

Sex Comparison of White Fulani Cattle Blood Profile in Southwestern Nigeria

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Target Audience: Physiologist, Breeder, Researchers

Abstract

Sexual dimorphism has been established in the brain regions of farm animals and poultry, but for their blood, reports do not agree as to differences at the same age. While some reports show no differences except for pregnant and lactating females, others indicate otherwise. This study was carried out to investigate the blood of white Fulani breed of cattle in southwestern Nigeria if there could be differences at same mature age (4yr). A total of 100 cattle were used consisting of 50 bulls and 50 cows. Full haematology was investigated using the Vet AutoHaemoanalyser machine. Some serum metabolites were also investigated including total Protein, Albumin and total cholesterol. Data obtained were subjected to one-way analysis of variance (ANOVA). The results show that white blood cell count (WBC) was significantly ($P<0.05$) higher in females (17.23 ± 1.08) than in males (12.25 ± 0.77). Mean Corpuscular haemoglobin concentration (MCHC) also showed sex differences with females having higher and significant ($P<0.05$) average value (33.8 ± 0.19) than males (32.6 ± 0.24). The results from Serum analysis show that bulls (with 37.8 ± 0.54) have higher and significant ($P<0.05$) Albumin values than cows (34.9 ± 0.29). Though the results obtained in this study fall within normal ranges for this species, it however does not indicate any specific sex effect for this breed.

Keywords: cattle, blood, sex

Description of problem

The blood is used amongst other things to evaluate the physiological, health and nutritional status of an animal. Hagawane *et al.* (1) emphasized the importance of haematological evaluation in livestock especially cattle as a valuable aid in the diagnosis of many diseases and extent of damage to blood cells. The significance of Profile of blood metabolites have been used widely to identify problem and to

indicate dietary causes of diseases or low production (2). The blood biochemical profiles are considered important in evaluating the health status of animals. The estimates of biochemical constituents are the prerequisites to diagnose several pathophysiological and metabolic disorders in cattle (3, 4, 5) gave ample evidence of sexual differences in the brain and in relation to behaviour. Ladokun (6) Observed differences in

swine blood. The present study was undertaken to study the hematological and some of the blood biochemical indices in white Fulani Cattle based on sex.

Materials and Methods

Animals

A total of 100 cattle were sampled from Southwestern part of Nigeria which includes: Ogun, Oyo and Osun states. Sampled animal comprises of 50-bulls and 50 'dry' cows (non-lactating or gestating). Both bulls and cows were of the White Fulani breed. These animals were owned by traditional Fulani herdsmen who have settled in these areas for 3 to 10 years. These animals were fed on natural feed. Salt licks were also provided in some farms to boost minerals and vitamins supplementation.

Blood collection and Analysis

Animals were randomly selected from each herd and bled from jugular vein venipuncture and blood collected into heparinized and non heparinized bottles. The former was for haematology, while the latter was used for serum analysis. Age estimation during sampling was done by dentition. Haematological analysis was done using the Mindray (BC-2800 Vet) autohaematology analyser at the Animal Physiology Laboratory, Federal University of Agriculture, Abeokuta.

Serum analysis

Serum analysis for Total protein (7), Albumin (8), Total Cholesterol (9), Triglyceride (10), Urea by the method of (11), Creatinine by the method of (12), Serum Alanine Transaminase (SALT) and Serum Aspartate Transaminase (SALT) was by Spectrophotometry (13) using the appropriate reagent kits by Randox..

Statistical analysis

Data obtained were subjected to one way analysis of variance (ANOVA) using SAS, 2001 package (14). Significant means were separated using the Duncan test of the same software.

Results and Discussion

The results of the haematology of white Fulani cattle are shown in Table 1. For haematology, sex difference was only observed for white blood cell count (WBC) with cows having a significantly ($P<0.05$) higher average value (17.23 ± 1.58) than bulls (12.25 ± 0.77). Sex difference was also observed for mean corpuscular haemoglobin concentration (MCHC) with females also having higher and significant ($P<0.05$) average values (33.84 ± 0.19) than bulls (32.69 ± 0.24). All other parameters for haematology were similar between cows and bulls. For Serum biochemical parameters (Table 2), only albumin was significant for sex, with bulls having higher and significant ($P<0.05$) average value (37.84 ± 0.54) than cows (34.98 ± 0.29).

Table 1: Effect of Sex on the Haematological Parameters of White Fulani Cattle reared in South West Nigeria

Haematological indices	Sex	
	Female	Male
PCV (%)	28.83±1.52	33.33±2.03
Hb (g/dl)	9.75±0.53	10.80±0.69
WBC (x10 ⁹ /l)	17.23±1.58 ^a	12.25±0.77 ^b
RBC (x10 ¹² /l)	6.65±0.24	7.08±0.32
MCV (fl)	42.82±1.14	45.72±1.14
MCH (g/dl)	14.66±0.36	15.11±0.48
MCHC (g/dl)	33.84±0.19 ^a	32.69±0.24 ^b
Neutrophils (%)	59.92±2.03	53.17±2.69
Lymphocytes (%)	38.92±2.03	45.83±2.79
Monocytes (%)	0.92±0.36	0.67±0.31
Eosinophils (%)	0.25±0.18	0.25±0.18
Basophils (%)	0.00±0.00	0.00±0.00

abc: means with different superscript vary significantly ($P < 0.05$)

PCV – Packed Cell Volume HB – Haemoglobin WBC – White Blood Cell MCV – Mean Corpuscular Volume MCHC – Mean Cell Haemoglobin MCHC – Mean Cell Haemoglobin Concentration

All other blood biochemical indices examined were similar for cows and bulls. The results obtained in this study falls within the range of values for bulls and non-lactating and non-gestating cows as outlined by 15. The reports by other workers (1, 16, 17, 18, 19, 20.) were only for lactating cows at different stages, without sex comparison while others were on disease challenge. Sekoni *et al.*

(21) worked on plane of nutrition especially protein. Rekwot *et al.* (22) also considered the effects of breed and sex in swine species. Though the values observed in this study fall into estimated ranges, they do not indicate specific sex differences, except for WBC (total). However, WBC differential does not support sex differences (20).

Table 2: Effect of Sex on Some Serum Indices in White Fulani Cattle reared in South West Nigeria

Serum indices + Unit	Sex	
	Femle	Male
Total Protein mg/dL	75.25±2.24	77.28±1.02
Albumin g/100ml	34.98±0.29 ^b	37.84±0.54 ^a
Globulin g/100ml	40.25±1.95	39.44±0.48
Total Cholesterol mg/dL	138.44±8.53	131.25±2.52
Triglyceride mg/dL	112.47±8.85	102.24±2.52
Urea mg/dL	28.42±1.27	29.35±2.15
Creatinine mg/dL	0.99±0.29	0.98±0.27
SAST µL	35.58±3.73	41.00±5.85
SALT µL	15.00±1.99	18.92±2.32

abc: means in the same row differently superscripted differ significantly (P<0.05)

SAST: Serum Aspartate Transaminase SALT: Serum Alanine Transaminase

Conclusion and Application

It can be concluded from this study, that for white Fulani cattle at 4 years of age reared in South west Nigeria, there are similarities in sexes for the haematology and some serum biochemical values.

References

- Hagawane, S. D, Shinde, S. B, and Rajguru, D. N (2009). Haematological and Blood Biochemical Profile in Lactating Buffaloes in and around Parbhani city. *Veterinary world* 2(12):467-469
- McDowell, L.R. (1992): Minerals in animal and human nutrition. Academic Press, Inc San Diego, California
- Adejumo, D.O., Sokunbi, O.A. and Ladokun, A.O. (2005): Sex differences in acetylcholinesterase activity and total protein in the brain and hypophyses of the Red Sokoto bucks and does. *Asset series A5(1)*: 121-127
- Arnold, A. P. (1980). Sexual differences in the brain. *American Scientist* 68(2):165-173
- Arnold, A. P. and Schlinger, B. A. 1993. Sexual differentiation of Brain and Behaviour. The Zebra Finch is not just a flying rat. *BrainBehav. Evol.* 42:231-234
- Ladokun A O. (2006). Exogenous hormonal regulation of growth rate, fertility and blood profile of large white pigs. PhD Thesis University of Ibadan, Ibadan. Nigeria pp 280
- Doumas, B. T. Standards for total serum protein assays-a collaborative study. 1975. *Clin. Chem.* 21:1159
- Doumas, B. T. and Biggs, H. G. 1972. Determination of Serum Albumin. In standard methods of clinical chemistry, vol. 7, edited

- by G. R. Cooper, New York, Academic press. p.175
9. Allain, C. C., Poon, L. S., Chan, C. S. G., Richmond, W., and Fu, P. C. (1974): Enzymatic determination of total serum cholesterol. *Clin. Chem.* 20:470
 10. Wahlefeld, A. W. 1974. : Triglyceride: determination after enzymatic hydrolysis. In Bergmeyer, H. U. (editor): *Methods of Enzymatic Analysis*, 2nd English edition New York Academic Press p 1831
 11. Chaney, A. L., and Marbach, E. P. (1962). Modified reagents for determination of urea and ammonia. *Clin. Chem.* 8: 130
 12. Henry, R. Cannon, D.C. and Winkelman, J.W. (1974). *Clinical Chemistry: Principles and Technics*, edited by Harper & Row. P. 543
 13. Bergemeyer, H. U., Scheibe, P. and Wahlefeld, A. W. (1978): Optimization of methods for aspartate aminotransferase and alanine aminotransferase. *Clin. Chem.* 24: 58-73
 14. SAS. (2001). SAS User's Guide. Statistical Analysis Institute Inc. Cary, North Carolina.
 15. Benjamin, M.M. (2001): *Outline of Clinical Veterinary Pathology*, 2nd edn. Kalayani Publishers, New Delhi-Ludhiana.pp31, 35-36, 51, 62, 71, 187-189,203
 16. Anosa, V. O. "Season variations in the blood picture of white fulani calves naturally exposed to helminthiasis." *Veterinary Parasitology* 4.2 (1978): 103-109.
 17. Akerejola, O.O., Umuna, N.N. and Denis S.M.: Serum biochemical levels of cattle in Northern Nigeria. *Nig. Vet. J.* 9: 26-31, 1980.
 18. Saror, D. and Coles, E.H. (1973): The blood picture of White Fulani (Zebu) and White Fulani/Fresian (crossbreed) dairy cow. *Bull. Epizoot Dis. Afr.* 21: 485-487.
 19. Saror, D., and Coles, E. H. (1973). "Some serum biochemical parameters in White Fulani (Zebu) and White Fulani-Friesian (crossbred) cattle in Nigeria." *Bulletin of epizootic diseases of Africa. Bulletin des epizooties en Afrique* 21.4: 489.
 20. Egbunike, G. N., and M. O. Akusu. "Breed and sex influences on porcine haematological picture under hot humid climatic conditions." *Veterinary Research Communications* 6.1 (1983): 103-109
 21. Sekoni, V.O., Saror, D.I., Njoku, C.O., Kumi-Diaka, J. and Opaluwa, G.I. (1990). Comparative haematological changes following *Trypanosoma vivax* and *T. congolense* infections in Zebu bulls. *Veterinary parasitology*, 35(1), 11-19.
 22. Rekwot, P. I., Oyedipe, E. O., Akerejola, O. O., Voh, A. A., & Dawuda, P. M. (1989). Serum biochemistry of Zebu bulls and their Friesian crosses fed two planes of protein. *British Veterinary Journal*, 145(1), 85-88.