Survey of milk protein polymorphism in the "Bovina Rossa Siciliana"

A. Zumbo[1], R. Finocchiaro[2], A. Rundo Sotera[1], M.T. Sardina[2]
J.B.C.H.M. van Kaam[3], E. Budelli[2], B. Portolano[2]

[1] Dipartimento Morfologia, Biochimica, Fisiologia e Produzioni Animali, Università di Messina, Italy
[2] Dipartimento Scienze Entomologiche, Fitopatologiche, Microbiologiche e Zootecniche, Università di Palermo, Italy
[3] Istituto Zooprofilattico Sperimentale della Sicilia "A. Mirri", Palermo, Italy

Corresponding author: Alessandro Zumbo. Dipartimento Morfologia, Biochimica, Fisiologia e Produzioni Animali, Sezione Zootecnica e Nutrizione Animale. Via Polo Universitario dell'Annunziata, 90128 Messina, Italy – Tel: +39 090 356961 Fax: +39 090 356569 – Email: alessandro.zumbo@unime.it

ABSTRACT

The "Rossa Siciliana" is an autochthonous small Sicilian dairy cattle population, accounting for 5-7,000 individuals. This breed is characterized by high ability to live on poor pasture lands, moderate milk production, and traditionally linked to cheese production. Aim of this work was to investigate milk protein polymorphisms in this population. A total of 62 individual milk samples were collected from 19 extensive farms spread in the "Parco dei Nebrodi" area (Messina). All samples were analyzed by isoelectrofocusing (IEF) with pH range 2.5-6. High variability was found at the CSN1S1, CSN2, CSN3, LGB and LALBA loci, while the CSN1S2 locus was monomorphic for the A allele. The allele frequencies and the Hardy-Weinberg equilibrium were estimated using the GENEPOP software, further the casein haplotype frequencies and the occurrence of the linkage disequilibrium were computed with the EH software, taking into account the association among loci. Joint analysis at all loci showed that the population is not in Hardy-Weinberg equilibrium (Chi-square=19.0, p-value=0.0407), probably due to genetic drift. Of the three alleles detected at CSN1S1 locus, CSN1S1*B and CSN1S1*C had high frequencies (0.734 and 0.258 respectively), as reported for most breeds. The CSN1S1*D allele was detected with a low frequency (0.008). High frequencies were found for CSN2*A^2 (0.573) and CSN3*B (0.637). High frequencies were observed for LALBA*B (0.903) and LGB*B (0.815). Strong linkage disequilibrium was detected for the polymorphic casein loci CSN1S1-CSN2-CSN3. For the casein haplotype only the hypothesis of association among loci was considered. Out of the 27 expected, only four haplotypes had a frequency higher than 0.10. The most frequent haplotype was BA^2B (0.236), followed by CA^2B (0.214), BA^1A (0.168), BA^1B (0.131), and BA^2A (0.094). The high frequency of BA^2B haplotype and the possible relation with production traits are under investigation.