CASEIN GENES IN CILENTANA GOAT BREED

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It is well known that casein genes are organized as a cluster including alpha s1-casein (CSN1S1), beta-casein (CSN2), l'alpha s2-casein (CSN1S2) and k-casein (CSN3). In the last years, the genetic polymorphism of goat casein has raised a considerable research interest due to its direct relationships with milk quality, composition and technological characteristics. Researches mainly concern CSN1S1 fraction, characterised by a high polymorphism, both at qualitative and quantitative level, strongly affecting the technological and nutritional properties of goat milk. CSN1S1 locus is controlled by several autosomic alleles, as already shown by the studies carried out at protein level by milk electrophoretic analysis. Recently, it has been possible to identify a great number of mutations affecting transcription and/or translation of casein genes by means of analysis techniques of genomic DNA and messenger RNA. In particular, mutations responsible for the reduced level of expression of some of the CSN1S1 and CSN1S2 alleles, and for the absence of the protein fractions synthesised by each of the calcium-sensitive casein genes CSN1S1, CSN1S2, and CSN2 have been identified in goat. Moreover, recent studies on goat CSN3 confirmed the occurrence of protein genetic polymorphism, and identified several mutations responsible of different protein phenotypes at DNA level, as well as a number of synonymous nucleotide exchanges. Currently, more than 14 alleles were identified at goat CSN3 locus.

Due to the tight association occurring among casein genes, the estimation of the relationships between casein variants and milk traits can be improved by considering the entire casein haplotype instead of individual genotypes. In fact, the effect of an allele at a given locus could be confounded with the effect of linked alleles at another locus. Moreover, selection for an allele could automatically increase the frequency of linked alleles which could not present a favourable effect on the trait of interest. In conclusion, the study at haplotype level is necessary to detect important effects which could be used for genetic improvement of goat breeds aiming to preserve bio-diversity, to safeguard typical products, and to the valorise the particular nutritional and hypo-allergenic properties of some casein haplotypes.

The aim of this work was to study the casein gene and haplotype variability in the Cilentana goat breed. A total of 50 individual milk samples were analysed by isoelectrofocusing. Moreover, DNA was extracted from milk and analysed by different molecular techniques to assess the occurrence of different polymorphisms not detectable at the protein level.
Particular attention was given to the presence of null alleles, which are important for the eventual breeding of goat lines specifically devoted to the production of hypo-allergenic milk. Some heterozygous goats for $CSN2*0$ allele were identified. The possibility of selecting casein haplotypes carrying $CSN2*0$ allele is discussed, as well as of crossing northern goat breeds, characterised by the occurrence of $CSNIS1*0$ allele, with southern caprine populations, which contain null alleles mainly at $CSN2$ and $CSN1S2$ in their genome. At $CSN3$ locus, the predominant allele was $CSN3*D$ (GenBank acc. number AY166705) differing from $CSN3*A$ only for the Val ($CSN3*A$) to Ile exchange at position 119 of the mature protein. Null alleles do not occur at this locus, which could as well be of interest for nutritional purposes due to biological properties of its peptide components.