

Testicular echotexture of young Nelore and Canchim bulls under different microclimatic conditions

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The rearing environment is critical to the sexual development of animals. Animals exposed to an inadequate environment and thermal stress are more prone to develop changes in their testicular functions. In this sense, ultrasound is a tool to identify possible testicular changes caused by the environment. Therefore, the aim of this study was to evaluate the testicular echogenic characteristics of young bulls of the Nelore and Canchim breeds exposed to different microclimatic conditions in a tropical environment. A total of 46 animals were used, 22 Nelore (*Bos indicus*) and 24 Canchim (5/8 *Bos taurus* x 3/8 *Bos indicus*), aged 8.0±0.1 months, weighing 200.5±3.3 kg BW and with a body condition score of 5.0 (scale of 1-9). The animals were kept in two experimental areas: (1) Non-shaded system (NS), composed of 10 Nelore bulls and 12 Canchim bulls (NS Nelore and NS Canchim), distributed in pastures with minimum natural shade, with an available shade area of 1.02%. (2) Silvopastoral system (SPS), composed of 12 Nelore bulls and 12 Canchim bulls (SPS Nelore and SPS Canchim), located in pastures with cultivated eucalyptus (*Eucalyptus urograndis*, clone GG100), with an available shaded area of 30%. Both production systems had an area of 12 ha for intensive rotational grazing of *Urochloa brizantha* (cv Piatã), with *ad libitum* access to mineral mix and water. Ultrasound evaluations were performed once a month for 12 months (animals were monitored from 8 to 19 months of age) with a Z60 Vet® device (Mindray Bio-Medical Electronics Co, Shenzhen, China), using a 5.0-8.0 MHz multifrequency linear transducer (52 mm; model 6LE5VP), with the equipment set to mode B, at a frequency of 7.5 MHz. Ultrasound images of the testicular parenchyma were obtained in longitudinal sections in the middle third of the organ. Three frames were selected and analyzed in Image Pro Plus 7.0™ software (Media Cybernetics, Inc., San Diego, CA, USA) using numerical values of gray-scale pixels ranging from 0 (absolute black) to 255 (absolute white) to obtain echogenicity (mean pixel value) and heterogeneity (standard deviation of mean pixel value). For all analyses, averages were extracted from the three measurements performed. Evaluations of triple interactions between treatments (NS and SPS), breeds (Nelore x Canchim), and age (8 to 19 months) were performed. Data were analyzed using PROC MIXED with a repeated statement to evaluate the interaction between sequential measurements. Analyses were performed using Statistical Analysis System (SAS) software, and a significance level of 5% ($P < 0.05$) was used. There was a significant interaction between production systems, breeds and age for parenchyma echogenicity ($P = 0.01$). A progressive increase in parenchymal echogenicity was observed from 8 months of age in NS Canchim (45.54±6.18), SPS Canchim (35.63±6.11), NS Nelore (21.14±5=6.18) and SPS Nelore (24.79±5.83) up to 12 months of age in NS Canchim (95.57±5.59), SPS Canchim (81.72±6.11), NS Nelore (66.19±5.88) and SPS Nelore (47.46±5.47). The NS Canchim and SPS Canchim groups were superior to the NS Nelore and SPS Nelore groups in most of the months evaluated. There was also a three-way interaction for parenchymal heterogeneity ($P < 0.0001$). The parenchyma heterogeneity of the NS Canchim and SPS Canchim groups was higher than that of the NS Nelore and SPS Nelore groups at 8 months in NS Canchim (10.22 ± 0.69), SPS Canchim (8.97 ± 0.70), NS Nelore (5.82 ± 0.69) and SPS Nelore (6.35 ± 0.62) up to 12 months in NS Canchim (15.11 ± 0.62), SPS Canchim (14.48 ± 0.63), NS Nelore (13.88 ± 0.66) and SPS Nelore (10.52 ± 0.61). However, between 13 and 19 months, the heterogeneity values were similar between the groups. In conclusion, echogenicity and heterogeneity of the testicular parenchyma increase with age, reaching a maximum at 12 months. Furthermore, the differences observed between the treatments are more related to the racial factor, with young Canchim bulls having higher echogenic values than Nelore bulls. (Processes: FAPESP 2021/04335-3 and CNPq 312295/2022-7).

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