HETEROSIS AND COMBINING ABILITY FOR BODY WEIGHT IN A DIALLEL CROSS OF THREE CHICKEN GENOTYPES

A MINI-DISSERTATIONSUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURE (ANIMAL PRODUCTION)

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DECLARATION

I declare that the dissertation hereby submitted to the University of Limpopo for the degree of Master of Science in Agriculture (Animal Production) has not previously been submitted by me for a degree at this or any other university, that it is my own work in design and execution, and that all material contained therein has been duly acknowledged.

Signature……. Date……..

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Abstract

Crossbreeding is one of the tools for exploiting genetic variation. The main purpose of crossing chickens is to produce superior crosses (i.e. make use of hybrid vigor), improve fitness and fertility traits.This study was carried out at the University of Limpopo Experimental Farm located in Limpopo, South Africa. The objective of the study was to evaluate the growth performance of differentpurebred and crossbred chicken genotypes. A 3 x 3 complete diallel mating system involving two indigenous breeds namely Venda (V) and Naked Neck (N) and one commercial broiler breed, Ross 308 (R), were used to produce three purebred (V x V, N x N, R x R), three crossbreds (R x V, R x N, V x N) and three reciprocals (V x R, N x R, N x V).The nine genetic groups were rearedfrom hatch to 13 weeks of age in a deep litter open house. Body weights of 180 chicks (20 chicks per genetic group), recorded at 0, 3, 5, 7, 9, 11, and 13 weeks of age, were used to estimate heterosis, general (GCA) and specific (SCA) combining abilities, maternal ability and reciprocal or sex-linked effects on body weights. Results showed that the Ross 308 had the heaviest body weight at all weeks of measurement except for hatch. With respect to crosses, the reciprocal V x R and the cross R x V had the heaviest body weights at 13 weeks (2448.40 and 2131.50 grams, respectively), although N x R had heavier body weight than R x V at all weeks of measurement except for hatch and 13th week. Results of heterosis estimates indicated that crossing between Venda male and Ross 308 female as well as between the Venda male and Naked Neck femalegave the highest heterotic effects for body weight(11.01% and 10.33%, respectively).General Combining Ability was significant (P≤0.01) for body weight from hatch to 13 weeks of age while SCA and Reciprocal effects (RE) were both significant (P≤0.05) for body weight at all ages of measurement except for hatch weight. The Ross 308 chicken gave the highest positive effect of GCA for body weight except for hatch weight. Venda sire crossed with Naked Neck dams gave the highest and positive effects of SCA for body weight. Naked Neck sire crossed with Venda dams had the highest positive estimate of RE for body weight except for the 13th week. Results show that using Venda chickens as a paternal breed in crossing with Naked Neck and Ross 308 females may improve growth performance of indigenous chickens.

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I can do all things through Christ who strengthens me (Philippians 4:13).

DEDICATION

This dissertation is dedicated to my parents, Mr. L. J. Siwendu and Mrs. C. K. Siwendu, for their support in educating me and for never giving up on me. Jwarha noDlomo ndiyabulela. To my son, Thumtha, I love u too much.

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