

Association of the *ACAA2* gene with dairy traits in Chios sheep

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The Acetyl-CoA acyltransferase 2 catalyses the last step of mitochondrial fatty acid β oxidation, playing a key role in meeting animal energy needs. A SNP (HM537015:g.2982T>C) located in the 3' *UTR* of the *ACAA2* gene has been linked with milk yield in dairy sheep. In this study, the association of the g.2982T>C SNP with milk yield, fat, protein content and prolificacy was studied on 1374 Chios sheep from 25 flocks in Cyprus and Greece. A cost effective sequencing and a Taqman RT-PCR assay were developed for genotyping all animals. Allele frequencies were similar in Cyprus and Greece with a respective T frequency of 0.54 and 0.60. The mixed model for the association analysis included the fixed effects of flock, lactation by lambing age interaction, year by season of lambing interaction, lactation duration for milk yield, and genotype; animal was fitted as a random effect. The SNP was significantly associated with milk yield in the Cypriot population with an additive effect of 10.61 kg ($p < 0.01$) on first and 7.62 kg ($p < 0.05$) on all lactations, and a positive dominance effect of 13.02 kg ($p < 0.01$) and 9.49 kg ($p < 0.01$), respectively. In contrast, a significant negative dominance effect was revealed in the Greek population amounting to -12.63 kg ($p < 0.01$) on all lactations. The SNP also had a significant additive effect of -0.05 ($p < 0.01$) on protein content, and significant additive (0.06, $p < 0.05$) and dominance (0.09, $p < 0.05$) effects on prolificacy in the Greek and Cypriot populations, respectively. Founder effect putatively accounting for the observed differences are discussed.