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Scrotal temperature patterns and seminal quality of composite bulls during winter and summer

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Keywords: bovine, fertility, testicular thermoregulation.

The objective was to compare the behavior of scrotal surface temperatures during extreme weather conditions recorded during winter or summer and evaluate their impact on raw semen quality, in order to expand the knowledge about reproductive physiology of composite bulls raised on tropical climate. The experiment was conducted in Embrapa, São Carlos-SP (tropical climate, subtype Cwa according Köppen). The average of minimum air temperature is 14.1°C and the maximum reaches 26.9°C during the winter. On the other hand, during the summer, minimum is 19.4°C and maximum average is 29.4°C. Seventeen Canchim bulls (⅝Charolais x ⅜Zebu) were utilized as semen donors. Bulls were 3 years old and weighted 504kg on average. Animals were kept in a single group in a pasture-based production system. Evaluations were performed monthly during winter (July to September) and summer (December to March). The scrotal surface temperature was measured by infrared thermometry (ST-600, Incoterm®). The three anatomical references chosen to describe the thermoregulatory efficiency were the spermatic cord (SpC, °C), dorsal testicular pole (DTP, °C) and tail of the epididymis (TEp, °C). Semen was monthly collected by electroejaculation and it was submitted to quantitative and qualitative laboratory evaluation (CBRA, 2013). Laboratory analysis included the assessment of sperm concentration (SC x109sptz/mL), progressive motility (PM%), total sperm defects (TDef %), fragmentation of chromatin (FC, % using toluidine blue technique) and sperm plasma membrane integrity (SMI, % using hiposmotic test). Data were analyzed using BioEstat 5.0 Version. Variables presenting abnormal distribution were transformed using linear transformation method and data were submitted to ANOVA. Means were compared by Tukey test ($P < 0.05$). Temperatures of SpC, DTP and TEp were lower in summer (32.57 ± 0.76 vs 33.79 ± 0.69°C; 31.88 ± 0.75 vs 32.31 ± 0.58°C; 28.15 ± 1.65 vs 30.01 ± 1.14°C, respectively; $P < 0.05$). This indicates that animals activated very efficiently their testicular thermoregulation system during the hottest season. The SC was higher in the summer (2.09 ± 1.51 vs 1.23 ± 0.87 x109sptz/mL, $P < 0.05$), while the PM was higher during the winter (69.72 ± 8.78 vs 56.18 ± 18.43%, $P < 0.05$). There were no significant differences in winter or summer for TDef (21.3 ± 11.1 vs 17.9 ± 11.4%), FC (3.2 ± 3.4 vs 2.4 ± 3.0%) and SMI values (66.2 ± 23.2 vs 67.0 ± 17.5%). Although the progressive motility was slightly higher in the winter, quantitative sperm production was higher during the summer. The similar incidence of morphologic defects, chromatin fragmentation and integrity of sperm membrane during the seasons demonstrates the potential fertilizing capacity of semen, regardless the climatic seasons. Thus, it was concluded that composite bulls showed functional scrotal thermoregulation system, which was able to efficiently compensate the bioclimatic adversities intrinsic to the summer season, and they kept the semen quality during the hottest part of the year.