**Thesis Title**  
Proteomic and Molecular Marker Analysis for Tenderness and Toughness Traits of Chicken Meat

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**Abstract**

In the present study, two dimensional gel electrophoresis (2DE) and matrix assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF/MS) were used to identify protein markers for tenderness and toughness traits of chicken meat. The polymorphisms of functional candidate genes and their association with meat quality were analyzed in Thai indigenous and commercial broiler chickens. Moreover, the proteome and transcriptome profiles of Thai indigenous and commercial broiler chicken muscles during growth periods (0, 3, 6 and 18 weeks of age) were analyzed by using 2DE and quantitative real-time PCR techniques. A total of 169 and 158 protein spots were observed in Thai indigenous and commercial broiler chicken muscles, respectively. Of these proteins, 5 protein spots were up- and down-regulated with Warner-Bratzler shear force (WBSF) values of chicken meat. Three protein spots were significantly correlated to WBSF values of chicken meat ($p<0.05$). These protein spots were characterized and showed homology with chicken PKM2, PGAM1 and TPII proteins. Moreover, the polymorphisms of $PKM2$, $PGAM1$ and $TPII$ genes were identified and located at position c.1323C>T, c.636C>T and c.585T>C of their open reading frame (ORF), respectively. The $PKM2$ and $TPII$ markers were associated with drip loss (DL) and dressing percentage (DP) values, respectively.
Whereas the *PGAM1* marker was associated with cooking loss (CL) and pH_{45min} values. Proteome analysis of muscle chicken during growth period revealed that five (*PGAM1, TPII, APOA1, HSP25 and FABP3*) and four (*PGAM1, TPII, APOA1 and FABP3*) protein spots are significantly associated with ageing of Thai indigenous and commercial broiler chickens, respectively. The expression levels of *HSP25* and *FABP3* genes were significantly decreased during growth periods, whereas the expression levels of *PGAM1, TPII* and *APOA1* genes were no significant differences among age groups of Thai indigenous chicken. There were also no significant differences in transcription levels of these five genes in age groups of commercial broiler chicken. The results indicate that the importance of energy metabolism proteins in glycolytic pathway is associated with chicken meat quality. Moreover, metabolic energy and stress proteins are important for muscle development of chicken. These findings provide novel molecular protein markers for meat tenderness and muscle development in chickens.