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THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

SPECIES FFECT ON SERUM BIOCHEMICAL PARAMETERS IN HOT SEASON OF MUBI, ADAMAWA STATE, NIGERIA

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ABSTRACT
The study was conducted to investigate the effect of ruminant species on serum biochemical parameters in hot season of Mubi. Cattle, sheep and goat were used for the experiment. Twelve samples (12) each were collected from each specie and was used to analyse for biochemical analysis. The data obtained was subjected to Analysis of Variance (ANOVA) of SAS and the means were separated using Duncan Multiple Range Test (DMRT). The result shows that the specie had significantly ($p<0.05$) affected all the biochemical parameters analysed. Cattle recorded higher values in all the biochemical parameters while sheep recorded lower values in most of the biochemical parameters. The pooled correlation also shows that all the parameters between the three species were positively correlated ($p<0.05$-0.01; $r=0.58$-0.93). It was concluded that cattle was more affected in the hot season of Mubi as it recorded the highest in all the biochemical parameters while sheep was the less affected as it recorded the lowest in most of the biochemical parameters. It is therefore recommended that adequate shade and sufficient drinking water be provided for cattle in the lairages of Mubi during the hot season.

INTRODUCTION
Livestock sector is an important sector because of its contribution in the global food security. They are said to provide 17% of global calories and 33% of global protein consumption (Rosegrant *et al*., 2001; Nayak *et al*., 2018). Among all the livestock that make up the farm animals in Nigeria, ruminants, comprising sheep, goats and cattle, constitute the farm animals largely reared by farmers.
Climate change is an important factor that negatively affects the production traits in cattle, sheep and goats and their performance, especially in hot climate or summer in all parts of the world and thus has been reported to impose stress which in turn affects serum biochemical parameters. (Atrian and Aghdam, 2012; Kasulo *et al*., 2012). The economic values of these species of ruminant animals play a significant role in the economic wellbeing of Nigerians in various ways. Economically the animals serve as source of income earning to major ruminants' dealers- sellers of live animals and butchers/meat sellers; generates employments and create markets for larger number of people who explore the animals' product (Adesehinwa *et al*., 2004). Serum biochemical parameters are good indices used to check the physiological status of animals, and changes in the values of these parameters can be used to assess the response of animals to various physiological situations (Silanikove, 2010). Reference value range for blood parameters often differ between species of animals and significant differences may be noticed between sexes and age groups within a species (Castro *et al*., 2016). Serum biochemical parameters serve as indicators for animal response to heat stress. Also, the health of these animals have been reported (Da-Silva *et al.*, 2003) to be affected by adverse meteorological conditions prevailing in tropical Africa; predisposing them to hyperthermia (heat stress) (Da-Silva *et al*.,2003).The aim of this paper is to evaluate the effect of species on serum biochemical parameters of Bovine, Caprine and Ovine species in hot season of Mubi.

MATERIALS AND METHODS.
Study location: The study was conducted in Mubi Abattoir. Mubi is located in the Sub-Sudan savannah vegetation belt with coordinates of 10016"N, 130 16"E and an altitude of 1906 feet (Adebayo *et al*.,

2020). The area has a mean annual rainfall ranging from 700-800mm. The highest rainfall is recorded in the month of August. The major occupation of the people is farming. However, because of the presence of Yedseram River, the people also engage in fishing activities but at a subsistence level. The climate is tropical with average temperature of about 32.9^{0}C in dry season with relative rainfall (Ovimaps, 2018; Adebayo *et al*., 2020).

***Experimental Animals*:** Three species of animals were used for the experiment. These species comprised Cattle, Sheep and Goats. A total of thirty six (36) blood samples comprising of twelve samples (12) each from cattle, sheep and goat was collected for the experiment.

Blood sample collection: Blood samples were collected from experimental animals via their jugular veins using 10mls syringe into blood bottle. Each tube was gently mixed by inversion; the tube was labelled based on specie of the experimental animals which was transported immediately to the Nutritional Laboratory of the Department of Animal Production, Adamawa States University (ADSU) Mubi for Laboratory analysis of serum biochemical parameters.

Parameters measured/ methods: Cholesterol was determined using a modified form of Liebermanns-Burchard's Method (Kingsley and Schaffert, 1949). This method was based on the dehydration of cholesterol followed by coupling of two such molecules to yield biocholestadine in the presence of chloroform, acetic acid and acetic anhydride was absorbed at 650mm. A blank of chloroform and ilca'reagent (1:4) was used. Total protein was determined by the burrete method (Michael and Lubran, 1978), Creatinine and Albumin was determine spectrophotometrically using commercial kits (Spencer, 1986), triglycerides by Wako method. All spectrophotometrical measurements were done using jenway spectrophotometer (AOAC, 2000).

Data Analysis.

a. *Statistical model*: The statistical model used for the experiment is given below

$Y_{ij} = \mu+S_i+e_{ij.}$ Where, Y_{ij} = Dependant variable, μ=Universal mean, S= Fixed effect of specie, e_{ij}=Residual error.

b. statistical analysis: The data that were obtained from the laboratory were subjected to Analysis of Variance (ANOVA) using the General Linear Model of SAS 9.0(SAS, 2004). Means with significant differences were separated using the Duncan Multiple Range Test (DMRT) (Duncan 1955).

RESULTS AND DISCUSSION

Table 1 shows the effect of specie on serum biochemical parameters of Cattle, Sheep and Goats. There was a significant ($p< 0.05$) difference among the mean of all the biochemical parameters measured. Cattle recorded the highest in all the biochemical parameters examined ($p<0.05$) while sheep recorded the lowest in most of the biochemical parameters measured.

Table 2 shows the pooled correlation between serum biochemical parameters of cattle, sheep and goat. All biochemical parameters were positively ($p<0.05$-0.01; r =0.58 - 0.93) correlated. Total protein correlated positively with all the parameters, Urea also correlated positively with all the parameters measured.

Different species as well as breeds have been reported to respond differently to varying environmental factors (Lestari *et al*., 2015). Serum biochemical parameters serve as indicators for animal response to heat stress and are good indices of the physiological status of animals, and changes in the values of these parameters can be used to assess the response of animals to various physiological situations (Silanikove, 2010). The result of this study shows that specie affected biochemical parameters which is similar to what Mbassa *et al*. (2003), Sharma *et al*, (2011), Njida *et al*. (2013) reported. Creatinine level is directly correlated with muscle mass and kidney function in animals (Prvulovic *et al*., 2012). Kaneko (2016) reported that glucose level may increase due to high-carbohydrate meals, sprint exercise, stress or excitement (including handling and sampling stress). Biochemical parameters are affected by many other

factors such as age, sex, environmental nutrition and change in climate (Mbassa *et al.*, 2003, Sharma *et al.*, 2011).

Table 4.1: Effect of specie (Mean± SE) on serum biochemical parameters of three species of ruminant animals

Parameters	Cattle	Sheep	Goat
Total Protein (%)	6.79±0.11[a]	5.27±0.06[b]	5.13±0.02[b]
Urea (mg/dL)	61.49±1.14[a]	41.21±0.11[c]	45.25±0.78[b]
Triglyceride (mg/L)	65.49±1.18[a]	43.66±0.88[c]	50.53±0.15[b]
Cholesterol (mg/L)	119.17±1.44[a]	78.60±0.19[b]	80.93±0.16[b]
Creatinine (mg/L)	0.92±0.02[a]	0.66±0.00[c]	0.81±0.01[b]
Glucose (mmol/L)	68.65±1.42[a]	51.08±1.26[b]	50.81±0.95[b]

[abc] means with different superscripts across the rows are statistically different; SE= standard error

Table 4. 3: Pooled correlation between serum biochemical parameters of Cattle, Sheep and Goat

	Total protein	Urea	Tryglyceride	Cholesterol	Creatinine	Glucose
Total protein						
Urea	0.90***					
Tryglyceride	0.88***	0.93***				
Cholesterol	0.95***	0.95**	0.93***			
Creatinine	0.58**	0.71**	0.73**	0.70**		
Glucose	0.82**	0.87***	0.87***	0.87***	0.58**	

*= significant at 0.05, ** = significant at 0.01, ***= significant at 0.001

CONCLUSION

From the findings of the experimental research, it was concluded that Cattle was the most affected specie in hot season of Mubi as it recorded the highest in all the biochemical parameters while sheep recorded the lowest in most of the biochemical parameters. It is therefore recommended that adequate shade and sufficient drinking water be provided for cattle in the lairages of Mubi during the hot season.

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