 \text{ g dL}^{-1}$  and Shrikhande *et al.* (2008) studied seasonal effect of the composition of blood and stated and  $7.05 \pm 0.28 \text{ g dL}^{-1}$  that were lower than the present study. Although, Ahmad *et al.* (2004) reported higher protein values ( $9.19 \pm 0.45 \text{ g dL}^{-1}$ ) in cross breed cows that was disagreed with the present study. The total serum

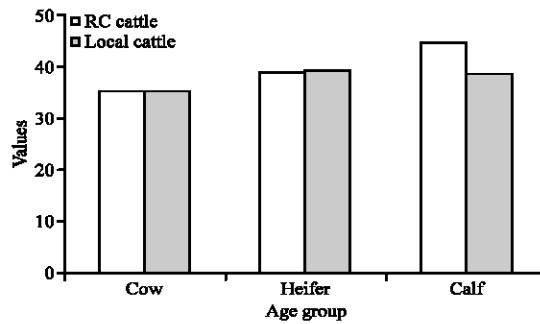


Fig. 1: Serum-glucose of red chittagong cattle and local cattle

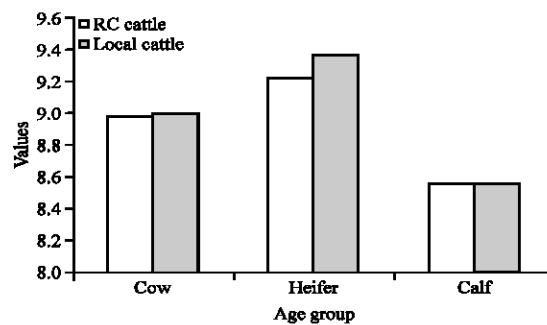


Fig. 2: Serum-total protein of red chittagong cattle and local cattle

protein of RC Heifer ( $9.22 \pm 0.731$  g dL<sup>-1</sup>) and Local heifer ( $9.37 \pm 0.645$  g dL<sup>-1</sup>) are almost similar. But Ahmad *et al.* (2004) findings in non cyclic cattle ( $15.23 \pm 0.89$  g dL<sup>-1</sup>) greatly differ with the present study. On the other hand, Kapale *et al.* (2008) and Doornenbal *et al.* (1988) reported lower result in Gaolao heifers ( $6.85 \pm 0.41$  g dL<sup>-1</sup>) and in Shorthorn in heifer ( $7.12$  g dL<sup>-1</sup>). In case of calf, total serum protein was also closely related between RC calf ( $8.55 \pm 0.686$  g dL<sup>-1</sup>) and Local calf ( $8.55 \pm 0.492$  g dL<sup>-1</sup>). This finding showed higher result than Gaolao calves ( $6.4 \pm 0.53$  g dL<sup>-1</sup>) and Shorthorn calves ( $7.01$  g dL<sup>-1</sup>) reported by Kapale *et al.* (2008) and Doornenbal *et al.* (1988) respectively. In this research, both breeds showed higher protein values in heifer than calf and adult that was comparable with the findings of Kapale *et al.* (2008), Gaikwad *et al.* (2007) and Doornenbal *et al.* (1988).

The study represent that glucose level was significantly ( $p < 0.05$ ) higher in RC calf than Local calf. But all other values (glucose and protein) are nearly similar in all age groups irrespective to breeds. The protein level was within normal range of reference values but the glucose values in all age groups were lower than the reference levels, in both RC cattle and local (Non descriptive) cattle. This may be due to seasonal, geographical, breed or other residual effect that needs further extensive study.

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#### REFERENCES

- Ahmad, J., L.A. Lodhi, Z.I. Qureshi and M. Younis, 2004. Studies on blood glucose, total proteins, urea and cholesterol levels in cyclic non-cyclic and endometritic crossbred cows. *Pak. Vet. J.*, 24: 1-3.
- Bhuiyan, A.K.F.H., M. Shahjalal, M.N. Islam, A.K.M.A. Rahman, J.F. Keown, L.D. van Vleck and R.W. Blake, 2007. Characterization, conservation and improvement of red chittagong cattle of Bangladesh. Proceeding of the USDA Project Review Workshop, March 18-20, BAU., Bangladesh, pp: 26-28.
- Dohoo, I.R., S.W. Martin, I. McMillan and B.W. Kennedy, 1983. Disease production and culling in Holstein-Fresian cows. II. Age seasonal and sire effects. *Prev. Vet. Med.*, 2: 665-670.
- Doornenbal, H., A.K. Tong and N.L. Murray, 1988. Reference values of blood parameters in beef cattle of different ages and stages of lactation. *Can. J. Vet. Res.*, 52: 99-105.
- Gaikwad, S.M., R.L. Dhoble, A.G. Sawale, P.M. Mane and S.C. Dawane, 2007. Osteomalacia in holstein fresian cow: A case report. *Intas Polivet*, 8: 381-381.
- Harman, J., Y. Grohn, H. Erb and G. Casella, 1996. Event-time analysis of the effect of season of parturition, parity and concurrent disease on parturition to conception interval in dairy cows. *Am. J. Vet. Res.*, 57: 640-645.
- Kapale, P.M., D.G. Jagtap, D.M. Badukale and S.K. Sahatpure, 2008. Serum total proteins and serum total cholesterol levels in gaolao cattle. *Vet. World*, 1: 115-116.
- Kumar, R., A. Kumar and S.K. Rastogi, 2006. Comparative blood biochemical profile of dairy cattle in three different regions of Uttaranchal. *Ind. J. Anmi. Sci.*, 76: 599-604.

- Lean, I.J., M.L. Bruss, H.F. Troutt, J.C. Galland and T.B. Farver *et al.*, 1994. Bovine ketosis and somatotropin: risk factors for ketosis and effects of ketosis on health and production. *Res. Vet. Sci.*, 57: 200-209.
- Radostits, O.M., C.C. Gay, D.C. Blood and K.W. Hinchcliff, 2000. *Veterinary Medicine*. 9th Edn. W.B. Saunders Co. Ltd., London, pp: 563-565..
- Roy, M., S. Roy and B.D. Sahu, 2007. Clinico-biochemical alterations in Ketosis in crossbreed cows. *Intas Polivet*, 8: 400-402.
- Sarker, M.S., A.S.M.G. Kibria, M.M. Alam, M.L. Rahman and K.S. Haque, 2010. Milk marketing system of red chittagong cattle breeding tract in Chittagong. *J. Sociol. Res. Dev.*, 7: 748-763.
- Seifi, H.A., P. Mirshokraie and N. Farzaneh, 2001. Metabolic profile test in Iran: Variations of metabolites around parturition at dairy cattle. *Acta Veterinaria Scandinavica*, 44: 123-123.
- Shrikhande, G.B., A.M. Rode, M.S. Pradhan and K.A. Satpute, 2008. Seasonal effect on the composition of blood in cattle. *Vet. World*, 1: 341-342.
- Steel, R.G.D. and J.H. Torrie, 1980. *Principles and Procedures of Statistics*. 2nd Edn., McGraw Hill Book Co. Inc., New York, USA., ISBN-13: 9780070610286, pp: 188-189.