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THE ROLE OF DIETARY CALCIUM IN THE
CONTROL OF EGG PRODUCTION

A thesis presented in partial fulfilment
of the requirements for the degree of
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at Massey University

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MASSEY UNIVERSITY

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ABSTRACT

Dietary calcium restriction is studied as a method of controlling egg production. Attempts have been made to delay the onset of egg production in the fowl by feeding pre-laying diets deficient in calcium. Calcium restriction had no apparent effect on sexual development and did not delay the time of first oviposition.

Low calcium diets were used at a later date to halt egg production firstly just after peak production and secondly towards the end of the first laying year. Egg production was depressed markedly but never completely ceased, and remained at a low level until calcium restrictions were lifted whereupon a rapid rise returned egg production to levels comparable to egg production rates of non calcium restricted control hens.

Comparisons between egg production, egg weight, shell weight and a measure of shell quality (shell weight per unit surface area of egg) revealed trends towards improved shell production and shell quality following calcium restriction but little else. There was only a small number of significant differences. Egg production pauses induced by low dietary calcium were thought to be unsatisfactory as substitutes for force moulting.

Calcium restriction caused declines in food consumption and body weight. While food consumption returned to levels equivalent to food consumption of non calcium restricted hens after calcium restriction, body weight in general did not.

Calculations of the calcium loss from the body of calcium restricted hens via egg shell production show that extremely severe depletion occurs unless egg production is stopped or at least egg shell production is stopped. Such depletion of calcium has greatest effects on the skeleton and damage to the bones, particularly of the legs, may result. This is a condition which may predispose to a paralytic condition characteristic of extreme calcium deficiency.

INTRODUCTION TO THESIS

A considerable amount of calcium nutrition research involving egg production stock in the past has mainly focused upon the relationship between calcium and eggshell quality. In the early 1960's exploration of the effects of low calcium diets was made on the basis of claims that some antibiotics were more effective when administered during periods of calcium restriction.

The discovery that calcium may have a controlling influence on egg laying in the hen initiated considerable research into the use of low calcium diets to cause cessation of egg production. Since then a great deal of the experimentation on calcium restriction in laying hens has arisen from a search for a suitable alternative method of causing periods of reproductive inactivity which occur during moults. Withdrawal of calcium from the diet is known to cause severe egg production depression which continues as long as calcium restriction is enforced. Egg production returns to its normal level when adequate dietary calcium concentrations are reintroduced.

While the effect of calcium restriction on egg production is well known, there is little understanding of characteristics of hens or eggs during and after periods of calcium restriction. Effects of low calcium diets on parameters such as egg weight, shell weight, shell quality, body weight and food consumption must be thoroughly investigated as these are important practical measures of possible benefits of calcium restriction. The measurement of these physiological characters is the central theme to this thesis.

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