IMPACT OF SOME HEAT RESISTANCE GENES ON QUANTITATIVE TRAITS IN CHICKEN USING MODERN GENETIC TECHNIQUES

By

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B.Sc. Agric. Sci. (Poultry Production), Ain Shams Univ. (2003)
M.Sc. Agric. Sci. (Poultry Breeding), Ain Shams Univ. (2008)

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ABSTRACT

Osama Kornah Abou-Emera Emara. Impact of Some Heat Resistance Genes on Quantitative Traits in Chicken Using Modern Genetics techniques. Unpublished Ph.D. Thesis, Department of Poultry Production, Faculty of Agriculture, Ain Shams University, 2017.

According to morphological appearance of feather coverage, a total number of 368 birds, representing three genotypes (heterozygous naked neck (Nanaff), heterozygous frizzle (nanaFf) and normally feathered (nanaff) genotypes) were classified. At sexual maturity, the chickens were individually housed in wire cages located in semi-closed house. Adult body weight, age at sexual maturity, egg number and egg weight were recorded for each genotype. At 30 weeks of age, egg quality characteristics were examined. Forty birds were randomly assigned (eight birds/genotype) to assess cell mediated immunity through PHA-P injection in wattles. Blood samples were collected from the wing vein. The DNA was purified by successive extraction with phenol:chloroform:isoamyl alcohol (25:24:1) and chloroform:isoamyl alcohol (24:1), respectively. A total of 20 microsatellite markers were selected based on the degree of polymorphism reported in the literature. The PCR amplification was carried out in 25 µL reaction volumes, gels were stained in ethidium bromide and DNA bands were visualized on UV-transilluminator. Data of SSR analyses were scored on the basis of the presence or absence of the amplified products for each primer. The similarity coefficients were then used to construct a dendrogram by Unweighted Pair-Group Method with Arithmetical Average (UPGMA).

The productive results revealed that the introducing Na and F genes in chicken breeds raised under hot weather significantly improved most of egg production and eggshell quality traits. Moreover, significantly higher cell mediated response was found in Na and F genotypes particularly, in homozygous manner compared to normally feathered genotype. A remarkable extensive genetic diversity was seen among the studied genotypes. Genetic distance as a pair-wise comparison of different genotype

ranged from 0.14 (NaNa-Nana) to 0.41 (Nana-FF). Both Na genotypes and F sibs located in a separate sub-cluster resulted in a clear distinction between the two major genes. The population structure of these genotype chickens could be explained by their morphological shape, feather distribution and structure, which suggested the presence of independent cluster join naked neck and normally feather birds, which differentiated from each other according to the distribution percentage of the plumage of the body, deviated with a wide range in a separate cluster from F individuals (FF and Ff) which differed in feather structure. Inferred information will provide valuable notion to the genetic intercourse of heat resistance genotypes. The high genetic diversity in heat resistance genotypes compared to normally feather ones is in agreement with great phenotypic variation of these birds. The evaluation of genetic diversity among chicken genotypes carrying Na and F genes based on the studied microsatellite markers was efficient and gained consistent results.

Key words: Microsatellites, genetic diversity, genetic markers, biodiversity, major genes, naked neck gene (Na), F gene (F), genetic cluster.

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