

EFFECT OF LOCATION ON THE BIOCHEMICAL TRAITS OF FEEDLOT BULLS FATTENED IN THE HOT PERIOD OF MUBI, ADAMAWA STATE

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ABSTRACT

This study aimed to investigate the effect of location on biochemical traits in feedlot bulls fattened in Mubi, Adamawa State during the hot period. Sixty (60) Ambala bulls comprising (20) each from the three (3) purposively sampled locations (Buladega, Tike cattle market and Njairi feedlot fattening Areas) were used for the experiment, which spanned from March –May, 2024. Three (3) ml of blood was collected from the jugular veins of the bulls using syringe and needle. The serum samples analyzed were total protein, albumin, globulin, glucose, cholesterol, and creatinine. Data collected from the experiment were analyzed using SAS, 9.0 statistical software, and means with significant differences were separated using Least Significant Difference (LSD) method. The relationship between biochemical traits was analyzed using the Correlation procedure of the same software. Results showed that location significantly influenced ($P < 0.05$) all biochemical properties evaluated. Tike cattle market recorded higher values for all the biochemical parameters; Glucose (59.68 mg/dL), Cholesterol (93.84 mg/dL), Triglycerol (53.91 mg/dL), Urea (52.91 mg/dL), Total Protein (7.88%) and Creatinine (0.91 mg/dL) while on other hand, Buladega had the least values for biochemical properties evaluated. There were positive correlations ($P < 0.05-0.001$; $r = 0.31$ to 0.94) between biochemical parameters, except for relationship between Creatinine and Total protein ($P > 0.05$; $r = 0.19$). It was concluded that location significantly affected all biochemical traits with bulls fattened at Tike cattle market recording higher values that make them more susceptible to heat stress. It is therefore recommended that feedlot cattle fattened in Tike cattle market should be provided with shade to reduce the direct effect of sunlight.

Keywords: Cattle, Biochemical traits, Correlation, Hot season, Adamawa State

INTRODUCTION

Feedlot bulls are bulls that are fattened for their meat. They are confined in yard area with watering and feeding facilities where they are completely hand or mechanically fed for the purpose of beef production (Syruczek *et al.*, 2017). In a feedlot, bulls are fed high quality dry feed rations designed to achieve a high rate of body weight gain. The greatest advantage of feedlot programme is that it is the most economical way of raising large number of cattle for beef production (Syrucet *et al.*, 2017; Kim *et al.*, 2023).

One of the major areas of concern in feedlot system is the fact that the bulls are exposed to direct sunlight which may lead to heat stress. Ja'afar-Furo *et al.* (2021) opined that feedlot animals were exposed to harsh weather conditions thereby limiting their performances; the bulls are mostly kept for more than the standard period of cattle fattening which is economically irrational leading to decrease returns on investment.

Serum biochemical indices are considered to be critical indicators of the physiological stages of farm animals, thus reflecting the relationship between their nutrition and health. They are useful for clinical evaluation of various animal diseases, health and physiological status (Belewu and Ogunsola, 2010). Those biochemical parameters (Glucose, Triglycerol, Creatinine etc) can be altered as a result of several factors such as feeding level, feed quality, age, sex, and breed, temperature and physiological status of animals (Jiwuba *et al.*, 2016).

Feedlot system of management is one among many remedies proffered by the livestock sub-sector to meet the nation's protein requirements (Gabdo *et al.*, 2020). Mubi has an international cattle market that attracts the inflow/outflow of cattle into and out of Nigeria. Also, the area is characterized by feedlot bulls that are fattened during the dry season and transported to the south in trucks. These bulls are left without shelter and exposed to sunlight and other harsh environmental condition. Due to their exposure to direct sunlight and other harsh condition, certain biochemical responses are likely to occur which will in turn cause some defensive and cushioning effect in the system. Therefore, there is a need to evaluate the biochemical response in feedlot bull reared in different locations of Mubi and its environs. Therefore, this paper aimed to assess the effect of location on biochemical traits in feedlot bulls fattened in the hot period of Mubi as well as the relationships that exist between biochemical traits

MATERIALS AND METHODS

Study Area: The study was conducted on three purposively sampled feedlots in Mubi, Adamawa State viz: (Buladega, Tike cattle market and Njairi, respectively). Mubi is geo-located at an altitude of 200 to 300 meters above sea level, between latitude 9°20' and 9°33'N and longitude 12° 30' and 12°50' E (Adebayo *et al.*, 2020).

Sources of Experimental Animals and Management: Thirty (30) bulls comprising (10) each from the three purposively sampled locations (Buladega, Tike Cattle Market and Njairi feedlot fattening Areas) was used for the experiment. The experiment spanned three months (March –May, 2024) during the hot season (March to May). Only apparently healthy bulls of similar ages (3-4 years) were used for the experiment.

Blood Sample Collection: Three (3) ml of blood was collected from the jugular vein of the 30 bulls (10 bulls from each location) using syringe and needle and were put into a bottle containing Ethylenediaminetetraacetic Acid (EDTA) and was transported to the Animal Nutrition Laboratory, Department of Animal Production, Adamawa State University, Mubi for analysis of biochemical parameters.

Serum Biochemical Analysis: Biochemical traits examined included total protein, albumin, globulin, glucose, cholesterol, and creatinine. All were analyzed by the method described by AOAC (2010).

Data Analysis: Data collected from the experiment were analyzed using the statistical software SAS, 9.0 (Statistical Analysis System, 2002) and means with significant differences were separated using Least Significant Difference (LSD) method. The relationship between biochemical traits was analyzed using the Correlation procedure of the same software.

RESULTS AND DISCUSSION

Table 1 shows the effect of location on biochemical properties in feedlot bull fattened during the hot period in Mubi. Location significantly influenced ($P<0.05$) all biochemical properties evaluated. Tike cattle market recorded higher values for all the biochemical parameters; Glucose (59.68 mg/dl), Cholesterol (93.84%), Triglycerol (53.91 mg/L), Urea (52.91 mg/dl), Total Protein (7.88 g /dl) and Creatinine (0.91 mg/dl) while on other hand, Buladega had the least values.

Cholesterol is one of the contending biochemical parameters because of the health threat it poses. It is an important component for the manufacture of bile acids, steroid hormones, and fat-soluble vitamins including vitamin A, D, E and K. Alabi, (2012) reported that continuous deposition of cholesterol may lead to narrowing of the coronary arteries which can lead to cases of cardiac arrest, heart failure and heart attack

Total protein, urea and albumin are the indicators of protein metabolism (Radkowaska and Herbut, 2014) and their concentrations have been used as indices for nutritional status. Serum total protein concentration increased markedly during hot period in feedlot bulls fattened at Tike cattle market and our results are similar to those of Sejian *et al.* (2010). Therefore, the high level of total protein recorded in Tike cattle market is an indication that the proteins in the diets were well utilized and retained in the animal's body in order to cushion the effect of heat stress

Creatinine and urea are the basic parameters reflecting the kidney function (Radkowaska and Herbut, 2014). The high level of creatinine recorded in Tike cattle market feedlot is an indication of the response of the cattle to heat stress. Other factors that affect this increase are breed, species, lactation period and season (Molefe and Mwanza, 2019).

A higher level of urea between the locations was found in the study which are also in agreement with the findings of Xie *et al.* (2018) and Kim *et al.* (2023), who reported higher blood urea nitrogen during the summer season. This increase may be due to the utilization of amino acids for energy. The other reason for an increased levels of urea and creatinine in the blood under heat stressful conditions, may be attributed to the decrease in ruminal ammonia – N which is compensated by the more absorption of urea -N by rumen (Kim *et al.*, 2023). Therefore, from the study, cattle raised at cattle market are likely to face hepatic and kidney problem. It is worth noting that all the biochemical traits measured are higher than normal ranges (www.laboklin.com) making the feedlot bulls vulnerable to heat stress.

Table 1: Effect of location on biochemical properties in feedlot bull fattened during hot period in Mubi

Parameters	Buladega	Njari	Tike cattle market	SEM
Glucose (mg/dl)	56.68 ^b	55.65 ^b	59.68 ^a	1.83
Cholesterol (mg/L)	61.45 ^c	73.64 ^b	93.84 ^a	0.53
Triglycerol (mg/L)	37.64 ^c	38.45 ^b	53.91 ^a	0.23
Urea (mg/dl)	44.67 ^b	46.55 ^b	52.91 ^a	1.92
Total Protein (g/dl)	5.74 ^c	7.35 ^b	7.88 ^a	0.13
Creatinine mg/dl	0.83 ^b	0.65 ^c	0.91 ^a	0.01

^{abc}means with different superscripts within the rows are significantly different at 5%

Table 2 shows the correlations among the biochemical properties according to the location of the feedlot bulls investigated. Correlation coefficients indicated that the parameters evaluated were significantly and positively ($P < 0.05$ - 0.001 ; $r = 0.31$ to 0.94) related to each other, except ($P > 0.05$; $r = 0.19$) for relationship between creatinine and total protein. The positive correlations between all biochemical parameters suggest that heat stress due to hotness of the weather affects all the biochemical parameters evaluated and that a significant increase in one biochemical parameter as a result of heat stress will lead to a significant increase in other parameters (Abbaya *et al.*, 2020).

Table 2: Correlation between biochemical properties in feedlot bull fattened during the hot period of Mubi

	Glucose	Cholesterol	Triglycerol	Urea	T. protein
Cholesterol	0.36*				
Triglycerol	0.47*	0.94***			
Urea	0.81**	0.66**	0.69**		
Total P	0.31*	0.88**	0.70**	0.58**	
Creatinine	0.50*	0.42*	0.70**	0.44*	0.02

*=significant at 0.05%; **=significant at 0.01%; ***= significant at 0.001%.

CONCLUSION AND RECOMMENDATION

Cattle fattened at Tike cattle market are likely to face hepatic and kidney problem as a result of heat stress. We recommend that shades be provided for the feedlot cattle fattened at the study locations, particularly Tike cattle market

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REFERENCES

- Abbaya, H. Y., Adedibu, I. I., Kabir, M. and Iyiola-Tunji, A.O. (2020). Breed and seasonal variation in thermoregulatory parameters of some selected Nigerian indigenous cattle. *Nigerian Journal of Animal Production*, 47(6): 18-31.
- Adebayo, A. A., Tukur, A. L. and Zemba, A. A. (2020). *Adamawa State Maps*. Paraclete Publishers, Yola, Nigeria. Pp 3 – 11.
- Alabi, O. M. (2012), cholesterol A. controversial components of poultry egg. A review. Proceedings of the 37th Conference of the Nigerian Society for Animal Production held at the University of Agriculture Makurdi, 18th – 21st March, 2012. Pp. 683 – 685.
- AOAC. (2010). Official methods of analysis. The association of official analytical chemists. 17th edition. Washington DC.
- Belewu M. A. and Ogunsola F.O (2010). Haematological and Serum Indices of Goat Fed Fungi Treated Jatropha curcas Kernel Cake in A Mixed Ration. *Journal of Agricultural Biotechnology and Sustainable Development*. 2(3): 35 – 38.

- Gabdo B. H., Ja'afar-Furo, M. R., Hamid, M. Y. and Thlaffa, Y. A. (2020). Estimation of technical efficiency of cattle feedlot system in Adamawa State, Nigeria: Comparison among estimators. *Agricultural Science and Technology Journal*, **12**: 24-30.
- Ja'afar-Furo, M. R., Hamid, M. R., Thlaffa, A.Y. and Sulaiman, A. (2021). Assessing resource utilisation in beef cattle feedlot system in Adamawa State, Nigeria. *Agricultural Science and Technology*, **13** (2):205-211.
- Jiwuba, P. C., Ikwunze, K., Dauda E. and Ugwu D. O (2016). Haematological and Serum Biochemical Indices of Growing Rabbits Fed Diets Containing Varying Levels of Moringa oleifera Leaf Meal. *British Biotechnology Journal*, **15**(2): 1-7.
- Kim, W.S., Nejad, J.G., Park, K. K. and Lee, H.G. (2023). Heat Stress Effects on Physiological and Blood Parameters, and Behavior in Early Fattening Stage of Beef Steers. *Animals*, **13**: 1130. [https:// doi.org/10.3390/ani13071130](https://doi.org/10.3390/ani13071130)
- Molefe, K. and M. Mwanza M. (2019). 'Serum biochemistry in cows of different breeds presented with reproductive conditions', *Onderstepoort Journal of Veterinary Research*, **86**(1): a1742.
- Radkowska, I. and Herbut, E. (2014). Haematological and biochemical blood parameters in dairy cows depending on the management system. *Animal Science Papers and Reports*, **32** (4), :317-325.
- SAS (2002). Statistical Analysis System User Guide. SAS/STAT version 9.0 for windows. SAS institute Inc., Inc Cary, North Carolina, USA.
- Sejian, V., Maurya, V. P. and Naqvi, S. M. K. (2010). Effect of thermal stress, restricted feeding and combined stresses (thermal stress and restricted feeding) on growth and plasma reproductive hormone levels of Malpura ewes under semi-arid tropical environment. *Journal of Animal Physiology and Animal Nutrition* **95**:252-258. doi: 10.1111/j.1439-0396.2010.01048.x
- Syrucsek, J., Kwapilik, J., Barton, L., Vacek, M, and Stadnik, L. (2017). Economic efficiency of bull fattening operations in the Czech Republic. *ACTA Universitas Agriculturae et Silviculturae Mendelianae Brunensis*, **65**: 527-536. www.laboklin.com
- Xie, Y., Bowe, B., Li, T., Xian, H., Yan, Y. and Al-Aly, Z. (2018). Higher blood urea nitrogen is associated with increased risk of incident diabetes mellitus. *National Medical Library*, **93**(3):741-752. doi: 10.1016/j.kint.2017.08.033. Epub 2017 Dec 11. PMID: 29241622.