

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

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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 different purebred 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 reared from 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 female gave the highest heterotic effects for body weight (11.01% and 10.33%, respectively). General Combining Ability was significant ($P \leq 0.01$) for body weight from hatch to 13 weeks of age while SCA and Reciprocal effects (RE) were both significant ($P \leq 0.05$) 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.

TABLE OF CONTENTS

Contents	Page
Declaration	ii
Abstract	iii
Acknowledgement	v
Dedication	iv
Table of contents	vii
List of Tables	viii
List of Figures	ix
CHAPTER 1: INTRODUCTION	1
1.1 Background	2
1.2 Problem statement	3
1.3 Motivation of the study	3
1.4 Objective of the study	4
CHAPTER 2: LITERATURE REVIEW	5
2.1 Crossbreeding	7
2.1.1 Breed Complementarity	7
2.1.2 Heterosis	7
2.2 General and specific combining abilities	10
2.2 Poultry Breeds	11
2.2.1 Venda breed	11
2.2.2 Naked Neck breed	11
2.2.3 Ross 308 breed	13
CHAPTER 3: MATERIALS AND METHODS	14
3.1 Study site	15
3.2 Preparation of the houses	15
3.3 Acquisition of materials and birds	15
3.4 Experimental design, treatments and procedures	15
3.5 Data collection	16
3.6 Data analysis	17
CHAPTER 4: RESULTS	19
CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS	25
CHAPTER 6: REFERENCES	31

Table	List of Tables Title of the Table	Page
1	3x3 Diallel Mating System.	16
2	Least square means for body weight (g) at different growing periods.	21
3	Direct additive effects for body weight of chickens at different ages.	22
4	Maternal effects for body weight of chickens at different ages.	22
5	Mean squares at different ages of measurements.	23
6	Crossbreeding genetic parameters for body weight at different ages.	24

Figure	List of Figures Title of the figure	Page
1	Heterosis (%) of body weight for crosses and reciprocal crosses.	23