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Novel SNPs of the porcine *TRIP12* are associated with water holding capacity of meat

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<https://doi.org/10.17221/7048-CJAS>

Citation: Loan H.T.P., Murani E., Maak S., Ponsuksili S., Wimmers K. (2013): Novel SNPs of the porcine *TRIP12* are associated with water holding capacity of meat. Czech J. Anim. Sci., 58: 525-533.

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Degradation of proteins during maturation of meat, mediated by the calpain/calpastatin system and the ubiquitination system, largely affects the tenderness and the water holding capacity (WHC) of meat. The thyroid hormone receptor interacting protein 12 (*TRIP12*) is known as a HECT domain-containing E3 ubiquitin-protein ligase that recognizes protein substrates for ubiquitination. This study aims to identify polymorphisms of the *TRIP12* gene and to evaluate the relationship between genotype, transcript abundance, and meat quality traits in pigs. Two synonymous SNPs (XM_003484315.1:c.2211T>C, c.4957A>C) were identified that segregated among animals of herds of the breed German Landrace (DL, $n = 269$) and the commercial crossbreed of Pietrain \times (German Large White \times German Landrace) (PiF1, $n = 300$). Statistical analysis revealed associations between *TRIP12* polymorphisms and the organismal traits related to water holding capacity, i.e. conductivity 45 min postmortem (CON₁, $P < 0.1$) and pH 24 h postmortem (pH₂₄, $P < 0.1$). Haplotype analysis revealed consistent effects on muscle CON₁ in the two populations ($P < 0.1$). Carriers of the minor alleles *C* at the two polymorphic sites tended to have higher transcript abundance as well as higher water holding capacity. The integrated analysis of genotypic and haplotypic variation, transcript abundance, and technological parameters of WHC indicates that the XM_003484315.1:c.2211T>C and c.4957A>C of *TRIP12* are in linkage disequilibrium with a causal factor located in a *cis*-regulatory region, which affects in the first instance gene expression and in the second traits related to water holding capacity. Our results provide statistical-genetical evidence supporting *TRIP12* as a functional candidate gene for water holding capacity of porcine *M. longissimus dorsi*.

Keywords:

E3 ligase; swine; drip loss; expression; ubiquitination; protein degradation; meat quality

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IF (Web of Science)

2017: **0.955**

5-Year Impact Factor: **1.06**
Q3 (33/60) – Agriculture, L
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