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"Solidarity in a competing world — fair use of resources"

Morphometric Differentiation of Indigenous Chicken Populations of Ethiopia Using Discriminant Analysis

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Abstract

Adequate knowledge of diversities within and between chicken populations will not only help in reducing misidentification in poultry husbandry but also aid conservation of many important endangered alleles. In poultry, variability in linear body measurements (LBMs) arises due to genetic and environmental effects, and the magnitude of variability may differ under different management practices and environmental conditions. This study evaluated the usefulness of morphological traits to distinguish three indigenous chicken populations of Ethiopia using discriminant analysis. A total number of 711 matured, traditionally-managed chickens were used for this study. The chickens were sampled from Gobusayo, Bakotibe and Danno districts of western Oromia zone in Ethiopia. Body-weight and LBMs i.e., back-lengths, beak-length, body-length, breast-circumference, comb-height, comb-length, keel-bone-length, neck-length, shank-circumference, shank-length, wattle-length, wattle-width, and wing-span were taken from December 2014 to April 2015 on each bird.

Univariate analysis of the population variability revealed that all the traits showed significant ($p < 0.05$) difference across the districts. The chickens from Danno had for most of the traits the highest LSMEANS value followed by Bakotibe and Gobusayo. Stepwise discriminant analysis indicated that wing-span, breast-circumference, back-length, shank-length, body-weight, comb-height, neck-length, comb-length, wattle-length, wattle-width and beak-length were more effective in that order discriminating the three chicken populations. As revealed by the canonical discriminant analysis, the Mahalanobis distance of the traits found between Gobusayo and Bakotibe chickens was 8.93, between Gobusayo and Danno chickens was 7.85 and between Bakotibe and Danno chickens was 2.05. This was complemented by the results of the nearest neighbour discriminant analysis, where 92.35 % of Gobusayo, 78.02 % of Bakotibe and 73.77 % of Danno chickens were classified into their source population. However, varied percentages of misclassification were observed showing the level of genetic exchange that has taken place between them overtime. This study indicates that discriminant analysis may be used successfully in the field to separate the chicken populations. The successful characterisation will help in selective breeding in future breeding programmes. The present results could be complemented by molecular characterisation using DNA markers; and serve as a basis for further characterisation, conservation and genetic improvement strategies for indigenous poultry.

Keywords: Discriminant analysis, indigenous chicken, morphological traits

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