



A SNP in *NEUROD1* is associated with production traits in Nelore beef cattle

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Brazil is an important producer and exporter of beef worldwide. Among the beef breeds used in this country, Nelore shows greater prominence due to its remarkable levels of production due to its adaptability and resilience in tropical environments. Residual feed intake (RFI), backfat thickness (BFT) and ribeye area (REA) are life time measured traits and detection of molecular markers associated with them can help breeding programs in order to select animals early in life and to predict breeding values with higher accuracy. In beef cattle, several polymorphisms have been already described as related to production traits. This study purpose was to access the presence of polymorphisms in the functional and positional candidate gene *NEUROD1* (neurogenic differentiation 1), and investigate their association with production traits in reference families of Nelore cattle. A total of 585 steers descending from 20 sires chosen to represent variability in this breed, were used. By sequencing of the 14 extreme animals for RFI, were prospected 7 new SNPs in the *NEUROD1* gene. The investigation of marker effects on the target traits RFI, REA, BFT, average daily gain (ADG) and metabolic body weight (MBW) was performed using a mixed model under the restricted maximum likelihood method. The SNP1062 characterized by the change of a cytosine for guanine, showed no significant association with RFI and REA in this beef cattle population evaluated. However, we found an additive effect on ADG ($P=0.0249$) and MBW ($P=0.0267$), with the estimated allele substitution effect of -5.59 kg and -0.93 kg^{0.75}, respectively. The allele C decreases the average of ADG and MBW in this population. This polymorphism accounted for 7.78 and 0.21 % of the total additive variance, and 9.98% and 0.27% of total genetic variance for ADG and MBW, respectively. A dominant effect of this SNP for BFT was also found ($P=0.009$). Our results is the first that suggest the *NEUROD1* gene as a candidate gene for BFT, ADG and MBW. The validation of this polymorphism in independent populations may help estimate this marker effect within populations and its phase relationship. Once confirmed, inclusion of this SNP in dense panels may improve accuracy of genomic selection for BFT, ADG and MBW. Despite Nelore being the breed of greatest economic importance in Brazil, few studies aiming to identify genes associated with production traits that are costly to evaluate and measured lately in lifetime have been performed.

Keywords: *Bos indicus*, candidate gene, feed consumption

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