

## DECLARATION

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

Thamaga Marupine Windy

Date.....



## ACKNOWLEDGEMENT

First and foremost, I would like to express my heartfelt thanks to my supervisor, Professor J W Ng'ambi. I greatly appreciate his meticulous guidance, patience, encouragement, leadership and the conducive environment that he created for me to complete my study smoothly and on time. I am extremely thankful to my co-supervisor, Professor D Norris, for his valuable support, encouragement and technical guidance during the course of the study.

I wish to convey my sincere thanks and acknowledgements to the Department of Agriculture, Forestry and Fisheries for the financial support without which this study would not have been possible. I would like to express my thanks to the National Research Foundation (NRF) for covering the research budget.

I would like to express my thanks to all the farm workers at the University of Limpopo Experimental Farm who participated in this study, for their patience, time and willingness to share their experiences.

I wish to extend the gratitude to members of my family, mother, husband, sister, two brothers, cousins and my beloved children for their moral support, prayers and encouragement.

## DEDICATION

I dedicate this work to my lovely husband, Thamaga Rapula Richard, my mother Lepulana Kgaudi Linah, my brother Lepulana Mosoro Michael and Lastly my lovely two children, Thamaga Ofentse Ducius and Thamaga Tebogo Cadius, who were always at my side to motivate me.

## ABSTRACT

An experiment was conducted to determine the effect of egg weight on hatchability, hatch-weight and subsequent productivity of Venda chickens. A total of 360 Venda chicken eggs based on their weights were collected within one week and assigned to four treatments with five replicates of 18 eggs per replicate. A randomized design was used. The four treatment weights were below 49 g, between 50 and 59 g, between 60 and 69 g and above 70 g. the eggs were incubated for 21 days. The chicks were raised up to 13 weeks based on their treatments but fed a similar diet. Egg weight was positively and strongly correlated ( $r^2 = 0.727$ ) with hatchability. Similarly, egg weight was positively and strongly correlated ( $r^2 = 0.953$ ) with chick hatch-weight.

Between one and seven weeks old, Venda chicks hatched from heavier eggs ate less ( $P < 0.05$ ) than those hatched from lighter eggs. Heavier eggs hatched chicks with better ( $P < 0.05$ ) feed conversion ratio. However, chicks hatched from heavier eggs tended to have higher ( $P < 0.05$ ) live weight at seven weeks old than those hatched from lighter eggs. Heavier eggs tended to hatch chicks that had higher ( $P < 0.05$ ) mortality rates. However, metabolisable energy and nitrogen retention of the chicks aged seven weeks was not ( $P > 0.05$ ) affected by egg weight. Growth rate and live weight of the chicks aged between one and seven weeks were optimized at different Venda chicken egg weights of 56 ( $r^2 = 0.514$ ) and 60 ( $r^2 = 0.870$ ) g, respectively. Egg weight had no ( $P > 0.05$ ) effect on metabolisable energy, feed conversion ratio, growth rate, live weight, carcass weight and carcass parts of Venda chickens aged between eight and 13 weeks except fat pad weight. Venda chickens hatched from lighter eggs had lower ( $P < 0.05$ ) fat pad weights than those hatched from heavier eggs. Meat samples of chickens hatched from lighter eggs had higher ( $P < 0.05$ ) nitrogen contents.

It is concluded that Venda chicken egg weight affects ( $P < 0.05$ ) egg hatchability, chick hatch-weight, growth rate, live weight and carcass characteristics of the chicken.

However, these variables are optimized at different egg weights. This has implications on selecting eggs for incubation.

## Table of contents

<b>Contents</b>	<b>Page</b>
Declaration	i
Acknowledgement	ii
Dedication	iii
Abstract	iv
Table of contents	v
List of tables	ix
List of figures	x
<b>CHAPTER ONE</b>	<b>1</b>
1.0 INTRODUCTION	1
1.1 Background	2
1.2 Problem statement	2
1.3 Motivation	2
1.4 Objectives	2
<b>CHAPTER TWO</b>	<b>3</b>
2.0 LITERATURE REVIEW	3
2.1 Introduction	4
2.2 Effect of egg weight on hatchability and chick hatch-weight	4

performance	
2.3 Effect of egg weight on growth of the chickens	7
2.4 Nutrient availability at hatching	7
2.5 Post- hatch nutrition and muscle growth	8
2.6 Conclusions	9
<b>CHAPTER THREE</b>	<b>10</b>
3.0 MATERIALS AND METHODS	10
3.1 Study site	11
3.2 Preparation of the house	11
3.3 Acquisition of material	11
3.4 Experimental design, treatment and procedures	11
3.5 Data collection	13
3.6 Chemical analysis	14
3.7 Statistical analysis	14
<b>CHAPTER FOUR</b>	<b>16</b>
4.0 Results	16
<b>CHAPTER FIVE</b>	<b>38</b>
5.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS	38
5.1 Discussion	39

5.2 Conclusions	42
5.3 Recommendations	42
<b>CHAPTER SIX</b>	<b>43</b>
6.0 References	43

## LIST OF TABLES

<b>Table</b>	<b>Title</b>	<b>Page</b>
4.01	Effect of egg weight (g/egg) on egg hatchability (%) and chick hatch-weight (g/chick) of indigenous Venda chickens	17
4.02	Relationships between Venda chicken egg weight (g/egg) and egg hatchability (%) and chick hatch-weight (g/chick)	20
4.03	Effect of Venda chicken egg weight on dry matter intake (g/bird/day), growth rate (g/bird/day), feed conversion ratio (FCR) (g DM feed/g weight gain), live weight (g/bird at 49 days old) and mortality of chicks from a day old up to 49 days of age	22
4.04	Relationships between Venda chicken egg weight (g/egg) and subsequent Feed intake (g/kg), feed conversion ratio (FCR) (g DM feed/g weight gain) and mortality of the chicks between one and seven weeks of age	26
4.05	Venda chicken egg weight (g/egg) for subsequent optimal growth rate(g/bird/day) and live weight (g/bird) of the chicks between one and seven weeks old	29
4.06	Effect of Venda chicken egg weight on subsequent intake (g/bird/day),growth rate (g/bird/day), feed conversion ratio (g DM feed g/weight gain), fat pad (g) weight, live weight (g/bird) and nitrogen retention (g/bird/day), apparent metabolisable energy (AME) (MJ/kg/DM) and live weight (g/bird/day) in of female chicks from eight weeks old up to 13 weeks of age female Venda chickens at 13 weeks of age	30
4.07	Effects of Venda chicken egg weight (g/egg) on subsequent optimal feed intake (g/bird/day), growth (g/bird/day) and feed conversion ratio (g	36

DM feed/g weight gain), live weight (g/bird) and fat pad weight (g) of female chicks between eight and 13 weeks of age

4.08 Effect of Venda chicken egg weight on subsequent live weight 37 (g/bird/day), carcass weight (g/bird), carcass parts (g) and nitrogen content of the breast meat samples of the female chickens at 13 weeks of age

## LIST OF FIGURES

<b>Figures</b>	<b>Title</b>	<b>Page</b>
<b>4.01</b>	Relationship between Venda chicken egg weight and egg hatchability	18
<b>4.02</b>	Relationship between Venda chicken egg weight and chick hatch weight	19
<b>4.03</b>	Relationship between Venda chicken egg weight and subsequent mortality of the chicks from a day old up to 49 days of age	23
<b>4.04</b>	Relationship between Venda chicken egg weight and subsequent feed conversion ratio of the chicks from a day old up to 49 days of age	24
<b>4.05</b>	Relationship between Venda chicken egg weight and subsequent feed intake of the chicks from a day old up to 49 days of age	25
<b>4.06</b>	Effect of Venda chicken egg weight on subsequent growth of the chicks from a day old up to 49 days of age	27
<b>4.07</b>	Effect of Venda chicken egg weight on subsequent live weight of the chicks at 49 days of age	28
<b>4.08</b>	Effect of Venda chicken egg weight on subsequent feed intake of female chicks from eight up to 13 weeks of age	31
<b>4.09</b>	Effect of Venda chicken egg weight on subsequent growth rate of female chicks from eight up to 13 weeks of age	32
<b>4.10</b>	Effect of Venda chicken egg weight on feed conversion ratio of female chicks from eight up to 13 weeks of age	33
<b>4.11</b>	Effect of Venda chicken egg weight on subsequent live weight of	34

female chicks at 91 days of age

- 4.12** Effect of Venda chicken egg weight on subsequent fat pad weight of 35 female chicks at 13 weeks of age