Assessment of variability of genes associated with meat quality traits in Cinta Senese pigs

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ABSTRACT

Cinta Senese is an autochthonous Tuscan pig breed, accounting for about 2-3,000 individuals. The breed is characterized by high ability to live outdoor on chestnut and acorn woods, low growth performances, good meat and fat quality and its commercial value is linked to high quality seasoned products. Studies on commercial pig breeds and lines have identified that mutations in several genes affect directly or are associated with meat quality traits. Here, we assessed allele frequencies at some of these loci in a sample of Cinta Senese pigs, representing from 1,3 to 6,6% of the whole population. This was a first step to evaluate, eventually, selection strategies aimed at preserving or improving meat quality traits in this breed. DNA was extracted from hair of Cinta Senese pigs, admitted to the herd book, that were genotyped by PCR-RFLP at the following loci: ryanodine receptor 1 (*RYR1*) influencing mainly $pH_1$and responsible for the PSE defect of the meat (181 animals); calpastatin (*CAST*) affecting meat tenderness (32 animals); protein kinase, AMP-activated, gamma 3 non-catalytic subunit (*PRKAG3* or Rendement Napole locus, RN) influencing muscle glycogen content, pH_u and responsible for the defect known as acid meat (129 animals); heart fatty acid-binding protein (*H-FABP*) associated with intramuscular fat content (41 animals) and melanocortin 4 receptor (*MC4R*) associated with backfat thickness (177 animals). The results for the *RYR1* locus showed that the positive allele (*1843C*) is almost fixed (0.98). *H-FABP* presented similar results for the two considered polymorphisms (0.15 and 0.85 for alleles *D* or *d* and 0.93 and 0.07 for alleles *A* or *a*, respectively). Concerning the CAST locus we performed two of the six known polymorphisms. The *B* and *F* alleles at the *CAST* locus were both detected with 0.03 frequency, whereas the *MC4R* locus showed intermediate frequencies of the two alleles (0.48 and 0.52 for allele *1* and *2,* respectively). All Cinta Senese animals were homozygous for the *R200* allele of the *PRKAG3* gene confirming the absence of the acid meat defect in the breed. The tested animals were in H.W. equilibrium at all the examined loci, except the first polymorphic site at the H-FABP locus that showed an excess of heterozygosity. Considering the low frequency of the negative allele for the *RYR1* locus, it seems feasible to eradicate the defective allele with any effect on the inbreeding level of the breed. Further studies are needed to confirm the obtained results in a larger sample, and eventually, to plan studies on associations between these DNA markers and meat quality traits in Cinta Senese breed.