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Detection of a Mutation in RYR1 Associated with Meat Quality in Commercial and Thai Native Pigs

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Abstract

Porcine Stress Syndrome (PSS) is a heredity disease caused by the C1843T mutation of the Ryanodine Receptor 1 (RYR1) gene. The mutation is also associated with an increased lean meat content but at the same time detrimental meat quality better known as PSE (pale, soft and exudative) pork (PSE). The aim of this study was to detect the mutation in commercial and Thai native pigs and finally to estimate possible associations with carcass composition and meat quality traits. The PCR-RFLP technique was used to identify the mutation in Duroc (DU) (n =25), Large White (LW) (n =47), Landrace (LR) (n =23), Pietrain (PT) (n =26), Thai native pigs (n =38), the commercial crossbred (LW × LR) (n =49), the commercial crossbred (DR × LW × LR), and the commercial crossbred (Line A × DU × PT) (n =155). Analysis of the genotype frequencies (CC, CT, and TT) revealed no significant differences within the group of commercial pigs but between them and Thai native pigs ($p < 0.05$). However, allele frequency analysis showed significant differences ($p < 0.05$) between Thai native pigs (C:T=1:0), Landrace, Pietrain LW × LR and DR × LW × LR (C:T = 0.85:0.15, 0.87:0.13, 0.85:0.15 and 0.86:0.14, respectively). The effect of the halothane gene mutation on cured meat was investigated for the DR × LW × LR pigs (CC=73, CT=25, TT=2). No significant differences were found for all meat quality traits between animals with the CC and CT genotype. Contrary to that, pH45min and pH24 hr post mortem in *Musculus Semimembranosus* (SM) and in *Musculus Longissimus Dorsi* (LD) were significantly lower, whereas, percentage of drip loss, lightness (L^*) and yellowness (b^*) at LD 48 hr after slaughter were significantly higher for the homozygous recessive genotype ($p < 0.05$). However, redness (a^*) was significantly higher for the TT (10.54 ± 0.14) and CT (8.90 ± 1.39) compared to CC pigs (8.33 ± 1.58) ($p < 0.05$). This study shows breed differences against PSS resistance in Thai native pigs and commercial pig breeds in Thailand, as well as associations of the RYR1 genotypes with several meat quality parameters.

Keywords: Commercial pig, meat quality, RYR1, Thai native pig