MC1R polymorphisms in some Italian local cattle breeds

E. Scotti, L. Fontanesi, M. Tazzoli, R. Davoli, S. Dall'Olio, V. Russo

Dipartimento Protezione e Valorizzazione Agroalimentare, Università di Bologna, Italy

Corresponding author: Luca Fontanesi. Dipartimento Protezione e Valorizzazione Agroalimentare, Sezione Allevamenti Zootecnici. Via F.lli Rosselli 107, 42100 Reggio Emilia, Italy – Tel: +39 0522 290516 – Fax: +39 0522 290523 Email: luca.fontanesi@unibo.it

ABSTRACT

Coat colour and colour pattern distribution is, in general, a distinctive trait in most cattle breeds. The relative amounts of black/brown (eumelanin) and red/yellow (phaeomelanin) pigments produced in melanocytes are controlled primarily by two loci, *Extension* and *Agouti*. The *Extension* (*E*) locus produces the melanocortin-1 receptor (MC1R). In cattle, four main alleles have been identified in the *MC1R* gene: E^+, the "so called" wild type allele that produces a variety of colours; E^D, the dominant allele that gives black coat colour; *e*, the recessive allele that yields red/yellow coat colour; *E1* that is determined by a 12 bp duplication and whose effect on coat colour is not well understood. As a first step to identify breed specific DNA markers that could be used for the traceability of dairy cattle products obtained with "mono-breed" milk, here we investigated the presence and distribution of the mentioned alleles at the *MC1R* locus in some local breeds that have different coat colour: Reggiana (red or *fromentino*), Bianca Val Padana (white) and Rendena (dark brown). A total of 442 animals (Reggiana, 284; Bianca Val Padana, 74; Rendena, 84) were genotyped at this locus using a PCR-restriction fragment length polymorphism (RFLP) protocol and a PCR-amplified product length polymorphism (APLP) method. Sequencing of a 740 bp fragment of the *MC1R* gene was carried out to confirm the results of the PCR-RFLP and PCR-APLP genotyping techniques. All Reggiana animals were homozygous "*ee*". This result confirm the effect of the *e* allele on coat colour in this breed. This allele was also identified, but with much lower frequency, in Bianca Val Padana (0.04) and in Rendena (0.01). Bianca Val Padana showed the presence of only another allele, E^+, at 0.96. In Rendena allele E^+ was 0.73 and allele *E1* was 0.26. Allele E^D was not observed in any of the three considered breeds. Comparing these data with results previously obtained for other major cattle breeds, it could be possible to consider, at least in some cases, the *MC1R* locus to distinguish or to exclude the dairy products obtained from milk of some breeds.