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Effects of age variance on repeatability estimates of egg dimensions of Bovan Nera Black laying chickens

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Abstract The present research was designed to examine the effects of age variance on repeatability estimates of egg length, egg breadth and egg shape index of Bovan Nera Black laying chickens at 25, 51, 72 weeks and combined ages of the bird. For this purpose thirty birds were selected from the flock of layers in the Babcock University Teaching and Research Farm. They were individually housed in labeled separate battery cage. A total of thirty (30) eggs were collected daily from the birds continuously for five (5) days of egg production, at each age of 25, 51 and 72 weeks. The total number of eggs collected at each age were 150 and 450 for the total of three age periods. Data were collected on egg production traits for egg length, egg breadth and egg shape index. These data were subjected to statistical analysis using Completely Randomized Design. General linear model procedure of statistical analytical system (SAS) was used to obtain the variance components for the estimation of repeatability. Moderate repeatability estimates were obtained when the age variance was included in the computation and low estimates were registered when the age variance was excluded from the computation. The repeatability estimates from different egg quality traits were low to high. Since most of the traits recorded low repeatability values, these traits can be improve by mass selection thereby culminating into egg production with optimal quality.

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1. Introduction

Poultry in one form or the other is kept in most areas of the world. There are fewer religious or social taboos associated with them than there are with livestock, thus products produced from poultry provide an acceptable form of animal protein to most people throughout the world except strict vegetarians and vegans. The contribution that poultry makes to the supply of animal protein varies from area to area and the consumption per head of population is greater in developed countries than in developing countries. Poultry production has the greatest potentials of bridging the protein deficiency gap existing in developing countries particularly Nigeria. The population of Nigeria is over 140 million people and with an estimated growth rate of 3.2% per annum NPC [1], the population is projected to reach about 184.8 million people in year 2016.

Improvement in body size and overall growth of exotic chicken is important from economic considerations bothering on the need to increase egg size and to improve the post-lay value of the chickens, since spent layers are generally in high demand. This can be achieved through estimation of genetic parameters [2–4].

The characters of economic importance in animals which are of concern to a breeder normally show continuous variation. Such characters are controlled by a large number of genes, each having a small, similar and supplementary effect on the character. The cumulative effects of such genes, coupled with environmental effects produce continuous variation in the phenotypic values of individuals.

If all the variation is attributable to environment, selection of phenotypically superior individuals does not result in any alteration in the next generation [5–7]. In making breeding plans, it is, therefore, necessary to know the relative importance of the heritable and environmental variation of the characters. Only the phenotypic values of individuals can be directly measured, but it is, the breeding value that determines their influence on the next generation. Therefore, if the breeder or experimenter chooses individuals to be parents according to their phenotypic values, his success in changing the characteristics of the population can be predicted only from knowledge of the degree of correspondence between phenotypic values and breeding values. This degree of correspondence is measured by one of the very important genetic parameters, heritability Falconer [6].

Also, sometimes basic information needed is that when selection is made for one particular character, how much genetic improvement is expected in the other character not selected for. This depends upon the degree of association between the two characters due to the pleiotropic effects of genes governing them, a measure of which is provided by the second parameter genetic correlation. Also, when the character under improvement is repeatable over time such as egg weight, egg length, egg breadth, egg shape index, egg yolk weight, egg albumen weight and albumen height to mention but a few in livestock, yet another basic information one must have is how much reliance can be placed on an individual's early record as an indication of its later performance, because in the event of high reliability, inferior individuals can be disposed of on the basis of their early performance [4,8–10]. The existence of reliability obviously depends upon the degree of association among the repeated records of the character on the same individual – a measure of which is provided by the third genetic parameter-the repeatability co-efficient.

The repeatability is thus the correlation between the repeated measurements of the same individual and represents the proportion of the variance of single measurement which is due to permanent or non-localized differences between individuals, both genetic as well as environmental Jain [5].

Repeatability estimates for the number of eggs laid in Bovan Nera, Harco black and Brown Lohman layers ranged from moderate to high which suggests great reliability on selection or culling of monogastric animal.

Toye et al. [9] reported repeatability estimates of egg number 0.22 for black harco layer, 0.20 for brown Lohman layer, and 0.21 for black harco and brown Lohman Layer. The estimates of egg weight was 0.41 for black harco layer 0.47 for brown Lohman layer and 0.43 for black harco and brown Lohman layers. Estimates of egg length was 0.26 for black harco layer, 0.31 for brown Lohman, black harco and brown