APRW -49

An Investigation of Some Serum Parameters of Cattle in Two Seasons at Benue and Ogun State of Nigeria

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Abstract
A total of 480 apparently healthy cattle comprising 240 Muturu and Bunaji breeds respectively, were used for the experiment which was designed to present an overview of the value of theirserum parameters. The experiment was set in a completely randomized design (CRD). Parameters analyzed showed that the concentrations of serum calcium (10.68 mg/dl), magnesium (2.59 mg/dl), glucose (78.00 mg/dl), cholesterol (117.20 mg/dl), LDL (72.90 mg/dl), AST (95.90 U/l), ALP (38.90 U/l), GGT (42.40 U/l), total protein (7.53 mg/dl) and albumin (3.63 mg/dl) were significantly ($p<0.05$) higher in the wet season. Mean values of phosphorus (5.96 mg/dl), urea (14.60 mg/dl) and HDL: LDL ratio (0.908 mg/dl) was higher in the dry season. Significant seasonal effects were not observed in other serum parameters measured. It was therefore concluded that variation in seasons influences some serum parameters of cattle.

Keywords: Cattle, Muturu, Bunaji, Serum, Nigeria

Introduction

Seasonal variation (wet and dry seasons) and its effects on feed and pasture availability is a pronounced phenomenon in Nigeria; and coupled with the attendant issue of climate change and global warming, this will have a far-reaching effect on feed resource and an indirect influence on the wellbeing of the animal. Mader and Kreikemeier (2006) had noted that within season changes in climatic parameters influences physiological parameters of animals. Low productivity of local breeds of livestock and depletion of the population of rare breeds are tag to nutritional inadequacies, and harsh environmental conditions amongst other things (Ate *et al.,* 2009; Hoffman, 2010). O'Neill *et al.* (2010) noted that if environmental stressors were not abruptly introduced, cattle have the capability to buffer and adapt quickly to these changes by physiologic and metabolic processes. However, these variations have marked effect on grazing behaviour, feed and water consumption, milk production and composition, cardio-respiratory behaviour and blood composition cattle. It has also been documented that the quality of grazing vegetation which changes with variation in climatic condition has a direct effect on the cattle fed in that area (Pavlik *et al.,* 2010).Ndlovu *et al.* (2007) pointed that serum metabolites are reliable indicators of the nutritional, fertility status (Ate *et al.,* 2009) and stress response (Huff *et al*., 2008) of the cattle.

Therefore this experiment was designed to assess the effect of seasonal variation on cattle serum parameters.

Materials and methods

The experiment was carried out in Ogun and in Benue States of Nigeria. Abeokuta in Ogun state, is located in the rainforest zone on latitude 7°10′ North and longitude 3° 2′ East in the altitude with an average humidity of 82% throughout the year (Bemji and Osinowo, 2009). Similarly, Makurdi in Benue State, lies on latitude 7° 45' North and longitude 8°31' East, with an annual mean relative humidity is 60.45% (Barbour *et al*., 1982).

Four hundred and eighty (480) apparently healthy farmer's animals were used for the experiment. Two hundred and forty (240) mature cattle of both sexes comprising of Muturu and Bunaji breeds were sampled in Benue and Ogun States. Five millilitres (5ml) of blood sample was bled from the jugular vein of each animal. The sera obtained were analyzed for the concentrations of the parameters as presented (Table 1), using automated Humalizer®-3000. Globulin was calculated as below.

$$\text{Globulin} = \text{Total protein} - \text{Albumin}$$

And Very low density lipoprotein (VLDL) was calculated using the formula:

$$\text{Cholesterol} - (\text{Triglyceride}/5 + \text{HDLP})$$

The experiment was in a completely randomized design (CRD). Data collected were subjected to analysis of variance (ANOVA) using GenStat® (2011) version 4 software. . Where significant differences occurred the mean was subjected to Duncan Multiple Range Test (DMRT) using SAS® (2009) version 9.2 statistical packages.

Result and discussion

The findings of the experiment showed that seasons had no significant effect on serum electrolytes, creatinine, triglycerides, HDL, VLDL, ALT, globulin and Albumin: Globulin ratio.All values obtained were however, within the normal range (Mitruka and Rawnsley, 1977; Kaneko *et al*., 2008). Cattle in the wet season had significantly ($p<0.05$) higher mean concentration of calcium and magnesium than cattle in the dry season. The mean of serum phosphorus of cattle also differed significantly ($p<0.05$) in the dry season (5.96mg) against those in the wet season (5.63mg). Season was found to have significant ($p<0.05$) effect on urea, and glucose. Rastogi (2007) noted that blood concentration of glucose and urea varies with dietary intake. At the period of nutritional stress, blood urea is often reabsorbed to compensate for ruminal depression in ammonia-N content (Ndlovu *et al*., 2007).The level of glucose could be tied to abundant pasture in the wet season.Seasonal effect was observed for the mean of serum cholesterol and LDL. This partially corroborates the report of Alameen and Abdelatif (2012). The mean HDL: LDL ratio, an atherogenic index (Greene *et al*., 2005) was significantly ($p<0.05$) higherduring the dry thanin the wet season. The mean values of HDL: LDL ratios obtained in both seasons were within the normal reference range for cattle.

Table 1: Effect of season on serum biochemistry of cattle in Benue and Ogun States

	Treatment		
Parameter	Wet	Dry	SEM
Electrolytes (mEq/l)			
Sodium	140.17	139.83	0.57
Potassium	4.99	5.01	0.06
Chloride	104.66	103.77	0.33
Minerals (mg/dl)			
Calcium	10.68*	10.35	0.08
Phosphorus	5.63	5.96*	0.08
Magnesium	2.59*	1.97	0.04
Metabolites (mg/dl)			
Urea	13.34	14.60*	0.38
Creatinine	1.20	1.28	0.05
Glucose	78.00*	71.40	1.54
Lipids (mg/dl)			
Triglycerides	27.84	27.88	1.10
Cholesterol	117.20*	107.20	1.56
HDL	38.75	40.29	1.09
LDL	72.90*	64.90	1.66
VLDL	5.57	5.58	0.22
HDL/LDL	0.715	0.908*	0.06
Serum enzymes (U/L)			
ALT	21.29	20.51	0.46
AST	95.90*	92.33	1.02
ALP	38.90*	30.40	2.22
GGT	42.4*	38.00	1.50
Serum protein (mg/dl)			
Total protein	7.53*	7.32	0.05
Albumin	3.63*	3.36	0.03
Globulin	3.90	3.96	0.05
A: G ratio	0.92	0.89	0.02

Key: HDL=High density lipoprotein; LDL=Low density lipoprotein; VLDL=Very low-density lipoprotein; ALT=Alanine aminotransferase; AST=Aspartate transaminase; ALP= Alkaline phosphatase; GGT= Gamma-

glutamyltransferase; A: G ratio= Albumin: Globulin ratio SEM= standard error of means. Means in the same row with asterisk (*) differ significantly ($p<0.05$).

Mean values of serum enzymes showed that AST, ALP and GGT were significantly ($p<0.05$) higher in the wet season. The suggestion of Semrad and Gay (2012) that incidence of pathogen and micronutrient deficiency as likely culprits may be valid since pathogenic organism are more prevalent in the wet season than in the dry seasons. The means of TP and albumin in the wet season differ significantly ($p<0.05$) among the treatment means. Serum protein is a function of diet being consumed by the animal (Madziga *et al*. 2013).

Conclusion and Recommendation

From the result of this work, it was concluded that seasonal variation influenced the concentration of serum constituents. It is therefore, recommended that the diet of cattle should be supplemented in the dry seasons noting that basic metabolites were significantly lower in that season.

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