SERUM LIPID PROFILE AND ENZYME ACTIVITY OF MUTURU AND BUNAJI CATTLE IN BENUE AND OGUN STATES

Ochefu, J., Ladokun, A. O. *, Smith, O. F. *, Iposu, S. O. *, Okwelum, N. * and Omire, O. *
Dept. of Animal Breeding and Physiology, Federal University of Agriculture, Makurdi
*Federal University of Agriculture, Abeokuta

ABSTRACT
This research was conducted to study the lipid profile and enzyme activity of Muturu and Bunaji cattle in Benue and Ogun States. A total of 480 cattle comprising 240 cattle of each breed at each location were sampled. The experiment was set in a 2×2 factorial format in a completely randomized design (CRD) with location, breed as factors. Samples were collected five times at each location. Serum parameters analyzed were Triglyceride, Cholesterols, High density lipoprotein (HDL), Very low density lipoprotein (VLDL), Aspartate aminotransferase (AST), Alkaline Phosphatase (ALP), γ-Glutamyl Transferase (GGT). The results showed that ALP (43.00±2.2U/l) GGT (45.50±1.5U/l) varied ($p<0.05$) in cattle in Ogun State compared to 34.90±1.5U/l and 7.32±0.05mg/dl respectively in Benue State. It can be concluded from this study that the parameters measured were within reference range. Observation showed that ALP and ALT varied due to breed and location while differences due to location only was noticed in triglycerides, cholesterol and VLDL.

Key words: Serum, Lipids, Enzyme, Muturu, Bunaji

INTRODUCTION
Haematobiochemical values during different physiological conditions could be used for the diagnosis of various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance of cattle, leading to heavy economic losses (Sattar and Mirza, 2009). Serum cholesterol, non-esterified fatty acids and liver enzymes can be used objectively, reliably and routinely to assess the nutritional status of cattle (Ndlovu *et al.*, 2007). In addition, serum enzyme levels are the determinants of response to stress in animal (Huff *et al.*, 2008). Cattle are a major source of meat supply in Nigeria. Faostat (2013) estimated cattle population in Nigeria to be about 15.2 million as at 2005. The zebu breeds (including Bunaji or white Fulani cattle) makes up a higher percentage and they are found in the drier north and sub-humid zones of the country. Adebambo, (2001) noted that 8.3 percent of the total cattle population in Nigeria is of the muturu breed; which population is gradually going into extinction. The production system of Bunaji and Muturu breed differ, in that the former is more of the nomadic pattern while the latter is sedentary, almost always tethered at grazing spots and housed in the evenings. So this study was to investigate the serum biochemical of these breed of cattle.

MATERIALS AND METHODS
The study was carried out in Ogun and in Benue States of Nigeria. Farmers' animals were used for the study and sampling was at areas and farms where the animals were found. A total of four hundred and eighty (480) animals were used for the study. Two hundred and forty (240) mature Muturu and Bunaji cattle comprising of equal number of either sexes were sampled. The study was in a (2×2) factorial arrangement in a completely randomized design (CRD). Five mililitres of blood sample was collected from the jugular vein of each animal by venipuncture into plain tube. After centrifugation, serum was decanted into testube. The sera collected was analyzed for the concentrations of triglycerides, cholesterol, high density lipoprotein (HDL) and the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl-transferase (GGT), alkaline phosphatase (ALP) using automated Humalizer®-3000. Agappe diagnostics®, Switzerland (www.agappeswiss.com), procedure for the chemistry of these parameters were used. Low density lipoprotein (LDL) and the ratio of HDL to LDL were calculated as below.

LDL= Cholesterol - (Triglycerides/5 + HDL) and $\text{HDL: LDL ratio} = \frac{\text{HDL}}{\text{LDL}}$

Data collected were subjected to analysis of variance (ANOVA) using GENSTAT® (2011) version 4 statistical software. Where significant differences occurred the mean was subjected to Duncan Multiple Range Test (DMRT) using SAS® (2009) version 9.2 statistical packages.

RESULTS AND DISCUSSION

The result as presented showed that mean concentration of triglyceride in bunaji at Benue State was significantly ($p<0.05$) lower compared to others means. On the other hand mean serum cholesterol concentrations was lower ($p<0.05$) in Benue Muturu cattle than other breeds. Species and within species variation have been known to exist in serum triglycerides, cholesterols and lipoproteins concentrations among domestic animals (Khoshvaghti *et al.*, 2012). These parameters are known to be influenced by diseases such as trypanosomiasis (Ogunsanmi *et al*., 2000). Ogun state lies in the humid zone which may have provided a veritable environment for disease vectors to thrive. Civelek *et al*. (2011) mentioned that high triglycerides value may be as result of the energy needs of the cattle, which occurs in the case of negative energy balance. It was observed in the course of the study that the management of both breeds in Ogun state and Muturu in Benue state was sedentary with animal almost always tethered and little or no supplementary feeding. This observation could explain the variation noticed in triglyceride concentration. Farid *et al*. (2013) also noted that cattle in certain physiological status (early lactation) may come into this situation when energy requirement exceeds feed consumption capacity. Mean HDL-C concentration was higher in cattle sampled in Benue state. Such lipomobilisation may be related stress due to disease, starvation or other environmental factors. But VLDL concentration followed the same trend as serum triglycerides. The higher triglyceride and VLDL observed in this study may be related to the energy needs of the cattle, which occurs in the case of negative energy balance (Civelek *et al*., 2011). The mean values of enzymes observed in this experiment were within reference range (Kaneko *et al.*, 2008). Enzyme activity showed that Muturu cattle presented significantly ($p>0.05$) higher serum ALT than found in Bunaji in both locations. Abeni *et al*. (2007) has stated that enzyme activity of ALP is a quick and reliable blood marker for heat stress. This could due to their darker hair cover rather absorb heat, from the hot tropical climate, than loss it via heat dissipation mechanism. It was also observed that mean serum AST activity followed the same trend as found in serum ALT. Muturu at Benue State showed higher ($p>0.05$) AST activity which were comparable with the activity observed in Bunaji cattle in the same location and Muturu cattle in Ogun state. While Bunaji cattle in Ogun state presented significantly ($p>0.05$) higher serum activity of ALP than other cattle in both locations. Serum ALP activity can be influenced by age (Mamun *et al.*, 2013) and/or physiological status (Adedibu *et al.*, 2013) of the animal. Breed difference were however, reported for Nguni and crossbred cattle for ALT, ALP and AST (Mapiye *et al*., 2010). GGT activity in muturu at Ogun State varied significantly ($P<0.05$) from other means. The elevation of GGT in the muturu depicts that the liver status of these animals may be compromised. Elevated serum GGT activity has been observed in sheep with severely impaired liver (Ozmen *et al*. 2008). However, since all animals sampled were not from the same farm, management practices in individual farms could be a probable pointer to variations in parameters investigated in this study.

Table 1 Serum lipid profile and enzyme activity of cattle in Benue and Ogun States

	Benue		Ogun		
Parameters	**Bunaji**	**Muturu**	**Bunaji**	**Muturu**	**SEM**
Lipids (mg/dl)					
Triglycerides	20.42^{b}	31.16^{a}	30.72^{a}	29.13^{a}	1.55
Cholesterol	114.15^{a}	112.20^{a}	118.13^{a}	104.29^{b}	2.20
HDL-C	44.34^{a}	40.76^{ab}	37.23^{bc}	35.76^{c}	1.54
LDL-C	65.73	71.14	68.78	69.87	2.35
VLDL	4.09^{b}	6.23^{a}	6.14^{a}	5.83^{a}	0.31
HDL:LDL	1.01^{a}	0.88^{ab}	0.69^{b}	0.66^{b}	0.09
Enzymes (U/L)					
ALT	19.51^{b}	22.13^{a}	19.46^{b}	22.50^{a}	0.65
AST	93.68^{ab}	96.37^{a}	91.20^{b}	93.43^{ab}	1.45
ALP	27.45^{c}	25.17^{c}	49.54^{a}	36.53^{b}	3.14
GGT	30.38^{c}	39.38^{b}	36.71^{b}	54.38^{a}	2.12

Key: HDL-C=High density lipoprotein cholesterol; LDL-C=Low density lipoprotein cholesterol; VLDL=Very low density lipoprotein; ALT=Alanine aminotransferase; AST=Aspartate transaminase; ALP= Alkaline phosphatase; GGT= Gamma glutamyl transferase; SEM= standard error of means. Means in the same row with different superscript(s) differ significantly ($p<0.05$).

CONCLUSION

It can be concluded from this study that the parameters measured were within reference range. Observation showed that ALP and ALT varied due to breed and location while differences due to location only was noticed in triglycerides, cholesterol and VLDL.

REFERENCES

Abeni, F., Calamari, L. and Stefanini, L. (2007) Metabolic condition of lactating dairy cows during the hot season in the Po Valley 1. Blood indicators of heat stress. *International of Journal Biometeorology* 52:87-96

Adebambo, O.A. (2001) The muturu: A rare sacred breed of cattle in Nigeria. In: Animal genetic resources information. *Journal of Agriculture* 31: 27-36

Adedibu, I. I., Opoola, E. and Jinadu, L. A. (2013) Associations between milk yield, parity, physiological status and certain serum biochemical properties of Friesian × Bunaji cows *International Journal of Agricultural Bioscience.* 2(3): 127-131

Civelek, T., Aydin, I., Cingi, C. C., Yilmaz, O. and Kabu, M. (2011) Serum Non-Esterified Fatty Acids and Beta-Hydroxybutyrate in Dairy Cows with Retained Placenta *Pakistan Veterinary Journal* 31(4):341-344.

FAOSTAT (2013) Nigeria stock cattle 2005-2013 faostat3.fao.org/download/Q/QA/E

Farid, A. S., Honkawa, K., Fath, E. M., Nonaka, N. and Yoichiro Horii, Y. (2013) Serum paraoxonase-1 as biomarker for improved diagnosis of fatty liver in dairy cows *BMC Veterinary Research* 9:73 http://www.biomedcentral.com/1746-6148/9/73

GenStat® (2011) General statistics version 4 VSN international Ltd Rothamsted experimental station

Huff, G. R., Huff, W. E., Rath, N. C., Anthony, N. B. and Nestor, K. E. (2008) Effects of Escherichia coli Challenge and Transport Stress on Hematology and Serum Chemistry Values of Three Genetic Lines of Turkeys *Poultry Science* 87:2234-2241.

Kaneko, J. J., Harvey, J. W. and Bruss, M. L. (2008) Veterinary clinical biochemistry of domestic animals Elsevier Inc. 896p

Mamun, M. A., Hassan, M. M., Shaikat, A. H., Islam, S. K., Hoque, M. A., Uddin, M. and Hossain, M. B. (2013) Biochemical analysis of blood of native cattle in the hilly area of Bangladesh *Bangladesh Journal of Veterinary Medicine*11 (1): 51-56 ISSN: 1729-7893

Mapiye, C., Chimonyo, M., Dzama, K. and M. C. Marufu, M. C. (2010) Protein Status of Indigenous Nguni and Crossbred Cattle in the Semi-arid Communal Rangelands in South Africa *Asian-Australian Journal of Animal Science* 23(2): 213 - 225

Ndlovu, T., Chimonyo, M., Okoh, A. I., Muchenje, V., Dzama, K. and Raats, J. G. (2007) Assessing the nutritional status of beef cattle: current practices and future prospects *African Journal of Biotechnol*ogy 6 (24): 2727-2734

Ogunsanmi, A., Taiwo, V., Onawumi, B., Mbagwu, H. and Okoronkwo, C. (2000) Correlation of physiological plasma lipid levels with resistance of cattle to trypanosomosis *Veterinarski Arhiv* 70(5):251-257

Ozmen, O., Sahindurian, S., Haligur, M. and Albay, M. K. (2008) Clinicopathological studies on facial eczema outbreak in sheep in southwest Turkey *Tropical Animal Health Production* 40: 545 – 551

SAS® (2009) Procedure user's manual version 9.2 SAS institute Gary NC

Sattar A. and Mirza, R. H. (2009) Haematological parameters in exotic cows during gestation and lactation under subtropical conditions *Pakistan veterinary journal* 29(3): 129-132