



An insight into the linkage disequilibrium map of the Canchim beef cattle breed

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The development of linkage disequilibrium (LD) maps is very important for understanding the nature of non-linear association between phenotypes and genes, as LD can be defined as the non-random segregation of a pair of alleles at polymorphic sites. Canchim is a composite beef cattle breed which was developed in the 1960's by the crossing of *Bos indicus* (3/8) x *Charolais* (5/8) animals. The objective in this study was to analyze the extension of LD maps from a Canchim beef cattle population. A population of 400 Canchim animals was genotyped using Illumina® BovineHD Beadchip that uniformly spans the bovine genome with over 777,000 SNPs. After quality control processing, 708,641 SNPs and 396 animals remained in the analysis. The software fastPHASE and Haploview were used for reconstructing haplotypes and for estimating LD statistics based on the squared correlation coefficient between SNP pairs (r^2) for each chromosome (chr). The average value of r^2 was calculated for distances of 1kb, 5kb, 100kb, 250kb and 500kb. At 1kb, chr 5 held the highest r^2 (0.58) while chr 23 held the smallest (0.45), this pattern extended up to a distance of 100kb, where at a distance of 250kb the highest r^2 was still held by chr 5 (0.14) whereas the smallest was held by chr 25 (0.10). At the furthest distance considered (500kb), the highest was held by chr 8 (0.12), while the smallest r^2 was held by chr 25 (0.07). The overall average r^2 was 0.53 at 1kb, 0.43 at 5kb, 0.18 at 100kb, 0.12 at 250kb, and 0.09 at 500kb. These results follow the theory that there is an inverse relationship between LD and distance. The LD held at 500kb can be considered a long range LD for cattle when compared to the LD values found in the literature for *Bos taurus* and *Bos indicus*. However, this LD value for Canchim agrees with the LD found in the literature for Brahman cattle, which is attributed to the recent formation of the breed as an admixture between *Bos taurus* and *Bos indicus*, similar to the situation found in Canchim breed formation. Further studies on Canchim LD maps are needed for the complete understanding of admixture, breed formation and some other effects that play an important role in LD estimation. Supported by: CAPES.

Keywords: composite beef cattle, *Bos taurus*, *Bos indicus*, haplotype

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