SHORT COMMUNICATIONS

Effects of *DGAT1* on milk performance in Sudanese Butana × Holstein crossbred cattle

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Abstract

The improvement of milk production of indigenous Sudanese cattle such as *Bos indicus* Butana and its cross with Holstein is a major goal of the Sudanese government to ensure sufficient healthy nutrition in the country. In this study, we investigated the K232A polymorphism of *diacylglycerol acyltransferase* (*DGAT1*), a well-known modulator of milk production in other breeds. We determined allele frequencies and the allele effects on milk production. Therefore, 93 purebred Butana and 203 Butana × Holstein crossbred cattle were genotyped using competitive allele-specific PCR assays. Association analysis was performed using a linear mixed model in R. In purebred Butana cattle, the lysine *DGAT1* protein variant K232, which is found to be associated with higher fat and protein contents, as well as higher fat yield was highly frequent at 0.929, while its frequency in Butana × Holstein crossbred cattle was 0.394. Significant effects were found on milk yield ($P = 7.6 \times 10^{-20}$), fat yield ($P = 2.2 \times 10^{-17}$), protein yield ($P = 2.0 \times 10^{-19}$) and lactose yield ($P = 4.0 \times 10^{-18}$) in crossbred cattle. As expected, the protein variant K232 was disadvantageous since it was decreasing milk, protein, and lactose yields by 1.741 kg, 0.063 kg and 0.084 kg, respectively. No significant effects were found for milk fat, protein, and lactose contents. The high frequency of the lysine *DGAT1* protein variant K232 in Butana cattle could contribute to their high milk fat content in combination with low milk yield. In Butana × Holstein crossbred cattle, the *DGAT1* marker can be used for effective selection and thus genetic improvement of milk production.

Keywords *Bos indicus* · Association analysis · Allele frequencies · Crossbreed