Influence of the age on hematological parameters of sindi cattle (*Bos indicus*) in Paraíba Backwoods*

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ABSTRACT. Delfino L.J.B., de Souza B.B., Silva W.W., Ferreira A.F. & Soares C.E.A. **Influence of the age on hematological parameters of Sindi cattle (*Bos indicus*) in Paraíba backwoods.** [Influência da idade nos parâmetros hematológicos do gado Sindi (*Bos indicus*) no sertão paraibano.] *Revista Brasileira de Medicina Veterinária, 36(3):266-270, 2014.* Departamento de Medicina Veterinária, Universidade Federal de Campina Grande, *Campus* de Patos, Av. Universitária, s/n, Santa Cecília, Patos, PB 58708-110, Brasil. Email: zulu_vet@hotmail.com

The aim this work was to establish reference values of the hemogram of Sindi cattle raised in Paraiba backwood and evaluate the influence of same age, on blood samples we collected from 60 clinically healthy animals, being 30 females and 30 males, with the following age groups: Group I: 6 - 24 months, Group II: 24 - 48 months and Group III: up to 48 months. The experiment was conducted at the Center for Research and Development for the Semiarid Tropics (NUPEÁRIDO) and the Veterinary Clinical Pathology Laboratory of the Health Center and Rural Technology (CSTR), Universidade Federal de Campina Grande (UFCG), *Campus* de Patos-PB. Blood samples were placed in tubes containing EDTA (tetracético-ethylenediamine-di-sodium) as an anticoagulant were performed the following tests: counting the number of red blood cells, packed cell volume (PCV), Hemoglobin (Hb) content, calculations of absolute Erythrocyte count (RBC), Mean corpuscular volume (MCV) and Mean corpuscular hemoglobin concentration (CHGH). Held global count and differential leukocyte such as segmented neutrophils, eosinophils, lymphocytes and monocytes. Reference values for erythrocyte count (RBC), hematocrit (PCV), hemoglobin (Hb), MCV and CHGH were, respectively, (6375 to 13,400 $X10^6/MM^3$), (32 – 50 %), (9 - 15 *G/DL*) (37 – 60 $\mu^{3)}$ (23 to 33 $\mu\mu G$). And for the WBC were obtained the following results: WBC (5270 to 17,170 *UL*), segmented neutrophils (from 1360 to 5780 *UL*) Eosinophils (240 to 2525 *UL*), lymphocytes (2330 to 11,470 *UL*), monocytes (72 – 116 *UL*). With the results showed differences in hematological values were important to establish reference values for breed.

KEY WORDS. Bovine, hemogram, nupeárido, breed.

RESUMO. A pesquisa objetivou estabelecer valores de referência do hemograma de bovinos da raça Sindi criados no semiárido paraibano e avaliar a influência da idade nos mesmos. Foram colhidas

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amostras de sangue de 60 animais clinicamente sadios, sendo 30 fêmeas e 30 machos, com as seguintes faixas etárias: Grupo I: 6 - 24 meses; Grupo II: 24 - 48 meses e Grupo III: acima de 48 meses. O experimento foi desenvolvido no Núcleo de Pesquisas e Desenvolvimento para o do Trópico Semiárido (NUPEÁRIDO) e no Laboratório de Patologia Clínica Veterinária do Centro de Saúde e Tecnologia Rural (CSTR) da Universidade Federal de Campina Grande (UFCG), *Campus* de Patos, PB. As amostras de sangue foram condicionadas em tubos de ensaio que continham EDTA (etilenodiamino--tetracético-di-sódica) como anticoagulante, foram realizadas as seguintes provas: contagem do número de hemácias (HEM); determinação do volume globular (VG); o teor de hemoglobina (HB); cálculos dos índices hematimétricos absolutos: VGM (volume globular médio) e CHGM (concentração de hemoglobina globular média). Realizou-se contagem global e diferencial de leucócitos tais como: Neutrófilos segmentados; Eosinófilos; Linfócitos e Monócitos. Os valores de referência para o número de hemácias, volume globular, hemoglobina, VGM e CHGM foram, respectivamente, (6375 to 13,400 $X10^6/MM^3$), (32 – 50 %), (9 - 15 *G/DL*) (37 - 60 $\mu^{3)}$, (23 to 33 $\mu\mu G$). E para o leucograma obtiveram-se os seguintes resultados: Leucócitos (5270 – 17170 *UL*); Neutrófilos segmentados (1360 - 5780 *UL*); Eosinófilos (240 - 2525 *UL*); Linfócitos (2330 - 11470 *UL*); Monócitos (72 - 1160 *UL*). Mediante os resultados observaram-se diferenças nos valores hematológicos, sendo importante estabelecer os valores de referência para cada raça.

PALAVRAS-CHAVE. Bovino, hemograma, nupeárido, raça.

INTRODUCTION

In recent decades the development of research in veterinary hematology area has been accentuated considerably mainly due to the improvement of the techniques and problems relevant to clinical in different animal species (Souza 2008, Silva 2010). Several studies propose monitoring of hematologic parameters to evaluate the health of dairy herd and report their association with different pathologies (Campos 2008).

The blood parameters have been used worldwide to evaluate the health status of animals (Delfino et al. 2012). Reference values for the interpretation of these parameters should be regional preference, because they are influenced according to species, sex, race, age, diet, physiological state, time of day, ambient temperature and others (Delfino et al. 2012). Thus, the values obtained for animals raised in a region can't be considered without a proper assessment as standard reference to another. In general, the blood test is done to assess the health status, overall, as a support to a diagnosis or monitoring of a treatment (Thrall 2007). The hemogram, when it backs gradually to normal ranges, it is also one of the best methods evaluate the choosing of best therapy. Blood components, beyond the information for evaluation of health status, are also used to indicate the stress state of the animals, Roberto et al. (2010) and Rodrigues et al. (2010). The importance of hematology as a means semiological, helping veterinarians to establish diagnosis, prognosis and follow treatments of many diseases that affect animals home, is recognized and consecrated worldwide (Delfino et al. 2012).

Morphological and quantitative changes in blood cells are translated by variations in hematocrit values, number of circulating leukocytes, erythrocytes and content of hemoglobin in erythrocytes (Iriadan 2007, Souza 2011).

Among the hematological indices, MCV (mean corpuscular volume) still is the most widely used in the evaluation of anaemia associated with analysis of morphological changes of red blood cells, which can also be interesting to provide subsidies in the recognition of various types of anaemia (Silva et al. 2010). The hemoglobin content of reticulocytes has been proposed as an interesting tool in the diagnosis of iron deficiency, especially in renal patients, where the state assessment iron is particularly important to monitor the response to therapy with recombinant erythropoietin (Pereira 2008).

In addition, factors like age, sex, race, nutritional, infectious and parasitic may influence the hematological indices (Ayres et al. 2007). Stress is a factor that can influence the hematologic indices, but according to Ferreira et al. (2009) the variation in cattle due to stress is lower than in other species.

In Brazil, researchers have shown interest in studying the influence some of these factors on the hematology of cattle, and even established some standard hematological (Iriadan 2007, Tucker 2008).

The aim of this work was to know the normal values of hemogram of Sindi cattle breed in the conditions of semiarid Paraiba backwood and checking the dynamics of change in hemogram against the influence of age.

MATERIAL AND METHODS

This study has been made since february to april

2010. It were used 60 cattle of Sindi race, 30 males and 30 females, healthy and breeding according to traditional manegement conditions, employed in the Núcleo de Pesquisas e Desenvolvimento para o Trópico Semiárido (Nupeárido) in identical conditions of sanity, enviromentals and nutritionals, where they have been grazing breeding. In the milking time, the cattle was feeding with the same quantity of food. Three groups were made, according to the age. The first was organized with animals of 6 – 24 months, the second with animals of 24 – 48 months and the third up to 48 months, each group was formed by 10 males and 10 females. The blood analysis were done in the Laboratório de Patologia Clínica Veterinária, from Centro de Saúde e Tecnologia Rural (CSTR), in the Universidade Federal de Campina Grande (UFCG), *Campus* de Patos, PB.

Blood samples were taken in the beginning of the morning, through the jugular vein with disposable nedlees 40 x 12, after desinfection with iodine alcohol. The samples were aconditioned in dry and clean tubes, collecting 5 mL of blood, with 0.05 mL of EDTA (etilenodiamino-tetracético-di-sódica) anticoagulant solution, at 10 %, and disposed in refrigerated boxes until the realization of the exams. These were finished before 24 hours of conservation. The techniques employed to determine eritrogram and leukogram counting followed Thrall (2007) recomendations.

Complete counting blood (CBC): the erythrocytes and leucocytes countings were made in Neubauer chamber modified using Gower solution as diluting to red blood cells and leucocytes count with Thoma solution.

Hematocrit (PCV): the sample was homogenised and ¾ of the microhematocrit tube was full up with blood, seeled and centrifugated for 8 - 10 minutes. After this procedure, the reading was made in special card.

Hemoglobin (Hb): the evaluation of HB content has been held through the cianometahemoglobin, with reading in biochemical analyzer semi-automatic Bioplus 2000.

Mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (CHGH): to the calc of the absolute hematimetrics, we used the Wintrobe equation (Thrall 2007).

Leucocytes counting diferential: this counting was done in blood smear fixed and stained with Panótico method, using fast stainng, and microscopy observation.

The data of mean and amplitude of hematological values were expressed by descritive analysis. The mean values and standard deviation was submitted the variance analisys (ANOVA) and the Tukey's test ($P < 0.05$) was used for comparison among mean values by Statistic System Analysis Program (SAEG 2007).

RESULTS AND DISCUSSION

We registered for the three groups the mean values of erytrocytes and related amplitudes, respectively: 6 – 24 months (9525.3 ± 1619.4 $X10^6/mm^3$) / (6400 – 14350); 24 – 48 months (9631 ± 2516.8 $X10^6/mm^3$) / (6990 – 15410); > 48 months (8228.3 ± 1366.7 $X10^6/mm^3$) / (5730 – 10440). Among all observed values only the 1st and the 2nd groups showed values higher than Souza et al. (2007), meanwhile the 3rd group was equivalent. The 1st group showed mean higher than the mean drescribed for Dias Júnior et al. (2006) and Ferreira et al. (2009). Garcia-Navarro (2005) pointed that when the erytrocytes number is high, the oxigen capacity of the tissues is high too, because during the erytrocytes passage through the pulmonar capilaries, the hemoglobin combine with oxigen, producing oxihemogobin.

We observed for the three studied groups the following mean values of hemoglobin with their amplitudes: 6 - 24 months (11.8 ± 1.3 *G/DL*) / (8.5 - 14.5); 24 - 48 months (11.3 ± 1.5 *G/DL*) / (8.5 - 15); > 48 months (11.4 ± 1.2 *G/DL*) / (9.5 -15). These values were compared with those described for Souza et al. (2007) and no significative differences were observed. The number of erytrocytes and other erytrogram values are listed in Table 1. In Table 2, the amplitude values are shown.

The means ± standard deviations and amplitudes of packed cell volume were: 6 - 24 months 42.3 ± 5.9 %; 30 - 57; 24 - 48 months 42.6 ± 5.1 %; 32 - 50

Table 1. Mean values and standard deviations from erytrogram of cattle Sindi breed (*Bos indicus*), breeding in Paraíba Backyards, Patos, PB.

Erytrogram	Mean values and standard deviation		
	1st Group 6 – 24 months	2nd Group 24 – 48 months	3rd Group > 48 months
Erytrocytes ($X10^6/mm^3$)	9525,3 ± 1619,4[a]	9631± 2516,8[a]	8228,3 ± 1366,7[a]
Hemoglobin (g/DL)	11,8 ± 1,3[a]	11,3 ± 1,5[a]	11,4 ± 1,2[a]
Hematocrit (%)	42,3 ± 5,9[a]	42,6 ± 5,1[a]	40,4 ± 3,7[a]
MCV (μ^3)	44,8 ± 3,9[a]	46,2 ± 8,6[a]	51,7 ± 6,5[a]
CHGH ($\mu\mu g$)	28 ± 2,9[a]	26,5 ± 1,8[a]	28,4 ± 3,0[a]

MCV: Mean Corpuscular Volume; CHGH: Mean Corpuscular Hemoglobin Concentration. Different letters in the same row indicate statistical difference (P<0,05).

Table 2. Amplitude of eritrogram of cattle Sindi race (*Bos indicus*), breeding in semiared conditions in Patos, PB.

Erytrogram	Amplitude		
	1st Group 6 – 24 months	2nd Group 24 – 48 months	3rd Group > 48 months
Erytrocytes ($X10^6/mm^3$)	6400 - 14350	6990 - 15410	5730 - 10440
Hemoglobin v	8,5 - 14,5	8,5 - 15	9,5 - 15
Hematocrit (%)	30 - 57	32 - 50	35 - 45
MCV (μ^3)	37,5 - 57,5	28,5 - 57,5	44,5 - 65
CHGH ($\mu\mu g$)	21,5 - 34	25 - 29,5	23,5 - 35,5

MCV: Mean Corpuscular Volume; CHGH: Mean Corpuscular Hemoglobin Concentration.

and > 48 months 40.4 ± 3.7 %; 35 – 45, respectively. The observed data were higher than those reported by Garcia-Navarro (2005), Dias Júnior et al. (2006) and Ferreira et al. (2009). Garcia-Navarro (2005) in high enviroment temperature the animals loose liquid through breath system and their plasmatic volume low, which leads to increase of Hematocrit.

Ours obtained results of mean corpuscular volume show equivalent amplitude for all aged groups when they have been compared with Souza et al. (2007) work. However, the means were higher than observed in Dias Júnior et al. (2006) and Ferreira et al. (2009) papers. The means and standard deviation of globular hemoglobin concentration for the three groups were, respectively, 28.0 ± 2.9 *G/DL*; 26.5 ± 1.8 *G/DL* e 28.4 ± 3.0 *G/DL*. The amplitude varied from 21.5 to 35.5 in all evaluated groups. These values were lower than the reference. In addition, the mean observed was low that disagree with in Dias Júnior et al. (2006) and Garcia-Navarro (2005) works.

To the three studied groups were observed the following mean values of leucocytes and their amplitudes: 6 - 24 months (10,118.7 ± 2,732.5 */UL*) / (5,550 - 20,850); 24 – 48 months (10,513.6 ± 4,002.4 */UL*) / (500 - 17,800); and > 48 months (8,741.7 ± 2,328.0 */UL*) / (4,750 - 12,850). Our obtained data were higher than Souza et al. (2007) for the 1st and 2nd groups. However, for the 3rd group the values were lower. When we compared our data with those described for Ferreira et al. (2009), the minimal values were low and the maximum values were high than those reported by those researchers. The

Table 3. Mean values and standard deviation of leukogram from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB.

Leukogram	Mean values and standard deviation		
	1st Group 6 – 24 months	2nd Group 24 – 48 months	3rd Group > 48 months
Leucocytes (/UL)	10118,7 ± 2732,5[a]	10513,6 ± 4002,4[a]	8741,7 ± 2328,0[a]
Segmented Neutrophyls (/UL)	2587 ± 1068,5[a]	3535 ± 1305,1[a]	3342,8 ± 1176,8[a]
Eosinophyils (/UL)	1072 ± 719,9[a]	1016 ± 645,2[a]	1306 ± 661,3[a]
Linfocytes (/UL)	6205 ± 221,9[a]	5861,3 ± 371,3[a]	3804 ± 155,9[a]
Monocytes (/UL)	9392,8 ± 339,8[a]	3302 ±175,4[a]	6405 ± 439,6[a]

Different letters in the same row indicate statistical difference (P<0,05).

Table 4. Amplitude of leukogram from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB.

Leukogram	Amplitude		
	1st Group 6 – 24 months	2nd Group 24 – 48 months	3rd Group > 48 months
Leucocytes (/UL)	5550 - 20850	500 - 17800	4750 - 12850
Segmented Neutrophyls (/UL)	565 - 5980	1900 - 6160	1615 - 5200
Eosinophyils (/UL)	135 - 2920	180 - 2370	400 - 2280
Linfocytes (/UL)	2442 – 14390	2430 – 12815	2110 – 7195
Monocytes (/UL)	60 - 1480	55 - 535	100 - 1455

Table 5. Normal values of hemogram from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB, 2010.

Hemogram	Amplitude
Erytrocytes (X10^6/MM^3)	6375 - 13400
Hemoglobin (G/DL)	9 - 15
Hematocrit (%)	32 - 50
MCV (μ^3)	37 - 60
CHGH (μμG)	23 - 33
Leucocytes (/UL)	5270 - 17170
Segmented Neutrophyls (/UL)	1360 - 5780
Eosinophyls (/UL)	240 - 2525
Linfocytes (/UL)	2330 - 11470
Monocytes (/UL)	72 - 1160

MCV: Mean Corpuscular Volume; CHGH: Mean Corpuscular Hemoglobin Concentration.

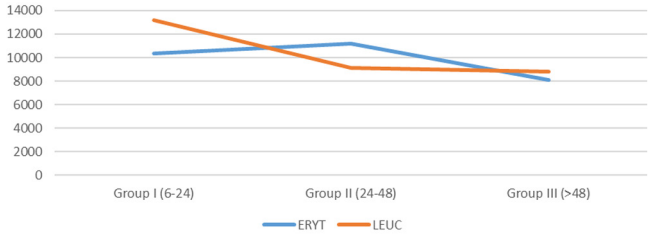

Figure 1. Mean values in amplitude of erytrocytes and leucocytes from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB.

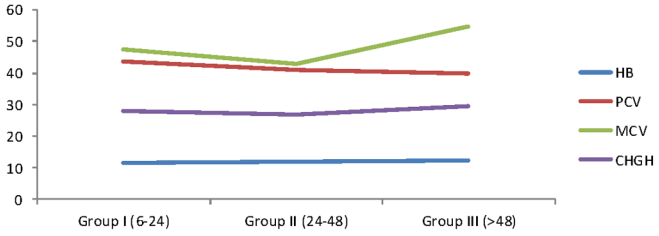

Figure 2. Mean values in amplitude of hemoglobin, hematocrit, mean corpuscular volume and mean corpuscular hemoglobin concentration from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB.

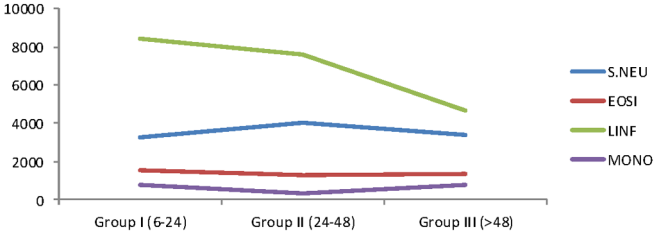

Figure 3. Mean values in amplitude of segmented neutrophyls, eosinophyils, linfocytes and monocytes from Sindi cattle (*Bos indicus*), breeding in Paraíba semiarid conditions, Patos, PB.

leucocytes number and the other leukogram values agree are shown in the Table 3, while in the Table 4 we report the amplitude of the leukogram values.

In our values of the amplitude and mean, we observed that there are a large difference among ours and those values reported by Garcia-Navarro (2005).

When we compared our results with those obtained by Souza et al. (2007), only the animals in the 3rd group shown lymphocytes values similar. Eosinophilia can be explained probably by an allergic reaction. Other hypothesis that can be used to explain the monocytosis observed in the animals was the healthy nutrition of some animals that presented body mass lower than the normal (Thrall 2007).

In Figures 1, 2, and 3 are established the valores normal values of erytrogram e leukogram from Sindi cattle (Bos indicus), breeding in Paraíba semiarid conditions, Patos, PB.

In the Table 5 there are the values for the hemogram of cattle Sindi (*Bos indicus*) breeding in Paraíba semiarid conditions, Patos-PB, 2010.

CONCLUSIONS

There are differences in the hematological paramethers. For this reason, it is too important define standard values according to age.

More studies should be done with the Sindi breed in semiarid conditions for determine more precision in standard values of cattle hemogram. It important to consider the influence of manegement, climate, sex, age and nutrition.

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