

Novel SNPs in the SPAG11 gene and association with testicular biometric variables in Boer goats and application of the levelled-container technique

ABSTRACT

Testicular volume (TV) is one of the most important traits used in evaluation of the reproductive capacity of male animals. The levelled-container used in the present study was found to be reliable instrument to measure TV, based on a water displacement method. Sperm-associated antigen 11 (SPAG11) is an important gene that affects male reproductive performance. An objective of the present study, therefore, was to determine if single nucleotide polymorphisms (SNPs) in a fragment of the SPAG11 gene could be used to determine associations with values of testicular biometric variables in Boer goats. Primers were designed to amplify the full length of the first two exons of SPAG11. The targeted fragment was generated using a molecular cloning technique. As the result, four SNPs, [g.1256A > G(ss19199134542), g.1270C > T(ss19199134541), g.1325A > G(ss19199134540) and g.1327 G > A (ss19199134543)], were detected using a single-base extension (SBE) method. Two of these SNPs were synonymous (ss19199134540 and ss19199134542). The other two SNPs were nonsynonymous, thus, there were changes in amino acid in the resulting protein: threonine to isoleucine (for ss19199134541) and arginine to glutamine (for ss19199134543). The SNP ss19199134543 was the only locus detected that was associated with TV ($P = 0.002$). None of the testes dimensions nor TW were associated with detected SPAG11 gene SNPs. Most likely, the ss19199134543 locus affects tissue structures adjacent to the testes, causing the change in TV. In conclusion, among the studied testicular biometric variables, TV had the greatest potential for preselecting of bucks with desirable semen quality. The use of the levelled-container as a TV measurement approach was an accurate and reliable method.

Keyword: Levelled-container; Testicular volume; SNP; SPAG11; Goat