Understanding Local Chicken Genetic Resources to Improve Livelihood

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Abstract

The identification and understanding of local chicken genetic resources and the prevention of further loss of genetic variation in the face of the rapidly increasing demand for animal protein and related economic and market forces is an important task to improve livelihood in developing countries. Genetic diversity was assessed using 10 microsatellite markers between and within five different local chicken ecotypes originated from different agro-ecological regions and corresponding market sheds of Ethiopia, namely, Tilili, Horro, Chefe, Jarso and Tepi and the reference breed, Fayoumi. DNA was isolated from blood of 25 individuals from each of the five local ecotypes and the reference breed. The results of this study showed that all the microsatellite markers tested were highly polymorphic for all the tested ecotypes. The mean number of alleles from all microsatellite markers tested per ecotype varied from 4.2 (Jarso) to 5.3 (Chefe). The number of alleles detected per locus varied from 2 to 10 alleles. The calculated expected heterozygosity level showed high genetic variability in all tested populations. Heterozygosity varied between the lowest value of 55 % (Jarso ecotype) and highest value of 63 % (Tilili and Chefe ecotypes) for all the microsatellite markers tested. The genetic distance analysis result showed the presence of considerable genetic variation between the different ecotypes, however, the within ecotype variation was higher than the between ecotypes variation. Phylogenetic trees obtained using the genetic distance in both standard Neighbour-Joining (NJ) and UPGMA methods assorted the ecotypes according their agro-ecological origins. The topography of both trees remained the same, but with higher significance level in NJ tree. Bootstrapping values were between 53 to 100 % in NJ tree and 43 % to 100 % in UPGMA tree. In both trees, Fayoumi population formed a distinct branch on it's own with high significance (100 %) level. The isolation by distance analysis based on normalised Mantel statistic showed a strong and positive correlation ($r = 0.62$) between the genetic distances and geographic distances matrixes.

Keywords: Biodiversity, genetic resources, local chicken, Ethiopia

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