

Blood Biochemistry in Nellore Cows of Different Ages from the Bolivian Tropics

Atsuko Ikeda^{1,2*} and Pablo Roberto Marini²

¹Faculty of Veterinary Science, Universidad Nacional de Rosario Av, Argentina

²Career of the Scientific Researcher (CIC-UNR), Universidad Nacional de Rosario, Argentina

*Corresponding author: Atsuko Ikeda, Faculty of Veterinary Science, Universidad Nacional de Rosario Av, Argentina



ARTICLE INFO

Received: 📅 April 09, 2021

Published: 📅 April 28, 2021

Citation: Atsuko Ikeda, Pablo Roberto Marini. Blood Biochemistry in Nellore Cows of Different Ages from the Bolivian Tropics. Biomed J Sci & Tech Res 35(3)-2021. BJSTR. MS.ID.005696.

Keywords: Nellore Cows; Total Protein; Glucose; Longevity; Grazing System

ABSTRACT

The objective of the work was to evaluate if the multiparous adult cows presented any difference in the values of blood biochemistry compared to young primiparous Nellore cows of the Bolivian tropics. During the month of February 2021, a study was carried out with 14 multiparous adult cows and 13 young primiparous cows, belonging to the Technology Center on Agriculture and Livestock in Bolivia (FUNDACION CETABOL) in Santa Cruz, Bolivia. The following variables were analyzed: Albumin, Total Protein, Globulin, Urea, Alkaline phosphatase, Aspartate transaminase, Glucose. The mean values and standard errors of the days of life of the cows used, according to the group they belonged to at the time of blood sampling and measurement were: Adult cows of 4561 ± 95 days and young cows of 1535 ± 99 days showing differences significant ($p \leq 0.001$). The all values of Albumin (g / dL), Total Protein (g / dL) and Urea (mg / dL) have values between normal ranges and without showing significant differences between adult cows and young cows. With the exception of Globulin (mg / dL) which has values above the normal ranges, although without showing significant differences between adult cows and young cows. The alkaline phosphatase enzymes were above the upper range, although without showing significant differences between both groups. For the enzyme aspartate transaminase, the values are between the normal ranges and without showing significant differences between both groups. The glucose values were found between the normal ranges for adult cows and for young cows and without showing significant differences between both groups. It is concluded that multiparous adult cows did not present any difference in blood biochemistry values compared to young primiparous Nellore cows of the Bolivian tropics.

Introduction

The metabolic indicators at the blood level have been used to evaluate the degree of effectiveness of the diet and the magnitude of the energy and protein imbalance [1]. However, the bovines belonging to the *Bos indicus* species the values of the reference metabolic indicators indicated by the literature are scarce compared to the reports for *Bos taurus*. Furthermore, if it is considered that most of the population of *Bos Indicus* cows is in tropical areas, the reported values are even more scarce [2], even today after several years the data of Metabolic profiles of indica cows in tropical areas. The knowledge of blood components can not only help to know the state of health but

could also be used as a tool to monitor the changes that occur in cows at different ages [3]. In the same way, no studies are observed regarding the status of metabolic profile values in adult beef cows. The adaptation of the beef cow to the system where it is developed is important for the sustainability of the production system [4]. The age of the first calving, the life expectancy and the longevity of the cows are key objectives to be met in cattle, especially in beef cows, because the cost of raising calves and being able to wean them depends largely on how early cows will calve and how long they remain in production during their lifetime [5]. This study would make it possible to have a better knowledge of the values of the metabolic indicators in Nellore cows, in addition to the assessment

in adult cows. The search for elements necessary to sustain the benefits of the longevity of the cows would help to consolidate the search in the productive systems of the longest-lived cows. The objective of the work was to evaluate if the multiparous adult cows presented any difference in the values of blood biochemistry compared to young primiparous Nelore cows from the Bolivian tropics.

Materials and Methods

During the month of February 2021, a study was carried out with 27 primiparous and multiparous Nelore cows from a herd of 135 total cows belonging to the Technology Center on Agriculture and Livestock in Bolivia (FUNDACION CETABOL) in Colonia Okinawa. (17° 13' 12" south latitude, 62° 53' 39" west longitude) Santa Cruz, Bolivia. The community is located at 286 m.s.n.m. and it has a tropical climate, with significant rainfall in most months of the year and a short dry season with little effect on the general climate. The average annual temperature is 24.3 °C with average rainfall of 986 mm in Colonia Okinawa. Rainfall is minimal in July, with average values of 50 mm, the wettest month in January with an average rainfall of 330 mm. The highest average temperatures correspond to the month of January, with values of 26.5 °C and the lowest to the month of July with records of 20.7 °C.

Animals

Fourteen multiparous adult cows (Adult Group: AG) between ten and fifteen years old and thirteen young primiparous cows (Young Group: YG) between three and four years old were used. The cows of both groups were with calves at the foot and gestating at the time of taking the sample.

Feeding and Management

The herd was fed grazing managed in intensive conditions, with cultivated pastures *Brachiaria decumbens* (8 to 12 t / ha / year of DM), *Brachiaria humidicola* (8 to 10 t / ha / year of DM), *Brachiaria dictyoneura* (8 to 10 t / ha / year of DM), *Cynodon dactylon* (10 to 20 t / ha / year of DM) and *Panicum maximum cv mombaza* (20 to 28 t / ha / year of DM) [6].

Variables to Analyze

Age at the time of sample collection: date of sample collection - date of birth in days.

Blood Chemistry

Albumin (g / dL), Total Protein (g / dL), Globulin (mg / dL), Urea (mg / dL), Alkaline phosphatase (U / L), Aspartate transaminase (U

/ L), Glucose (mg / dL).

Sampling

A total of 5 ml of blood was collected from the coccygeal vein and was distributed in a Lithium heparin blood collection tube. Once the whole-blood sample is collected, testing was conducted within 2 hours (at room temperature) to prevent cellulose precipitation in the blood. The analysis is done in the Artemis Veterinarian laboratory in the city of Santa Cruz - Bolivia, for the determination of the content of Albumin (g / dL), Total Protein (g / dL), Globulin (mg / dL), Urea (mg / dL), Alkaline phosphatase (U / L), Aspartate transaminase (U / L) and Glucose (mg / dL) through laboratory equipment SKYLA VB1 Chemistry Analyzer produced by Lite-ON Technology Corp. HSPB.

Statistic Analysis

The means and standard errors were obtained, and it was tested whether there were significant differences between the groups (AG and YG) by applying analysis of variance to a classification criterion. Means for one-way ANOVA. Statistical analyzes were performed with the JMP software package in its version 5.0 for Windows (JMP®, SAS Institute, 2003).

Results

The mean values and standard errors of the days of life of the cows used, according to the group they belonged to at the time of blood sampling and measurement were: AG of 4561 ± 95 days and YG of 1535 ± 99 days showing differences significant ($p \leq 0.001$). Indicating that there are two different groups for comparison. And the median and ranges of the number of deliveries of both groups were: AG 9 (6-12) and YG 1 (1). Table 1 shows the values of Albumin (g / dL), Total Protein (g / dL) and Urea (mg / dL) all have the values between normal ranges and without showing significant differences between adult cows and young cows. Except for Globulin (mg / dL) which has values above the normal ranges, although without showing significant differences between adult cows and young cows. Figure 1 shows the values of the alkaline phosphatase enzymes 164.8 adult cows and 166.3 young cows are above the upper range (17.5-152.7 U / L), although without showing significant differences between both groups. For the enzyme aspartate transaminase, they have values between the normal ranges and without showing significant differences between both groups. For the glucose values, the values obtained were found between the normal ranges for adult cows (65.2 ± 3.3 mg / dl) and for young cows (68.1 ± 3.5 mg / dl) and without showing significant differences between both groups.

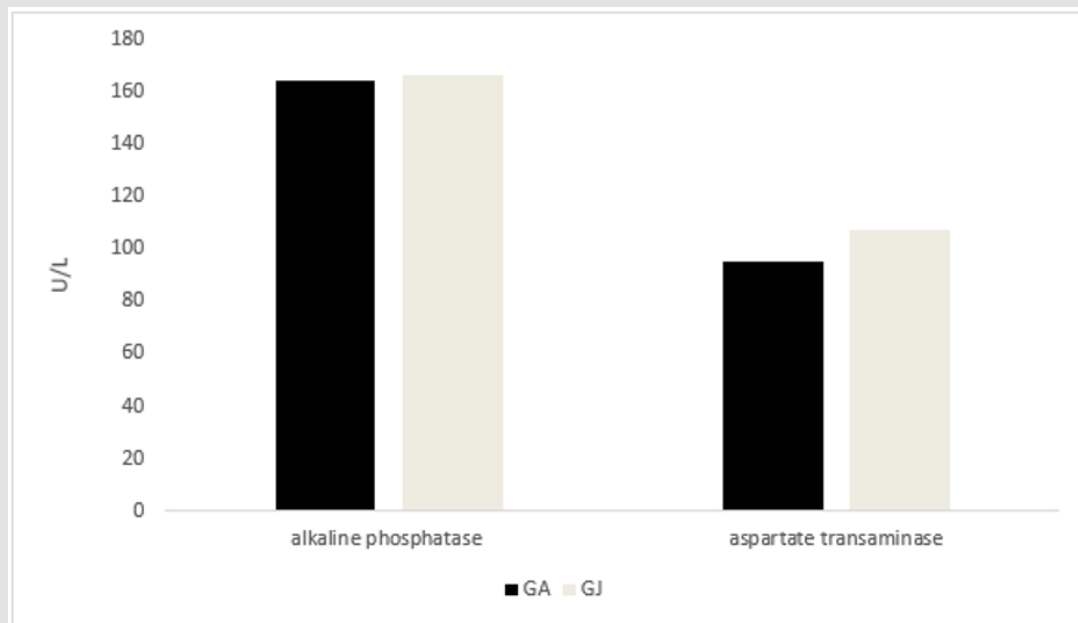


Figure 1: Values of Enzymes of metabolism by group.

- GA - Adult Group
- GJ - Young Group

Table 1: Protein metabolism values by group.

Groups	Albumin G/dl	Total protein g/dl	Globulin G/dl	Urea Mg/dl
AG	2.8 ± 0.1	8.0 ± 0.1	5.2 ± 0.1	9.6 ± 1
YG	2.9 ± 0.1	8.0 ± 0.1	5.2 ± 0.1	9.7 ± 1
Significancia	ns	ns	ns	ns

Note: All values correspond to the arithmetic mean ± standard error.

Sample size: AG: 14 cows and YG: 13.

ns (no significant); * (p< 0,05); ** (p<0.001); *** (p<0.0001)

Discussion

In this work, values were within the normal ranges of Albumin (2.8-3.9 g / dL), Total Protein (6.2-8.2 g / dL) and Urea (7.8-24.6 mg / dL). [7-9] (and showing no significant differences between both groups of adult and young cows. Globulin (2.9-4.9 mg / dL) showed values above the normal ranges. [7-9], although without show significant differences between adult cows and young cows. The increase in gamma globulins could be indicating an immune response of the organism in the presence of *Fasciola hepatica*, increasing the rate of circulating immunoglobulins [10]. Also, the increase in the concentration of globulins occurs when there is the presence of infectious processes in the body [11]. The alkaline phosphatase enzyme values were above the range (17.5-152.7 U / L), although without showing significant differences between both groups. Unlike the enzyme aspartate transaminase, they have values between normal ranges and without showing significant differences between both groups.

Serum elevations of alkaline phosphatase activity would indicate possible states of cholestasis [10]. For the glucose values, the values obtained were found between the normal ranges for adult cows (65.2 ± 3.3 m / dl) and for young cows (68.1 ± 3.5 mg / dl) and without showing significant differences between both groups. These results are similar to those reported by Lana Ferreira [12]. where the highest serum glucose concentrations were observed at calving (80.37 mg / dl), then decrease after 15 days and then stabilize (65, 2 ± 3.3 m / dl). The results showed that there are no differences in the values analyzed between adult cows and young cows, an important fact to take into account when making decisions to discard a cow, where at least for this group of cows it would not be the reason. Herds in general are made up of a higher percentage of growing cows (first calving and second calving) and should be made up of 20% first calving cows, 20% second calving cows and 60% adult cows [13]. Achieving the highest number of adult cows in the herd close to 80%, would allow from a zootechnical concept that the traits associated with biological efficiency such as longevity

and reproduction of cows generate greater sustainability of the productive system [14].

Conclusion

It is concluded that multiparous adult cows did not present any difference in blood biochemistry values compared to young primiparous Nelore cows from the Bolivian tropics.

Acknowledgement

Funding

This work was supported by the Technology Center on Agriculture and Livestock in Bolivia (FUNDACION CETABOL) in Japanese Community Okinawa, Santa Cruz, Bolivia.

References

1. Roa Vega ML, Ladino Romero EA, Hernández Martínez MC (2017) Indicadores de bioquímica sanguínea en bovinos suplementados con *Cratylia argentea* y *Saccharomyces cerevisiae*. *Pastos y Forrajes* 40(2): 144-151.
2. Alonso Villa N, Ceballos A, Ceron D, Serna CA (1999) Valores bioquímicos sanguíneos en hembras Brahmán bajo condiciones de pastoreo. *Pesq agropec bras Brasilia* 34(12): 2339-2343.
3. Bezerra L, Ferreira AF, Camboim EKA, Justiniano SV, Machado PCR, et al. (2008) Profile hematological of goat clinical healthy servants in Cariri paraibano. *Ciência e Agrotecnologia* 32(3): 955-960.
4. Vinhasftavo LC, Filho KE, De Almeida Torres Júnior RA, Brandão Ferreira Ítavo CC, Nogueira E, et al. (2014) Efficiency of Calf Production of Cows from Two Genetic Groups. *R Bras Zootec* 43(7): 390-394.
5. Dákary I, Márton D, Keller K, Fördös A, Török M, et al. (2006) Study on the Age at First Calving and the Longevity of Beef Cows. *Journal Central European Agriculture* 7(3): 377-388.
6. (2020) ESCASAN. Grass Seed Matsuda.
7. Kaneko JJ, Harvey JW, Bruss ML (1997) Appendix. In *Clinical Biochemistry of Domestic Animals* (5th Edn.), Academic Press Cambridge, MA, USA, pp. 885-905.
8. Suttle NF (2010) *Mineral Nutrition of Livestock* (4th Edn.), CABI Publishing Wallingford, UK, pp. 595.
9. Underwood EJ, Suttle NF (2003) *Los Minerales en la Nutrición del Ganado* (3rd Edn.), Acribia S A Zaragoza, Spain, pp. 637.
10. Coppo JA (2001) *Fisiología comparada del medio interno*. Ed. Dunken, Buenos Aires 191-199 and 289-290.
11. Duncan JR, Prasse KW, Mahaffey EA (1994) *Veterinary laboratory medicine*. Iowa State University Press, Ames, USA, pp. 300.
12. MF de Lana Ferreira, Navajas Rennó L, Detmann E, Fonseca Paulino M, De Campos Valadares Filho S, et al. (2020) Performance, metabolic and hormonal responses of grazing Nelore cows to an energy-protein supplementation during the pre-partum phase. *BMC Veterinary Research* 16: 108.
13. Saravia A, César D, Montes E, Taranto V, Pereira M (2011) Manejo del rodeo de cría sobre campo natural. *Bibliotecas INIA Instituto Nacional de Investigación Agropecuaria Uruguay*, p. 74.
14. Ikeda A, Garzón J P, Moyano JC, Leib S, Marini PR (2020) Fruchtbarkeits- und Aufzuchtleistung von Nelore-Rindern verschiedenen Alters bei Weidehaltung in den bolivianischen Tropen. *Zuchtungskunde* 92: 125-132.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2021.35.005696

Atsuko Ikeda. Biomed J Sci & Tech Res



This work is licensed under Creative Commons Attribution 4.0 License

Submission Link: <https://biomedres.us/submit-manuscript.php>



Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

<https://biomedres.us/>