



Association of bovine Toll-like receptor 4 with tick infestation rates and blood histamine concentration

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ABSTRACT. We investigated a possible association between bovine Toll-like receptor 4 (*TLR4*) and resistance to tick infestation in 103 cattle, including BMY cattle (1/2 Brahman, 1/4 Murray Grey, and 1/4 Yunnan Yellow cattle), Brahman, and Red Angus grazing on improved pasture. The tick infestation weight and number of *Rhipicephalus microplus* and the blood histamine concentration were measured and compared with those of 32 Chinese Holsteins and 30 Simmentals. A 228-bp fragment was amplified and sequenced to analyze the polymorphisms of the *TLR4* gene. After SSCP and sequencing analysis, 4 SNPs, i.e., 535(A>C), 546(T>C), 605(T>A), and 618(G>C), were identified, corresponding to GenBank accession Nos. AY297041 and NW_003104150; the latter two SNPs caused Leu→Gln and Gln→His substitutions, respectively. Genotype AA was completely predominant in the Chinese Holstein and Simmental; genotypes AA and AB were detected in Red Angus, while genotypes AA, AB, BB, and BC were

detected in Brahman and in BMY cattle. A negative correlation was identified between blood histamine concentration and number of tick infestation; in BMY cattle this negative association was significant. The tick infestation in cattle with genotype BB was significantly lower than in those with genotype AA. Blood histamine concentration in cattle with genotype BB was significantly higher than in those with genotype AA. The *TLR4* gene mutation could affect the blood histamine level and activate the immune reaction after tick infestation. Allele B has potential as a molecular marker for tick-resistance originated from Zebu cattle for use in cattle breeding programs.

Key words: *TLR4* gene; Tick; *Rhipicephalus microplus*; Histamine; Brahman; BMY cattle