Genetic characterization of Red Junglefowl (*Gallus gallus*), Thai indigenous chicken (*Gallus domesticus*), and two commercial lines using selective functional genes compared to microsatellite markers

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**ABSTRACT.** Genetic characterization among Red Junglefowl (GS, *Gallus gallus spadiceus*), Thai indigenous chicken (TIC, *Gallus domesticus*) and commercial lines has been widely used for studies of genealogical origin, genetic diversity, and effects of selection. We compared the efficiency of genetic characterization of chicken populations that had been under different intensities of selection using selective functional gene versus microsatellite markers.
marker analyses. We genotyped 151 chickens from five populations: Red Junglefowl, TIC and commercial lines (BR, broiler and WL, White Leghorn). Genetic structure analyses using six loci of five functional genes - corresponding to heat tolerance (heat shock protein 70, HSP70/C, HSP70/M), broodiness (vasoactive intestinal peptide receptor-1, VIPR-1), egg production-[24-bp indel (insertion or deletion) prolactin, 24bpPRL], ovulation rate (growth hormone receptor, GHR), and growth (insulin-like growth factor-1, IGF-1) - were compared with 18 microsatellite markers. PCR-RFLP and allele specific PCR were used for functional gene typing. A neighbor-joining tree from Nei’s genetic distance was constructed to show genetic relationships. A similar pattern was found with both functional genes and microsatellites. Three groups consisting of BR, WL and TIC-GS-GG were formed. A principal component plot based on individual similarity using Dice’s coefficient was also constructed to confirm the relationship. Different patterns were found when using functional genes versus microsatellites. A principal component plot with functional genes also gave three clusters consisting of BR, WL and TIC-GS-GG. A principal component plot using microsatellites gave four clusters, consisting of WL, GG, TIC, and BR-GS. Characterization of BR and GS differs from previous studies. We concluded that genetic characterization with appropriate functional genes is more accurate when differences in genetic make-up among populations are known. Genetic characterization using functional gene data was consistent in neighbor joining and principal component plot analyses, while genetic characterization using microsatellite data gave varied results depending on the analysis methodology.

Key words: Genome comparisons; Genetic structure; Genetic diversity; Genetic characterization