

Study of SNPs in genes encoding for structural and proteolytic proteins in skeletal muscle of Italian Large White and Italian Duroc pigs

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ABSTRACT

In pigs, several studies focused on structural and proteolytic muscle genes and their possible relationship with meat production traits as they may play key role in muscle mass accretion. In the present work, we investigated four genes expressed in skeletal muscle, calpain 1 (*CAPN1*), calpastatin (*CAST*), myopalladin (*MYPN*), and titin (*TTN*). These genes were mapped on porcine chromosomes 2p14-p17, 2q21-q24, 14q25-q29, and 15q23-q26, respectively, and located in regions where quantitative trait loci for carcass traits were found.

The μ -calpain protein (coded by *CAPN1* gene) is involved in the early *post mortem* protein degradation promoting the initial disruption and destabilization of the myofibrillar structures. Calpastatin is a specific inhibitor of ubiquitous calpains and its *post mortem* activity influences meat tenderization process. Myopalladin is a sarcomeric protein which has central roles in the organization and assembly of the Z-line and seems to affect regulatory mechanisms of muscle gene expression. *TTN* encodes a large abundant protein of striated muscle that is involved in muscle assembly and ultrastructure and it is also implicated in muscle elasticity.

To evaluate the putative effects of these four genes on carcass quality traits, we analysed one single nucleotide polymorphism (SNP) for each gene, identified in the 3' untranslated regions (*MYPN* and *TTN*) and in introns (*CAST* and *CAPN1*) in 272 sib tested Italian Large White (ILW) and 114 sib tested Italian Duroc (ID) pigs.

General linear model procedure of the SAS package was used to search for association between the SNPs and the following productive traits: average daily gain (ADG), backfat thickness (BFT), lean cuts (LC), ham weight (HW), feed conversion ratio (FCR) for both breeds and visible intramuscular fat (VIF) only for the ID breed.

No significant associations were found between the SNPs analysed in *CAPN1* and *TTN* and the selected traits. Statistically significant associations were found for *CAST* gene with ADG, LC and FCR ($P < 0.05$) in the ILW breed and with ADG, LC, BFT, HW ($P < 0.05$) in the ID breed. Moreover, in the ID breed, the *MYPN* gene was associated with all the considered traits ($P < 0.01$).

This work confirms the results previously reported in literature indicating that *CAST* and *MYPN* could be considered positional and biological candidate genes affecting carcass traits.