

# **Body Weight, Flock Uniformity, Production Performance and Egg Quality over the Laying Period of Brown Egg- Laying Hens**

**By**

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**A thesis submitted for the degree of  
Doctor of Philosophy of the University of New England**



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# DECLARATION

I certify that the substance of this dissertation has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this dissertation and all sources used, have been acknowledged in this dissertation

Signature

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September 2015

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# TABLE OF CONTENTS

<b>DECLARATION .....</b>	<b>i</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>ii</b>
<b>TABLE OF CONTENTS .....</b>	<b>iii</b>
<b>LIST OF TABLES .....</b>	<b>viii</b>
<b>LIST OF FIGURES .....</b>	<b>x</b>
<b>LIST OF APPENDICES.....</b>	<b>xiii</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>xiv</b>
<b>LIST OF PUBLICATIONS .....</b>	<b>xv</b>
<b>Abstract .....</b>	<b>xvi</b>
<b>Chapter 1.....</b>	<b>1</b>
<b>LITERATURE REVIEW .....</b>	<b>1</b>
1.1 General Introduction.....	1
1.2 Body weight and laying performance.....	2
1.3 Flock uniformity.....	3
1.4 Factors affecting uniformity.....	4
1.5 Measurement of body conformation of laying hens.....	5
1.6 Application of computed tomography.....	5
1.7 Bone types.....	7
1.8 Calcium metabolism.....	8
1.9 Structure of the ovary and oviduct .....	9
1.10 Egg defence.....	11
1.11 Egg structure .....	11
1.11.1 The yolk.....	11
1.11.2 The albumen .....	12
1.11.3 Shell membrane .....	13
1.11.4 The shell .....	13
1.12 Amorphous calcium carbonate.....	18
1.13 Ultrastructural characteristics in the mammary layer.....	19

1.13.1	Mamillary caps .....	20
1.13.2	Confluence.....	20
1.13.3	Early and late fusion .....	20
1.13.4	Alignment of the mamillae .....	20
1.13.5	Type-A body.....	20
1.13.6	Type-B body.....	20
1.13.7	Aragonite .....	21
1.13.8	Cubics.....	21
1.13.9	Cubic cone formation.....	21
1.13.10	Cuffing .....	21
1.13.11	Changed membrane .....	21
1.13.12	Pitting .....	21
1.14	Factors affecting egg quality .....	22
1.15	Housing system .....	23
1.15.1	Cage systems .....	25
1.15.2	Free range systems .....	26
1.16	Welfare issues of housing system .....	28
1.17	Egg quality and housing systems .....	29
1.18	Introduction to the current study .....	31
<b>Chapter 2.....</b>		<b>32</b>
<b>GENERAL MATERIALS AND METHODS .....</b>		<b>32</b>
2.1	Birds housing and general management .....	32
2.2	Body weight and flock uniformity .....	32
2.3	Egg production and quality .....	32
2.3.1	Traditional eggshell and egg internal quality measurements .....	33
2.3.2	Estimation of the amount of cuticle .....	34
2.4	Scanning electron microscopy .....	36
2.5	Ultrastructural scoring of the shell mamillary layer .....	37
2.6	Bone breaking strength .....	37
2.7	Statistical analysis .....	37

**Chapter 3.....38**

**BODY WEIGHT UNIFORMITY OF HENS IN A COMMERCIAL CAGE**

**PRODUCTION SYSTEM AND THE EFFECTS ON EGG QUALITY .....38**

3.1	Introduction.....	38
3.2	Materials and methods.....	39
3.2.1	Birds management .....	39
3.2.2	Egg quality measurements.....	40
3.2.3	Bone breaking strength .....	40
3.2.4	Statistical analysis of data .....	40
3.3	Results.....	41
3.3.1	Body weight and flock uniformity .....	41
3.3.2	Egg production and quality .....	43
3.3.3	Estimation of the amount of cuticle .....	51
3.3.4	Eggshell ultrastructural variations of the mammillary layer .....	55
3.3.5	Bone size and strength .....	57
3.4	Discussion .....	59
3.4.1	Body weight and body weight uniformity.....	59
3.4.2	Eggshell and egg internal quality measurements.....	60
3.4.3	Estimation of the amount of cuticle .....	61
3.4.4	Shell ultrastructure .....	62
3.4.5	Bone size and strength .....	64
3.5	Conclusions .....	64

**Chapter 4.....65**

**EFFECT OF BODY WEIGHT UNIFORMITY ON EGGSHELL QUALITY OF HENS**

**IN A FREE-RANGE PRODUCTION SYSTEM OVER THE LAYING PERIOD.....65**

4.1	Introduction.....	65
4.2	Materials and methods.....	67
4.3	Statistical analysis of data.....	67
4.4	Results.....	68
4.4.1	Body weight and flock uniformity and egg production .....	68
4.4.2	Egg quality .....	71
4.4.3	Estimation of the amount of cuticle .....	79

4.4.4	Eggshell ultrastructural variations of the mammillary layer .....	83
4.5	Discussion .....	85
4.5.1	Body weight, body weight uniformity and egg production .....	85
4.5.2	Eggshell and egg internal quality measurements.....	86
4.5.3	Estimation of the amount of cuticle .....	89
4.5.4	Eggshell ultrastructural variations of the mammillary layer .....	89
4.6	Conclusions. ....	90
<b>Chapter 5.....</b>		<b>91</b>
<b>EFFECT OF BODY WEIGHTS AT POINT OF LAY ON EGG PRODUCTION</b>		
<b>PERFORMANCE AND EGG QUALITY OF HY-LINE BROWN HENS .....</b>		<b>91</b>
5.1	Introduction.....	91
5.2	Materials and methods.....	93
5.2.1	Body weight and flock uniformity.....	93
5.2.2	Egg production and ultrastructures parameters .....	93
5.2.3	Bone breaking strength .....	93
5.3	Results.....	95
5.3.1	Body weight, body weight uniformity, feed intake and egg production.....	95
5.3.2	Egg production .....	100
5.3.3	Egg quality measurements.....	106
5.3.4	Estimation of the amount of cuticle .....	111
5.3.5	Ultrastructure variations of the eggshell .....	115
5.3.6	Bone strength.....	118
5.4	Discussion .....	119
5.4.1	Body weight and body weight uniformity.....	119
5.4.2	Eggshell and egg internal quality measurements.....	122
5.4.3	The amount of cuticle cover on eggshell .....	123
5.4.4	Scoring of ultrastructure variations of the shell.....	124
5.4.5	Bone strength.....	124
5.5	Conclusion .....	125

<b>Chapter 6.....</b>	<b>126</b>
<b>APPLICATION OF COMPUTERIZED TOMOGRAPHY SCANNING FOR ASSESSING BODY CONFORMATION OF HENS AT THE END OF THE LAYING PERIOD .....</b>	<b>126</b>
6.1 Introduction .....	126
6.2 Material and Methods .....	127
6.3 Statistical analysis of data .....	128
6.4 Results.....	129
6.5 Discussion .....	137
6.6 Conclusion .....	138
<b>Chapter 7.....</b>	<b>139</b>
<b>GENERAL DISCUSSION .....</b>	<b>139</b>
<b>CONCLUSIONS .....</b>	<b>145</b>
<b>References .....</b>	<b>147</b>
<b>Appendices .....</b>	<b>168</b>



## LIST OF TABLES

Table 2.1.	Scoring sheet for cuticle quantification by SEM .....	36
Table 3.1.	Body weight (BW) of hens in a cage production system .....	41
Table 3.2.	Main effect of flock age on egg quality measurements.....	45
Table 3.3.	Interaction of flock age and sheds on the eggshell quality measurements at 19, 26, 37, 50 and 60 weeks of age .....	46
Table 3.4.	Main effect of sheds on egg quality measurements .....	47
Table 3.5.	Main effect of flock age on shell reflectivity before staining and spectrophotometric measurements ( $L^*a^*b^*$ ) of stained cuticle .....	52
Table 3.6.	Cuticle cover scores under scanning electron microscopy (SEM) .....	54
Table 3.7.	The main effect of flock age on the mammillary ultrastructure scores of the eggshell.....	55
Table 3.8.	The length, width and breaking strength of humerus and femur bones for different rearing sheds .....	57
Table 4.1.	Flock body weight in free-range systems from age 19 to 60 weeks .....	69
Table 4.2.	Flock uniformity in seven free range flocks at different ages .....	70
Table 4.3.	Hen-housed egg production (%) of the seven free range flocks .....	73
Table 4.4.	Effects of hen age on the traditional measures of eggshell quality corrected .....	74
Table 4.5.	Traditional measures of eggshell quality among the flocks .....	77
Table 4.6.	Spectrophotometric measurements .....	79
Table 4.7.	Spectrophotometric measurements of stained cuticle among the flocks.....	82
Table 4.8.	The main effect of flock age on the mammillary ultrastructure scores of the eggshell in a free range system .....	83
Table 4.9.	Effect of flock on the mammillary ultrastructure scores of the eggshell .....	84
Table 5.1.	Feed composition and formulation of the experimental diets .....	94
Table 5.2.	Body weight uniformity of body weight groups from age 16 weeks to 80 weeks in percentages .....	97
Table 5.3.	Average Hen-day egg production from 20 weeks to 80 weeks of age.....	101
Table 5.4.	Main effect of flock age on egg quality measurements.....	107
Table 5.5.	Main effect of BW groups on egg quality parameters .....	108
Table 5.6.	Interaction between body weight group and flock age for egg quality measurements.....	109

Table 5.7.	Main effect of flock age on shell reflectivity and spectrophotometric measurements ( $L^*a^*b^*$ ) before and after staining .....	112
Table 5.8.	Main effect of body weight groups on shell reflectivity and spectrophotometric $L^*$ , $a^*$ , $b^*$ before and after staining and the single score.....	113
Table 5.9.	The differences between shell reflectivity, $L^*$ , $a^*$ , $b^*$ value before and after staining and the single score .....	113
Table 5.10.	The main effects of BW group on the ultrastructural properties .....	116
Table 5.11.	The main effect of flock age on the mammillary ultrastructure scores of the eggshell.....	117
Table 5.12.	The length, width and breaking strength of humerus and femur bones for different BW groups.....	118
Table 6.1.	Body weight, abdominal fat and the variables predicted from CT .....	129
Table 6.2.	Body weight, abdominal fat and variables predicted from CT .....	132
Table 6.3.	The comparison of correlations between body weight and fat pad with the variables predicted by CT .....	136

# LIST OF FIGURES

Figure 1.1.	Structure of the oviduct .....	9
Figure 1.2.	Schematic diagram of egg structure .....	12
Figure 1. 3.	Eggshell ultrastructure in transverse section .....	14
Figure 3.1.	Body weight of flocks with the lowest and highest BW weight compared to breed standards.....	42
Figure 3.2.	Flock uniformity between two sheds .....	43
Figure 3.3.	Hen-day egg production (%).....	44
Figure 3.4.	Shell reflectivity between the two sheds .....	48
Figure 3.5.	Egg weight comparison between the two rearing sheds.....	48
Figure 3.6.	Egg weights and body weight between the rearing sheds, measured against the breed standard .....	49
Figure 3.7.	Shell weights between the rearing sheds .....	50
Figure 3.8.	Shell thickness between the rearing sheds.....	50
Figure 3.9.	The correlation between shell reflectivity and L value before staining .....	52
Figure 3.10.	The correlation between a* value after staining and the single score.....	53
Figure 3.11.	The different L and single score value between rearing sheds .....	54
Figure 3.12.	Changed membrane score between the rearing sheds.....	56
Figure 3.13.	The SEM appearance of the new features in rearing Shed A at 26 weeks of age low (left) and high (right) magnification .....	56
Figure 3.14.	The SEM appearance of the new features in rearing Shed B at 26 weeks of age low (left) and high magnification (right) .....	57
Figure 3.15.	The correlation between body weight, bone strength, length and width in Sheds A and B.....	58
Figure 4.1.	Body weights at 6 weeks of age in free range systems, compared to the breed standard.....	68
Figure 4.2.	Body weights at 16 weeks of age in free range systems, compared to the breed standard .....	69
Figure 4. 3.	Flock uniformity of seven flocks from age 6 to 60 weeks .....	71
Figure 4.4.	Hen-day egg production of the seven free range flocks, as compared to the breed standard .....	72

Figure 4.5.	The correlation between the average body weight and egg production from 26 to 60 week.....	73
Figure 4.6.	The correlation between flock uniformity from 26 to 50 weeks, and egg production 26-60 .....	74
Figure 4.7.	The correlation between shell thickness and shell breaking strength .....	75
Figure 4.8.	The correlation between egg weight and shell breaking strength.....	75
Figure 4.9.	The correlation between egg weight and shell thickness .....	78
Figure 4.10.	Correlation between shell reflectivity and L value before staining .....	80
Figure 4. 11.	The correlation between a* value after staining and the single score.....	81
Figure 5.1.	Average body weights of the birds from 16 weeks to 80 weeks of age .....	96
Figure 5.2.	The correlation between BW at 19 weeks and BW at 70 weeks .....	96
Figure 5.3.	The correlation between point of lay of Light BW and body weight at 50 weeks .....	98
Figure 5.4.	The correlation between point of lay of Medium BW and body weight at 50 weeks .....	98
Figure 5.5.	The correlation between point of lay of Heavy BW and body weight at 50 weeks .....	98
Figure 5.6.	The correlation between point of lay of Light BW and body weight at 70 weeks .....	99
Figure 5.7.	The correlation between point of lay of Medium BW and body weight at 70 weeks .....	99
Figure 5.8.	The correlation between point of lay of Heavy BW and body weight at 70 weeks .....	99
Figure 5.9.	Figure hen day production at different body weights from 20 to 80 weeks of age. ....	100
Figure 5.10.	Correlation between BW at 19 weeks and total egg produced to 43 weeks.....	102
Figure 5.11.	Correlation between body weight at 37 weeks and egg produced to 40 weeks...	102
Figure 5.12.	Correlation between BW @19 week and total eggs produced 19-72 weeks.....	103
Figure 5. 13.	Correlation between body weight and the egg mass .....	103
Figure 5.14.	Feed intake of flock on the different BW groups from 19 to 80 weeks of age ...	104
Figure 5.15.	Correlation between body weight and feed intake.....	105
Figure 5.16.	Correlation between body weight and FCR.....	105
Figure 5.17.	Shell thickness in different BW groups.....	111
Figure 5.18.	Correlation between shell reflectivity and L* value before staining .....	114

Figure 5.19.	Correlation between shell reflectivity and L value after staining .....	114
Figure 6.1.	The correlation between body weight and measured abdominal fat, CT predicted entire percentage fat and CT predicted carcass predicted fat .....	130
Figure 6.2.	The correlation between body weight and percentage lean predicted CT entire and percentage CT carcass.....	131
Figure 6.3.	The correlation between body weight and bone predicted by CT .....	131
Figure 6.4.	The correlation between abdomen fat measured and fat predicted by CT .....	132
Figure 6.5.	The correlation between body weight and abdominal fat measured in the laboratory setting experiment, and fat predicted by CT .....	133
Figure 6.6.	The correlation between body weight and lean percentage predicted by CT entire .....	134
Figure 6.7.	The correlation between body weight and bone percentage predicted by CT.....	134
Figure 6.8.	The correlation between abdominal fat and fat predicted by CT.....	135
Figure 6.9.	The correlation between fat pad weight and lean predicted by CT .....	135

## LIST OF APPENDICES

Appendix A. Main effect of sheds on shell reflectivity before staining and spectrophotometric measurements ( $L^*a^*b^*$ ) before and after staining .....	169
Appendix B. The main effect of flock age and rearing shed on the mammary ultrastructure scores of the eggshell .....	170
Appendix C. Interaction between free range flocks and flock age for egg quality measurements.....	171
Appendix D. Hen-day egg production (%) of hens at different body weights from 20 to 80 weeks of age (Chapter 5) .....	173
Appendix E. Season time of Free-range flocks when the first egg collected for analysis at the age of 26 weeks .....	174

## LIST OF ABBREVIATIONS

ACC	Amorphous calcium carbonate
AECL	Australian Egg Corporation Limited
BS	Breaking strength
BW	Body weight
Ca	Calcium
CT	Computed tomography
DXA	Dual Energy x-ray
FCR	Feed conversion ratio
FR	Free range
g/d	gram/day
p	Phosphorous
HDP	Hen day production
HH	Hen housed
HU	Haugh units
MRI	Magnetic resonance imaging
PTH	Parathyroid hormone
ROI	Region of interest
SEM	Scanning electron microscope
Wk	Week

# LIST OF PUBLICATIONS

## Conference proceedings

Suawa, E. K. and Roberts, J. R. (2013) *Effect of body weight uniformity on eggshell quality of free range laying hens*. Paper presented at XV European Symposium on the Quality of Eggs and Egg Products and XXI European Symposium on the Quality of Poultry Meat. Bergamo, Italy, September 15-19.

Suawa, E. K. and Roberts, J. R. (2014) *Body weight, flock uniformity and egg quality of flocks reared in two different rearing sheds*. Paper presented at the 25<sup>th</sup> Annual Australian Poultry Science Symposium (Proceedings Vol. 25, pp. 118-121), Sydney, New South Wales, Australia.

Suawa, E. K. and Roberts, J. R. (2015) *Body weight at point of lay and the ultrastructural properties of eggshells*. Paper presented at the Australian Poultry Science Symposium (Proceedings Vol. 26, pp. 26), Sydney, New South Wales Australia.

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Suawa, E. K., Roberts, J. R. and Parkinson, G. (2016) *Body weight uniformity and eggshell quality of hens in a free-range production system*. Paper presented at the Australian Poultry Science Symposium (Proceedings Vol. 27, pp. 137-140), Sydney, New South Wales Australia.

## Poster

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## **Abstract**

Genetic selection of laying hens has produced lighter body weight while maintaining maximum egg production. Heavy birds have problems during the laying period such as fatty liver and large size egg. The body weight at point of lay and flock uniformity can be used to predict the production performance during the laying period. However, there is evidence that hens which are overweight produce poor quality eggs during the laying period.

The first two studies were conducted to investigate the importance of body weight at point of lay and flock uniformity on eggshell quality and production performance on commercial farms, both cage and free-range production systems. A laboratory experiment was then set up using the information derived from the on-farm studies, and extended to analyse body conformation using computed tomographic scanning.

The body weight and flock uniformity in the on-farm studies varied from farm to farm. The poor performance of many of the flocks also illustrates the likely variation occurring at a commercial level; poor compliance with average growth rate patterns and low uniformity standards. Hen age had the greatest effect on most egg quality variables.

In the laboratory experiment, flock uniformity prior to point of lay was designed to be above the breeder standard. Body weight at point of lay significantly affected egg production and eggshell quality. However, there was no significant effect on bone breaking strength and bone dimensions. Body weight was significantly correlated with the composition of lean, fat and bone. Heavy hens deposited more fat than lean tissue.

Body weight should be maintained at the level of breeder standards. Correct body weight and high uniformity of the flock at point of lay will result in good performance over the laying period with high peak production and good persistency of production and the production of good quality eggs. Management is the key factor to regulation of body weight during rearing and at point of lay.